హార్షిత్ ఇనిస్టిట్యూట్

గవర్నమెంట్ జాబ్ మీ స్వప్నం అయితే అదే మార్గం

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NEW CLASS NOTES

English Medium (ఇంగ్లీష్ మీడియం)

ARITHMETIC

By
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SI, కానిస్టేబుల్స్, RRB, SSC, VRO,
BANK PO'S CLERK'S, DAO,
APPSC,TSPSC

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Index

Time & Work 24/6/18

→ A can complete a work in 'n' days, for 1 day $- \frac{1}{n}$.

→ A can complete a work, for 1 day $- \frac{1}{n}$, the total work will be n

1 man = 10 days.

1 man per 1 day = $\frac{1}{10}$

1 man per 3 days = $\frac{1}{10} \times 3$

2 men = 10 days.

2 men per 1 day = $\frac{1}{10} \times 2$ men.

1. 5 men completed a work in 10 days, for 1 day?.

$5m = \frac{1}{10}$

for 1 man = $\frac{1}{50}$.

2. A can complete a piece of work in 13 days, after 5 days, How much work is remaining?

Per 1 day = $\frac{1}{13}$.

Per 5 days = $\frac{1}{13} \times 5 = \frac{5}{13}$ > $\frac{8}{13}$ remaining

=

3. $\frac{3}{5}$ th of the work is completed in 12 days. In how many 2 days the total work will be completed?.

$3 \rightarrow 12$,

$5 \rightarrow ?$.

$$\frac{12 \times 5}{3} = 20 \text{ days}.$$

4. 4 men can complete 25% of work in 12 days, in how many days, total work will be completed?.

$$\frac{25}{100} = \frac{1}{4}.$$

$1 \rightarrow 12$.

$4 \rightarrow ?$.

$$\frac{12 \times 4}{1} = 48 \text{ days}$$

(or) $25 \rightarrow 12$.

$100 \rightarrow ?$.

$$\frac{100 \times 12}{25} = 48 \text{ days}.$$

5. A person completes $\frac{4}{7}$ th of the work in 6 days, In how many days, the remaining work will be completed?.

$4 \rightarrow 6$

$3 \rightarrow ?$.

$$\frac{3 \times 6}{4} = \frac{9}{2} = 4.5 \text{ days}.$$

6. $\frac{2}{3}$rd of the work is completed in 8 days, $\frac{3}{5}$th of the work will be completed in ?

2

$\frac{2}{3} \rightarrow 8$.

$\frac{3}{5} \rightarrow ?$.

$$\frac{\frac{3}{5} \times 8}{\frac{2}{3}} = \frac{3}{5} \times \overset{4}{\cancel{8}} \times \frac{3}{\cancel{2}} = \frac{36}{5} = 7.2 \text{ days}.$$

7. $\frac{4}{5}$th of the work is completed in 28 days. In 30 days, how much work will be completed?.

$\frac{4}{5} \rightarrow 28$.

$? \leftarrow 30$

$$\frac{\cancel{4}}{\cancel{5}} \times \overset{6}{\cancel{30}} \times \frac{1}{\cancel{28}_{7}} = \frac{6}{7} \text{th work}$$

8. A does a work in 10 days, B in 15 days. find in how many days, they complete the work together?

I method $A = 10 = \frac{1}{10}$; $B = 15 = \frac{1}{15}$.

$5 \overline{)10, 15}$
$2, 3.$

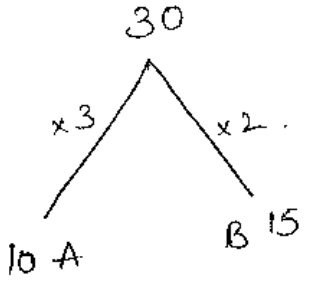
$$\frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{5}{30} = \frac{1}{6} = 6 \text{ days}$$

II method

$$\frac{AB}{A+B} = \frac{\overset{2}{10} \times \overset{3}{15}}{\cancel{25}\ \cancel{5}} = 6 \text{ days}$$

III method

$5\overline{)10, 15}$
$2, 3.$



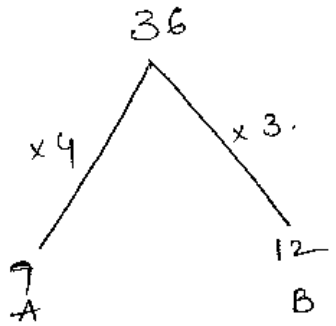
$$A+B = \frac{30}{3+2} = 6 \text{ days}$$

9. A can complete a work in 9 days, B in 12 days. In how many days they complete the work, together?

I method $\quad \frac{AB}{A+B} = \frac{9\times12}{9+12} = \frac{3\cancel{9}\times12}{\cancel{21}7} = \frac{36}{7} = 5\frac{1}{7}$ days.

II method

$3\overline{)9, 12}$
$3, 4$



$$\frac{36}{4+3} = \frac{\cancel{36}}{7} = 5\frac{1}{\cancel{7}}$$ days.

10. A completed $\frac{2}{3}$rd of the work in 6 days. B completed $\frac{3}{4}$ th of the work in 15 days. In how many days, they complete the work together?

$A \rightarrow \frac{2}{3}$

$2 \rightarrow 6$

$3 \rightarrow ?$

$\frac{3\times6^{3}}{\cancel{2}} = 9$ days.

$B = \frac{3}{4}$.

$3 \rightarrow 15$

$4 \rightarrow ?$

$\frac{4\times\cancel{15}^{5}}{\cancel{3}} = 20$ days.

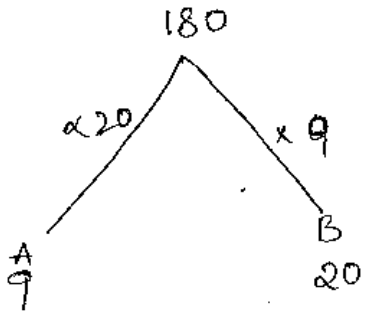
I method

$$\frac{AB}{A+B} = \frac{9 \times 20}{29} = \frac{180}{29} = 6\frac{6}{29} \text{ days.}$$

II method

9, 20

180



$$\frac{180}{20+9} = \frac{180}{29} = 6\frac{6}{29} \text{ days.}$$

11. A Completes $\frac{2}{5}$ th of the work in 3 days, & B completes $\frac{3}{4}$th of the work in 2 days. In how many days, they Complete $\frac{3}{5}$th of the work, if they work together & also the total work?.

Total work.

$2 - 3$

$5 \rightarrow ?$

$\frac{5 \times 3}{2} = \frac{15}{2}$.

$3 \rightarrow 2$.

$4 \rightarrow ?$.

$\frac{4 \times 2}{3} = \frac{8}{3}$.

I method

$$\frac{AB}{A+B} = \frac{\frac{15}{2} \times \frac{8}{3}}{\frac{15}{2} + \frac{8}{3}} = \frac{20}{\frac{45+16}{6}} = \frac{\frac{20}{61}}{6} = 20 \times \frac{6}{21}$$

$$= \frac{120}{21} = 1\frac{59}{61} \text{ days}$$

$\frac{3}{5}$th of the work:

$$\frac{120}{61} \times \frac{3}{5} = \frac{72}{61} = 1\frac{11}{61} \text{ days.}$$

12. A can complete a work by working 8 hrs a day in 5 days. B can complete the same work by working 6 hrs a day in 10 days. Then in how many days they complete the work together if they work for 4 hrs a day.

$$A \times 8 \times 5 = B \times 6 \times 10.$$

$$40A = 60B.$$

$$\frac{A}{B} = \frac{60}{40}.$$

I method

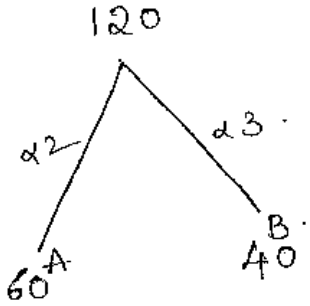
$$\frac{AB}{A+B} = \frac{60 \times 40}{60+40} = \frac{2400}{100} = \frac{24}{4} = 6 \text{ days}.$$

(4 hrs)

II method

$$20 \overline{)\, 60, 40}$$

$$3, 2.$$



$$\frac{120}{5} = \frac{24}{4} = 6 \text{ days}.$$

(4 hrs/day)

13. A works for 6 hrs a day in 5 days, B does the same work for 4 hrs a day in 3 days. Then if they work together for 2 hrs a day, in how many days, they complete the work ?.

A 6×5 = B 4×3.

30 12.

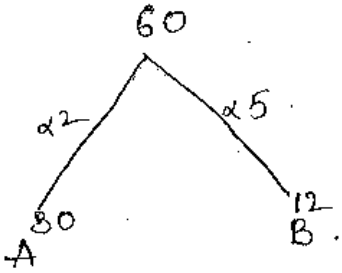
I method

$$\frac{30 \times 12}{30+12} = \frac{30 \times 12^{4}}{42_{14}} = \frac{120^{60}}{7} = 8\frac{4}{7} = \frac{60^{30}}{7} \times \frac{1}{2} =$$

$4\frac{2}{7}$ days

=

II method



$$\frac{60^{30}}{7} \propto \frac{1}{2} = 4\frac{2}{7} \text{ days}$$

=

3 | 30, 12
2 | 10, 4
5, 2

14. A & B can complete a work in 16 days. A done completes in 20 days. find, in how many days B done will complete the work ?.

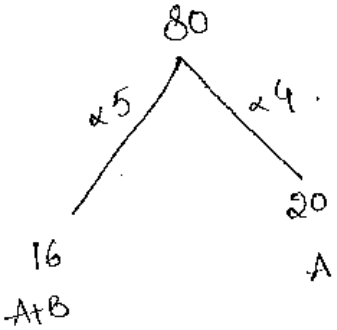
A+B = 16, A = 20.

I method

$$\left|\frac{AB}{A-B}\right| = \left|\frac{16 \times 20}{20-16}\right| = \left|\frac{16^{4} \times 20}{4}\right| = 80 \text{ days}.$$

4 | 16, 20
4, 5

II method



$$\frac{80}{1\,(5-4)} = 80 \text{ days}.$$

15. A father & Son Complete a work in 10 days by working togelther. father alone does in 12 days, then in how many days Son alone will Complete the work?.

I method

$$\left|\frac{AB}{A-B}\right|$$

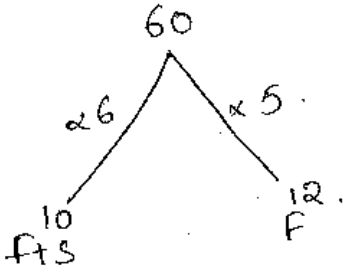
$f+S=10$.

$f=12$.

$$\left|\frac{10\times 12}{10-12}\right| = \left|\frac{10\times \overset{6}{\cancel{12}}}{\cancel{2}}\right| = 60 \text{ days}$$

II method

$$\begin{array}{r|l} 2 & 10, 12 \\ \hline & 5, 6. \end{array}$$



$$\frac{60}{1}(6-5) = 60 \text{ days}.$$

16. A & B Can Complete a work in 9 days. If they both, with the help of C, Can Complete the work in 6 days. Then C alone Can Complete the work in how many days?.

I method

$$\left|\frac{AB}{A-B}\right|$$

$A+B=9$

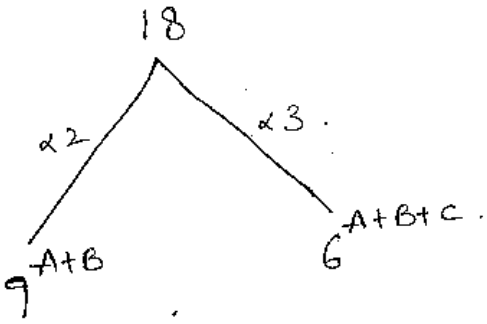
$A+B+C=6$

$$\frac{\cancel{3}\cancel{6}\times\cancel{9}}{\cancel{15}\ \cancel{5}} = \frac{\cancel{18}}{\cancel{3}}$$

$$\left|\frac{9\times 6}{9-6}\right| = \frac{54}{3} = 18 \text{ days}.$$

II method

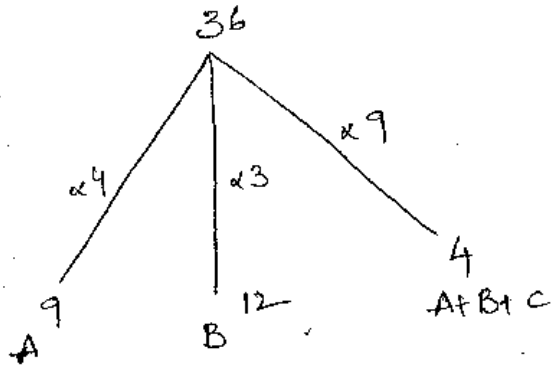
$3 \overline{)9, 6}$
$3, 2$.



$$\frac{18}{1}(3-2) = 18 \text{ days}.$$

17. A can complete a work in 9 days & B in 12 days. They both with the help of C completes the same work in 4 days. find, in how many days C alone will complete the work?.

A → 9
B → 12.
A+B+C → 4
C → ?.



$4 \overline{)9, 12, 4}$
$3 \overline{)9, 3, 1}$
$3, 1, 1$

A+B+C = 9
A+B = 7.
C = 9-7 = 2.

$$\frac{36}{2} = 18 \text{ days}.$$

II method

$A+B+C = \frac{1}{4}$ $\quad A = \frac{1}{9}$ $\quad B = \frac{1}{12}$.

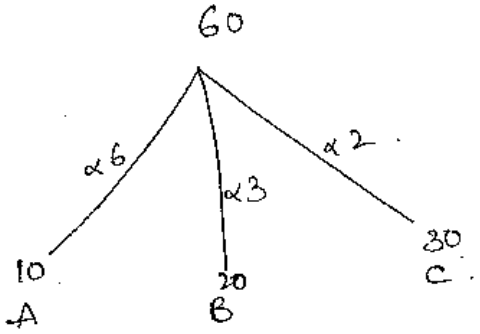
$(A+B+C) - A - B = \frac{1}{4} - \frac{1}{9} - \frac{1}{12}$

$= \frac{9-4-3}{36} = \frac{9-7}{36} = \frac{2}{36} = \frac{1}{18} = 18$ days.

18. A Completes a work in 10 days, B in 20 days & C in 30 days. In How many days they Complete by working together.

I method $\frac{ABC}{AB+BC+CA} = \frac{10\times20\times30}{200+600+300} = \frac{6000}{1100} = 5\frac{5}{11}$ days.

II method

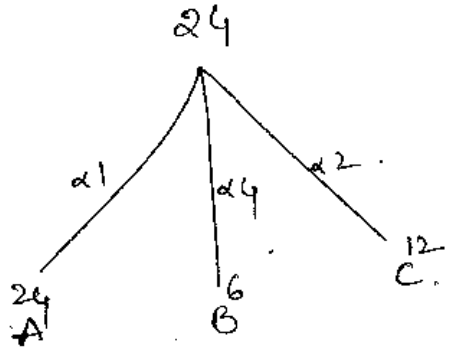


10 | 10, 20, 30
1, 2, 3.

$\Rightarrow \frac{60}{11} = 5\frac{5}{11}$ days.

19. A Completes a work in 24 days, B in 6 days & C in 12 days. A+B+C in How many days?

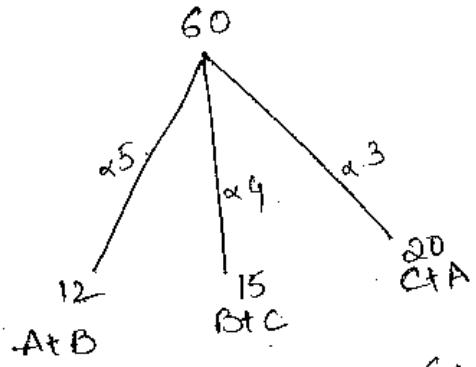
$$\begin{array}{r|l} 6 & 24, 6, 12 \\ 2 & 4, 1, 2. \\ & 2, 1, 1. \end{array}$$



$$\frac{24}{7} = 3\frac{3}{7} \text{ days.}$$

20. A & B Complete a work in 12 days, B & C in 15 days, C & A in 20 days. A+B+C in How many days.

$$\begin{array}{r|l} 3 & 12, 15, 20 \\ 5 & 4, 5, 20 \\ 4 & 4, 1, 4 \\ & 1, 1, 1 \end{array}$$



$$2(A+B+C) = 12.$$

$$A+B+C = 12/2 = 6.$$

$$6 \rightarrow 2+3+1$$

$$\Rightarrow \frac{60}{6} = 10 \text{ days.}$$

A alone $= \frac{60}{2} = 30$ days.

B alone $= \frac{60}{3} = 20$ days.

C alone $= \frac{60}{1} = 60$ days.

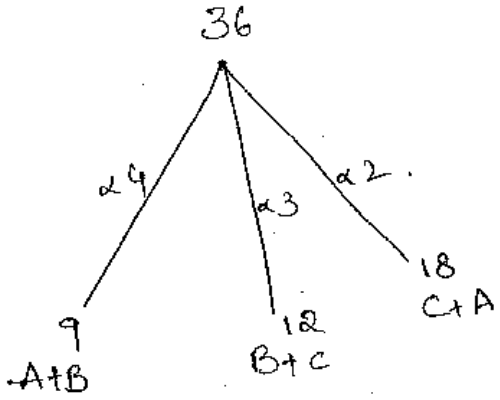
21. A & B Complete a work in 9 days, B & C in 12 days, C & A in 18 days. find i) A+B+C → ? days.

ii) A alone → ? days.

iii) B alone → ? days.

iv) C alone → ? days.

v) Who Completes in less no. of days?



3 | 9, 12, 18
2 | 3, 4, 6
3 | 3, 2, 3
1, 2, 1

$2(A+B+C) = 9$

$\therefore E \rightarrow A+B+C = \frac{9}{2} = 4.5 - E$

i) $A+B+C \rightarrow T \rightarrow 36^{4} \times \frac{2}{\cancel{9}} = 8$ days

Efficiency = A+B+C = 4.5

1.5+2.5+0.5.

1.5 → 3/2

2.5 → 5/2

0.5 → 1/2.

ii) $36^{12} \times \frac{2}{\cancel{3}} = 24$ days — A alone.

iii) $36 \times \frac{2}{5} = \frac{72}{5} = 14\frac{2}{5}$ days — B alone.

iv) $36 \times \frac{2}{1} = 72$ days — C alone.

v) A+B = 9

B+C = 12.

C+A = 18.

A+B = 9.

from this, B = 9

C = 12.

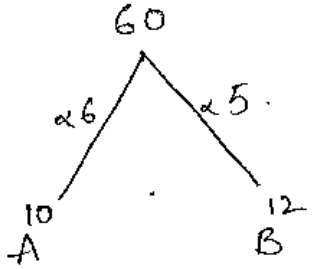
A = 18.

B Completes the work in less no. of days.

22. A & B can complete a work in 10 & 12 days. A & B started working together, after 3 days, A left the work, find in how many days, work will be completed?. (7)

13

$2 \mid 10, 12$
$5, 6.$



Efficiency = 6+5 = 11.

3×11 = 33.

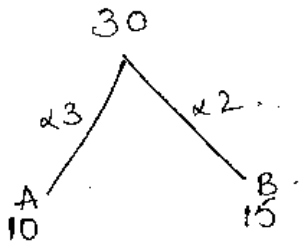
60 - 33 = 27.

$B \rightarrow \frac{27}{5} = 5\frac{2}{5}$

Total $\rightarrow 3 + 5\frac{2}{5} = 8\frac{2}{5}$ days.

23. A & B started working together, But after some days, A left the work & the whole work will be completed in 9 days, If A & B complete in 10 & 15 days, find after how many days A left the work?.

$5 \mid 10, 15$
$2, 3.$



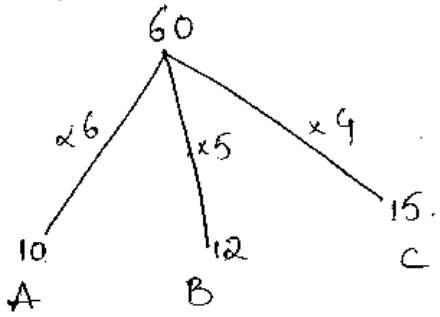
$B \rightarrow 2 \times 9 = 18.$

$A \rightarrow 30 - 18 = \frac{12}{3} = 4$ days.

24) A, B & C Complete in 10, 12 & 15 days.

i) If A, B & C start to work together, after 2 days A left the work & next after 2 days, C also left, then find in how many days the whole work will be completed?

$$\begin{array}{r|l} 3 & 10, 12, 15 \\ 5 & 10, 4, 5 \\ 2 & 2, 4, 1 \\ 2 & 1, 2, 1 \\ & 1, 1, 1 \end{array}$$



B.

$\underbrace{A+B+C}_{2}$ $\times 15$ $= 30$

$\underbrace{B+C}_{2}$ $\times 9$ $= 18$

$30 + 18 = 48$

$60 - 48 = \frac{12}{5} = 2\frac{2}{5}$

$\Rightarrow 2 + 2 + 2\frac{2}{5} = 6\frac{2}{5}$ days.

ii) A, B & C start working together, A & B left the work 2 days before the completion of the work. Then the whole work will be completed in how many days.

1 method

A+B+C.

C

$2 \times 4 = 8$.

$A+B+C = 60 - 8 = 52$.

$\frac{52}{15} = 3\frac{7}{15}$

$2 + 3\frac{7}{15} = 5\frac{7}{15}$.

2 method.

If A & B have worked for the rest of 2 days, also then,

$A+B = 11 \times 2 = 22 + 60$

$\Rightarrow \frac{82}{15} = 5\frac{7}{15}$.

iii) If A left the work 2 days before the completion of the work, & B left the work 3 days before the completion of the work. In how many days the total work will be completed? 8/15

[before +
after −]

$$\begin{array}{r} 60 \\ A_{2\times6}\ +12 \\ \hline B_{3\times5}\ +15 \\ \hline 87 \end{array}$$

$$A+B+C = \frac{87}{15} = \frac{29}{5} = 5\frac{4}{5} \text{ days.}$$

iv) A, B & C start to work together, But A left the work after 2 days, B left the work 1 day before the completion of the work. In how many days, the total will be completed?

$$\begin{array}{r} 60 \\ A_{2\times6}\ -12 \\ \hline 48 \\ B_{1\times5}\ \ +5 \\ \hline 53 \end{array}$$

$$B+C = \frac{53}{9} = 5\frac{8}{9} \text{ days.}$$

v) A, B & C start to work together, but after 3 days, A left the work & C left the work 4 days before the completion of the work. In how many days, the total work will be completed?

$$\begin{array}{r} 60 \\ A_{3\times6}\ -18 \\ \hline 42 \\ C_{4\times9}\ +16 \\ \hline 58 \end{array}$$

$$B+C \rightarrow \frac{58}{9} = 6\frac{4}{9} \text{ days.}$$

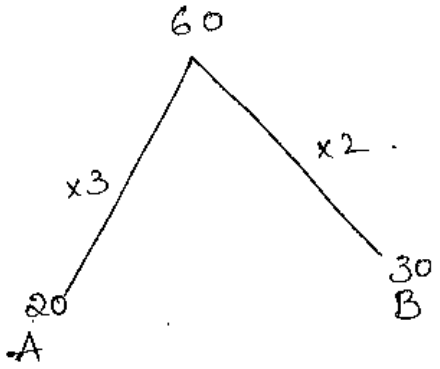
=

25. The ratio b/w the efficiency of A & B is 3:5. Then find the ratios of time.

$5:3 \quad (or) \quad \frac{1}{3} : \frac{1}{5} = 5:3.$

26. A can complete a work in 20 days, & B in 30 days, if they work together, they work for 700/-. Then find A's share.

$10 \overline{)20, 30}$
$2, 3.$



$5 \rightarrow 700$

$3 \rightarrow ?$

$\frac{3 \times 700}{5} = 420/-$

(or) A : B.

20 : 30.

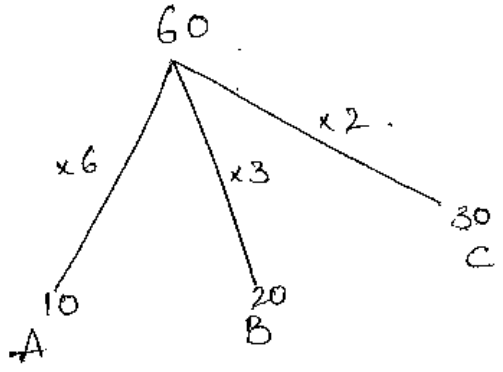
Time 2 : 3.

Efficiency 3 : 2.

$\frac{3}{5} \times 700 = 420/-$

27. A can complete a work in 10 days, B in 20 days, C in 30 days. If they work for 1320/-. find C's share.

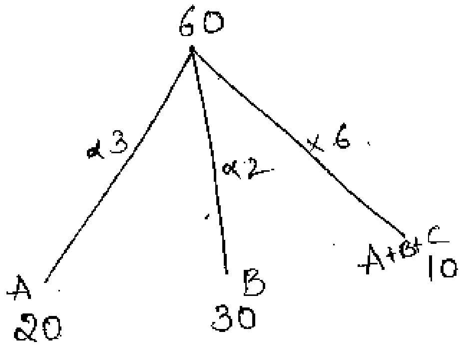
$10 \overline{)10, 20, 30}$
$1, 2, 3.$



$\frac{2}{11} \times 1320 = 240/-$

28. A can complete a work in 20 days, B in 30 days, with the help of C they complete the work in 10 days. They recieve 720/- for the work. find C's share.

10 | 20, 30, 10
2, 3, 1



A+B+C = 6.
3+2+1

$\frac{1}{6} \times 720 = 120/-$ (120)

29. The ratio's b/w the efficiencies of A & B is 3 : 4, A can complete in 12 days, in How many days B will complete the work.

A : B.
Efficiency 3 : 4.
Time 4 : 3.
↓×3 ↓×3
12 9 days

30. B's efficiency is 20% more than that of A. B completes a work in 30 days. In How many days A alone can complete & A+B in How many days?

A B.
100 120
E → 5 : 6.
T → 6 : 5
↓×6 ↓×6
A → 36 days 30 days.

ii) A+B =

$$\frac{AB}{A+B} = \frac{30 \times 36}{30+36} = \frac{180}{11} = 16\frac{4}{11} \text{ days.}$$

31 Efficiency of B is $2\frac{1}{2}$ times of the efficiency of A. B Completes the work before 6 days than A. A alone Completes the work in how many days?

A : B.

1 : $2\frac{1}{2}$.

E → 1 : $\frac{5}{2}$ → 2 : 5

T → $\frac{5}{2}$: 1 → 5 : 2

∨

3.

~~3~~ → ~~6~~ 2

5 → ?

= 10 days.

32 A & B's ratio of their efficiency is 3 : 4. A+B Complete the work in 9 days. A alone Complete the work in how many days

A : B.

Efficiency : 3 : 4

Time 4 : 3.

A+B = 9 days. (time)

Time is changed into efficiency = $\frac{1}{9}$.

7 → $\frac{1}{9}$

3 → ?

$\frac{1}{\cancel{9}_3} \times \cancel{3} \times \frac{1}{7} = \frac{1}{21} = 21$ days.

33. The ratio's b/w the efficiencies of A & B is 5:4. They both complete the work in 20 days. find in How many days A alone Completes the work? 19

A : B.

Efficiency → 5 : 4.

Time → 4 : 5.

A + B = 20 days, $E = \frac{1}{20}$.

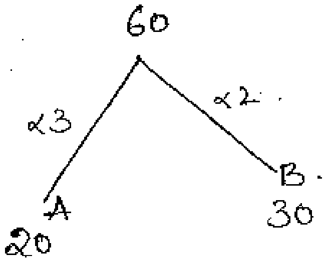
$9 \rightarrow \frac{1}{20}$.

$5 \rightarrow ?$.

$\frac{1}{20} \times 5 \times \frac{1}{9} = \frac{1}{36} = 36$ days.

34. A completes a work in 20 days, B completes in 30 days. first A started the work, & after 5 days B joined the work. In How many days the work will be completed if they work together.

$10\,\underline{|\,20, 30}$
$\quad 2, 3.$

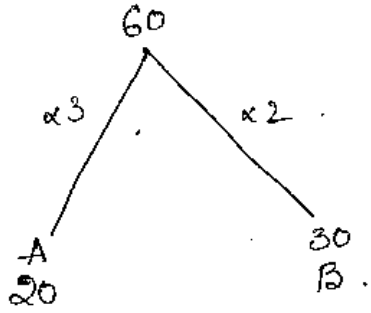


60.
$A_{3\times5}$ - 15
45.

A+B (3+2): $\frac{45}{5} = 9 + 5 = 14$ days.

35. A Completes a work in 20 days & B in 30 days. If they work together for 5 days, A left the work, remaining work is completed by B alone. find in how many days the total work is completed? 20

$10\overline{)20, 30}$
$2, 3.$



60

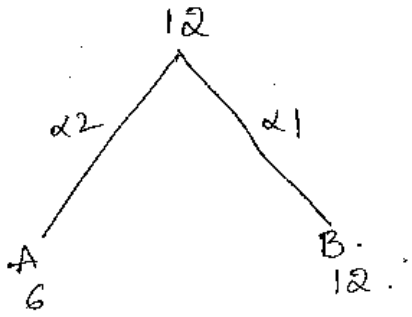
A+B $5 \times 5 - 25$

35

B → $\frac{}{2} = 17\frac{1}{2} + 5 = 22\frac{1}{2}$ days.

36. A completed above 6 days, B complete same work in 12 days, taken the due to work alternative work. A started the work first. In how many days the work will be completed?

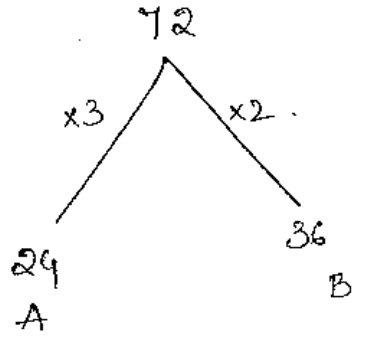
$6\overline{)6, 12}$
$1, 2.$

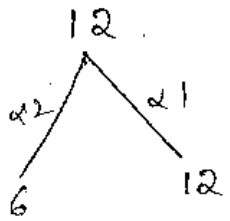


$\frac{12}{3} = 4 \times 2 = 8$ days.

37) A & B completed a work in 24 & 36 days. They work in alternative days. B started the work & A completed the work. In how many days the total work is completed? 21

$$\begin{array}{r|l} 6 & 24, 36 \\ \hline 2 & 4, 6 \\ \hline & 2, 3. \end{array}$$





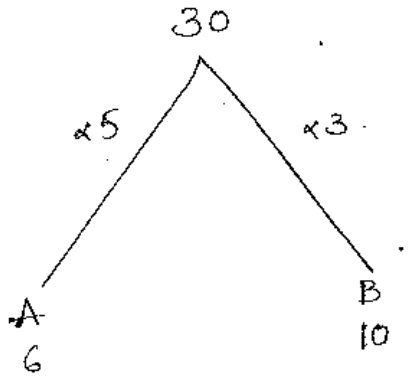
$\frac{2+1}{2}$ $\quad \frac{12}{3} = 4 \times 2$ days.

$\underbrace{2+3}_{2 \text{ days}}$ $\quad \frac{72}{5} = 14 \times 2 = 28$ days.

$(72 - 70) = \frac{2}{2} = 1$ day ; $28 + 1 = 29$ days.

38) A completes a work in 6 days, B in 10 days, if they complete the work in alternative days, if A started the work first, in how many days, the total work will be completed?

$$\begin{array}{r|l} 2 & 6, 10 \\ \hline & 3, 5 \end{array}$$



$\underbrace{A+B}_{5+3}$ $\quad \frac{30}{8} = 3 \times 2 = 6$ days

8 days units

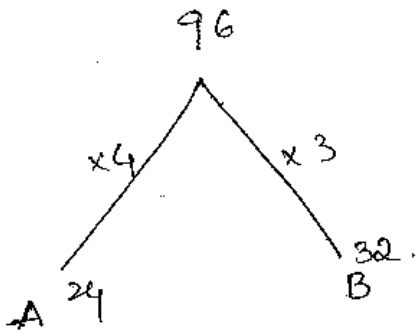
$30 - 24 = \frac{6 \text{ units}}{5\,(A)} = 1$

$\frac{1}{3}(B)$

$6 + 1 + \frac{1}{8} = 7\frac{1}{3}$ days.

39. A Completes a work in 24 days & B in 32 days, if both started the work, & A left after some days, remaining work is completed by B alone in 18 days. In How many days the total work is completed ?.

8 | 24, 32
3, 4



$18 \times 3 = 54 \rightarrow$ B alone.

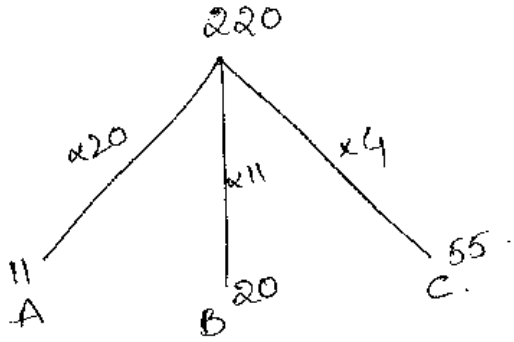
$96 - 54 = \frac{42}{7} = 6$ days (A+B)

After 6 days A left the work.

Total work is completed in $18 + 6 = 24$ days.

40. A Completes a work in 11 days, B in 20 days & C in 55 days. B & C helped A in alternative days. In How many days the total work is completed ?.

11 | 11, 20, 55
5 | 1, 20, 5
1, 4, 1



2 days A+B = 20+11 = 31

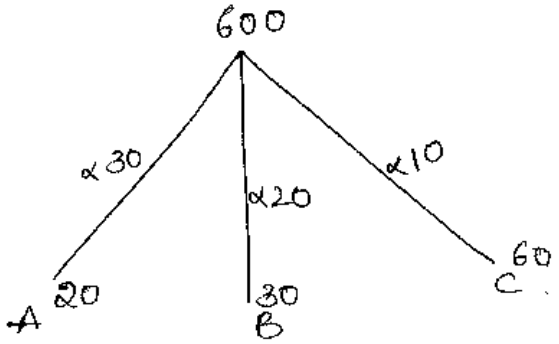
11 days A+C = 20+4 = 24

55

$\frac{\cancel{220}^{20}}{\cancel{55}\ \cancel{5}} = 4 \times 2 \text{ days} = 8 \text{ days}$

$\Rightarrow$

41. A, B & C Complete a work in 20, 30, 60 days. Every 3rd day B & C help A, & in How many days they Complete the work?



20	20, 30, 60
3	1, 30, 3
10	1, 10, 1
600	1, 1, 1

23

1 day A → 30

II day A → 30.

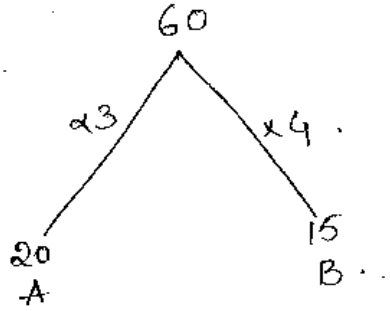
III day A+B+C → 30+20+10 = 60

120

$\frac{600}{120} = 5 \times 3 = 15$ days.

42. A & B Complete a work in 20 & 15 days. After working together for 6 days, B is replaced by C & the remaining is Completed in 4 days by A & C. Then find in How many days C alone can Complete the work?.

5	20, 15
	4, 3



A+B = 7×6 = 42.

60 − 42 = 18.

$A+C = \frac{18}{4} = 4.5$

A = 3 + 1.5

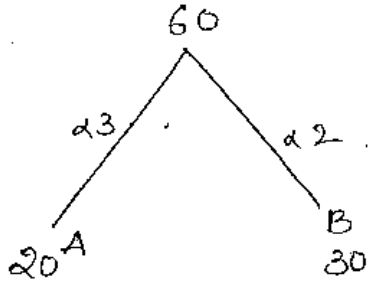
↓ ↓

1 day C.

C-Alone = $\frac{60}{1.5}$ $\frac{4}{60 \times \frac{10}{15}} = 40$ days.

43. A Completes a work in 20 days & B in 30 days. If they both Started the work together, A left the work before 5 days of the Completion of the work. find in how many days they both Completed the work & also in how many days A left the work?.

I method



$2 \mid 20, 30$
$5 \mid 10, 15$
$2, 3.$

1 day → A+B = 5.

If A worked for 5 days, $3 \times 5 = 15 + 60 = \frac{75}{5(3+2)} = 15 - 5 = 10$ days

II method

5×2 days = 10 days → B Alone

$60 - 10 = \frac{50}{5} = 10$ days.

(A+B = 3+2)

44. An Amount of 529/- is distributed among A, B & C. The Share of A & B is $\frac{19}{23}$ of the total Amount, The Share of B & C is $\frac{8}{23}$ of the total Amount. find C's Share.

$A+B = \frac{19}{23} > \frac{9}{23} = C$.

$\frac{4}{23} \times \overset{23}{529} = 92/-$

45. A, B & C earn 300/- per day. A & C earn 100/- per day. B & C earn 152/- per day. find the share of C per day. 25

$A + C = 188$.

$300 - 188 = 112 = B$.

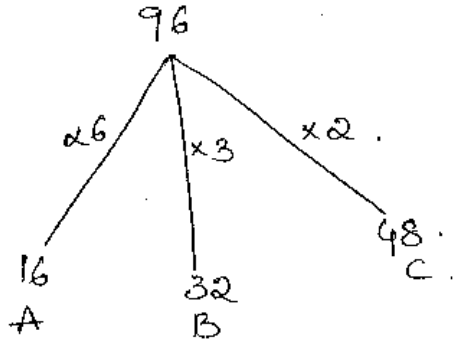
$112 + C = 152$

$C = 152 - 112 = 40/-$

46. A completes a work in 16 days, B in 32 days & C in 48 days. If they started the work together, C left after 4 days & B left ~~after~~ 2 days of the completion of the work. In how many days, the total work is completed?

before

I method



16 | 16, 32, 48
1, 2, 3

$C = 2 \times 4 = 8$

96
+ 6
94

$B = 3 \times 2 = 6$

$A + B = \frac{94}{9} = 10\frac{4}{9}$ days.

II method

$A + B + C$: $4 \times 11 = 44$

$A + B$: $6 + 3$

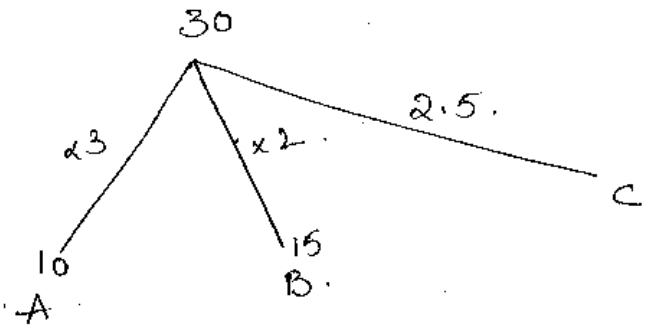
A : $2 \times 6 = 12$.

$96 - 56 = \frac{40}{9} = 4\frac{4}{9}$

$4 + 2 + 4\frac{4}{9} = 10\frac{4}{9}$ days.

47. A piece of work is completed by A in 10 days & by B in 15 days. After working for 5 days, remaining work is completed by C in 2 days. They earned a total Amount of 1500/-. B & C's daily wage is ?

$5 \mid 10, 15$
$2, 3.$



$5 \times 5 \text{ days} = 25 \text{ units}$

$30 - 25 = 5 \text{ units}$

$C = \frac{5 \text{ units}}{2 \text{ days}} = 2.5 \rightarrow E \text{ of } C$

$2\frac{1}{2} = \frac{5}{2}$

$\frac{30}{\frac{5}{2}} = 30 \times \frac{2}{5} = 12 \text{ days}$

A : B : C

$3 \times 5 : 2 \times 5 : 2.5 \times 2$

~~15~~ : ~~10~~ : ~~5~~

3 : 2 : 1

$B = \frac{2}{6} \times \overset{250}{\cancel{1500}} = \frac{500}{5} = 100/-$

$C = \frac{1}{6} \times \overset{250}{\cancel{1500}} = \frac{250}{2} = 125/-$

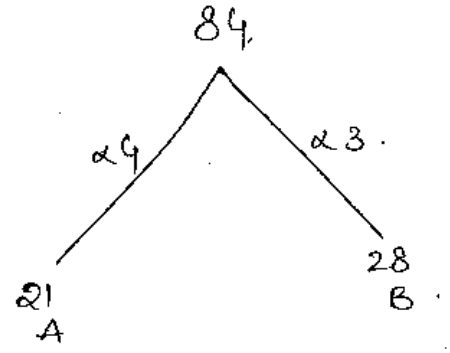
$B + C = 100 + 125 = 225/-$

48 In An Amount A has 21 days Salary, B has 28 days Salary. If they work together, that Amount Lasts for? 27

I method

$$\frac{AB}{A+B} = \frac{21 \times 28}{49} = 12 \text{ days.}$$

II method.



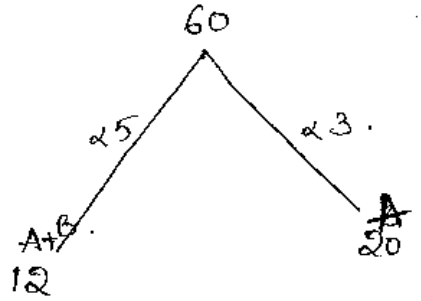
7 | 21, 28
3, 4.

$$\frac{84}{7} = 12 \text{ days.}$$

49 A & B Completes a work in 12 days. A alone in 20 days, if B works only Half of the days, the total work is Completed by them together in?

4 | 12, 20
3, 5.

I method



B Alone = 5 − 3 = 2

$$\frac{60}{2} = 30 \text{ (Half).}$$

Full (30 × 2) = 60.

A = 20

B = 60

$$\frac{AB}{A+B} = \frac{20 \times 60}{80} = \frac{60}{4} = 15 \text{ days (A+B)}$$

II method

$$\left|\frac{AB}{A-B}\right| = \frac{12 \times 20}{8} = 30$$

$B = 30 \times 2 = 60$.

$A = 20$.

$$\frac{AB}{A+B} = \frac{20 \times 60}{80} = \frac{30}{2} = 15 \text{ days}$$

50. A & B Completes a work in 12 days. After working together for 8 days A left & B done working for 20 days Completes the remaining work. In how many days B done will Complete the total work?.

$A+B = 12$.

8 (+4) → 12

20 (-8) → 12.

$A \times 4 = B \times 8$

$\frac{A}{B} = \frac{2}{1}$

$B \rightarrow (2+1) \times 12 = \frac{36}{1}$ days.

$A \rightarrow \frac{36}{2} = 18$ days.

51. A & B can complete a work in 30 days. They started working together. And after 23 days B left that work, & the whole work is completed in 33 days. find the time A alone can complete that work in ?.

$A + B = 30$ days.

33	23,
(-3)	(+7)

$A \times 3 = B \times 7$.

$3A = 7B$.

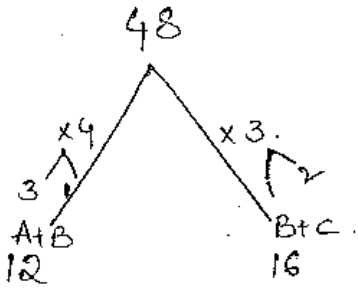
$\frac{A}{B} = \frac{7}{3}$.

$$(7+3) \times 30 = \frac{300}{7} = 42\frac{6}{7} \text{ days.}$$

52. A & B complete a work in 12 days. B & C complete the work in 16 days. If A work for 5 days & B works for 7 days, & C completed the remaining work in 13 days. Then find in how many days C would complete the work alone?.

4 | 12, 16

3, 4



$\underbrace{A+B}_{5}$	$B+C$	C.
$\times 4$	$\times 3$	2.
20	6	

$48 - 26 = \frac{22}{11} = 2$ (Efficiency) of C.

↓ Units

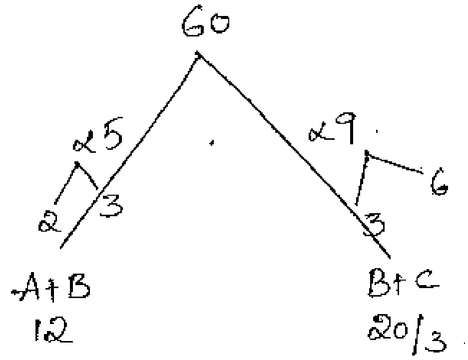
$C = \frac{48}{2} = 24$ days

$B = \frac{48}{1} = 48$ days.

$A = \frac{48}{3} = 16$ days.

53\. A & B can do a work in 12 days, while B & C can do in $6\frac{2}{3}$ days, work is completed by A, B & C by working 3, 4 & 7 days. Find in how many days A alone could complete the work?

$$4\,\underline{|\,20,\ 12}$$
$$\quad 5,\ 3.$$



$$6\frac{2}{3} = \frac{20}{3}.$$

$$\frac{360}{20/3} = 3 \times 3 = 9$$

A+B	B+C	C
3×5	1×9	6
15	9	

$$15 + 9 = 24$$

$$60 - 24 = \frac{36}{6} = 6 \text{ efficiency of C.}$$

$$C = \frac{60}{6} = 10 \text{ days.}$$

$$B = \frac{60}{3} = 20 \text{ days.}$$

$$A = \frac{60}{2} = 30 \text{ days}$$

54\. A alone would take 27 hrs more to work than that of A & B work together. B takes 3 hrs more to complete a work alone than A & B work together. In how many days, A alone will complete that work?

$$A = 27 + (A+B)\ ;\ B = 3 + (A+B).$$

$$\sqrt{27 \times 3} = \sqrt{81} = 9$$

$$A = 9 + 27 = 36.$$

$$B = 9 + 3 = 12.$$

(Total) $\frac{AB}{A+B} = \frac{36 \times 12}{48} = 9$ days.

55. A & B alone complete a work in 12 days & 3 days more respectively than A+B. Then find in how many days A alone will complete that work? 16

Let $x = A+B$.

$A = 12 + x$.

$B = 3 + x$.

$\sqrt{12 \times 3} = \sqrt{36} = 6$.

$A = 6 + 12 = 18$.

$B = 6 + 3 = 9$.

56 A can complete a work in 5 more days than B. While A does the same work in 9 more days than C. If A & B can complete the whole work in same time, with respect to C, alone does the whole work. In how many days A alone can complete the work?

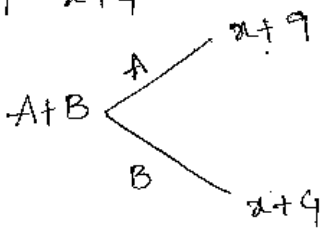
$A = 5 + B$.

$A = 9 + C$.

$A + B = C$.

$x \quad x$.

A	B	C
$x+9$	$x+4$	x



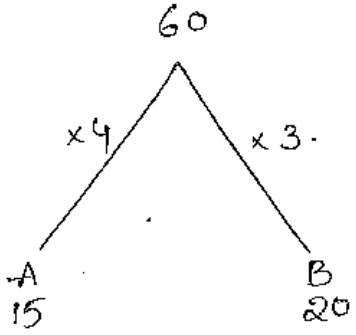
$\sqrt{9 \times 4} = \sqrt{36} = 6 = C$.

$A = 6 + 9 = 15$.

$B = 6 + 4 = 10$.

57. 2 men can build a wall in 15 & 20 Hrs. But if they work together, they use 280 less bricks/hr & build a wall in 12 hrs. find the no. of bricks in that wall?

$5 \mid 15, 20$
$3, 4$



$\frac{60}{12} = 5$ bricks.

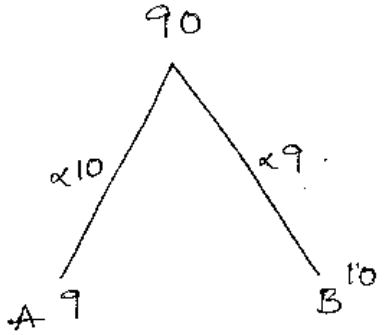
A+B = 7 units
A+B = 5 units
} 2 units — 280

60 → ?

$\frac{60 \times 280}{2} = 8400$ bricks.

58. 2 men can build a wall in 9 hrs & 10 hrs respectively. But if they work together, then they use 10 less bricks/hr & build a wall in 5 hrs. find the no. of bricks in that wall?

$9, 10$
90



A+B = 19 bricks
A+B = 18 bricks
} 1

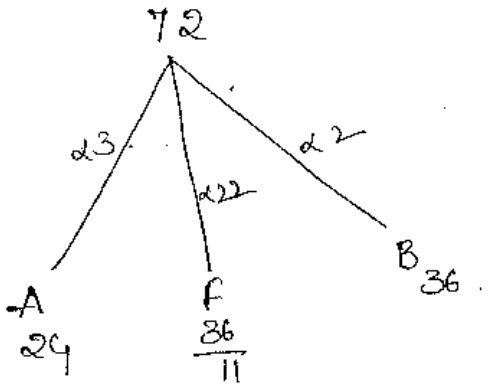
$\frac{90}{5} = 18$ bricks.

1 → 10

90 → ?

900 bricks.

59. A man has 3 sons. I & II can complete a work in 24 & 36 days. In how many days the III son will complete the work, if the man could alone complete the work in $3\frac{3}{11}$ days. The man can do double the work in the same time than his sons. In what time all his sons together can complete the work? 17



12 | 24, 36, 36
3 | 2, 3, 3
2, 1, 1.

$\frac{2}{72} \times \frac{11}{36} = 22.$

	father	(A+B+C)
Efficiency	2	1
Time	1	2

Efficiency 2 : 1.

x11 ↓ 22 ; x11 ↓ 11.

A+B+C = 11.

3 + 2 + 6

$\frac{72}{6} = 12$ days.

$A+B+C = \frac{72}{11} = 6\frac{6}{11}$ days.

60. 5 men can complete a work in 6 days. 3 women can complete the same work in 20 days. Then find in how many days, 1 man + 1 woman complete that work together? 34

I method

$5M = \frac{1}{6}$; $3W = \frac{1}{20}$.

$1M = \frac{1}{30}$; $1W = \frac{1}{60}$.

$1M + 1W = \frac{1}{30} + \frac{1}{60} = \frac{2+1}{60} = \frac{3}{60} = \frac{1}{20} = 20$ days.

II method

$5M \times 6 = 3W \times 20$

$1M = 2W$.

$\frac{M}{W} = \frac{2}{1}$ efficiency.

$5M \times 2 \times 6 = 60$.

$1M + 1W = 1 \times 2 + 1 \times 1 = 3 = 60/3 = 20$ days.

61. 10 men can complete a work in 12 days. 10 women can complete the same work in 6 days. Then find in how many days the same men & women work together to complete the work.

$10M \times 12 = 10W \times 6$.

$2M = W$.

$\frac{M}{W} = \frac{1}{2}$ efficiency.

$10M \times 1 \times 12 = 120$.

$10M + 10W = 10 \times 1 + 10 \times 2$.

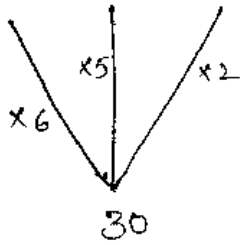
$= \frac{120}{30} = 4$ days.

62) 5 men can complete a work in 4 days. 8 women can complete the same work in 3 days. 10 Boys can complete in 6 days. In how many days 1 man & 1 woman & 1 Boy will complete by working together?

$$5m \times 4 = 8w \times 3 = 10B \times 6$$

$$5m = 6w = 15B$$

5 | 5, 6, 15
3 | 1, 6, 3.
1, 2, 1



$$5m \times 6 \times 4 = \frac{120}{13} = 9\frac{3}{13} \text{ days}$$

$1 \times 6 + 1 \times 5 + 1 \times 2 = 13$

63) 8 men can complete a work in 5 days. 6 women can complete the same work in 10 days. In how many days 4 men & 10 women will complete the same work if they work together?

$$8m \times 5d = 6w \times 10d$$

$$2m = 3w$$

$$\frac{m}{w} = \frac{3}{2} \text{ Efficiency.}$$

$$8m \times 3 \times 5 = 120.$$

$$4m + 10w = 4m \times 3 + 10w \times 2 = 12 + 20 = 32.$$

$$\frac{120}{32} \quad \frac{60}{16} \quad \frac{15}{4} = 3\frac{3}{4} \text{ days.}$$

64. 3 men or 4 women can complete a work in 22 days. Then find in how many days 2men & 1woman can complete the work by working together.

1 method

$3m \times 22 = 4w \times 22$

$3m = 4w$

$\frac{m}{w} = \frac{4}{3}$ → Efficiency.

$3m \times 4 \times 22 = 264$.

$2m + 1w = 2 \times 4 + 1 \times 3 = 11$

$\frac{264}{11} = 24$ days.

2 method

$3m = 22$ days.

$1m = 66$ days.

$2m = 33$ days.

$4w = 22$ days.

$1w = 88$ days.

$\frac{AB}{A+B} = \frac{33 \times 88}{33+88} = \frac{3\ \ 8}{\cancel{33} \times \cancel{88}} = 24$ days.

65. 4 men or 5 women can complete a work in 30 days. In how many days 3women & 2men can complete the work by working together?

$4m \times 30 = 5w \times 30$

$\frac{m}{w} = \frac{5}{4}$ → Efficiency.

$4m \times 5 \times 30 = 600$.

$3w + 2m = 3 \times 4 + 2 \times 5 = 22$.

$\frac{600}{22} = 27\frac{3}{11}$ days.

66. 5 men & 2 women by working together complete a work in 6 days. 1 man & 3 woman can complete the same work in 8 days. Then find in how many days 2 men & 2 women can complete the same work by working together?.

19

$$(5m+2w)\times 6_3 = (1m+3w)\times 8_4.$$

$$15m+6w = 4m+12w.$$

$$11m = 6w.$$

$$\frac{m}{w} = \frac{6}{11} \text{ - Efficiency.}$$

$$(6\times 6 + 2\times 11)\times 6 = 36+22$$

$$2m+2w = ?.$$

$$2m\times 6 + 2\times 11 = 12+22 = 34.$$

$$(5m\times 6 + 2w\times 11)\times 6 = 312.$$

$$\frac{312}{34} = \frac{156}{17} = 9\frac{3}{17} \text{ days.}$$

67. 6 men & 8 boys can complete a work by working together in 10 days. 26 men & 48 boys can complete the same work in 2 days. Then find in how many days 15 men & 20 Boys complete that work.

$$(6m+8B)\times 10_5 = (26m+48B)\times 2.$$

$$30m+40B = 26m+48B.$$

$$4m = 8B$$

$$\frac{m}{B} = \frac{2}{1}$$

$$15\times 2 + 20\times 1 = 50.$$

$$(6m\times 2 + 8\times 1)\times 10 = 200$$

$$\frac{200}{50} = 4 \text{ days.}$$

68. 4men & 6 women can complete a work in 8 days. And the same work is completed by 3men & 7 women in 10 days. In how many days, 10 women can complete the work?.

$$(4m+6w)\times 8 = (3m+7w)*10$$

$$16m+24w = 15m+35w$$

$$1m = 11w$$

$$\frac{m}{w} = \frac{11}{1} \rightarrow \text{Efficiency}.$$

$$(4m\times 11 + 6w\times 1)\times 8 = (44+6)\times 8 = 400.$$

$$10w\times 1 = 10 = \frac{400}{10} = 40 \text{ days}.$$

69. 12 Children can complete a work in 16 days. The same work is completed by 8men in 12 days. If 16 men start the work & after 3days 10 men left the work & at the same time 4 children joined. In how many days, the remaining working is completed by them?.

$$12c\times 16 = 8m\times 12.$$

$$2c = 1m$$

$$\frac{c}{m} = \frac{1}{2} \rightarrow \text{Efficiency}.$$

$$16\times 2\times 3 = 96 \text{ units}$$

$$12\times 1\times 16 = 192 \text{ units}$$

$$192-96 = 96 \text{ units}$$

$$6m+4c = 6\times 2+4\times 1 = 16$$

$$\frac{96}{16} = 6 \text{ days}.$$

70. 12 men can complete a work in 36 days. 18 women can complete the same work in 60 days. 8 men & 20 women completed the work in 20 days. Remaining work is completed by women alone in 4 days. find the no. of women?.

$12m \times 36 = 18W \times 60$

$2m = 5W$

$\frac{m}{W} = \frac{5}{2}$ → Efficiency.

$(8 \times 5 + 20 \times 2)\ 20 = (40 + 40) \times 20 = 1600$ units.

$12 \times 5 \times 36 = 2160$ units

$2160 - 1600 = 560$ units.

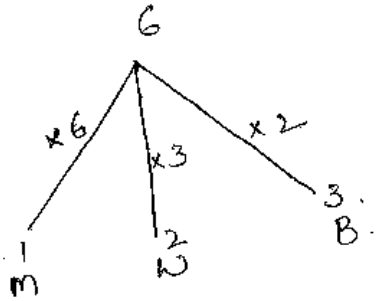
$\frac{560}{2 \times 4} = 70$ women.

71. 1man or 2 women or 3 Boys can complete a work in 22 days. find in how many days 1man & 1woman & 1 child can complete the work?

$1m = 2W = 3B$.

$1M \times 2/2 = 2W \times 2/2 = 3B \times 2/2$

1, 2, 3 | 6



$1m \times 6 \times 22 = 132$ units

$1m + 1W + 1B = 1 \times 6 + 1 \times 3 + 1 \times 2 = 6 + 3 + 2 = 11$

$\frac{132}{11} = 12$ days.

72. $$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

20 men complete a work in 15 days. In How many days, 25 men can complete the work?

$$\overset{4}{\cancel{20}} \times \overset{3}{\cancel{15}} = \overset{5}{\cancel{25}} \times D_2$$

$$12 = D_2$$

73. 50 men can complete a work in 12 days. Then, How many men can complete the work in 8 days?

$$\overset{25}{\cancel{50}} \times \overset{3}{\cancel{12}} = M_2 \times \cancel{8}^{2}$$

$$75 = M_2$$

74. 40 men complete a work in 10 days. But inorder to complete the work before 2 days, How many men in extra are needed?

$$\overset{10}{\cancel{40}} \times \overset{5}{\cancel{10}} = \overset{x}{M_1} \times \cancel{8}^{2}$$

$$50 = x$$

$$50 - 40 = 10 \text{ men more are needed.}$$

75. Some men complete a work in 15 days. By 15 men more joining, the work completed 3 days earlier. find How many men worked first?

$$x \times \overset{5}{\cancel{15}} = (x+15) \times \overset{4}{\cancel{12}}$$

$$5x = 4x + 60$$

$$x = 60 \text{ men}$$

76 Some men complete a work in 15 days, but by 15 men less working, the work completed in extra 5 days. find how many men worked first?

$$x \times 15 = (x-15) \times 20$$

$$3x = 4x - 60$$

$$\text{men} = 60.$$

77 20 men can complete a work i.e binding books in 8 days, 400 books. Then find in how many days 30 men can bind 600 books?

$$\frac{20\phi \times 8}{40\phi} = \frac{30\phi \times x}{60\phi}$$

$$40 = 5x$$

$$8 = x$$

78 18 men can build a wall of 140m in 42 days. find in how many days 30 men can build a 100m wall?

$$\frac{18m \times 42}{140} = \frac{30\phi \times x}{10\phi}$$

$$36m = 2x.$$

$$18 \text{ days}$$

79. A Contractor with the help of 104 men can complete a work within 56 days working 8 hrs a day. But after 30 days $\frac{2}{5}$ th of the work is only completed, the remaining work by working 9 hrs a day, How many extra men are needed?

$$\frac{\overset{10}{\cancel{30}} \times 8 \times \overset{52}{\cancel{104}}^{2}}{\frac{\cancel{2}}{\cancel{5}}} = \frac{\overset{8}{\cancel{9}} \times x \times 26}{\frac{3}{5}}$$

$$160m \Rightarrow 160 - 104 \Rightarrow 56 \text{ men}$$

80. A Contractor made an agreement to complete a work in 40 days with 100 men. But, after 35 days, extra 100 men joined, & the work can be completed in time. If 100 men does not join, How many days the work would have been delayed?

$$200 \times 5 = 100 \times D_2$$

$$D_2 = 10$$

$$10 - 5 = 5 \text{ days}$$

81. 3 men can complete a work in 6 days. After 2 days, other 3 men joined. find in How many days the remaining work will be completed?

$$\cancel{3}m \times \overset{2}{\cancel{6}} = \overset{x}{\cancel{6}}m \times D_2$$

$$2m = D.$$

$$2 \text{ days}$$

82. Inorder to type 36 pages, Raju take 6 hrs. While Ramu take 5 hrs to type 40 pages. find, in how many hours, they type 140 pages, if they work on different Computers & start at the same time?.

$$\frac{36}{6} = \frac{40}{5}$$

$$1\text{ hr} \rightarrow 6+8 = 14 \text{ pages}$$

$$\frac{140}{14} = 10 \text{ hrs}$$

83. 6 men & 10 women work together for 6 hrs a day to complete a work in 15 days & completes $\frac{5}{12}$ th of the work. At present 2 men & 4 women joined & work for 7 hrs a day, remaining work will be completed in? [Here 2 men work = 3 women work].

$$2m = 3w$$

$$\frac{3}{2} = \frac{m}{w} \rightarrow \text{Efficiency}.$$

$$\frac{(6m+10w)\times 6\times 15}{\frac{5}{12}} = \frac{(8m+14w)\times 7\times D_2}{\frac{7}{12}}$$

$$(6\times 3+10\times 2)\times 6\times 3 = 8\times 3+14\times 2\times D_2$$

$$(18+20)\times 18 = (24+28)D_2$$

$$\frac{19}{38}\times\frac{9}{18} = \frac{171}{13} = 13\frac{2}{13} \text{ days}.$$

84. 10 men & 14 women can complete a work in 6 days. 14 men & 24 women can do the same work in 4 days. find in how many days 10 men & 3 women can complete the same work in ?.

$$(10m + 14w) \times 6^{3} = (14m + 24w) \times 4^{2}$$

$$30m + 42w = 28m + 48w$$

$$2m = 6w$$

$$\frac{m}{w} = \frac{3}{1}$$

$$(10\times3 + 14\times1) \times 6 = (10\times3 + 3\times1) D_2$$

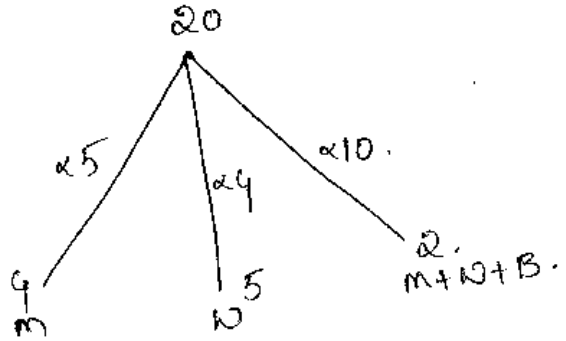
$$(30 + 14) \times 6 = (30 + 3) D_2$$

$$\frac{264}{33}^{8} = 8 \text{ days}$$

85. 1 man & 1 woman agreed to do a work for 870/-. man alone can do the work in 4 days & woman alone can do in 5 days. They with the help of 1 boy can complete that work in 2 days. find the share of Boy?.

m — 4 days.
w — 5 days.
m + w + B — 2 days.

$2 \mid 4, 5, 2$
$2, 5, 1$



m + w + B = 10.
5 + 4 + 1

$$\frac{1}{10} \times 870 = 87/-$$

86. 3 men can complete a work in 2 days. $2\frac{1}{2}$ times the work will be completed by 5 men in.

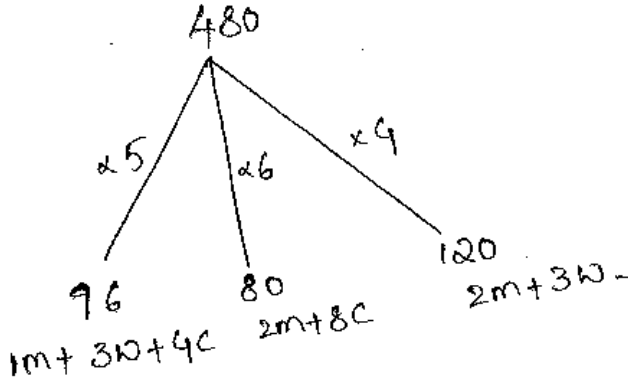
$2\frac{1}{2} = \frac{5}{2}$

$$3m \times 2 = \frac{5m \times D_2 \times 1}{5}$$

$$3 = D_2$$

87. 1 man, 3 women & 4 children can complete a work in 96 hrs. While 2 men & 8 children can complete the same work in 80 hrs. And 2 men & 3 women can complete the same work in 120 hrs. find in how much time 10 men & 5 women can complete the work?

2	96, 80, 120
4	48, 40, 60
3	12, 10, 15
5	4, 10, 5
2	4, 2, 1
2	2, 1, 1
	1, 1, 1



$2m + 8C = 8$ (cancel by 2)

$1 \quad 4 \quad 3$

$1m + 4C = 3$

$1m + 3W + 4C$ can be replaced by, $1m + 4C = 3$.

$3W + 3 = 5$

$3W = 5 - 3$

$3W = 2$.

$W = \frac{2}{3}$.

$2m + 3W = 4$

$2m + 3 \times \frac{2}{3} = 4$

$2m = 2$

$1m = 1$

10m + 5w

$\Rightarrow 10\times1 + 5\times\frac{2}{3}$

$= 10+\frac{10}{3} = \frac{30+10}{3} = \frac{40}{3}$

$\frac{480}{40/3} = \frac{\overset{12}{\cancel{480}}\times 3}{\cancel{40}} = 36$ days

88 A, B & C can complete a work in 30 days by working together. A+C are twice efficient than B. And A+B are thrice efficient than C. find in how many days, A alone will complete the work?.

(A+B+C) × 30.

	A+C		B	A+B		C
Efficiency →	2	:	1	3	:	1
Time	1	:	2	1	:	3.

(Efficiencies should be made equal to solve easily)

so,

$\frac{A+C}{B} = \frac{2}{1}\Big]3$ $\frac{A+B}{C} = \frac{3}{1}\Big]4$

Cross multiply.

$\frac{2}{1}\times 4$ $\frac{3}{1}\times 3$.

$\frac{A+C \to 8}{B \to 4}\Big]12$ $\frac{A+B \to 9}{C \to 3}\Big]12$ (Here Efficiencies are made to be equal)

A	B	C
5	4	3

A+B+C = 12 × 30 = 360

$A = \frac{360}{5} = 72$ days.

$B = \frac{360}{4} = 90$ days.

$C = \frac{360}{3} = 120$ days.

89. A+B can complete a work in half the time of C. While B & C can complete the same work in $\frac{1}{3}$rd of the time than A. If they together complete the work in 20 days, In how many days they complete the work alone?. 24

A+B	C	B+C	A
1	2	1/3	3 1

$\frac{A+B}{C} = \frac{1}{2}$ → time. $\frac{2}{1}$ → Efficiency.

$\frac{B+C}{A} = \frac{\frac{1}{3}}{1} = \frac{1}{3}$ time $\frac{3}{1}$ → efficiency.

$\frac{2}{1}$] 3 $\frac{3}{1}$] 4.

$\frac{2}{1} \times 4$ $\frac{3}{1} \times 3$.

$\frac{A+B}{C} \rightarrow \frac{8}{4}$] 12 $\frac{9}{3}$] 12 ← B+C / A

A+B+C. $12 \times 20 = 240$.
3 + 5 + 4

$A = \frac{240}{3} = 80$ days.

$B = \frac{240}{5} = 48$ days.

$C = \frac{240}{4} = 60$ days.

90. A & B can complete a work in 40% less time than C. While B & C can complete the same work in 60% less time than A. If they together work, they can complete in 20 days. then in how many days will they alone complete the work.

$$\frac{A+B}{C} = \frac{60}{100} = \frac{3}{5} \rightarrow T \rightarrow \frac{5}{3} \rightarrow E.$$

$$\frac{B+C}{A} = \frac{40}{100} = \frac{2}{5} \rightarrow T \rightarrow \frac{5}{2} \rightarrow E.$$

$\frac{5}{3}$]8 $\frac{5}{2}$]7.

$\frac{5}{3} \times 7$ $\frac{5}{2} \times 8$.

$\frac{A+B}{C}$ $\frac{B}{A}$ → $\frac{35}{21}$]56 $\frac{40}{16}$]56. $\frac{B+C}{A}$

A B C.

16 19 21 $56 \times 20 = 1120$.

$A \rightarrow \frac{1120}{16} = 70$ days.

$B \rightarrow \frac{1120}{19} = 58.3$ days.

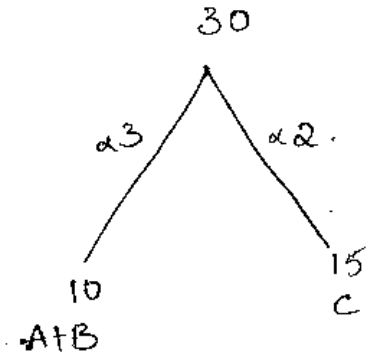
$C \rightarrow \frac{1120}{21} = 53.3$ days.

91. A takes as much time as B & C takes to finish a job. A & B finish the job in 10 days. C alone can do the same job in 15 days. In how many days B alone can do the work?

$\frac{B+C}{A} = \frac{1}{1} \rightarrow T \quad \frac{1}{1} \rightarrow E$

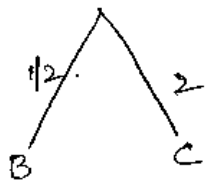
A+B = 10 days.
C = 15 days.
B → ?.

5 | 10, 15
2, 3.



3+2 = 5 → A+B+C = 5.
B+C A.
E → 1 : 1
$2\frac{1}{2} : 2\frac{1}{2}$ (B's eqn total 5)

$2\frac{1}{2}$ (B+C)



$B = \frac{30}{1/2} = 60$ days.

92. In a factory, there are 3 shifts of work for a day. During the 3 shifts, the average working efficiency of workers is 80%, 70% & 50% respectively. A's work is completed in 60 days, by the group working in the 1st shift. If the work is done in all the shifts, then in how many days less the required work is completed?.

E → 8ϕ : 7ϕ : 5ϕ (8+7+5) = 20.

$8 \times 60 = \frac{480}{20} = 24.$

60 − 24 = 36 days.

93. A started a work & left after working for 4 days. B finished the remaining work in next 18 days. Had A left the work after working for 6 days, then B would have finished the remaining work in next 12 days. Then find in How many days A & B alone will complete the work separately?

$A \times 4 \quad B \times 18 = A \times 6 \quad B \times 12$

A   B

$2 \langle \begin{matrix} 4 \\ 6 \end{matrix} \qquad \begin{matrix} 18 \\ 12 \end{matrix} \rangle 6$

$A \times \cancel{2}^{1} = B \times \cancel{6}^{3}$

$\frac{A}{B} = \frac{3}{1} \rightarrow E$

$4 \times 3 + 18 \times 1 = 30$

$A \rightarrow \frac{30}{3} = 10$ days.

$B \rightarrow \frac{30}{1} = 30$ days.

94. P, Q & R are 3 typists working alternatively can type 216 pages in 4 hrs. In 1 hr, R can type as many pages more than Q, as Q can type more than P. R can type as many pages in 5 hrs, as P in 7 hrs. How many pages does each of them type per Hour.

$R \times 5 = P \times 7$

$\frac{R}{P} = \frac{7}{5}$

$\frac{7+5}{2} = \frac{12}{2} = 6$.

R   Q   P

$7x \quad 6x \quad 5x$

$7 + 6 + 5 = 18$

$18x \times 4 = \cancel{216}^{52}$

$x = 3$.

$R \rightarrow 7x = 7 \times 3 = 21$ pages/hr.

$Q \rightarrow 6x = 6 \times 3 = 18$ pages/hr.

$P \rightarrow 5x = 5 \times 3 = 15$ pages/hr.

95. 3 typists working together 8 hrs per day can type 900 pages in 20 days. The no. of pages typed by A in 4 hrs = the no. of pages typed by C in 1 hr. Find, How many pages are typed by C in 1 hr, if in 1 day, B types as many pages more than A as C types as many pages more than B. 76

$A \times 4 = C \times 1$

$4A = 1C$.

$\frac{A}{C} = \frac{1}{4}$] 5

$\frac{5}{2} = 2.5$.

A B C.

1x 2.5x 4x.

1.5 1.5.

$4\frac{1}{2} \times 8 \times 20 = 900$. & 3.

$\frac{15}{2} \times 8 \times 20 = 700$

$4x = 3$

$x = \frac{3}{4}$

A → $1x = 1 \times \frac{3}{4} = \frac{3}{4}$ hrs.

B → $\frac{5}{2}x = \frac{5}{2} \times \frac{3}{4} = \frac{15}{8}$ hrs.

C → $4x = 4 \times \frac{3}{4} = 3$ hrs.

96. B+C can complete a work in 50% more time than A+B+C. If they work together on a job, till the whole work completed, then B earns 120/- out of total 450/-. Then find in How many days they together complete the whole work, while A & B takes $\frac{8}{3}$ more no. of days to complete the work than A+B+C.

B+C A+B+C B A+B+C.

Time → 150 100 Earnings 120 : 450

3 : 2 4 : 15.

Efficiency → 2 : 3. Efficiency 4 : 15.

$\frac{B+C}{A+B+C} = \frac{2}{3}$ $\frac{B}{A+B+C} = \frac{4}{15}$.

make denominators equal,

$\frac{2}{3} \times 5 = \frac{10}{15}$ $\frac{4}{15}$.

B+C — 10 B — 4

A+B+C — 15 A+B+C — 15.

A B C.

Efficiency → 5 4 6

A+B A+B+C

Efficiency → 9 5

3

Time → 5 : 3.

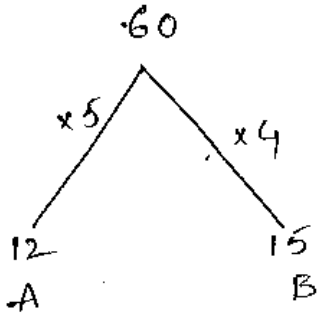
2x.

$2x = \frac{8}{3}^{4}$; $3x = 3 \times \frac{4}{3} = 4$ days.

97. A & B complete a work in 12 & 15 days. They started to work alternatively for 1 day each. A started the work first. In how much time 60% of the work will be completed?.

27

$3\overline{)12, 15}$
$4, 5$



$60 \times \frac{60}{100} = 36$

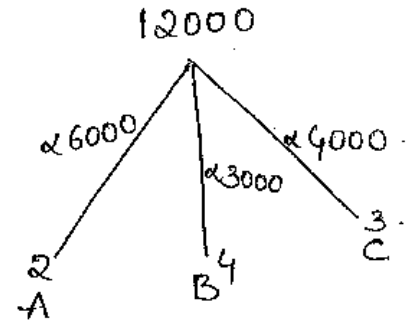
1 day A − 5] 9 unit
2 day B − 4

2 days cycle → 9 unit
↓ ×4
? 36

$2 \times 4 = 8$ days

98. 3 men, A, B & C can make 12,000 pens in 2 hrs, 4 hrs & 3 hrs respectively. If they work half an hour for every time, but they don't work together. And A starts the work first. find in how much time they can make 18,500 pens?.

2, 4, 3.



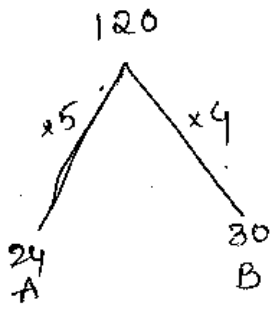
	A	B	C
6500 ←	3000	1500	2000
$1\frac{1}{2}$ hr	$\frac{1}{2}$ hr	$\frac{1}{2}$ hr	$\frac{1}{2}$ hr

$1\frac{1}{2}$ hr — 6500.
3 hrs — 13,000.
A − $\frac{1}{2}$ — 3000
B − $\frac{1}{2}$ — 1500
C − 15 mins — 1000
18,500

4 hrs 15 mins.

99. A & B complete a work in 24 & 30 days respectively, working 10 hrs/day, the work is to be done in 2 shifts. Morning shift is for 6 hrs & evening is for 4 hrs. On the 1st day, A works in the morning & B works in the evening. They interchange their shifts everyday. find in how much time, the total work will be completed

$6 \mid 24, 30$
$4, 5.$



	I shift	II shift
I day	A(6)	B(4)
II day	B(6)	A(4)

2 days — 9 units

$\times 13$ $\quad$ $\times 13$

26 days $\quad$ 117

$120 - 117 = 3.$

$A \rightarrow \frac{5}{10\text{ hrs}} \times 6\text{ hrs} = 3\text{ units}$

$\Rightarrow$ 26 day 6 hrs.

$\rightarrow$ work is completed on 27th day.

100. 40 men can complete a work in 30 days. They started the work together & after every 10 days, 5 men left the work. In how much time, work will be completed ?. 28

$40m \times 30d = 1200 \rightarrow$ total work.

$40 \times 10 = 400$
$35 \times 10 = 350$
$30 \times 10 = 300$
1050 $(1200 - 1050 = 150)$

$25 \times 6 = 150$.

$(10+10+10+6) \rightarrow 36$ days

$\frac{150}{25} = 6$

101. 60 men can complete a work in 40 days. They started the work together, but after every 10 days, 5 men left the work. In How much time, the work will be completed ?

$60 \times 40 = 2400$.

$60 \times 10 = 600$.
$55 \times 10 = 550$.
$50 \times 10 = 500$.
$45 \times 10 = 450$
$40 \times 7\frac{1}{2}$ 2100
300
$47\frac{1}{2}$ days. 2400

$\frac{300}{40} = 7\frac{1}{2}$.

102. 33 men can do a job in 30 days. If 44 men started the work together, & every day, 1 person left the work. Then, what is the maximum no. of days required to complete the whole work?.

$$33 \times 30 = 990$$

$$\frac{n}{2}\left(2a + (n-1)d\right) = 990.$$

$$a = 44$$

$$d = -1$$

$$\frac{n}{2}\left(2 \times 44 + (n-1)-1\right) = 990.$$

$$\frac{n}{2}(88 - n + 1) = 990.$$

$$\frac{n}{2}(89 - n) = 990.$$

through options,

a) 44
b) ...
c) ...
d) ...

$$\frac{44}{2}(89 - 44) = 990.$$

$$22 \times 45 = 990.$$

$$990 = 990 \checkmark$$

44 days.

103 A Contractor undertakes to finish a work in 150 days. And he employs 20men, 30 women & 75 children, after 60 days only $\frac{1}{4}$ th of the work is completed. Now, he has removed all the women & 50 children & employed some more men, so that the work will be finished 5 days earlier. find the extra men; if 3men = 5 women & 2 women = 3 children.

57
29

$$\frac{(20m + 30w + 75c) \times 60}{\frac{1}{4}} = \frac{(20m + x + 25c) \times 85}{\frac{3}{4}}$$

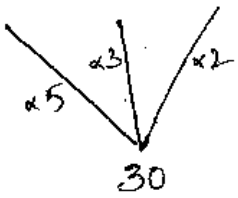
5 | 20, 30, 75
3 | 4, 6, 15
2 | 4, 2, 5
2, 1, 5

Given, $3m = 5w$ $2w = 3c$.

Cross multiply to make women equal.

$(3m = 5w) \times 2$ $(2w = 3c) \times 5$.

$6m = 10w = 15c$.



3 | 6, 10, 15
5 | 2, 10, 5
2 | 2, 2, 1
1, 1, 1

$20 \times 5 + 30 \times 3 + 75 \times 2$

$(20 \times 5 + x \times 5 + 25 \times 2)$

$\frac{(100 + 90 + 150) \times 60}{1} = \frac{(100 + 5x + 50) \times 85}{3}$

$340 \times 60 = \frac{(150 + 5x) \times 85}{3}$

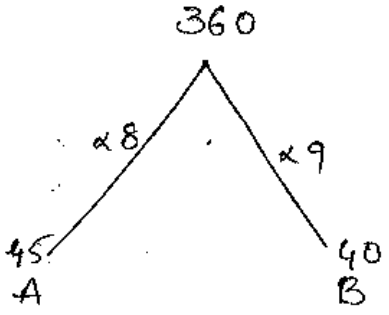
$720 = 150 + 5x$

$570 = 5x$

$114 = x$

104. A & B can complete a work in 45 & 40 days. After started working for some time, A left the work, remaining work is completed by B in 23 days. find, after how many days A left the work?.

$5 \mid 45, 40$
$9, 8$



B alone → $23 \times 9 = 207$.

$$\frac{360 - 207 = 153}{(A+B)\ 17} = 9 \text{ days. (A left after 9 days)}$$

105. 4 men & 6 children work for 6 days & earn 2100/-. Again, the same work is done by 7 men & 11 children for 10 days & they earn 6250/-. Then find how many days should 5 men & 8 children work to earn 2250/-?

$(4m+6c)6 = 2100$; $(7m+11c)10 = 6250$; $(5m+8c)x = 2250$

$$\frac{m_1 D_1 H_1}{\text{money}_1} = \frac{m_1 D_2 H_2}{\text{money}_2}.$$

$$\frac{(4m+6c)\cancel{6}^{3}}{\cancel{210}\phi} = \frac{(7m+11c)\cancel{10}^{5}}{\cancel{6250}\phi}$$
$$42 \qquad 125$$

$(12m+18c)125 = (3m+55c)42$.

$1500m + 2250c = 1470m + 2310c$.

$30m = 60c$

$\frac{m}{c} = \frac{2}{1}$ → Efficiency.

$$\frac{(4\times 2+6\times 1)6}{\cancel{2100}\ 42} = \frac{(5\times 2+8\times 1)x}{\cancel{2250}\ 45}$$

$$\frac{(8+6)6}{} = \frac{(10+8)x}{}$$

$$\frac{14\times \cancel{6}}{\cancel{42}\ 7} = \frac{18x}{45}$$

$$\frac{\cancel{14}^{2}}{7} = \frac{\cancel{18x}^{\cancel{6}\ 2}}{\cancel{45}\ \cancel{15}\ 5}$$

$$5\ \frac{\cancel{10}}{\cancel{2}} = x$$

5 days.

106. X Can do a piece of work in 24 days, when he had worked for 4 days, Y Joined him. If total work is Completed in 16 days, in how many days, Y alone finish the work?

I method

$$\frac{1}{\cancel{24}\ \cancel{6}\ 3}\times \cancel{16}^{\cancel{4}\ 2} = \frac{2}{3} > 1$$

$16 - 4 = 12$

$1 \rightarrow 12$

$3 \rightarrow ?$

$= 36$ days

II method

$16 - 4 = 12$

$$X = \frac{\cancel{4}}{\cancel{24}} = \frac{1}{6} > \frac{5}{6}$$

$5 \rightarrow 12$

$6 \rightarrow ?$

$$\frac{72}{5} = x + y$$

24 | 24, 72
 1, 3

72

×3 ×5

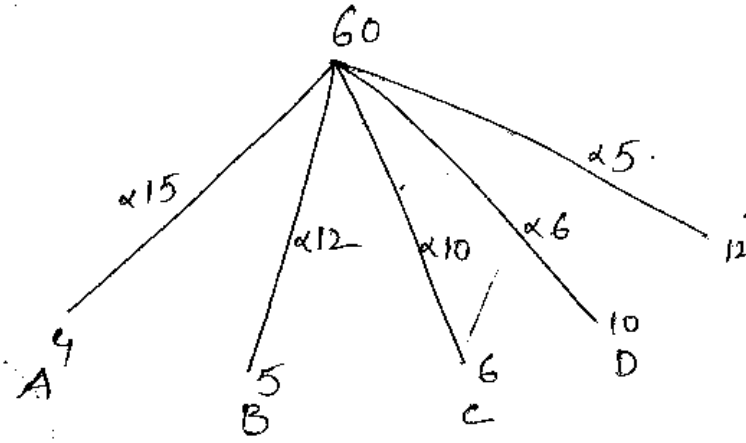
X 24 72/5 Y

$x + y = 5$

$3 + 2$

$$\frac{\cancel{72}}{\cancel{2}} = 36 \text{ days}$$

104. A work is completed by A, B, C, D & E in 4, 5, 6, 10 & 12 days. find in how many days, they complete the work together?



2	4, 5, 6, 10, 12
3	2, 5, 3, 5, 6
2	2, 5, 1, 5, 2
5	1, 5, 1, 5, 1
60	1, 1, 1, 1, 1

$$\frac{60}{48} = 1\frac{12}{48} = 1\frac{1}{4} \text{ days}$$

1. A pipe can fill a tank in 10hrs. How much part can be filled in 3hrs.

$$1 \text{ hr} \rightarrow \frac{1}{10}$$

$$3\text{hrs} \rightarrow \frac{1}{10} \times 3 = \frac{3}{10} \text{ th part.}$$

2. A pipe can fill a tank in 25mins. After 10 mins, How much part is left to be filled.

$$\frac{1}{\cancel{25}_{5}} \times \cancel{10}^{2} = \frac{2}{5} > \frac{3}{5} \text{ th part is remaining.}$$

3. $\frac{3}{4}$ th part of a tank is filled in 6hrs. In How much time, the tank will be filled?.

$$3 \rightarrow 6$$

$$4 \rightarrow ?.$$

$$\frac{4 \times \cancel{6}^{2}}{\cancel{3}} = 14\text{hrs.}$$

4. A pipe can be filled $\frac{5}{7}$ th of the tank in 10hrs. In How much time, the remaining part of the tank can be filled?.

$$\frac{5}{7} > \frac{2}{7} \text{ remaining.}$$

$$5 \rightarrow 10$$

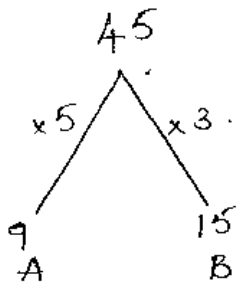
$$2 \rightarrow ?.$$

$$\frac{\cancel{10}^{2} \times 2}{\cancel{5}} = 4\text{hrs.}$$

5. Pipe A can fill a tank in 9 hrs & pipe B can fill in 15 hrs. find in how much time both the pipes can together fill the tank?

I method $\frac{AB}{A+B} = \frac{9 \times 15}{24} = \frac{45}{8} = 5\frac{5}{8}$ hrs.

II method

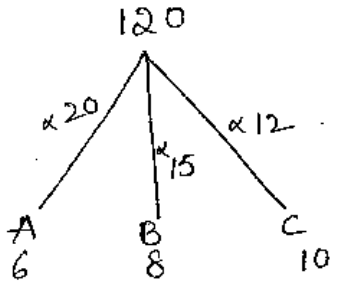


$3\overline{)9,15}$
$3,5$

$\frac{45}{8} = 5\frac{5}{8}$ hrs.

6. Pipes A, B, & C fill a tank in 6 hrs, 8 hrs & 10 hrs respectively find, in how much time, the 3 pipes together fill the tank?

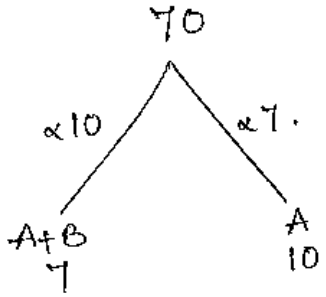
$2\overline{)6,8,10}$
$3,4,5$



$\frac{120}{20+15+12} = \frac{120}{47} = 2\frac{26}{47}$ hrs.

7. A & B pipes can fill a tank in 7 hrs, A only fill the tank in 10 hrs. In how many hours, pipe B alone can fill the tank?

$7\overline{)7,10}$
$70\ \ 1,10$



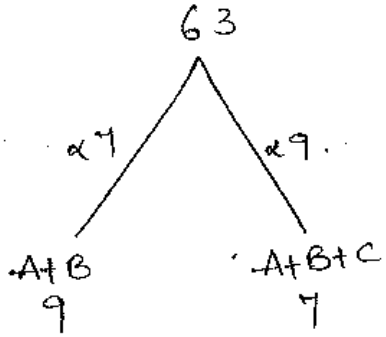
$A+B = 10$
$A = 7$.
$B = 10-7 = 3$.

B alone $\Rightarrow \frac{70}{3} = 23\frac{1}{3}$ hrs.

8. Pipes A & B can together fill a tank in 9hrs, they can fill the same tank with the help of C in 7hrs. In How much time C alone can fill the tank?. (2)

7,9 | 63
63.

63



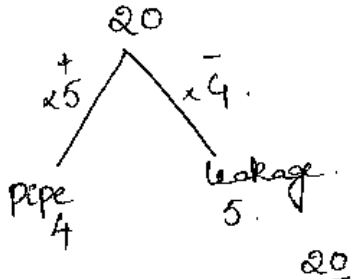
A+B = 7.

C = 9 − 7 = 2.

C alone → $\frac{63}{2} = 31\frac{1}{2}$ hrs.

9. A pipe can fill a tank in 4hrs, due to some leakage, the time to fill the tank is 5hrs. In How much time, that leakage will empty the full tank?.

4,5 | 20.



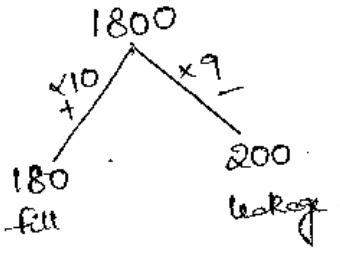
5 − 4 = 1

$\frac{20}{1} = 20$ hrs.

10. A pipe can fill a tank in 3hrs, due to a leakage, in the tank it takes 20mins more time to fill the tank. In How much time that leakage will empty the tank?

3hrs → 3 × 60min → 180mins.
+ 20mins
200 mins

2 | 180, 200
90, 100.



10 − 9 = 1

$\frac{1800}{1} = \frac{1800}{60} = 30$hrs

11. Pipe 'A' can fill a tank in 20mins, After filling for 5mins, other 3 pipes B, C & D are opened, find in how much time the tank is filled?

$1 \times 15 = 4D_2$

$\frac{15}{4} = 3\frac{3}{4}$ mins. $\quad \frac{3}{4} \times \overset{15}{\cancel{60}} = 45$ secs.

$\Rightarrow 5 + 3\frac{3}{4} = 8\frac{3}{4}$ mins.

8mins 45 secs.

12. Pipe 'A' can fill a tank in 40mins, after $\frac{5}{8}$th of the time, other 2 pipes B & C are opened, find in how much time, the tank is filled?

$40 \times \frac{\overset{5}{\cancel{5}}}{\cancel{8}} = 25$mins

$40 - 25 = 15$ mins.

$1 \times \overset{5}{\cancel{15}} = \cancel{3} \times T_2$.

$5 = T_2$

$25 + 5 = 30$ mins.

13. Pipe 'A' can fill a tank in 6hrs. After half of the tank is filled, another 3 pipes B, C & D are opened. In how much time, the tank is filled?

$6 - 3 = 3$hrs.

$1 \times 3 = 4 \times T_2$.

$\frac{3}{4} = T_2$. $\quad \frac{3}{4} \times \overset{15}{\cancel{60}} = 45$ mins.

$3\text{hrs}\ \frac{3}{4}$ mins

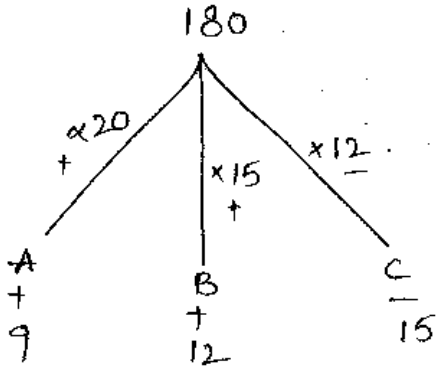
$\Rightarrow$ 3hrs 45mins.

14 Pipes A & B can fill a tank in 9hrs & 12hrs, but C can empty the tank in 15hrs. If they are opened, in how much time, the tank will be filled?

(3)

65

3 | 9, 12, 15
3 | 3, 4, 5
1, 4, 5



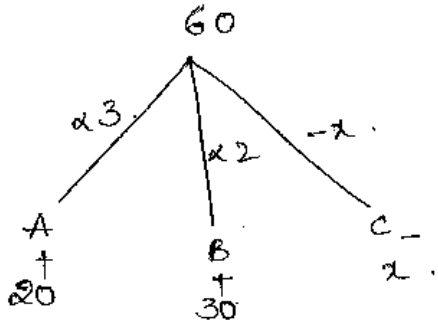
$20+15-12=23$.

$$\frac{180}{23} = 7\frac{19}{23} \text{ hrs.}$$

=.

15. Pipes A & B can fill a tank in 20mins & 30mins, but pipe C empties the tank in some time. If they start to work together, after 1hr, the tank is filled. Find in how much time, C empties the tank.

5 | 20, 30
2 | 4, 6
2, 3.



$$\frac{60}{5-x} = 60$$

$60 = 300 - 60x$.

$60x = 240$.

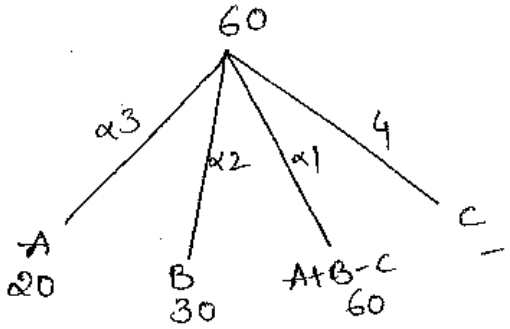
$x = 4$ mins

=.

C → $\frac{60}{4} = 15$ mins

=.

II method



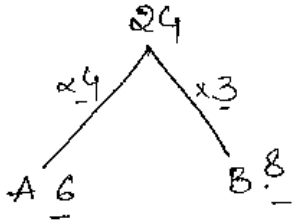
$\frac{60}{4} = 15$ mins

III method

$\frac{1}{20} + \frac{1}{30} - \frac{1}{60} = \frac{3+2-1}{60} = \frac{4}{60} = \frac{1}{15} = 15$ mins.

16. Pipes A & B can empty a tank in 6hrs & 8 hrs. If they are opened at the same time, in how much time, the tank is emptied ?

2 | 6, 8
3, 4

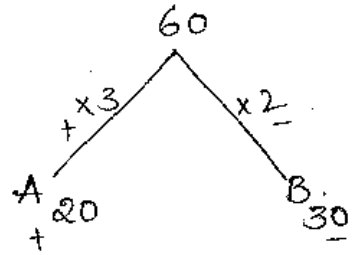


$\frac{\cancel{24}}{\cancel{24}} + \frac{\cancel{24}}{4} + \frac{24}{7} = 3\frac{3}{7}$ hrs.

17. Pipes A & B can can fill a tank in 20mins, pipe B empties in 30mins. first $\frac{2}{5}$th of the tank is filled. find the time to fill the tank?

2 | 20, 30
5 | 10, 15
2, 3.

I method



$\frac{2}{5} > \frac{3}{5}$

$\frac{60}{1} = \overset{12}{\cancel{60}} \times \frac{3}{\cancel{5}} = 36$ mins.

II method

$5 \rightarrow 60$

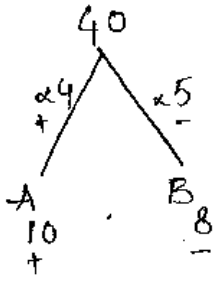
$3 \rightarrow ?$

$\frac{3 \times \overset{12}{\cancel{60}}}{\cancel{5}} = 36$ mins.

18. Pipe 'A' can fill a tank in 10hrs, pipe B empties it 8hrs. (4) first, $\frac{5}{8}$ th of the tank is filled. If the two pipes start to work together, find the time to fill or empty the tank.

67

2 | 10, 8
5, 4



$\frac{40}{-1} = 40 \times \frac{5}{8} = 25$ mins to empty. (B'coz the time taken to empty the tank is more).

19. The ratio b/w the efficiencies of two pipes A & B is 3:5. Pipe A fills in 12hrs, pipe B will fill the tank in?

A : B.

Efficiency 3 : 5

Time 5 : 3

$5 \rightarrow 12$.

$3 \rightarrow ?$.

$\frac{3 \times 12}{5} = \frac{36}{5} = 7\frac{1}{5}$ hrs.

*20. Pipe A's efficiency is 3 times, that of B. If they both together fill a tank in 8hrs. Find in what time A alone will fill the tank in?.

$E \rightarrow 3 : 1$

$T \rightarrow 1 : 3$.

$A+B \rightarrow 8 \rightarrow$ Time.

$\frac{1}{8} \rightarrow$ Efficiency.

$4 \longrightarrow \frac{1}{8}$.

$3 \longrightarrow ?$

$\frac{1}{8} \times 3 \times \frac{1}{4} = \frac{1}{32} \times 3 = \frac{3}{32} = \frac{32}{3} = 10\frac{2}{3}$ hr

Q1. The ratio b/w the efficiencies of A, B & C is 3:4:5, the 3 pipes fill the tank together in 40 mins. find, in how much time C alone will fill the tank?.

$E \rightarrow 3:4:5$.

$A+B+C \rightarrow 40$ mins $\rightarrow$ Time.

$\frac{1}{40} \rightarrow$ Efficiency.

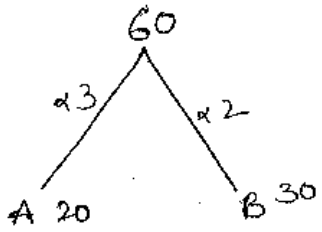
$12 \longrightarrow \frac{1}{40}$.

$5 \longrightarrow ?$.

$\frac{1}{40} \times 5 \times \frac{1}{12} = \frac{1}{480} \times 8 = \frac{1}{96} = 96$ mins

1hr 36 mins.

Q2. Pipes 'A' & 'B' can fill a tank in 20mns & 30 mins respectively. first, pipe 'A' worked for 10 mins & then Pipe 'B' was opened, The remaining tank is filled by the two pipes. find in how much time, the tank is filled?



5 | 20, 30
2 | 4, 6
2, 3.

$10 \times 3 = 30$,

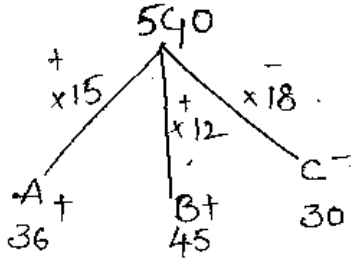
$60 - 30 = \frac{30}{5} = 6$ mins (Remaining tank)

$10 + 6 = 16$ mins (Total tank).

23. Pipes 'A' & 'B' can fill a tank in 36 mins & 45 mins, where as Pipe 'c' empties the tank in 30 mins. A & B were first opened, & after 4 mins, Pipe 'C' was also opened. find in how much time the tank can be filled? (5)

69

6 | 36, 45, 30
3 | 6, 45, 5
5 | 2, 15, 5
2, 3, 1



27 x 7 = 189

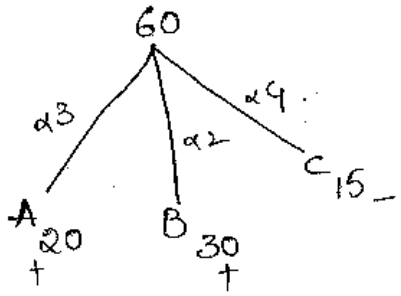
540 − 189 = 351

$\frac{351}{27-18} = \frac{351}{9} = 39$ mins.

39 + 7 = 46 mins.

24. Pipes 'A' & 'B' can fill a tank in 20 mins & 30 mins, But 'c' empties it in 15 mins. first A & B were opened & after 5 mins, Pipe C is opened. Find the time to fill the tank?

5 | 20, 30, 15.
3 | 4, 6, 3.
2 | 4, 2, 1
2, 1, 1



5 x 5 = 25.

60 − 25 = 35.

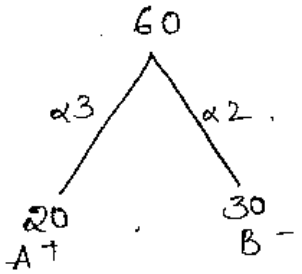
$\frac{35}{1}$ = 35 mins.

35 + 5 = 40 mins.

25. Pipe 'A' can fill a tank in 20 mins while B can empty it in 30 mins. 'A' was opened first, & after 5 mins, B was also opened. In How much time the total tank can be filled ?

70

$10 \mid 20, 30$
$2, 3.$



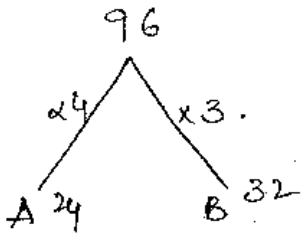
$3 \times 5 = 15$.

$60 - 15 = \frac{45}{1} = 45$ mins.

$45 + 5 = 50$ mins.

26 Pipes 'A' & 'B' can fill a tank in 24 mins & 32 mins respectively. If they were opened at the same time, & after some time Pipe 'B' was stopped. Then, the tank is filled in 18 mins. Find the time at which B was stopped?

$9 \mid 24, 32$
$2 \mid 6, 8$
$3, 4$



$A \rightarrow 18 \times 4 = 72$

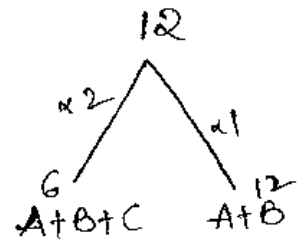
$96 - 72 = \frac{24}{3} = 8$ mins

27. Pipes A, B & C fill a tank in 6 hrs. The 3 pipes were opened at the same time, after 2 hrs, pipe 'C' was stopped. The remaining tank was filled by A & B in 8 hrs. find the time, if C alone fills the tank?

(6)

71

I method



$\Rightarrow \frac{12}{1} = 12$ hrs

II method

$A+B+C = 6 \rightarrow \frac{1}{6} \rightarrow$ Efficiency.

↑ Time

$A+B \rightarrow$

$\frac{1}{6} \times x = \frac{1}{3} > \frac{2}{3}$

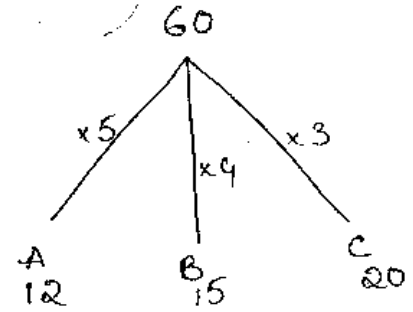
$2 \rightarrow 8$

$3 \rightarrow ?$

$\frac{3 \times 8^{4}}{2} = 12$ hrs

28. Pipes A, B & C fill a tank in 12 hrs, 15 hrs & 20 hrs. A is opened till the tank is filled, while B & C help A in alternative hours, for 1 hr each. Find the time to fill the tank?

4	12, 15, 20
5	3, 15, 5
3	3, 3, 1
	1, 1, 1



5+4 (A+B) + 5+3 (A+C)

1st hr, II hr.

2 hrs.

9+8 = 17.

$\frac{60}{17} = 3 \times 2 = 6 + 1 \rightarrow 7$ hrs.

5!
+ 9 (5+4) → 1 hr.

29. Pipe 'B' fills a tank 10 mins slower than A. If they both fill the tank in 12 mins. Find the time at which A can fill the tank.

72

Through option Verification.

a) 10 b) 20 c) 30 d) 40.

A B.

20 30.

$\frac{20 \times 30}{50} = 12$ mins (verification)

30. Pipe 'B' fills 5 mins earlier than 'A'. If they both fill in $13\frac{7}{11}$ mins find in how much time B fills the tank?

Through option Verification.

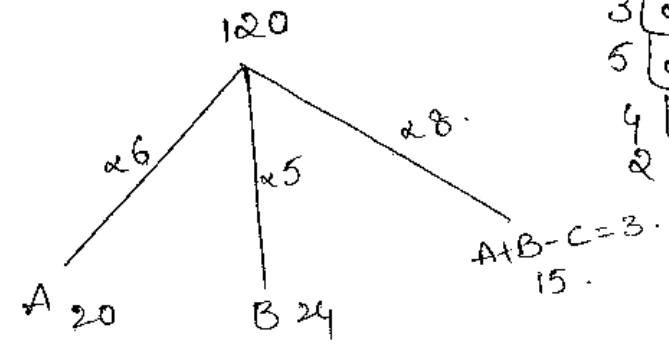
a) 15 b) 25 c) 20 d) 10.

A B.

30 25

$\frac{30 \times 25}{55} = \frac{150}{11} = 13\frac{7}{11}$ mins (verified).

31. 2 pipes can fill a tank in 20 mins & 24 mins & 3rd pipe can empty 3 gallons of water/min. If they were opened together, the total tank will be filled in 15 mins. find the Volume of the tank?



3 | 20, 24, 15
5 | 20, 8, 5
4 | 4, 8, 1
2 | 1, 2, 1
1, 1, 1

A+B-C=3.

6+5-8=3.

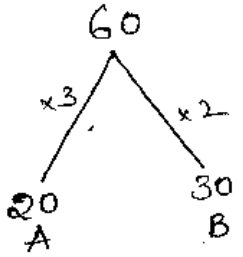
3=C

$\frac{120}{3} = 40\text{min} \times 3 = 120$ gallons.

34. Taps A & B can fill a cistern in 20 & 30 hrs respectively. Both the pipes are opened to fill the tank, after $\frac{1}{3}$rd of the tank is filled, due to a leakage formed at the bottom of the tank, $\frac{1}{3}$rd of the water is leaked. In how much time, the tank will be filled ?. (7)

73

$$\begin{array}{r|l} 5 & 20, 30 \\ 2 & 4, 6 \\ \hline & 2, 3. \end{array}$$



A+B =

$20\ \cancel{60} \times \frac{1}{\cancel{3}} = 20$

$\frac{20}{5} = 4$ mins.

due to leakage.

$3+2 = 5 \times \frac{-1}{3} = \frac{-5}{3}$

$5 - \frac{5}{3} = \frac{10}{3}$.

$A+B-C = 60$

$20 - C = 60$

$C = 40$.

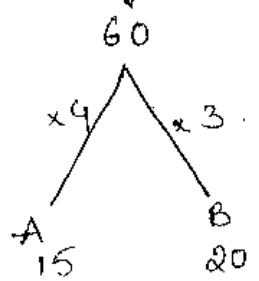
$C \rightarrow \frac{1}{3}$ is filled, $\frac{1}{\cancel{3}} \times \overset{20}{\cancel{60}} = 20$ remaining.

$\frac{40}{10/3} = 12$ mins,

$12 + 4 = \underline{16}$ mins.

35. A & B can fill a tank in 15 & 20 hrs. Both the pipes are opened together, after the tank was $\frac{1}{4}$th full, a leakage developed at the bottom of the tank, by which $\frac{1}{5}$th water of the water tank leaks out. find in how many hours, the tank will be filled ?.

$$\begin{array}{r|l} 5 & 15, 20 \\ \hline & 3, 4 \end{array}$$



A+B

$\cancel{60}^{15} \times \frac{1}{\cancel{4}} = 15$ mins

$\frac{15}{7} = 2\frac{1}{7}$

A+B−C

$4+3 = 7 \times -\frac{1}{5} = \frac{-7}{5}$

32. A Boy & a girl can fill a tank with water, the boy fills 4 litres of water for every 3 mins, & the girl fills 3 litres of water for every 4 mins. find the time at which 100 litres of water is filled by them together?

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E T

B : (4 litres x 3 min) x 4 = 16 litres / 12 mins

G : (3 litres x 4 min) x 3 = 9 litres / 12 mins.

(Here time is made equal) 25 litres / 12 mins.

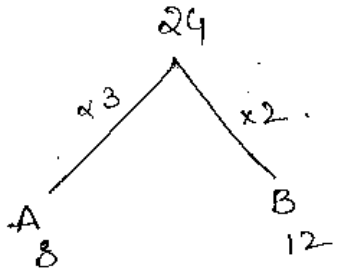
12 mins → 25 litres.

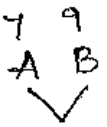
? ← 100 litres.

$\frac{4}{\cancel{100} \times 12}{\cancel{25}} = 48$ mins.

33. Pipes A & B can fill a tank in 8hrs & 12hrs respectively. Pipe 'A' was opened at 9 A.M & Pipe 'B' at 9 A.M. At what time, the total tank will be filled.

4 | 8, 12
2, 3





A → 3 x 2 = 6, 24 − 6 = 18

$\frac{18}{6} = 3\frac{3}{5}$

A+B → 6

$9 + 3\frac{3}{5} = 12\frac{3}{5}$ (or) $\frac{3}{\cancel{5}} \times \overset{12}{\cancel{60}} = 36$ mins.

12 hrs 36 mins.

$$7 - \frac{7}{5} = \frac{28}{5}$$

$$\frac{45}{28/5} = \frac{225}{28} = 8\frac{1}{28}.$$

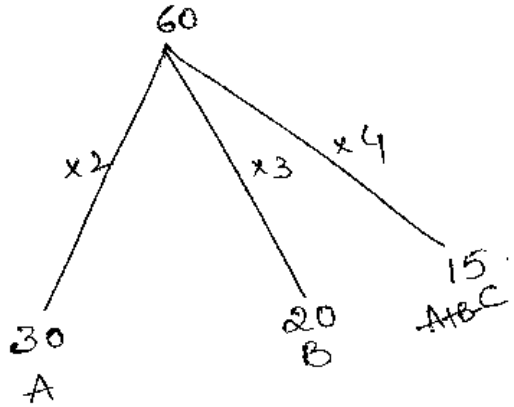
$$\Rightarrow 2\frac{1}{7} + 8\frac{1}{28} = 10\frac{5}{28} \text{ hrs.}$$

36 In a tank, 4 taps of equal efficiency are fixed at equal heights. first pipe is at the bottom/base of the tank & the fourth pipe is at $\frac{3}{4}$ th height of the tank. Calculate, in how much time the tank will be emptied, if the first pipe can empty the tank in 12hrs.

$$\frac{3}{4} + \frac{3}{3} + \frac{3}{2} + \frac{3}{1}$$

$$\frac{9+12+18+36}{12} = \frac{75}{12} = 6\frac{3}{12} \text{ or } 6\frac{1}{4} \text{ hrs.}$$

37. 3 pipes A, B & C are attached to a cistern. A & B fills the tank in 30hrs & 20hrs & pipe C leaks out 45 litres of water per minute. If all the 3 pipes are opened, the tank will be filled in 15hrs. find the capacity of the tank?.



5	20, 30, 15
3	4, 6, 3
2	4, 2, 1
2	2, 1, 1

$A + B - C = 4$

$5 - C = 4$

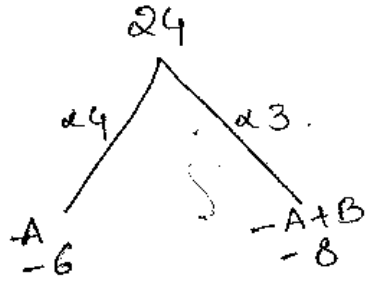
$1 = C$

C alone $\rightarrow \frac{60}{1} = 60\text{mins} \rightarrow 1\text{hr}.$

$60 \times 60 \times 45 = 1,62,000$ litres.

38. A leak at the bottom of the tank, empties it in 6 hrs & a tap that fills the tank at 4 litres/min is turned ON. If both the taps are opened, the tank will empty in 8 hrs, find the capacity of the tank?.

$2\overline{)6, 8}$
$3, 4$.



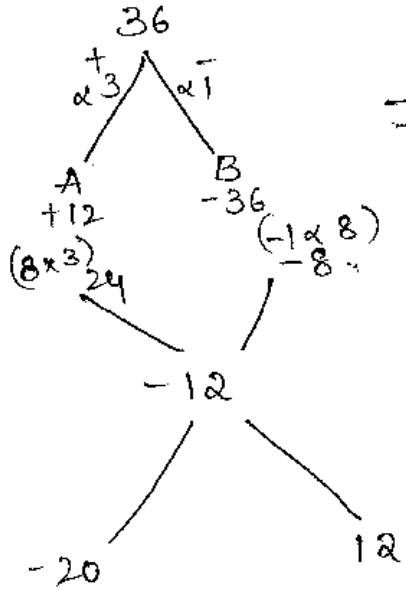
$-A+B = 3$.
$-4+1 = 3$.

$B = \frac{24}{1} = 24$ hrs.

$24 \times 60 \times 4 = \underline{5760}$ litres.

39. 8 taps are fixed in a tank, some are water taps & some are out let taps. Each water tap can fill the tank in 12 hrs & each out let tap can empty it in 36 hrs. Then find how many water taps are to be fixed, if the whole tank is filled in 3 hours.

$12\overline{)12, 36}$
$1, 3$.



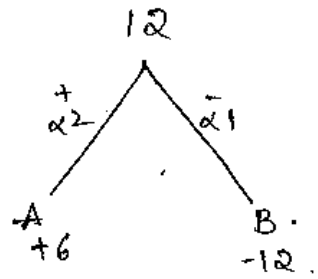
$\frac{-36}{3} = -12$.

5 : 3.

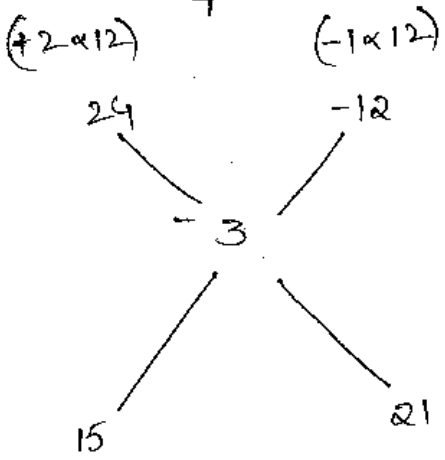
$\frac{5}{8} \times 8 = \underline{5}$ taps.

40. 12 taps are fixed in a tank, some are Water taps & the rest are Outlet taps, each Water tap can fill in 6hrs & each Outlet tap can empty in 12hrs. If all the taps are opened together, then the tank is filled in 4hrs, find the no. of Water taps?. (9)

$6 \mid 6, 12$
$1, 2$



$\frac{-12}{4} = -3$

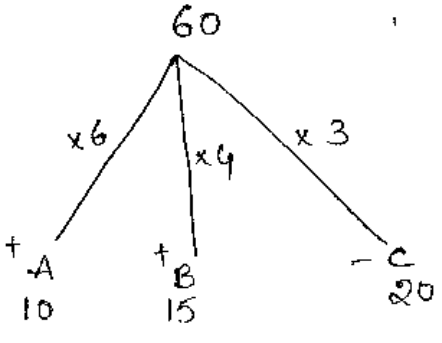


5 : 7

$\frac{5}{12} \times 12 = 5$ taps

41. A & B can fill a tank in 10hrs & 15hrs, an Outlet tap can empty it in 20 hrs. Initially taps A & B are opened & when the tank was supposed to be filled, it was found that tap C was opened mistakenly, & now C is stopped. After how much time, the tank is filled?.

$5 \mid 10, 15, 20$
$2 \mid 2, 3, 4$
$1, 3, 2.$



$A+B = \frac{60}{10} = 6$ hrs.

C can empty,

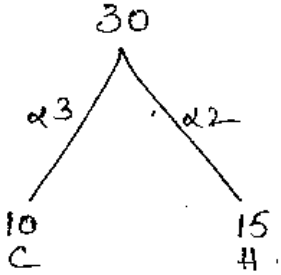
$-3 \times 6 = -18$ hrs.

$A+B = \frac{+18}{+5} = 1\frac{4}{5}$ (or)

1hrs 48 mins.

42. A bath tub can be filled with cold water pipe in 10 mins & by a hot water tap pipe in 15 mins. A person opened the two pipes & after some time thought that the bath tub can might be filled, but after closing the leakage at the bottom of the tub, the tub is filled in 4 mins. Find, the time the leakage will empty the tank in?.

$5 \mid 10, 15$
$2, 3.$



$A+B = \frac{30}{5} = 6.$

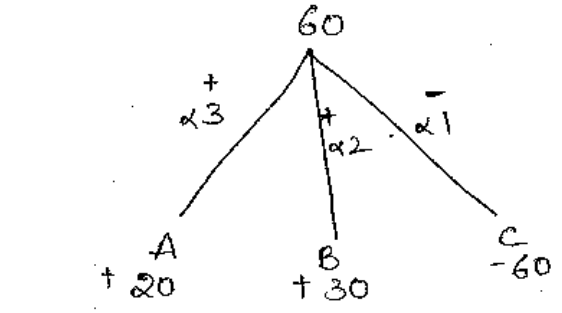
$3 \times \text{leakage} = 5 \times 2 \text{ min}.$

$\text{leakage} = \frac{10}{3}$

$\frac{30}{10/3} = 9 \text{ mins}$

43. 3 pipes A, B & C are attached to a cistern. Pipes A & B can fill the cistern in 20 & 30 hrs respectively, where as pipe C empties it in 60 hrs. Pipes A & C are opened for the 1hr & Pipes B & C are opened for the 1hr. This process is continued untill the cistern is filled. In how much time, the tank will be filled?.

$10 \mid 20, 30, 60$
$2 \mid 2, 3, 6$
$3 \mid 1, 3, 3$
$1, 1, 1$



A+C → 2 → 1hr

B+C → 1 → 1hr

2 hrs → 3 units

×20 ×20

40 Hrs 60 Hrs

40 Hrs

44. In what time could a cistern is filled by the 3 pipes whose diameters are 1cm, $1\frac{1}{3}$ cm & 2cm running together, if the largest alone fills it in 61 mins, the amount of water flowing in by each pipe being proportional to the square of its diameter. (10)

$$A : B : C$$

$$1 : \frac{9}{3} : 2.$$

Efficiency $9 : 16 : 36.$

$$\text{Tank } C = 36 \times 61$$

$$9 + 6 + 36 = 61$$

$$\frac{36 \times 61}{61} = 36 \text{ mins.}$$

45. In what time, would a cistern be filled by 3 pipes whose diameters are 1cm, 2cm & 4cms running together when the largest alone will fill it in $1\frac{1}{20}$ hrs, the amount of water flowing by each pipe being proportional to the square of its diameter?.

$$A : B : C$$

$$1 : 2 : 4$$

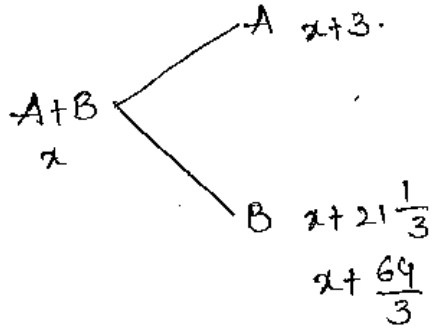
$$1 : 4 : 16.$$

Capacity of the tank

$$\frac{16 \times \frac{21}{20}}{21}$$

$$\frac{4 \cancel{16} \times \cancel{21}}{\cancel{5} \cancel{20} \times \cancel{21}} = \frac{4}{5} \times 60^{12} = 48 \text{ mins.}$$

46. 1 pipe A, takes 3 mins more time to fill the tank, than two pipes A & B are opened together to fill it, If pipe B takes $21\frac{1}{3}$ mins more time to fill the tank than A & B. find in how much time, they both fill the tank? 80



$$\sqrt{3 \times \frac{64}{3}} = \sqrt{64} = 8 \text{ hrs}.$$

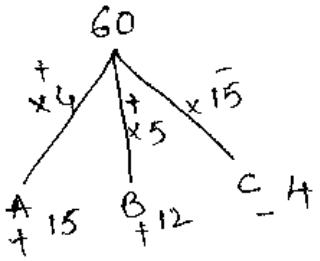
47. 12 pipes of equal capacity fill a tank in 45 mins, How many pipes of that same capacity are required to fill the tank in 30 mins?

$$12 \times 45 = P_2 \times 30$$

$$18 \text{ pipes}$$

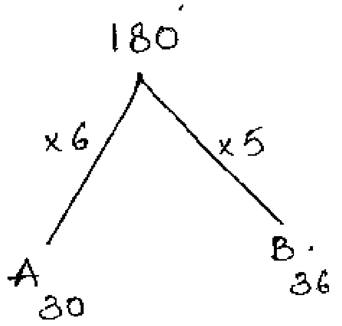
48. 2 pipes can fill a tank in 15 hrs, & 12 hrs & another pipe can empty it in 4 hrs. If all the 3 pipes are opened at 8, 9, 11 Am, at what time, the tank is emptied?.

3 | 15, 12, 4
4 | 5, 4, 4
5, 1, 1



49. 2 pipes can fill a reservoir in 30 mins & 36 mins. Both the pipes are opened together, due to some problem, first pipe fills the reservoir at 5/6 th of its original speed & II pipe fills at $\frac{9}{10}$ th of its original speed. Immediately the problem was solved, & the reservoir was filled in $15\frac{1}{2}$ mins. for how long did this problem remained?

$$6 \,\underline{|\, 30, 36}$$
$$5, 6.$$



$A+B = 15\frac{1}{2}$ mins.

$\frac{31}{2} \times 11$

$\frac{341}{2} = 170.5$

$$A \to \cancel{6} \times \frac{5}{\cancel{6}} = 5 \text{ time.}$$

$$B \to \cancel{5} \times \frac{9}{1\cancel{0}_2} = 4.5 \text{ time.}$$

$$A+B = 9.5$$

$$\begin{array}{r} 180 \\ -170.5 \\ \hline 9.5 \end{array}$$

$\frac{\cancel{9.5}}{\cancel{9.5}} = 1$ min.

50. A tap drips at a rate of 2 drops per sec. 400 drops make 50 ml. The no. of litres wasted in 500 days.

500 x 24 x 60 x 60.
days hours mins secs.

$$\frac{\overset{10800000}{\cancel{43200000}} \times \cancel{2}}{\cancel{8}\ \frac{\cancel{400}}{\cancel{50}}}$$

4

$$\Rightarrow \frac{10800\cancel{000}}{1\cancel{000}} = 10800 \text{ litres.}$$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Distance = Speed x time.

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{time} = \frac{\text{distance}}{\text{speed}}$$

D	Km	meter
T	hr	secs
S	Km/hr	m/sec

$$\text{Km/hr} = \frac{1000\text{m}}{60\text{m} \times 60\text{sec}} = \frac{10\text{m}}{36\text{m/sec}} = \frac{5}{18}\ \text{m/sec}$$

Km/hr to m/sec:

$$x\ \text{Km/hr} = x \times \frac{5}{18}\ \text{m/sec}.$$

m/sec to Km/hr.

$$x\ \text{m/sec} = x \times \frac{18}{5}\ \text{Km/hr}.$$

$\Rightarrow$ 18 Km/hr $= 18 \times \frac{5}{18} = 5$ m/sec.

$\Rightarrow$ 5 m/sec $\times \frac{18}{5} = 18$ Km/hr.

$\Rightarrow$ 36 Km/hr $= \frac{2}{36} \times \frac{5}{18} = 10$ m/sec.

$\Rightarrow$ 54 Km/hr $= \frac{3}{54} \times \frac{5}{18} = 15$ m/sec.

$\Rightarrow$ 72 Km/hr $= \frac{4}{72} \times \frac{5}{18} = 20$ m/sec.

$\Rightarrow$ 90 Km/hr $= \frac{5}{90} \times \frac{5}{18} = 25$ m/sec.

$\Rightarrow$ 108 Km/hr $= \frac{6}{108} \times \frac{5}{18} = 30$ m/sec.

$\Rightarrow$ When 2 persons, travel in opposite direction, we have to add their speeds.

x Km/hr $\longrightarrow$ $\longleftarrow$ y Km/hr $\Rightarrow (x+y)$ Km/hr

$\Rightarrow$ When 2 persons, travel in the same direction, we have to take the difference of their speeds.

x Km/hr $\longrightarrow$

y Km/hr $\longrightarrow$ $\Rightarrow (x-y)$ Km/hr.

1 minute = 60 seconds. ; 1 hr = 60 minutes.

1 Hour $= \frac{1}{60}$ minutes.

1. If the speed of a bus is 126 Km/hr. find its speed in m/sec.

$$126 \times \frac{5}{18} = 35 \text{ m/sec}.$$

2. If the speed of a bus is 45m/sec. find its speed in Km/hr.

$$45 \times \frac{18}{5} = 162 \text{ Km/hr}.$$

3. A person travels at a speed of 60 Km/hr. find his speed in m/sec.

$$60 \times \frac{5}{18} = \frac{100}{6} = 16\frac{4}{6} = 16\frac{2}{3} \text{ m/sec}.$$

4. A person travels a distance of 600m in 45 secs. find his speed in Km/hr.

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

$$\frac{600}{45} = 13\frac{3}{9} = 13\frac{1}{3}$$

$$\Rightarrow \frac{120}{9} \times \frac{18}{5} = 48 \text{ Km/hr}.$$

5. A person travels a distance of 900m in 2 mins. find his speed in Km/hr.

$$\frac{900}{2 \times 60} = \frac{15}{2} = \frac{15}{2} \times \frac{18}{5} = 27 \text{ Km/hr}.$$

6. A person travels a distance of 400m at a speed of 25m/sec. find his time.

$$T = \frac{D}{S} = \frac{400}{25} = 16 \text{ secs}$$

7. A distance of 700m is travelled at a speed of 60Km/hr. Find the time?

$D = 700m, \quad S = 60 Km/hr.$

$T = \frac{D}{S}$

$60 \times \frac{5}{18} = \frac{\cancel{300}\ \cancel{700}}{\cancel{18}\ 6} = \frac{50}{3}$

$= \frac{700}{50/3} = \frac{\cancel{700}^{14} \times 3}{\cancel{50}} = 42 \text{ secs}$

8. With a speed of 30 m/sec, in 40 secs. find the distance?.

$D = S \times T.$

$D = 30 \times 40 = 1200 m$

9. A person with a speed of 90 km/hr, travels for 50 seconds. find his distance.

$D = S \times T$

$\cancel{90}^{5} \times \frac{5}{\cancel{18}} = 25 m/s/c \times 50 s/c = 1250 m$

10. A person at a speed of 12 km/hr travels for 40 mins.

$\Rightarrow \cancel{12}^{2} \times \frac{40}{\cancel{60}} = 8 km.$

11. A person from his place, walks to go forward & returns to the same place by running, it takes 6hrs. If he runs to & fro it takes 4hrs 40mins. Then, find the time if he walks to & fro.

A —(W / R)— B 6hrs $W + R = 6$

A —(R / R)— B 4hrs 40mins $R + R = 4:40$

$2R = 4:40$

$R = 2:20$

$W + R = 6$

$W + 2.20 = 6$

$W = 3:40$

$W + W = 3:40 + 3:40$

$= 7:20$ mins.

(or) 2nd method

$6 - 4.40 = 1.20$

$6 + 1.20 = 7:20$ mins

12. A person travels from A to B by walk, & from B to A by cycle & the total time taken is 8hrs. If he travels both the time by cycle, it takes 2 hrs less time than before. Then find the time if he walks for both the time. 85

4

$$W + C = 8 \text{ hrs}.$$

$$C + C = 6 \text{ hrs} \quad (8-2)$$

$$2C = 6$$

$$C = 3.$$

$$W + 3 = 8$$

$$W = 5 \text{ hrs}.$$

$$W + W = 5 + 5 = 10 \text{ hrs}.$$

II method

$$8 + 2 = 10 \text{ hrs}.$$

13. In order to reach his destination, a person travels at a speed of $\frac{5}{7}$ th of his usual speed and he is 10 mins late. Find the normal time to reach his place?

$$\text{Speed} = \frac{5}{7} \rightarrow 2$$

$$\text{Time} = \frac{7}{5} \rightarrow 2.$$

$$2 \longrightarrow 10$$

$$5 \rightarrow ?.$$

$$\frac{5 \times 10^{5}}{2} = 25 \text{ mins}$$

14. A person travels at a speed of $\frac{8}{5}$ th of his usual speed & reaches 12 mins early. Then find the Normal time to reach his place?. 86/5

Speed = $\frac{8}{5}$ > 3. Time $\frac{5}{8}$ > 3.

3 — 12 mins

8 → ?

32 mins.

15. The ratio b/w the speeds of a bus & a lorry is 5:4. Bus travels a distance of 200 km in 4 hrs. find the distance travelled by the lorry in 300 km distance?.

$\text{Speed} = \frac{\text{distance}}{\text{time}}$.

Speed = 5:4

Time = 4:5

$\text{Speed} = \frac{200}{4} = 50$ km/hr.

Speed $5 \xrightarrow{\times 10} 50$ km/hr

$4 \xrightarrow{\times 10} 40$ km/hr

time 40, 50.

$\frac{300}{40} = 7.5$ hrs

16. A person travelling at a speed of 10Km/hr, increases his speed by 2km for every hour. find the distance travelled by him in 20 hrs.

10, 12, 14, ...

$\frac{n}{2}(2a + (n-1)d)$

a = 10

d = 2

n = 20.

$\Rightarrow \frac{20}{2}(2(10) + (20-1)2)$

$\Rightarrow 10(20 + 90 - 2)$

$\Rightarrow 10(60 - 2)$

$\Rightarrow$ 580 km

17. A person travelling at a speed of 40 Km/hr, increases his speed by 10 Km for every hour. find the time taken by him to travel a distance of 185 Km. 6

1hr	2nd	3rd	4th
40	50	60	70

150 Km.

$$T = \frac{D}{S} = \frac{35}{70} = \frac{1}{2}.$$

$$\Rightarrow 3\frac{1}{2} \text{ hrs}.$$

18. A bus travels a distance of 120 Km in 3hr 20 mins & a person travels a distance of 400m in 36 secs. Find the ratio of their speeds.

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{120}{3\frac{20}{60}} = \frac{120}{\frac{10}{3}} = 120 \times \frac{3}{10} \times \frac{3}{18} = 10$$

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{400}{36}$$

19. A person travels some distance by cycle, half of the distance by walk, & the time is doubled. Then find the ratio b/w the speeds?

$$S_1 : S_2$$

$$\frac{D}{T} : \frac{D}{T}$$

$$\frac{1}{1} : \frac{\frac{1}{2}}{2}$$

$$1 : \frac{1}{4}$$

$$4 : 1$$

20. The ratio b/w Speeds of two vehicles is $\frac{2}{3} : \frac{3}{4}$. Find the ratio b/w their times?

$$\frac{2}{3} : \frac{3}{4}$$

Speeds → 8 : 9

Time → 9 : 8.

21. The ratio b/w the Speeds of 3 vehicles is 3:4:5. Find the ratio b/w their times.

Speeds 3 : 4 : 5.

Time $\frac{1}{3} : \frac{1}{4} : \frac{1}{5}$.

3, 4, 5

$$\frac{60}{3} : \frac{60}{4} : \frac{60}{5}$$

⇒ 20 : 15 : 12.

22. A person travels by Bus & in 1minute, he crosses 21 trees. The distance b/w 2 trees is 50ms. find the speed of the bus in hrs.

20 × 50 = 1000m

$$\Rightarrow \frac{20}{\cancel{1000}} \times \frac{18}{\cancel{5}} = 60 \text{ km/hr}.$$

23. If a person travels at a speed of 30 km/hr for 2 hrs & 40 km/hr for 3 hrs, find his average speed?

$$\text{Avg Speed} = \frac{\text{total distance}}{\text{total time}}$$

30 × 2 + 40 × 3.

$$\frac{60 + 120 = 180 \text{ km}}{2 + 3 \rightarrow 5} = 36 \text{ km/hr}.$$

24. If a person travels at a speed of 15 Km/hr for 4 hrs, & another 6 hrs at 20 Km/hr and at last 5 hrs @ 50 Km/hr. find his average speed?.

$$15\times4 + 20\times6 + 50\times5$$

$$60 + 120 + 250$$

$$(4+6+5) \rightarrow \frac{430}{15} \quad \frac{86}{3} = 28\frac{2}{3} \text{ Km/hr}.$$

25. A person in his journey, travelled 500 Km, first 300 Km at 60 Km/hr speed & the rest at 40 Km/hr speed. find the average speed?

$$\frac{300}{60} = 5\text{hrs} \qquad \frac{200}{40} = 5\text{hrs}. \qquad (5+5)\overline{)500} \quad 50 \text{ Km/hr}.$$

26. 2 persons travel in the same direction @ 60 Km/hr speed & 45 Km/hr at speed. After 3 hrs, find the distance b/w them.

$$60 - 45 = 15.$$

$$15 \times 3 = 45 \text{ Km}.$$

27. 2 persons travel in the same direction at 60 Km/hr speed & 40 Km/hr speed and they started together. find the time at which the distance b/w them is 60 Km?.

$$60 - 40 = 20$$

$$T = \frac{D}{S} = \frac{60}{20} = 3\text{hrs}.$$

28. 2 persons start from the same place, at same time in North & South directions @ 40 Km/hr & 30 Km/hr speed. After 50 mins, find the distance b/w them?

$$40 + 30 = 70 \text{ Km/hr}.$$

$$D = S \times T = 70 \times \frac{50}{60} = \frac{350}{6} = 58\frac{1}{3} \text{ Km}.$$

29. 2 persons travel in opposite directions from the same place at a speed of 10 Km/hr & 15 Km/hr. After how much time, the difference b/w their distance is 75 Km.

90

$$10+15 = 25 \text{ Km/hr}.$$

$$T = \frac{D}{S} = \frac{75}{25} = 3 \text{ hrs}.$$

30. A thief travelling at a speed of 10 Km/hr was chased by a Police at a speed of 15 Km/hr, the distance b/w them is 600 m. Find the time, the thief will be caught in ?.

$$D = 600\text{m}. \qquad 15 - 10 = 5 \text{ Km/hr}.$$

$$T = \frac{D}{S}.$$

$$= \frac{600}{\frac{5 \times 5}{18}} = 24 \times 18 = 432 \text{ secs}.$$

31. A thief travelling at a speed of 60 Km/hr was chased by a Police at a speed of 80 Km/hr; the distance b/w them is 800m. Find the time, the thief will be caught in ?.

$$D = 800\text{m}. \qquad 80 - 60 = 20 \text{ Km/hr}.$$

$$T = \frac{D}{S}.$$

$$= \frac{800}{\frac{20 \times 5}{18}} = 18 \times 8 = 144 \text{ secs}.$$

32. A police traced a thief at a distance of 300m, who is travelling at a speed of 8 Km/hr, & he travelled at a speed of 10 Km/hr to catch him. Find the distance where the police caught the thief?

$$10 - 8 = 2 \text{ Km/hr}.$$

$$T = \frac{D}{S} = \frac{300\text{m}}{\frac{2 \times 5}{18}} = \frac{2700}{5} = 540 \text{ secs}.$$

$$D = S \times T$$

$$10 \text{ Km/hr} \times \frac{5}{18} \times 540 = 1500 \text{ m}$$

(Police speed)

33. A thief robbed a car at 2pm & travelled by it at 60 Km/hr. Spee At 4pm, the owner recognized it and at a speed of 80 Km/hr travelled in another car. Find the time, the thief is caught in?

$80 - 60 = 20$ Km/hr.

1 → 60 Km.

2 → 120 Kms.

$T = \frac{D}{S}$

$\frac{120}{20} = 6$ hrs

4pm + 6 = 10pm

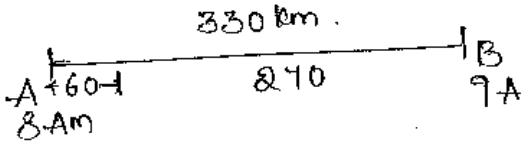
34. The distance b/w A & B is 1200 mts. From that 2 places, 2 person start at the same time & travel in opposite direction at a speed of 40 Km/hr & 32 Km/hr. After, what time they will meet?

$T = \frac{D}{S}$ $\quad 40 + 32 = 72.$

$\frac{1200}{72 \times \frac{5}{18}} = \frac{1200}{20} = 60$ secs = 1 min

35. The distance b/w 2 stations A & B is 330 Kms. A bus started from A @ 8 AM @ speed of 60 Km/hr. Another bus started from B @ 9 AM @ speed of 75 Km/hr. If they travel in opposite directions, after what time they will meet?

$60 + 75 = 135$ Km/hr.



$\frac{270}{135} = 2$ hrs (After what time)

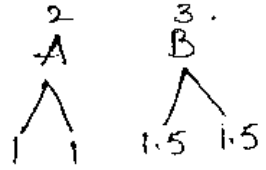
9 + 2 = 11 AM (At what time).

36. A Husband & wife travel in opposite direction on a circular path of 800m at 5 Km/hr & 4 Km/hr speed. find after how much time, they both meet for the first time?. 92

$5+4 = 9$ Km/hr.

$$T = \frac{D}{S} = \frac{800}{9 \times 5} = \frac{1600}{5} = 320 \text{ secs.}$$

37. On a circular path, 2 persons travel at the same time in opposite direction, 2 rounds/hr & 3 rounds/hr at 5AM. How many times they will meet before 6:30 AM.



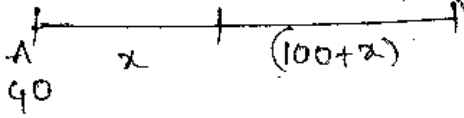
1hr ⟶ 2+3 = 5 rounds

$5+2 = 7$ times.

38. From 2 stations A & B, 2 buses at speed of 40 Km/hr & 50 Km/hr travel in opposite directions. At the time of their meet, 1 bus travelled 100 Km more than the other. Find distance b/w the 2 stations.

$40+50 = 90$ Km/hr.

$D = S \times T$.



$50 - 40 = 10$

$10 \rightarrow 100$.

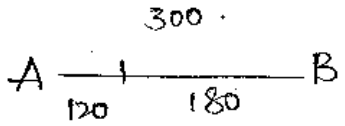
$T = \frac{100}{10} = 10$ hrs.

$D = S \times T$.

$= 90 \times 10 = 900$ Kms.

39) The distance b/w two stations A & B is 300 kms. From these 2 stations 2 buses travel in opposite direction. From A, they meet at a distance of 120 Km. Find the ratio b/w the difference of their speeds?

93

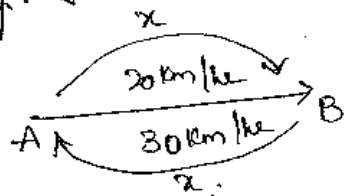


D → 12ϕ : 18ϕ

2 : 3.

S → 2 : 3 (B'coz the ratio b/w distance & speeds is always the same)

40) A person, inorder to reach his place travels at 20 Km/hr speed & again returns at a speed of 30 Km/hr. It took 10 hrs time for the total Journey. Find the distance from A to B.



I method

$$\frac{x}{20} + \frac{x}{30} = 10$$

$$\frac{3x + 2x}{60} = 10$$

$$5x = 600$$

$$x = 120 \text{ Km}$$

II method

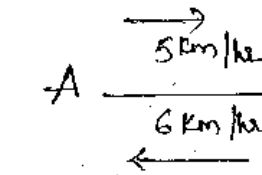
If equal distance is given, then

$$\frac{\text{Product of Speeds}}{\text{Sum of Speeds}} \times \text{time}.$$

$$\frac{20 \times 30}{50} \times 10.$$

$$= 120 \text{ Km}$$

41. A person at a speed of 5 Km/hr travels some distance and returns at 6 Km/hr speed. It took 44 mins for him. Find the total distance of this Journey?.



$$\frac{44}{60} = \frac{22}{30} = \frac{11}{15}$$

$$\Rightarrow \frac{5 \times 6}{11} \times \frac{11}{15} = 2 \text{ Km}$$

$$2 \text{ Km} + 2 \text{ Km} = 4 \text{ Km}$$

42. A person travels at a speed of 10 Km/hr & returns @ 5 Km/hr speed. It took 45 mins for the total Journey. Find the distance?

$$D = ST$$

$$\frac{10 \times 5}{15} \times \frac{45}{60} = \frac{15}{6} = 2.5 \text{ Km}$$

43. A person travels $\frac{3}{4}$ th part of a distance at a speed of 10 Km/hr & the remaining at a speed of 20 Km/hr. It took 35 mins for the total Journey. Find the total distance?

$$\frac{\frac{3}{4}x}{10 \text{ Km/hr}} + \frac{\frac{x}{4}}{20 \text{ Km/hr}} = \frac{35}{60} \text{ mins.}$$

$$\frac{3x}{40} + \frac{x}{80} = \frac{35}{60}$$

$$\frac{6x + x}{8} = \frac{35}{6}$$

$$36x + 6x = 280$$

$$42x = 280$$

$$x = \frac{280}{42} = \frac{40}{6} = 6\frac{2}{3} \text{ Kms}$$

44. A persons starts at 10 km/hr speed & returns at a speed of 15 km/hr & hence he reaches 20 mins early. Find the distance? 15 min before

$$\frac{\text{Product of Speeds}}{\text{Difference of Speeds}} \times \text{time}.$$

$$\frac{10 \times 15}{15 - 10} \times \frac{20}{60}$$

$$\frac{10 \times 15}{5} \times \frac{1}{3} = \frac{150}{15} = 10 \text{ km}$$

45. If a person travels at a speed of 40 km/hr, he reaches the railway station 20 mins early. If he travels at 30 km/hr speed, he reaches only 10 mins early. Then find the distance from his House to the Railway station.

$$\frac{\cancel{40} \times \cancel{30}}{\cancel{10}} \times \frac{10}{60} = 20 \text{ km}$$

46. If a person travels at a speed of 20 km/hr, he reaches the office 10 mins late, if he travels at a speed of 30 km/hr he reaches 10 mins early. Find the normal time, to reach the office & also the distance?

$$D = \frac{20 \times 30}{10} \times \frac{20}{60} = 20 \text{ km}.$$

$$T = \frac{D}{S} = \frac{20 \text{ km}}{20} \quad \text{(We can take any Speed)}$$

$$= 60 \text{ mins (late)}$$

$$-10$$

$$50 \text{ mins time.}$$

$$\frac{20 \text{ km}}{30} \times 60$$

$$= 40 \text{ min (early)}$$

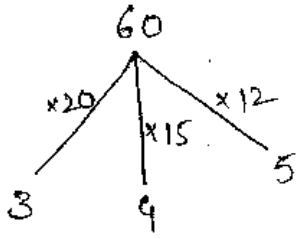
$$+10$$

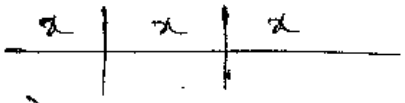
$$50 \text{ mins}$$

47. A person travels 3 equal distances at 3 Km/hr, 4 Km/hr, & 5 Km/hr speed. It took a total time of 45 mins. Find his total distance of travel?

96

3, 4, 5





$$\frac{x}{3} + \frac{x}{4} + \frac{x}{5} = \frac{47}{60} \quad (20+15+12)$$

$$\frac{20x + 15x + 12x}{60} = \frac{47}{60}$$

$$47x = 47$$

$$x = 1\text{Km}.$$

$$3x = 3 \times 1 = 3\text{Km} \rightarrow \text{total}.$$

48 One day, a boy goes to school at a speed of 5Km/hr and he is late by 10 mins. On the next day, he travels at a speed of 6Km/hr & he reaches 5 mins early. Find the distance from his house to school?

$$\frac{\text{Product of Speeds}}{\text{difference of Speeds}} \times \text{time}.$$

$$\frac{5 \times 6}{1} \times \frac{15}{60_2} = 7.5\text{ Km}$$

49. Raju at 7AM travels on cycle for some distance, due to its repair, he sat idle for 35 mins & again returns to go his house by walk & reaches at 1pm. The speed when he travelled on cycle is 10Km/hr & the speed by walk is 1Km/hr. Find the distance of his travel? 16

When equal distance is given,

$\frac{AB}{A+B} \times$ time

A ——— B

$\frac{\cancel{10}^{5} \times 1}{11} \times \frac{65}{\cancel{12}_{6}} = \frac{325}{66} = 4\frac{61}{66}$ Km.

7 : 13

6 hrs.

5 : 60
− 35
5 : 25.

$5 \cdot \frac{\cancel{25}}{\cancel{60}} \frac{5}{12}$.

$5\frac{5}{12} = \frac{65}{12}$.

50. A Car travels at $\frac{5}{7}$th of its usual speed, & reaches a distance of 42Km at in 1hr 40mins 48 secs. Find the usual speed of his Car?

D = ST.

$42\text{Km} = \frac{5}{7}x \times \frac{42^{6}}{\cancel{255}}$

$35 = x$

1 Hr 40min $\frac{48\text{sec}}{60}$

1Hr 40m. $\frac{4}{5}$.

1Hr $\frac{204}{5 \times 60}$

$1\frac{17}{25} = \frac{42}{25}$.

51 A person travels a distance of 380 Km in 8 hrs. first, some distance at a speed of 40 km/hr & the remaining at a speed of 60 km/hr. find the distance travelled by him in the II part.

I method

$$\frac{x}{40} + \frac{380 - x}{60} = 8 \text{ hrs.}$$

98

20 | 40, 60
2, 3.

$$\frac{3x + 2(380 - x)}{120} = 8$$

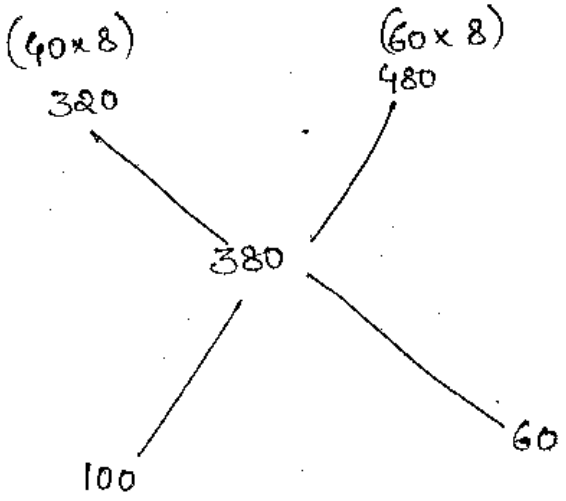
$$\frac{3x + 760 - 2x}{120} = 8$$

$$760 + x = 960$$

$$x = 200$$

$380 - 200 = 180$ — I part.

II method



~~100 : 60~~

5 : 3

$D = S \times T$

$60 \times 3 = 180$ Km

52. A person travels a distance of 61 Km at in 9 hrs. some distance by walk at a speed of 4 Km/hr & the remaining by cycle at a speed of 9 Km/hr. Find the distance travelled by him by walk?.

(4×9) (9×9)

36 81

61

20 25

20 : 25

4 : 5

D = S × T.

4 × 4 = 16 Km → Walk.

9 × 5 = 45 Km → Cycle.

*53. A train starts from A at 4 AM & reaches B at 4 pm. Another train starts from B at 9 AM & reaches A at 5pm. Find the time at which the 2 trains meet.

4 AM to 4 pm → 12 hrs.

9 AM to 5 pm → 8 hrs.

4 | 8, 12

2, 3

24

×2 ×3

8 12

5 pm 8 hrs. 9 AM

A B.

4 AM 2×2=4 20 Km. 4 pm

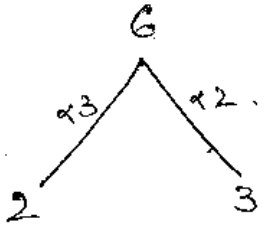
9 AM 12 hrs.

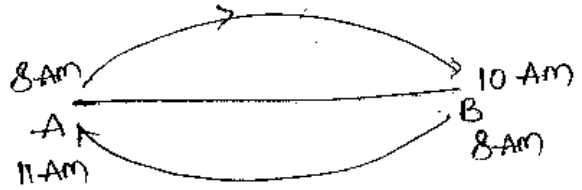
$\frac{8+12}{2+3} = \frac{20}{5} = 4$ hrs.

⇒ 9 + 4 = 1 pm

54. A train starts from Delhi to Vijayawada at 8 Am & reaches at 10 Am. Another train starts from Vijayawada at 8 Am & reaches Delhi at 11 Am. At what time, the 2 trains will meet?

8 Am to 10 Am → 2 hrs.
8 Am to 11 Am → 3 hrs.





$\frac{6}{5} = 1\frac{1}{5}$ (or) $\frac{1}{5} \times 60^{12}$.

1 hr 12 mins.

8 + 1.12 → 9.12 Am (time)

55. Distance b/w stations A & B is 120 Kms. One person starts from A to B at 25 Km/hr speed & another person starts from B to A at 15 Km/hr speed. At the same time, a dog at 30 Km/hr speed runs from A to B & B to A, till they meet. Find the distance that the dog runs in total?

D = 120 Km S = 25 + 15 = 40 Km/hr

$T = \frac{D}{S} = \frac{120}{40} = 3$ hrs.

$S = \frac{D}{T}$; $D = S \times T$. $30 \times 3 = 90$ Kms

* 56. A person travelled some distance on scooter. If he increases his speed increased by 3Km/hr than the usual speed, he reaches 40 mins early. If the speed is reduced by 2Km/hr then it's late by 40 mins. Then find the distance travelled by him ?.

101

To find original speed ?

$$\frac{2S_1S_2}{S_1-S_2} = \frac{2\times 3\times 2}{3-2} = \frac{12}{1} = 12 \text{ Km/hr}.$$

$$\frac{\overset{4}{12}\times\overset{5}{15}}{\cancel{3}} \times \frac{\overset{2}{\cancel{40}}}{\cancel{60}} = 40 \text{ Km}$$

57. A person travels at a speed of 8Km/hr. for every 10 Kms of travelling, he takes rest for 5mins. Then inorder to travel a distance of 40Km, the time taken by him is ?.

$$\frac{40}{10} = 4-1 = 3\times 5 = 15 \text{ mins}.$$

$$T = \frac{40}{8} = 5 \text{ hrs}.$$

$\Rightarrow$ 5hrs 15mins.

58. A person travels at a speed of 12Km/hr. for every 5Kms of travelling, he takes rest for 3mins. Then inorder to travel a distance of 60Km, the time taken by him is ?.

$$\frac{60}{5} = 12-1 = 11\times 3 = 33 \text{ mins}$$

$$T = \frac{60}{12} = 5 \text{ hrs}.$$

5hrs 33mins.

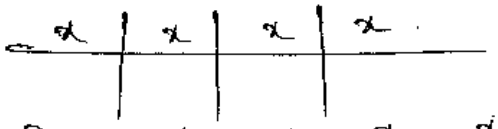
59. A person travels from A to B at a speed of 40 Km/hr & from B to A at 60 Km/hr. find his average speed?

$$\frac{2xy}{x+y}$$

$$\Rightarrow \frac{2 \times 40 \times 60}{100} = 48 \text{ Km/hr}.$$

If 3 speeds are given, then $\frac{3xyz}{xy+yz+zx}$

60. A Car travels 4 equal distances at 10 Km/hr, 20 Km/hr, 30 Km/hr & 40 Km/hr speed. find the average speed of the Cars.



$$T = \frac{D}{S} = \frac{x}{10} + \frac{x}{20} + \frac{x}{30} + \frac{x}{40}$$

$$\frac{12x+6x+4x+3x}{120} = \frac{25x}{120}$$

$$S = \frac{4x}{\frac{25x}{120}} = \frac{4 \times 24}{5} = \frac{96}{5} = 19.2 \text{ Km}$$

$$24$$

61. A person travels a distance of 20 Km in 30 mins, but after travelling for half of the distance, $\frac{3}{5}$th of time is completed. If he has to travel the remaining distance in the remaining time, find the speed?

20 Km — 30 mins

$30 \text{ mins} \times \frac{3}{5} = 18$ mins.

$30 - 18 = 12$ mins.

10 Km — 12 mins.

$S = \frac{D}{T} = \frac{10}{\frac{12}{60}} = \frac{600}{12} = 50$ Km/hr.

62. A person travelling at a speed of 10 Km/hr reaches his place at 2pm. If he travels at 15 Km/hr speed, he reaches at 12noon. In order to reach at 1pm, the speed he has to travel is?

$\frac{\text{Product of Speeds}}{\text{difference of Speeds}} \times \text{time}$.

$\frac{10 \times 15^{3}}{5} \times 2 = 60$ Km

$T = \frac{60}{10} = 6$ hrs.

2pm ← 8-Am

$T = \frac{60}{15} = 4$ hrs.

12noon ← 8-Am.

8am → 1pm → 5 Hrs.

$\frac{60}{5} = 12$ Km/hr.

63. A non-stop bus travels at 108 Km/hr speed. If it stops at every station, it travels at a speed of 45 Km/hr. find the time of its stoppage per 1 hr.

108 − 45 = 63.

108 → 60 mins

(time reduced due to stoppages) 63 → ?

$\frac{63 \times 60^{5}}{108_{12}} = 35$ mins

64. A person runs 9 rounds per day on a 400m circular ground for 4 days 88, 96, 89 & 87 mins. find his speed in meters/min ?

23/104

4 days → 4 × 9 = 36 rounds.

$$\frac{400 \times 36}{88+96+89+87} = \frac{14400}{360} = 40 \text{ m/min}$$

65. A gun is fired from behind a train, the driver of the train hears the sound $1\frac{1}{2}$ min later than guard. find the length of the train & speed of the train & speed of the sound is 60 km/hr & 1100 km/hr.
min

train → 60 km/hr, Sound → 1100 m/min.

train → $60 \times 1000 = \frac{60000}{60} = 1000$ m/min.

Sound → 1100 m/min.

1100 − 1000 = 100

$D = S \times T$

$= 100 \times \frac{3}{2} = 150$ m/s.

$1\frac{1}{2} \rightarrow \frac{3}{2}$.

66. A person travels 120 kms by a streamer & 450 kms by train & 60 kms by horse. The total journey takes 13 hrs 30 mins. If the rate of the train is 3 times that of horses & 1.5 times to that of streamer. Find the speed of the train? 195

T	H	Streamer.
$3x$	x	$2x$

$$\frac{3x}{1.5} = \frac{3x}{\frac{3}{2}}$$

$$3x \times \frac{2}{3} = 2x.$$

$$T = \frac{D}{S} = \frac{\overset{150}{\cancel{450}}}{3x} + \frac{60}{x} + \frac{\overset{60}{\cancel{120}}}{2x}$$

$$13\frac{1}{2} = \frac{27}{2}$$

$$= \frac{150 + 60 + 60}{x} = \frac{27}{2}$$

$$\frac{270}{x} = \frac{27}{2}$$

$$\Rightarrow \overset{10}{\cancel{270}} \times \frac{2}{\cancel{27}} = x$$

$$\Rightarrow 20 = x$$

Train speed $\rightarrow 3x \rightarrow 3 \times 20 = 60$ Km/hr.

64. 2 guns were fired from same place at an interval of 28 mins. But a man sitting in the train approaching the place hears the II firing 26 mins after the Ist. If the speed of the sound is 325 m/sec, then find the speed of the train?

	Time	Speed
Train	$\cancel{26}$ 13	1
Sound	2 . 1	13

28
26] 2

$13 \rightarrow 325$

$1 \rightarrow ?$

$$\frac{325}{13} = 25 \text{ m/sec}$$

68. 2 guns were fired from same place at an interval of 28 mins. But a man sitting in the train going away from the place hears the II firing 30 mins after the Ist. If the speed of the train is 20 Km/hr. find the speed of the sound.

106

25

	Time	Speed	
Train	30	15	1
Sound	2	1	15

28]
30]2

1 — 20

15 → ?

$15 \times 20 = \underline{300}$ Km/hr.

69. for every 20 mins, a bus arrives at the bus stand. But a Person going towards the bus stand finds that for every 24 mins a bus departures. find the speed of the bus, if the speed of the man is 30 Km/hr.

	Time	Speed	
Man	24	6	1
bus	4	1	6

20]
24]4

1 — 30

6 → ?

180 Km/hr

70. A truck crosses a man moving along the road at 6 Km/hr. The man could see the truck upto 2 mins. Find the speed of the truck, at the time of disappearance the distance of truck to man is 1.2 Km.

$$D = S \times T$$

$$1.2 = (x-6) \times \frac{2}{60} \Rightarrow \frac{12}{10} = \frac{x-6}{30}$$

$$360 = 10x - 60$$

$$420 = 10x$$

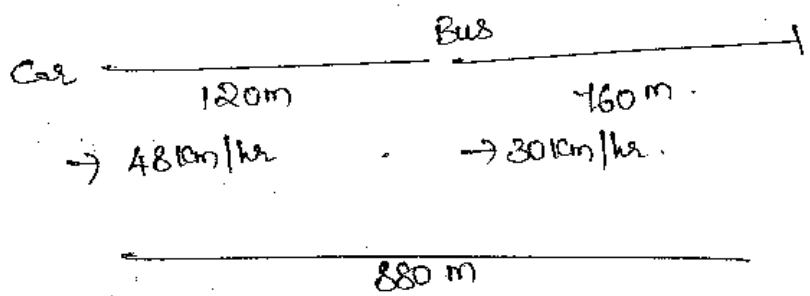
$$42 = x$$

$$36 + 6 = x$$

$$42 = x$$

$$42 \text{ Km/hr}$$

71. A Car is 120 m behind the bus. In how much time it will be 760 m ahead of the bus, if their speeds are 48 Km/hr & 30 Km/hr ?



$$\text{Speed} = 48 - 30 = 18 \text{ Km/hr} \times \frac{5}{18} = 5 \text{ m/s}$$

$$T = \frac{D}{S} = \frac{880 \text{ m}}{5 \text{ m/s}} = 176 \text{ secs}$$

72. A boy plans a bomb at a place & starts running @ speed of 30m/sec. After 56 secs, the bomb was blast. In how much time, the sound of the blast will be heard by the 108 boy, if the speed of the sound is 450 m/sec. 27

$$D = S \times T = 30 \times 56 = 1680 \text{ m}.$$

$$450 \text{ m/s} - 30 = 420 \text{ m/sec}.$$

$$T = \frac{D}{S} = \frac{\cancel{30} \times \cancel{56}^{4}}{\cancel{420}_{\cancel{14}}} = 4 \text{ secs}$$

73. A dog chases a rabbit, the rabbit is 125 laps a head of itself jumps from dog. The rabbit can jump 4 times in a time in which the dog can jumps 3 times. The distance covered by the rabbit & dog in 1 jump is 1.75 m & 2.75 m. In how many jumps, the dog will catch the rabbit?

$$R : D$$
$$\cancel{1.75} : \cancel{2.75}$$
$$7 : 11$$

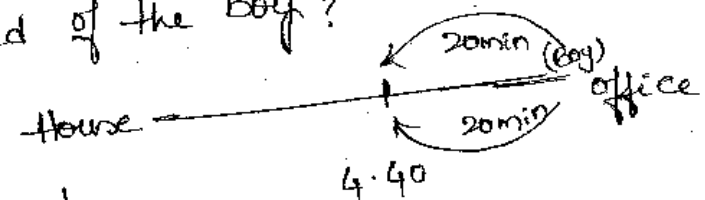
$$D \rightarrow 11 \times 3 = 33 \text{ m/s}$$
$$R \rightarrow 4 \times 7 = 28 \text{ m/s}.$$

$$R \rightarrow 125 \times 7$$

$$33 - 28 = 5 \text{ m/s}$$

$$D \rightarrow \frac{\overset{25}{\cancel{125}} \times 7}{\cancel{5}} = 175 \times 3 = 525 \text{ Jumps}$$

74. A boy starts from his house at a certain time with a certain speed to pick up his girl friend from office at 5pm. One day, his girl friend left her office at 3pm & starts walking with a speed of 40 km/hr & meets the boy in the way who left his house at his usual time, they reached home 40 mins earliers than their usual time. find the speed of the boy?



	Time	Speed.
Boy	20	1
		5
girl	100	5
		1

1 → 40

5 → ?

200 km/hr.

1hr : 60min → 100 min.

75. A distance of 600km is to be covered in 2 parts. In 1st phase, 120 km is travelled by train & rest by car. And it took a total of 8 hrs. But, if 200 kms is covered by train & rest by car, it takes 20 mins more. find the Average speed of the car & train? I → T → 120 C → 480 ; II → T → 200, C → 400

$$\left[\frac{120}{T} + \frac{480}{C} = 8\right] \times 5 \qquad \left[\frac{200}{T} + \frac{400}{C} = 8\frac{1}{3}\right] \times 3$$

(Make trains equal)

$$\frac{600}{T} + \frac{2400}{C} = 40$$

$$\frac{600}{T} + \frac{1200}{C} = 25$$

$$\frac{1200}{C} = 15$$

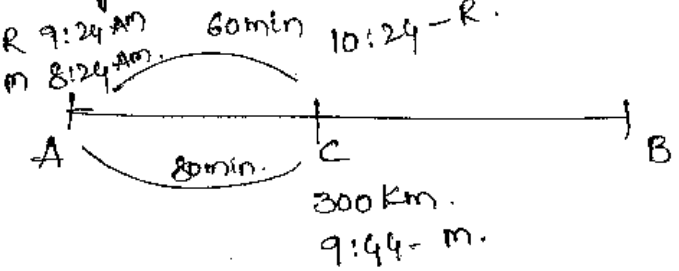
$$8\frac{1}{3} \times 3 = \frac{25}{3} \times 3 = \frac{25}{1}$$

$$\frac{120}{T} + \frac{480}{80} = 8$$

$$\frac{120}{T} = 2$$

$$S = 60 \text{ Km/hr}$$

76. 2 places A & B are 300 Km apart, Mohith starts from City A at 8.24 Am & an hour later, Rohith starts from City A, & after travelling for 1hr, he reaches at City C, that Mohith has passed 40 mins earlier. C falls on the way from A to B they reach City B at same time. Find their speed?



	Time	Speed.
m	~~80~~ 4	3x
R	~~60~~ 3	4x

$3 \times 25 = 75$ Km/hr. ✓

$4 \times 25 = 100$ Km/hr. ✓

$$\frac{300 \text{ Km}}{3x} - \frac{300 \text{ Km}}{4x} = 1$$

$$\frac{1200 \text{ Km} - 900 \text{ Km}}{12x} = 1$$

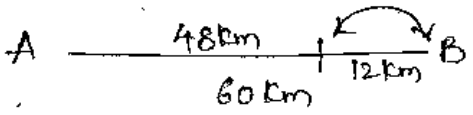
$$\frac{300 \text{ Km}}{12} = x.$$

$$25 = x.$$

77. 2 places A & B are 60 Km apart. 2 men P & Q start from A at same time & meet 1st time at a place 12 Kms from B. They have to reach at A after immediate return from B, if the speed of the slower person is 48 Km/hr, find the difference of their speeds?

111

30



(∵ the ratio b/w distance & speeds is always same)

	P		Q	
distance	~~48Km~~	:	~~72~~ Km	(48+24)
	2	:	3	slower, faster
Speed	2	:	3.	

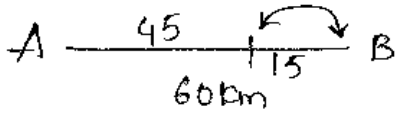
2 → 48

3 → ?

$\frac{3 \times 48}{2} = 72$ ..

difference → 72 − 48 = 24 Km/hr.

78. Vijay & Raju start at same time from A to B. After reaching their destination, they returned to their starting point & they meet for the 1st time at 15 Km from B. If the difference b/w their speeds is 60 Km/hr. find the speed of the faster if A & B are 60 Km apart?



75Km → meet.

distance	45	: 75		2 → ~~60~~ 30
	3	: 5		5 → ?
Speed	3	: 5		150 Km/hr.

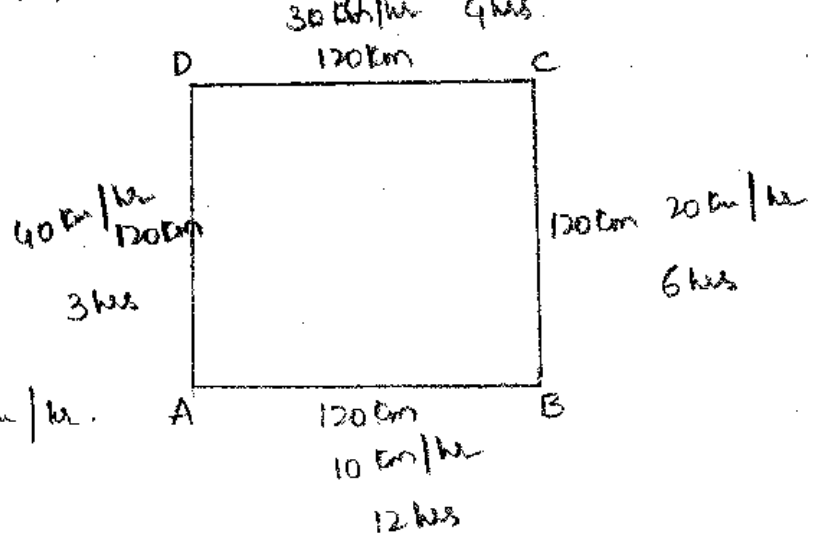
79. A man travels from A to B at a speed of 29 Km/hr & he travels a distance from B to C with a speed of 39 Km/hr in 29 mins. find the average speed of the whole Journey?

B'coz, times are equal Avg = $\frac{\text{total distance}}{\text{total time}}$

$$\frac{29+39}{2} = \frac{68}{2} = 34 \text{ Km/hr}.$$

80. A man travels from A to B of 39 Km, with a speed of 15 Km/hr. And he travels from B to C of 52 Km with a speed of 18 Km/hr. find the average speed of the whole journey?

81. 4 Cities A, B, C, D are on the Corner of a Square. And the side of the Square is 120 Km. A man travels from A to B at a speed of 10 Km/hr, B to C at 20 Km/hr, C to D at 30 Km/hr & D to A at 40 Km/hr. find the average speed of the whole Journey.



$$\frac{480}{25} = 19.2 \text{ Km/hr}.$$

(12+6+4+3)

82. A man travels from A to B @ 20 km/hr speed & he comes back from B to A at 30 km/hr & again he travels from A to B at 40 km/hr. find the average speed of the whole journey, distance from A to B → 120 kms. 3 2

$120 \times 3 = 360$ kms.

$A \to B \quad \frac{120}{20} = 6$ hrs.

$B \to A \quad \frac{120}{30} = 4$ hrs.

$A \to B \quad \frac{120}{40} = 3$ hrs.

$$\frac{360}{13} = 27\frac{9}{13} \text{ km/hr}.$$

(or)

$$\frac{3ABC}{AB+BC+CA}$$

83. B leads to A at a start of 5 secs in 1000m race. But both finish the race at the same time. find the time taken by A to finish the race at the same time. If the speed of B is 5m/sec.

$$S = \frac{D}{T} = \frac{1000m}{5m/sec} = 200 \text{ secs}.$$

B = 200 secs
A − 5
A → 195 secs.

84. A is $1\frac{2}{3}$ times faster than B. A leads to B by 60m in a race. find the length of the race if both finish the race at the same time?

33
114

$1\frac{2}{3} = \frac{5}{3}$

A : B

5 3

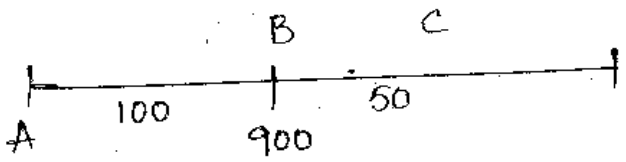
$2 \rightarrow 60$

$5 \rightarrow ?$

$\frac{5 \times 60^{30}}{2} = 150m$

85. In a 1000m race, A gives a start of 100m to B & 150m to C How much start B can give to C in a race of 1000m?

[B leads to A → 100m.
C leads to A → 150m.
B leads to C in 1000m → ?]



900 — 50

1000 — ?

$\frac{1000 \times 50}{900} = \frac{500}{9} = 55\frac{5}{9}$ mins

86. A can finish a race in 3min 10secs. While B can finish the same race in 3min 20 secs. By what distance, A will defeat B in a race of 1000m.

115
34

	A	B
Time	190 sec	200 secs.
Speed	20	19

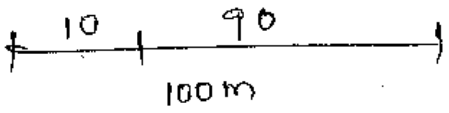
$$\begin{array}{r} 19 \\ \times 50 \\ \hline 950 \end{array}$$

20 → ×50 → 1000

19 → ×50 → 950

1000 − 950 = 50m

87. In a 100m race, A runs at a speed of 9km/hr. He gives a start of 10m to B & still defeats him by 10 secs. find the speed of B.



$D = S \times T$

$$9\,\text{km/hr} \times \frac{5}{18_2} = 2\frac{1}{2}.$$

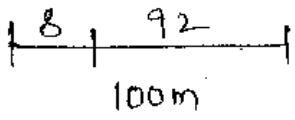
$$A \rightarrow T = \frac{D}{S} = \frac{100\text{m}}{\frac{5}{2}} = 40\,\text{secs}.$$

$B \rightarrow 50$ secs.

$$B \rightarrow \frac{D}{T} \rightarrow \frac{90}{50} = 1.8\,\text{m/sec}$$

88. In a 100m race, A runs at a speed of 5 Km/hr. He gives a start of 8m to B. & still defeats him by 8 secs. find the speed of B.

116



$5 \times \frac{5}{18} = \frac{25}{18}$

$\frac{100}{25/18} = \frac{4}{100} \times \frac{18}{25} = 72$ secs.

B = 80 secs (72+8)

$B = \frac{D}{T} = \frac{92}{80} = \frac{46}{40} \quad \frac{23}{20}$ m/sec.


HARSHITH INSTITUTE
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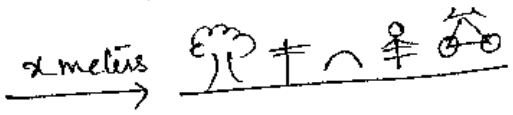
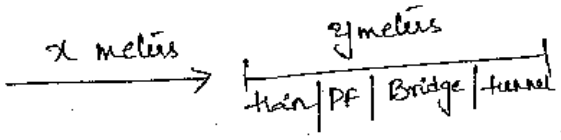
Trains 11/7/10

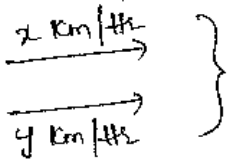
→ If a train of length 'x' meters crosses a tree, a man, or a pole, then length = the length of the train.



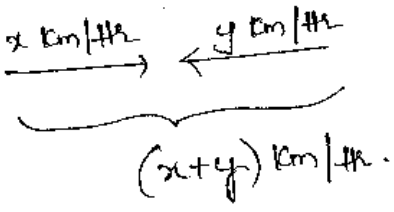
→ If a train of length 'x' meters crosses a train or platform, a bridge or a tunnel of length 'y' meters then length = Sum of their both lengths.



→ If 2 trains of speeds x Km/hr & y Km/hr are travelling in the same direction, then, Speed = difference of their speeds.



→ If 2 trains of speeds x Km/Hr & y Km/Hr travel in opposite direction, then Speed = Sum of their speeds.



D	meters	Km
T	Sec	Hr
S	m/s	Km/Hr

1. A train of length 600m, crosses a tree in 25 secs, then find the speed of the train?

$$S = \frac{D}{T} = \frac{600}{25} = 24 \text{ m/sec}.$$

2. A train of length 800m, crosses a pole in 1min 12 secs, then find the speed of the train in km/hr.

1min 12 secs = 60+12 = 72 sec

$$S = \frac{D}{T} = \frac{800}{72} \times \frac{18}{5} = 40 \text{ km/hr}.$$

3. A train of length 500m, crosses a bridge of length 400m in 2 mins, find the speed of the train?

2mins → 60+60 = 120sec

$$S = \frac{D}{T} = \frac{500+400}{120} = \frac{900}{120} = 7.5 \text{ m/sec}.$$

4. A train of length 800m, travels with a speed of 20m/sec, in what time will it cross a tree?

$$T = \frac{D}{S} = \frac{800}{20} = 40 \text{ secs}.$$

5. A train crosses a mile stone in 15 secs, with a speed of 30m/sec. Find the length of the train?

$$D = S \times T$$
$$= 30 \times 15 = 450 \text{m}$$

6. Find in what time, will a train of length 500m, will cross a man with a speed of 60 km/hr.

$$\frac{500}{60 \times \frac{5}{18}} = 30 \text{ secs}$$

7. Find the time, at which a train of length 600m, with a speed of 90 km/hr, will cross a platform of length 200m?

$$T = \frac{D}{S} \qquad \frac{600+200}{90 \times \frac{5}{18}} = \frac{800}{90 \times \frac{5}{18_2}} = \frac{160}{5} = 32 \text{ secs}$$

8. A train with a speed of 45 km/hr, crosses a tree in 40 secs, find the length of the train?

$$D = S \times T$$

$$45 \times \frac{5}{18_2} \times 40^{20} = 500 \text{ m}$$

9. A train of length 300m, with a speed of 60 km/hr, crosses a bridge in 45 secs. find the length of the Bridge?.

$$D = S \times T$$

$$(x+y) = 60^{10} \times \frac{5}{18_3} \times 45^{15}$$

$$(300+y) = 750$$

$$y = 750 - 300 = 450 \text{ m}$$

10. A train of length 300m, with a speed of 20 m/sec, crosses a platform in 30 secs, find the length of the platform?.

$$D = S \times T.$$

$$300 + y = 20 \times 30$$

$$300 + y = 600$$

$$y = 300 \text{ m}$$

10. A train travelling with a speed of 72 Km/Hr, Crosses a platform of length 400m in 50 secs, find the length of the train?

$$D = S \times T.$$

$$(x+y) = \overset{4}{\cancel{72}} \times \frac{5}{\cancel{18}} \times 50.$$

$$x + 400 = 1000.$$

$$x = 600\,m$$

11. A train with a speed of 108 Km/Hr, Crosses a bridge of length 400m in 25 secs. find the length of the train?

$$\overset{6}{\cancel{108}} \times \frac{5}{\cancel{18}} = 30\ m/sec.$$

$$D = S \times T.$$

$$(x+y) = 30 \times 25$$

$$x + 400 = 750.$$

$$x = 750 - 400$$

$$x = 350m$$

12. A train of length 200m, Crosses a pole in 10 secs. In what time will it Cross a bridge of length 300m?.

I method $S = \frac{D}{T} = \frac{200}{10} = 20\,m/s$.

$$T = \frac{D}{S} = \frac{500}{20} = 25\ secs$$

II method

$$200 \text{ —— } 10$$
$$500 \longrightarrow ?$$
$$\frac{500 \times 10}{200} = \frac{50}{2} = 25\ secs$$

13. A train of length 400m Crosses a man in 20 seconds. In how much time will it Cross a bridge of length 300m?.

$$400 \text{ —— } 20$$
$$700 \longrightarrow ?$$

$$D = 400 + 300$$
$$= 700$$

$$\frac{700 \times \overset{5}{\cancel{20}}}{\cancel{700}} = 35\ secs.$$

14. 2 trains of length 500m & 200ms, travel in opposite direction & Crosses each other in 36 secs, 1 train's speed is 30 Km/Hr, find the Sped of the other train.

$$S = \frac{D}{T} = 500 + 200 = 700.$$

$$\frac{\cancel{700}^{70}}{\cancel{36}} \times \frac{18}{5} = 70 \text{ Km/Hr}.$$

$$70 - 30 = 40 \text{ Km/Hr}.$$

15. A train of length 600m, travels at speed of 60 Km/Hr, A man travels in the opposite direction at a speed of 10 Km/Hr. Find the time, they cross each other?.

$$T = \frac{D}{S}$$

$$= \frac{\overset{12}{\cancel{600}}}{\cancel{50} \times \frac{5}{\cancel{18}}}$$

$$= 12 \times \frac{18}{5} = \frac{216}{5} = 43.2 \text{ secs (or) } 43\frac{1}{5} \text{ secs}$$

16. A train of length 500m, travels with a speed of 45 Km/Hr, In How much time will it cross a man travelling in the opposite direction with a speed of 15 Km/Hr?.

$$T = \frac{D}{S} = \frac{500}{\cancel{60} \times \frac{5}{\cancel{18}\ 3}} = 30 \text{ secs}.$$

17. 2 trains of equal lengths travel in the same direction & Crosses a pole with speeds of 30 m/sec & 40 m/sec. find the time, they cross each other?.

$$D = S \times T$$

$$x + x = 10 \text{ m/s} \times T$$

Cannot be determined.

18. A train of length 800m travels with a speed of 10Km/Hr, it crosses a man at a distance of 200m, travelling in the same direction with a speed of 20 Km/hr. Find the time at which they cross each other?

$800 + 200 = 1000$.

$$T = \frac{D}{S}$$

$$= \frac{1000}{80 \times \frac{5}{18}} = 45 \text{ secs}$$

19. A train of length 500m travels with a speed of 45 Km/Hr. It crosses a man at a distance of 100m, travelling in the opposite direction with a speed of 15 Km/Hr. Find the time at which they cross each other?.

$500 + 100 = 600$.

$$T = \frac{D}{S}$$

$$= \frac{600}{60 \times \frac{5}{18}} = \frac{180}{5} = 36 \text{ secs}$$

20. 2 trains of length 400m & 300m travel in the same direction with speeds 50 Km/Hr & 60 Km/Hr. Find the time at which they cross each other?.

$400 + 300 = 700$.

$$T = \frac{D}{S}$$

$$\frac{700}{10 \times \frac{5}{18}} = \frac{1260}{5} = 252 \text{ secs}.$$

21. A train of length 500m travels at a speed of 45 Km/Hr & another train of length 300m travels with the same speed in opposite direction. find the time at which the 1st train will cross a passenger in the 2nd train?.

$$T = \frac{D}{S}.$$

$$= \frac{500}{90 \times \frac{5}{18}} = \frac{100}{5} = 20 \text{ secs}.$$

22. 2 trains of equal length travel in the same direction with speeds 50 Km/Hr & 30 Km/Hr, they cross each other in 90 secs. find the lengths of the 2 trains?

$$D = S \times T$$

$$x + x = 20 \times \frac{5}{18} \times 90$$

$$2x = 500$$

$$x = 250 \text{ m}$$

23. 2 trains travel with a speed of 40 Km/Hr & 50 Km/Hr in opposite direction in & cross each other in 40 secs. Length of one train is 350m. find the length of the other train.

$$D = S \times T$$

$$= 90 \times \frac{5}{18} \times 40$$

$$= 1000$$

$$1000 - 350 = 650\text{m}$$

24. 2 trains of length 400m & 200m travel in the same direction, they cross each other in 54 secs. Speed of one train is 45 Km/Hr. find the speed of the II train.

$$S = \frac{D}{T}$$

$$= \frac{600}{54} \times \frac{18}{5}$$

$$x - y = 40 \text{ Km/Hr}$$

$$x - 45 = 40 \text{ Km/Hr}$$

$$x = 45 + 40 = 85 \text{ Km/Hr}$$

25. 2 trains of equal lengths travel in same direction. They cross a pillar in 30 secs & 40 secs. Find the time at which they cross each other?

$$T = \frac{D}{S}$$

$$= \frac{2t_1t_2}{t_1 - t_2}$$

$$= \frac{2 \times 40 \times 30}{10} = 240 \text{ secs}$$

26. 2 trains of equal length travel in opposite direction. They cross a mile stone in 20 & 30 secs. Find the time at which they cross each other?

$$T = \frac{D}{S}$$

$$= \frac{2t_1t_2}{t_1 + t_2}$$

$$= \frac{2 \times 20 \times 30}{20 + 30}$$

$$= \frac{2 \times 20 \times 30}{50}$$

$$= 24 \text{ secs}$$

27. A train travels with some speed, & 2 persons travel in the same direction with speed of 2 Km/hr & 4 Km/hr, the train crosses them in 9 secs & 10 secs. Find the length of the train?

$$D = D$$
$$S \times T = S \times T$$

$$(x-2) \times 9 \times \frac{5}{18} = (x-4) \times 10 \times \frac{5}{18}$$

$$9x - 18 = 10x - 40$$

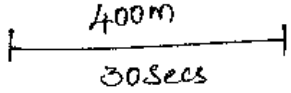
$$40 - 18 = 10x - 9x$$

$$22 = x$$

$$(22-2) \times 9 \times \frac{5}{18} = 20 \times \frac{5}{2} = 50 \text{m}$$

28. A train crosses a man standing on a bridge of length 400m in 10 secs & crosses the bridge in 30 secs. find the length of the train?

1 method



$D = S \times T$

$S = \frac{D}{T} = \frac{400m}{20} \rightarrow (30-10)$

$= 20\ m/sec$

$D = S \times T$

$= 20 \times 10 = 200m$

2 method

$S = S$.

$\frac{D}{T} = \frac{D}{T}$

$\frac{x+400}{30} = \frac{x}{10}$

$x + 400 = 3x$

$400 = 2x$

$200 = x$

29. A train crosses a man in 20 secs & crosses a platform of length 600m in 45 secs. find the length of the train?.

$D = S \times T$.

40 45 20

25.

$25 \longrightarrow 600$

$20 \rightarrow ?$

$\frac{20 \times 600}{25} = 480m$

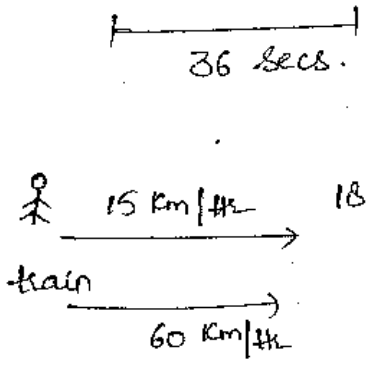
30. A train crosses a bridge of length 300m in 50 secs & crosses a man in 30 secs. find the speed of the train in Km/Hr?.

50 30

20.

$S = \frac{D}{T} = \frac{300}{20} \times \frac{18}{5} = 54$ secs.

31. A train travels with a speed of 60 Km/Hr & crosses a platform in 36 secs & also a man travelling in the same direction in 18 secs, speed of man is 15 Km/Hr. find the length of train & platform?.



$D = S \times T$

$(60-15) \rightarrow 45 \times \frac{5}{18} \times 18$ sec.

$D = 225$m (train length)

$D = S \times T$.

$x + y = 60 \times \frac{5}{18} \times 36^{2}$

$225 + y = 600$

$y = 600 - 225 = 375$m (platform length)

32. A train travels with a speed of 54 Km/Hr & crosses a bridge in 30 secs. A man travels with a speed of 6Km/Hr in the opposite direction & the train crosses him in 12 secs. find the length of the bridge.

$54 + 6 = 60$ Km/Hr.

Speed of the train = 54km/Hr
time = 30 secs.

$D = S \times T$

$60 \times \frac{5}{18} \times 12$

$D = 200$m → train length

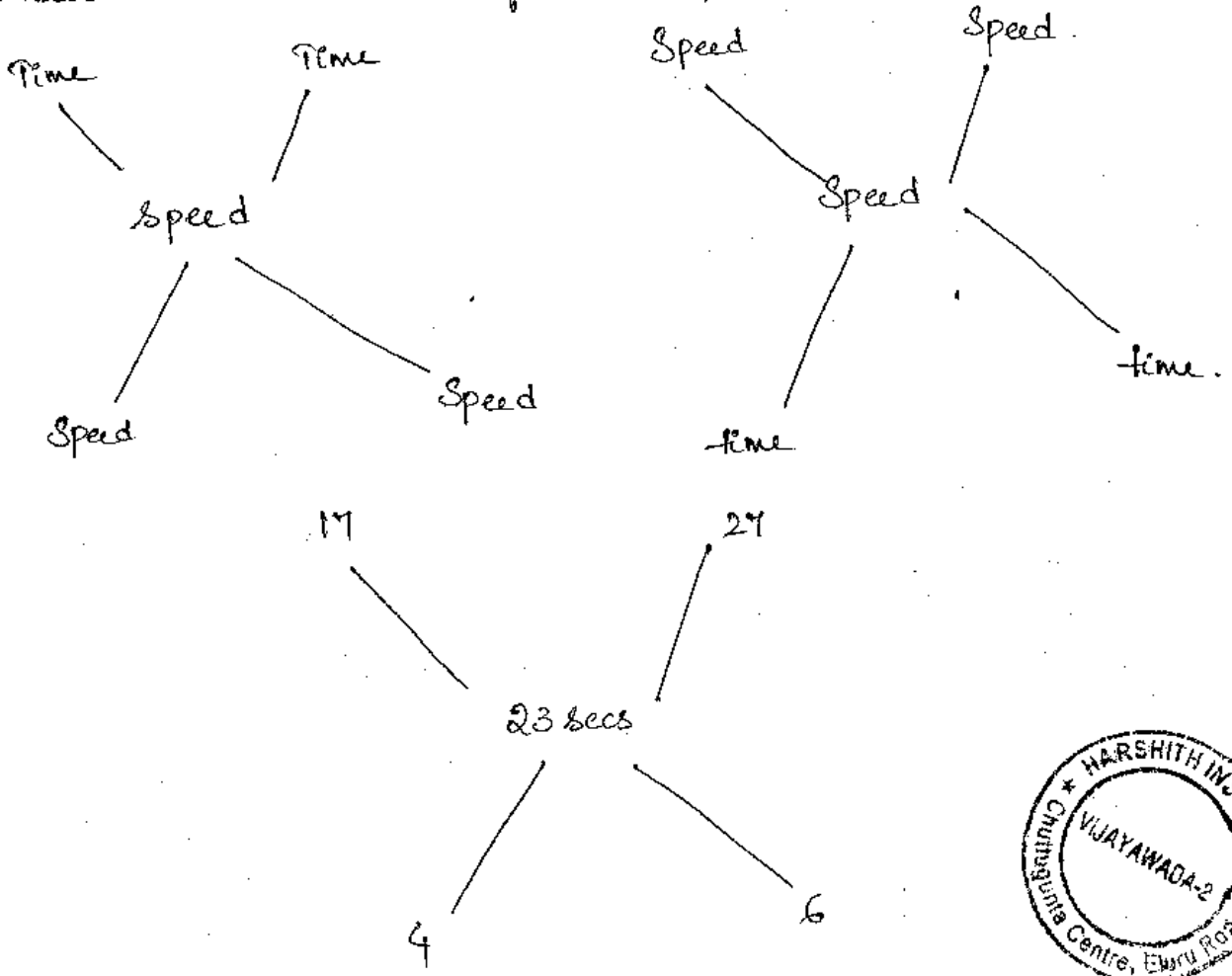
Speed of man = 6Km/Hr.
time = 12 secs.

$(x+y) = 54 \times \frac{5}{18} \times 30$

$200 + y = 450$

$y = 250$m → bridge length.

33) 2 trains travel in opposite directions, cross a telephone pole with a speed of 17 m/sec & 27 m/sec, they cross each other in 23 secs. Find the ratio of their speeds.



~~4:6~~
2 : 3.

34) 2 trains of length 120 m & 96 m with different speeds travel in the same direction & crosses each other in 18 secs & if they travel in opposite direction, they cross each other in 12 secs. Find their speeds?

$(x+y) = \frac{216}{12} = 18 \text{ m/sec}$

$(x-y) = \frac{216}{18} = 12 \text{ m/sec}.$

$(x+y)+(x-y) = 18+12$

$2x = 30$

$x = 15 \text{ m/sec}.$

$x+y = 18.$

$y = 18-15 = 3 \text{ m/sec}.$

35. 2 trains, one from VZA to Delhi & II from Delhi to VZA start at the same time, after they meet, they reach their destinations after 9hrs & 16hrs. Find the ratio of their speeds?

(distance & speed ratios are always equal)

$\sqrt{t_2} : \sqrt{t_1}$

$D = S \times T$

$\sqrt{16} : \sqrt{9}$

$4 : 3$.

36. A train starts at 2pm with a speed of 70 km/hr. At 3:30pm in the same direction, another train starts with a speed of 85 km/hr. Find the time at which the II train crosses/meets the Ist one.

$T = \frac{D}{S}$

Ist train - 3:30 - 2 = 1:30.

D → 70+35 = 105 km.

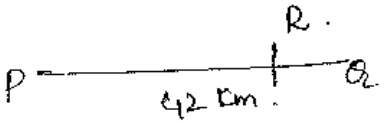
I 70 →

II 70+15 →

$\Rightarrow \frac{105}{15} = 7$ hrs.

3:30 + 7 = 10:30pm

37. Some & mone travel from P to Q, a distance of 42 km, at a speed of 6km/hr & 8 km/hr. mone reached Q & again returned to meet Some at R. find the distance from P to R.



(Returned → double the distance)

S : M

6 : 8

3 : 4

$\frac{3}{7} \times 84 = 36$ kms

38. 2 trains with speeds 56 Km/Hr & 29 Km/Hr. The train which is faster than the other, crosses a man before crossing a train 129 in same direction in 16 secs. Find the length of the train which is faster?.

$$D = S \times T$$

$$(56-29) \times \frac{5}{18} \times 16$$

$$27 \times \frac{5}{18} \times 16$$

$$= 120\text{m}$$

39. A passenger train of length 400m travel at a speed of 60 Km/Hr. & another goods train of length 800m travel in the opposite direction with a speed of 30 Km/Hr.

i) find in how much time, the passenger train will cross the goods train

ii) find in how much time the goods train will cross the driver in the passenger train.

60 Passenger → 400m ← 30 Goods 800m

i) $T = \frac{D}{S} = \frac{1200\text{m}}{90 \times \frac{5}{18}} = 48 \text{ secs}$

Passenger → ← Goods 800

ii) $T = \frac{800}{90 \times \frac{5}{18}} = 32 \text{ secs}$

40. 2 equal lengths of trains travel at a speed of 30 Km/Hr & 130 24 Km/Hr, in opposite direction. They cross each other for 40 secs. find the length of the 2 trains.

$$D = S \times T$$

$$x + x = \frac{3}{54} \times \frac{5}{18} \times 40$$

$$2x = 600$$

$$x = 300\,m$$

Boats & Streams. 5/8/17.

m → Speed of the boat or man in still water.

S → Speed of the Current or water or stream.

Ds → Down stream (m+s), Speed of the boat / man along with the stream / water.

$$Ds = m + s \quad \longrightarrow \longrightarrow$$

Us → Up stream (m−s), Speed of the boat / man in opposite direction to the stream / water. $Us = m - s \quad \longrightarrow \longleftarrow$

If Ds & Us are given, then,

$$m = \frac{Ds + Us}{2}, \quad s = \frac{Ds - Us}{2}$$

1. The speed of a man in still water is 4 Km/hr, Speed of the stream is 3 Km/hr. Find, speed of the boat with Current?

$$Ds = m + s = 4 + 3 = 7 \text{ Km/hr}.$$

2. The speed of the boat in still water is 7 Km/hr, Speed of the stream is 5 Km/hr. Find the speed of the boat in opposite direction?.

$$Us = m - s = 7 - 5 = 2 \text{ Km/hr}.$$

3. The speed of the boat in still water is 4 Km/hr, & speed of the boat with stream is 7 Km/hr. Find the speed of the stream?.

$m = 4,\ Ds = 7,\ S = ?$.

$Ds = m + S$.

$7 = 4 + S$

$7 - 4 = 3 = S$

$S = 3$ Km/hr.

4. Speed of the boat in still water is 12 Km/hr. Speed of the boat in opposite direction is 7 Km/hr. find the speed of the stream?

$Us = m - S$.

$m = 12,\ Us = 7$.

$7 = 12 - S$

$S = 12 - 7$

$S = 5$ Km/hr.

5. Speed of the boat in still water is 8 Km/hr. Speed of the stream is 3 Km/hr. find the distance travelled in 3hrs in the direction of the stream? (down stream)

Distance = $S \times T$.

$Ds = m + S = 8 + 3 = 11$ Km/hr.

$11 \times 3 = 33$ Km

6. Speed of a man in still water is 6 Km/hr. Speed of the stream is 4 Km/hr. find the distance travelled in 20 mins in the opposite direction to the stream (US)?

$D = S \times T$.

$US = m - s$, $= 6 - 4 = 2$ Km/hr.

$2 \times \frac{20}{60} \frac{1}{3} = \frac{2}{3}$ Km (or) $\frac{2}{3} \times 1000 = 666.66$ Km

7. Speed of the boat with the stream is 18 Km/hr. The speed of the boat in the direction opposite to the stream is 8 Km/hr. find the speed of the boat in still water?

$$m = \frac{DS + US}{2} = \frac{18 + 8}{2} = \frac{26}{2} = 13 \text{ Km/hr}.$$

8. Speed of the boat in down stream is 30 Km/hr. Speed of the boat upstream is 20 Km/hr. find the speed of stream?

$$S = \frac{DS - US}{2} = \frac{30 - 20}{2} = \frac{10}{2} = 5 \text{ Km/hr}.$$

9. A man travels down stream of 40 Km in 2 hrs & in the opposite direction travels the same distance in 4 hrs. find the speed of the man in still water?

$$m = \frac{DS + US}{2}, \quad S = \frac{D}{T}$$

$DS = 20$ Km/hr, $US = \frac{40}{4} = 10$ Km/hr.

$\left(\frac{40}{2}\right)$

$$= \frac{20 + 10}{2} = \frac{30}{2} = 15 \text{ Km/hr}.$$

10. A boat travels down stream a distance of 20 Km in 30 mins & up stream travels 15 kms in 45 mins. find the speed of the stream.

$$S = \frac{DS - US}{2}$$

$$DS = \frac{20}{\frac{30}{60}} = 40 \text{ Km/hr.} \qquad US = \frac{15}{\frac{45}{60}} = 15 \times \frac{60}{45_3} = 20 \text{ Km/hr}$$

$$= \frac{40 - 20}{2} = \frac{20}{2} = 10 \text{ Km/hr.}$$

11. A man inorder to travel some distance down stream takes 3 times the actual time, that is taken to travel upstream the same distance. Speed of the stream is 6 Km/hr. Find the Speed of man in still water?

$$\text{Speed} = \frac{D}{T}$$

	DS		US.
$T \rightarrow$	1	:	3.
$S \rightarrow$	3	:	1

$$M = \frac{DS + US}{2} = \frac{3+1}{2} = \frac{4}{2} = 2 \text{ Km/hr.}$$

$$S = \frac{DS - US}{2} = \frac{3-1}{2} = \frac{2}{2} = 1 \text{ Km/hr.}$$

$$1 \longrightarrow 6$$

$$2 \longrightarrow ?$$

$$\Rightarrow 12 \text{ Km/hr.}$$

15. A man travels DS, some distance @ 20 Kmph speed & travels the same distance US, @ 10 Km/hr speed. It took 40 mins for total Journey. find the distance travelled by him?.

$$\frac{xy}{x+y} \times \text{time}.$$

$$\frac{20\times10}{30} \times \frac{40^{2}}{60_{3}} = \frac{20}{3} \times \frac{2}{3} = \frac{40}{9} = 4\frac{4}{9} \text{ Kms}.$$

16. Speed of the stream is 2 Km/Hr (DS), Speed of the boat is 10 Km/Hr. The boat travels some distance DS & the time taken by it to travel is 4Hrs more than the usual time, DS when it travels US. find the distance travelled DS?.

$$D = S \times T.$$

$$D = \frac{\text{Product of Speeds}}{\text{difference of speeds}} \times \text{time}.$$

$$DS = M+S = 10+2 = 12$$
$$US = M-S = 10-2 = 8.$$

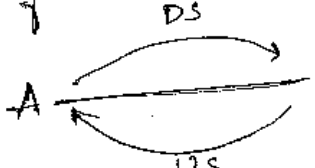
$$\frac{12\times8}{4} \times 4 = 96 \text{ Kms}$$

17. A man travels, DS, some distance in 12 Hrs & US, the same distance @ 18 Hrs. Speed of the stream is 6 Km/Hr. find the speed of the man.

Distance same, so,

$$D.S = US.$$
$$M = x,$$
$$S = 6 \text{ Km/Hr}.$$

$$M+S = DS$$
$$M-S = US.$$



$$DS \quad US.$$
$$S \times T = S \times T.$$
$$(x+6)\times12 = (x-6)\times18.$$
$$12x+72 = 18x-108.$$
$$180 = 6x$$
$$30 = x$$

30 Kmph

18. A man travels DS, some distance in 8 hrs & US, the same distance in 10 hrs. Speed of man in still water 12 Km/hr. find the speed of the stream. $S = \frac{D}{T}$.

$DS = m + s$

$US = m - s$.

$12 + x$

$12 - x$.

$DS = US$.

$S \times T = S \times T$.

$(12+x) \times 8 = (12-x) \times 10$.

$48 + 4x = 60 - 5x$.

$9x = 12$.

$x = \frac{12}{9} = 1\frac{1}{3}$ Km/hr.

19. A Boat travels @ 10 Km/hr speed. It travels DS, a distance of 91 Kms & to return (US) takes 20 hrs. find the speed of the stream?

1 method through options,

a) 2 b) 3 c) 4 d) 1

$\frac{91}{DS} + \frac{91}{US} = 20$ hrs.

$DS = m + s$

$US = m - s$

$m = 10$ Km/hr.

$\frac{91}{10+3} + \frac{91}{10-3}$

$7 \quad \frac{91}{13} + \frac{91}{7} = 20$ hrs ✓

I method

$$\frac{91}{10+x} + \frac{91}{10-x} = 20.$$

$$91\left(\frac{10-x+10+x}{(10+x)(10-x)}\right) = 20.$$

$$91(20) = 20(10^2 - x^2)$$

$$100 - 91 = x^2$$

$$\sqrt{9} = x.$$

$$3 = x$$

20. A man travels DS, a distance of 44 Kms & US, a distance of 30 Kms, in 10 Hrs. In the same way, DS 55 Kms distance & US, 40 Kms in 13 Hrs. find the speed of man & stream?.

$$S = \frac{D}{T}$$

$Ds = m + s.$

$Us = m - s.$

(See for common multiples of both 44 & 55 & also for 30 & 40)

44, 55 → 11

30, 40 → 5, 10.

first try with 11 & 5,

Trail & Error method:

DS + US.

$$\frac{44}{11}\text{km} + \frac{30}{5}\text{km} = 10\text{ Hrs}.$$

$$\frac{55}{11}\text{km} + \frac{40}{5}\text{km} = 13\text{ Hrs}.$$

$4 + 6 = 10$ Hrs.

$5 + 8 = 13$ Hrs.

So, 11, 5.

$Ds = 11$, $Us = 5$.

$$m = \frac{Ds + Us}{2}, \quad S = \frac{Ds - Us}{2}$$

$$\frac{11+5}{2} = \frac{16}{2} = 8, \quad S = \frac{11-5}{2} = \frac{6}{2} = 3$$

8 Km/Hr, 3 Km/Hr.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* PERCENTAGE *

Percentage: percentage means for every 100. (1)

Eg: $\frac{3}{4} \times \overset{25}{100} = 75\%$. $\Leftrightarrow$ $75\% = \frac{75}{100} = \frac{3}{4}$

converting into percentages:

1. $\frac{1}{2} = \frac{1}{2} \times \overset{50}{100} = 50\%$.

2. $\frac{1}{4} = \frac{1}{4} \times \overset{25}{100} = 25\%$.

3. $\frac{1}{5} = \frac{1}{5} \times \overset{20}{100} = 20\%$.

4. $\frac{1}{6} = \frac{1}{6} \times \overset{16.66}{100} = 16\frac{2}{3}\%$.

converting into Fractions:

1. $40\% = \frac{\overset{2}{40}}{\underset{5}{100}} = \frac{2}{5}$

2. $60\% = \frac{\overset{3}{60}}{\underset{5}{100}} = \frac{3}{5}$

3. $33\frac{1}{3}\% = \frac{100}{3}\% = \frac{100}{3 \times 100} = \frac{1}{3}$

converting into decimals:

1. $20\% = \frac{20}{100} = 0.2$

2. $45\% = \frac{45}{100} = 0.45$

3. $56\% = \frac{56}{100} = 0.56$

4. $75\% = \frac{75}{100} = 0.75$

5. $40\% = \frac{40}{100} = 0.4$

(1)

1 to 12 percentages:

(2)

1. $\frac{1}{1} \times 100 = 100\%$.

2. $\frac{1}{2} \times 100 = 50\%$.

3. $\frac{1}{3} \times 100 = 33\frac{1}{3}\%$. , $\frac{2}{3} = 66\frac{2}{3}\%$.

4. $\frac{1}{4} \times 100 = 25\%$. , $\frac{3}{4} = 75\%$.

5. $\frac{1}{5} \times 100 = 20\%$. , $\frac{2}{5} = 40\%$. , $\frac{3}{5} = 60\%$.

6. $\frac{1}{6} \times 100 = 16\frac{2}{3}\%$. , $\frac{5}{6} = 83\frac{1}{3}\%$.

7. $\frac{1}{7} \times 100 = 14\frac{2}{7}\%$.

8. $\frac{1}{8} \times 100 = 12\frac{1}{2}\%$.

9. $\frac{1}{9} \times 100 = 11\frac{1}{9}\%$.

10. $\frac{1}{10} \times 100 = 10\%$.

11. $\frac{1}{11} \times 100 = 9\frac{1}{11}\%$.

12. $\frac{1}{12} \times 100 = 8\frac{1}{3}\%$.

$\frac{2}{7} = 28\frac{4}{7}\%$. $\frac{3}{8} = 37\frac{1}{2}\%$. $\frac{2}{9} = 22\frac{2}{9}\%$. $\frac{2}{11} = 18\frac{2}{11}\%$.

$\frac{3}{7} = 42\frac{6}{7}\%$. $\frac{5}{8} = 62\frac{1}{2}\%$. $\frac{4}{9} = 44\frac{4}{9}\%$. $\frac{3}{11} = 27\frac{3}{11}\%$.

$\frac{4}{7} = 57\frac{1}{7}\%$. $\frac{7}{8} = 87\frac{1}{2}\%$. $\frac{5}{9} = 55\frac{5}{9}\%$. $\frac{4}{11} = 36\frac{4}{11}\%$.

$\frac{5}{7} = 71\frac{3}{7}\%$. $\frac{7}{9} = 77\frac{7}{9}\%$. $\frac{5}{11} = 45\frac{5}{11}\%$.

$\frac{6}{7} = 85\frac{5}{7}\%$.

(8)

1. $\frac{11}{7} = 1 + \frac{4}{7} = 100 + 57\frac{1}{7} = 157\frac{1}{7}\%$

2. $\frac{31}{6} = 5 + \frac{1}{6} = 500 + 16\frac{2}{3} = 516\frac{2}{3}\%$

3. $\frac{37}{8} = 4 + \frac{5}{8} = 400 + 62\frac{1}{2}\% = 462\frac{1}{2}\%$

4. $\frac{26}{3} = 8 + \frac{2}{3} = 800 + 66\frac{2}{3} = 866\frac{2}{3}\%$

=

1. $566\frac{2}{3}\% = 500 + 66\frac{2}{3} = 500 + \frac{2}{3} = \frac{17}{3}$

2. $437\frac{1}{2}\% = 400 + 37\frac{1}{2} = 4 + \frac{3}{8} = \frac{35}{8}$

3. $157\frac{1}{7}\% = 100 + 57\frac{1}{7} = 1 + \frac{4}{7} = \frac{11}{7}$

4. $216\frac{2}{3}\% = 200 + 16\frac{2}{3}\% = 2 + \frac{1}{6} = \frac{13}{6}$

Note:

$25\% = \frac{1}{4} \rightarrow$ original value

increase $+1$ add

decrease -1 subtract

Simple problems (basics):

1. 20% of 70

Sol: $\frac{20}{100} \times 70 = 14$ (or) $2 \times 7 = 14$

2. 40% of 60

Sol: $\frac{40}{60} \times 100 = 24$ (or) $4 \times 6 = 24$

3. 40% of 300

Sol: $40 \times 3 = 120$

4. 60% of 7000

Sol: $60 \times 70 = 4200$

5. 800% of 300

Sol: $800 \times 3 = 2400$

6. 400% of 800

Sol: $400 \times 8 = 3200$

7. 300% of 60000

Sol: $300 \times 600 = 180000$

8. 40% of 7

Sol: $\frac{40}{100} \times 7 = \frac{14}{5} = 2.8$

(or)

$\frac{4 \times 7}{10} = \frac{28}{10} = 2.8$

9. 8% of 60

Sol: $\frac{8 \times 6}{10} = 4.8$

10. 6% of 8

Sol: $\frac{6 \times 8}{100} = 0.48$

11. 7% of 9

Sol: $\frac{7 \times 9}{100} = 0.63$

12. 0.2% of 6

Sol: $\frac{0.2 \times 6}{100} = \frac{1.2}{100} = 0.0012$

5

13. 4% of 0.4

Sol: $\frac{4 \times 4}{1000} = 0.016$

14. 0.6% of 0.6

Sol: $\frac{6 \times 6}{10000} = 0.0036$

=

1. $16\frac{2}{3}\%$ of 1200

Sol: $\frac{1}{6} \times \overset{200}{\cancel{1200}} = 200$

2. $14\frac{2}{7}\%$ of 1400

Sol: $\frac{1}{7} \times \overset{200}{\cancel{1400}} = 200$

3. $37\frac{1}{2}\%$ of 3200

Sol: $\frac{3}{8} \times \overset{400}{\cancel{3200}} = 1200$

4. $11\frac{1}{9}\%$ of 999

Sol: $\frac{1}{9} \times \overset{111}{\cancel{999}} = 111$

5. $44\frac{4}{9}\%$ of 2736

Sol: $\frac{4}{9} \times \overset{304}{\cancel{2736}} = 1216$

6. $157\frac{1}{7}\%$ of 217

Sol: $\frac{11}{7} \times \overset{31}{\cancel{217}} = 341$

7. $216\frac{2}{3}\%$ of 126

Sol: $\frac{13}{6} \times \overset{21}{\cancel{126}} = 273$

8. $566\frac{2}{3}\%$ of 666

(6)

Sol: $\frac{17}{3} \times \overset{222}{\cancel{666}} = 3774$

=

1. 100% of 1342

100 → 1342

10 → 134.2

1 → 13.42

2 → 26.84

2. 100% of 600

100 → 600

10 → 60

1 → 6

2 → 12

20 → 120

5 → 30

25 → 150

=

1. 25% of 25%

Sol: $\frac{25}{\cancel{100}_{4}} \times \frac{25}{\cancel{100}_{4}}$ $\frac{625}{10000}$

$= \frac{1}{4} \times \frac{1}{4}$ (or) $= 0.0625$

$= \frac{1}{16}$

2. 40% of 40%

Sol: $\frac{40}{100} \times \frac{40}{100}$ (or) $\frac{16}{100}$

$= \frac{2}{5} \times \frac{2}{5} = \frac{4}{25}$ $= 0.16$

(7)

$\boxed{x\%\text{ of } y = y\%\text{ of } x}$

Eg: 30% of $70 = 70\%$ of 30

$21 = 21$

1. 34.56% of $63.45 = 63.45\%$ of x.

Sol: $x = 34.56$

Formula, $\boxed{\text{percentage} = \frac{\text{is}}{\text{of}} \times 100}$

Problems:

1. 300 is what percentage of 50?

Sol: $\text{percentage} = \frac{\text{is}}{\text{of}} \times 100$

$= \frac{300}{50} \times \frac{2}{100} = \underline{600\%}$

2. 120 is what percentage of 750?

Sol: $\text{percentage} = \frac{\cancel{120}^{4}}{\cancel{750}_{\cancel{50}_{5}}} \times \frac{4}{\cancel{100}} = \underline{16\%}$

3. 1200 gm is what percentage of 12 kgs?

Sol: $\boxed{1\text{ kg} = 1000\text{ gm}}$

$\text{percentage} = \frac{\overset{10}{\cancel{1200}}\text{ gm}}{\cancel{12} \times 1000\text{ gm}} \times 100 = \underline{10\%}$

4. 2 dozens is what percentage of 1 gross?

Sol: $\boxed{1\text{ Gross} = 12\text{ dozens} = 144\text{ items}}$

$\frac{2}{12_6} \times 100 = \underline{16\frac{2}{3}\%}$

5. 3 hours is what percentage of one hour day?

Sol:

1 day = 24 hours

(8)

$$\frac{3}{24_8} \times 100 = 12\frac{1}{2}\%$$

6. 1 minutes 1 sec is what percentage of one hour?

Sol:

1 hour = 3600secs | 1 min = 60sec | 1 sec = 1

1 min 1 sec = 60 + 1 = 72

$$\frac{72^{2}}{3600} \times 100 = 2\%$$

7. $\frac{2}{3}$ is what percentage of $\frac{3}{4}$?

Sol:

$$\frac{2/3}{3/4} \times 100$$

$$\Rightarrow \frac{2}{3} \times \frac{4}{3} \times 100 \Rightarrow \frac{8}{9} \times 100 = 88\frac{8}{9}\%$$

8. 0.3 is what percentage of 2.5?

Sol:

$$\frac{2.5}{0.3} \times 100 \Rightarrow \frac{0.3}{2.5} \times 100 = \frac{3}{25} \times 100^{4} = 12\%$$

9. 25% is what percentage of 40%?

Sol:

$$\frac{25}{40_2} \times 100^{5} = \frac{125}{2} = 62\frac{1}{2}\%$$

10. Find the value of 15% in 600

Sol:

$$\frac{15}{100} \times 600 = 90$$

11. Find the value of 20% in 500

Sol:

$$\frac{20}{100} \times 500 = 100$$

12. In 900 is 10% value added to it self. then find that number? (9)

Sol:

$100 \rightarrow 900$

$10 \rightarrow 90$

$\Rightarrow \frac{110 \times 900}{100} = \underline{990}$

(or)

$900 \times \frac{10}{100} = 90$

$\Rightarrow 900 + 90 = 990$

13. when we subtracted 20% of a number from 700 find that number?

Sol:

$100 \rightarrow 700$

$80 \rightarrow ?$

$\frac{80}{100} \times 700 = \underline{560}$

14. when we added $16\frac{2}{3}\%$ of a number to 1200. Then find the result?

Sol:

$16\frac{2}{3}\% = \frac{1}{6} \rightarrow$ original value

$6 + 1 = 7$ add

$\Rightarrow \frac{7}{\cancel{6}} \times \overset{200}{\cancel{1200}} = \underline{1400}$

15. when $11\frac{1}{9}\%$ is subtracted from 360. Then find the number?

Sol:

$11\frac{1}{9}\% = \frac{1}{9} \rightarrow$ original value

$9 - 1 = 8$ subtracted

$\Rightarrow \frac{8}{9} \times \overset{40}{\cancel{360}} = \underline{320}$

16. If $16\frac{2}{3}\%$ of a number is added with it self then the result become 4956. find the original value?

Sol:

$16\frac{2}{3}\% = \frac{1}{6}$

$\Rightarrow \frac{6 \times 4956}{7} = \underline{4248}$

17. In $16\frac{2}{3}\%$ of a number subtracted from it self then the number result becomes 5670. Then find the original number? (10)

Sol:

$16\frac{2}{3}\% = \frac{1}{6}$

$\Rightarrow \frac{20}{3} \times \frac{1}{100} = \frac{1}{15}$

$14 \rightarrow 5670$

$15 \rightarrow ?$

$\frac{15}{14} \times 5670 = \underline{6075}$

18. If 64 is added in a number then number becomes $157\frac{1}{7}\%$ of it self find the number?

Sol:

$157\frac{1}{7}\% = \frac{11}{7}$

$4 \rightarrow 64$

$7 \rightarrow ?$

$\frac{7}{4} \times 64 = \underline{112}$

(or)

$\frac{11}{7} \rightarrow$ original value

$7 \rightarrow 64$

$11 \rightarrow ?$

$\frac{11}{7} \times 64$

19. If 930 is added in a number the number becomes $444\frac{4}{9}\%$ then find the original number?

Sol:

$444\frac{4}{9}\% = \frac{40}{9}$

$31 \rightarrow 930$

$9 \rightarrow ?$

$\frac{9}{31} \times 930 = \underline{270}$

20. If 21 is added in a number the result becomes $137\frac{1}{2}\%$ then find that number?

Sol:

$137\frac{1}{2}\% = \frac{11}{8}$

$8 \rightarrow 21$

$3 \rightarrow 21$

$3 \rightarrow ?$

$8 \rightarrow ?$

$\frac{3}{8} \times 21 = \frac{63}{8} \Rightarrow$ ✗

$\frac{8}{3} \times 21 = \underline{56}$

21. 750 is how much percentage more than that of 600?

(11)

Sol:

750 600

150

$\frac{25}{\cancel{150}} \times \cancel{100} = 25\%$

$\cancel{600}$

22. 700 is how much percentage less than that of 900?

Sol:

900 700

200

$\frac{200}{\cancel{900}} \times 100 = 22\frac{2}{9}\%$

23. A person salary increased from 10,000 to 12,000 then find the increased percentage?

Sol:

10,000 12,000

2,000

$\frac{2,000}{\cancel{10,000}} \times \cancel{100} = \frac{100}{5} = 20\%$

24. A person weight is 90 kg and he decreased to 75 kg then how much percentage he decreased

Sol:

90 75

15

$\frac{15}{\cancel{90}_6} \times 100 = 16\frac{2}{3}\%$

25. In a town the population increased from 40,000 to 60,000 in 10 years. Then find the average increased percentage per year?

Sol: (17)

40,000 60,000

20,000

$\frac{20,000}{40,000} \times 100 = \frac{1}{2} \times 100 = \underline{50\%}$.

26. $\frac{1}{3}$ of 150 is how much % less than that of $\frac{2}{5}$ of 180?

Sol: $\frac{1}{3} \times \overset{50}{\cancel{150}} = 50$, $\frac{2}{5} \times \overset{36}{\cancel{180}} = 72$

50 72

22

$\frac{\overset{11}{\cancel{22}}}{\cancel{72}_{36}} \times \frac{\overset{25}{\cancel{100}}}{9} = \frac{11 \times 25}{9} = \frac{275}{9} = \underline{30\frac{5}{9}\%}$.

27. $\frac{1}{8}$ of the 400 is how much percentage more than that of $\frac{1}{5}$ of the 200?

Sol: $\frac{1}{8} \times \overset{50}{\cancel{400}} = 50$, $\frac{1}{5} \times \overset{40}{\cancel{200}} = 40$

50 40

10

$\frac{10}{40} \times 100 = \frac{1}{4} \times 100 = \underline{25\%}$.

28. 15% of a number is 60 then find that number?

Sol:

$15 \rightarrow 60$

$100 \rightarrow ?$

$\frac{100}{\cancel{15}} \times \overset{4}{\cancel{60}} = \underline{400}$

29. $12\frac{1}{2}$ % of a number of is 30 then find that number?

(13)

Sol:

$12\frac{1}{2}\% = \frac{1}{8}$

$1 \longrightarrow 30$

$8 \longrightarrow ?$

$\frac{8}{1} \times 30 = \underline{240}$

30. 30% of a number is 120 then find that number what percentage of 20?

Sol:

$30 \longrightarrow 120$

$100 \longrightarrow ?$

$\frac{100}{30} \times \overset{40}{\cancel{120}} = 400$

$\Rightarrow \frac{\overset{400}{\cancel{400}}}{\underset{3}{\cancel{120}}} \times 100 = \frac{1000}{3} = \underline{333\frac{1}{3}\%}$

31. 40% of a number is 12 then find that number 70% of that number?

Sol:

$40 \longrightarrow 12$

$70 \longrightarrow ?$

$\frac{70}{40} \times 12^{3} = \underline{21}$

32. In a number $16\frac{2}{3}\%$ is 30 then find the percentage $11\frac{1}{9}\%$?

Sol:

$16\frac{2}{3}\% = \frac{1}{6}$, $11\frac{1}{9}\% = \frac{1}{9}$

$16\frac{2}{3}x \longrightarrow 30$

$11\frac{1}{9} \longrightarrow ?$

$\frac{1}{\underset{3}{\cancel{9}}} \times \frac{\overset{2}{\cancel{6}}}{1} \times \overset{10}{30} = \underline{20\%}$

33. when 40 is subtracted from a number value decreased 10%. then find that number? (14)

Sol:

$10 \longrightarrow 40$

$100 \longrightarrow ?$

$\frac{100}{10} \times 40 = \underline{400}$

34. 60 is subtracted from a number that value decreased to 80%. then find the number?

Sol:

$20 \longrightarrow 60$

$100 \longrightarrow ?$

$\frac{100}{20} \times 60^{3} = \underline{300}$

35. The difference between $16\frac{2}{3}\%$ of a number and $12\frac{1}{2}\%$ of the same number is 20 then find that number?

Sol:

$16\frac{2}{3}\% = \frac{1}{6}$, $12\frac{1}{2}\% = \frac{1}{8}$

$\frac{1}{6} - \frac{1}{8} = \frac{4-3}{24} = \frac{1}{24}$

$1 \longrightarrow 20$

$24 \longrightarrow ?$

$\frac{24}{1} \times 20 = \underline{480}$

37. 120 is added to 70% of a number the result will be itself then find that number?

Sol:

$30 \longrightarrow 120$

$100 \longrightarrow ?$

$\frac{100}{30} \times 120^{4} = \underline{400}$

38. when 20 is added to $66\frac{2}{3}\%$ of a number the result will be it self?

Sol:

$66\frac{2}{3}\% = \frac{2}{3}$

$1 \longrightarrow 20$

$3 \longrightarrow ?$ $\quad \frac{3}{1} \times 20 = \underline{60}$

39. when 21 is added to $\frac{4}{7}$ of a number the result will be its self then find the 10% of that number?

Sol:

$3 \longrightarrow 21$ (15)

$7 \longrightarrow ?$

$\frac{7}{3} \times 21^{7} = 49$

$\Rightarrow 49 \times \frac{10}{100} = \underline{4.9}$

40. 15 is sobtraded from $\frac{8}{3}$ of number the result will be itself then find the 20% of that number?

Sol:

$3 \longrightarrow 15$

$5 \longrightarrow ?$

$\frac{5}{3} \times 15^{5} = 25$

$\Rightarrow \frac{5}{25} \times \frac{20}{100} = \underline{5}$

41. 25% of a number of equal to 35% of another number then find the radio's between the 2 numbers?

Sol:

$\frac{5}{25}$% of $x = \frac{7}{35}$% of y

$\Rightarrow x : y = 7 : \underline{5}$

42. $\frac{2}{3}$ of a number is equal to 10% of another number then how much percentage smaller number in largest number?

Sol:

$\frac{2}{3}$ % of $x = \frac{1}{100}$ of y

$\Rightarrow \frac{x}{y} = \frac{1}{10} \times \frac{3}{2} = \frac{3}{20}$

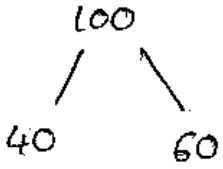
$\Rightarrow \frac{3}{20} \times \frac{5}{100} = \underline{15\%}$

43. 10% of a number is equal to 15% of another number Sum of the two number is 60. then find that number? (16)

Sol:
$$10\% \text{ of } x = 15\% \text{ of } y$$
$$\frac{x}{y} = \frac{3}{2}$$
$$\Rightarrow \frac{3}{2}\,\frac{2}{5} \times 60^{12} = \underline{24}$$

44. 18 is more than that of 40% of a number then find that number?

Sol:



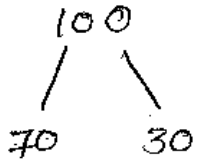
$60 \rightarrow 18$

$100 \rightarrow ?$

$$\frac{100}{60} \times 18^{3} = \underline{30}$$

45. 35 is 70% less than that of a number then find that number?

Sol:



$30 \rightarrow 35$

$100 \rightarrow ?$

$$\frac{100}{30} \times 35^{7} = \frac{7}{6} \times 100 = \underline{116\frac{2}{3}}$$

46. 35 10% is 70% 15% of number is 24 Then find that number?

Sol:
$$\frac{10}{2\,100} \times \frac{15}{100} \times x = 24$$
$$\Rightarrow \frac{3}{200} x = 24^{8} \Rightarrow x = 8 \times 200 \Rightarrow \underline{x = 1600}$$

47. $12\frac{1}{2}\%$ of $11\frac{1}{9}\%$ of a number is 20 then find that number? (17)

Sol:

$12\frac{1}{2}\% = \frac{1}{8}$, $11\frac{1}{9}\% = \frac{1}{9}$

$\Rightarrow \frac{1}{8} \times \frac{1}{9} \times x = 20$

$\Rightarrow x = 20 \times 8 \times 9$

$\Rightarrow x = \underline{1440}$

48. The difference of two numbers is 20%. Smallest number is 12 then find the longest number?

Sol:

A	B
80%	100%

$80 \rightarrow 12$

$100 \rightarrow ?$

$\frac{\overset{5}{\cancel{100}}}{\underset{2}{\cancel{80}}} \times \overset{3}{12} = \underline{15}$

49. The difference 40% of a number and $\frac{2}{3}$ of the same number is 12. Find that number?

Sol:

$\frac{\overset{2}{\cancel{40}}}{\underset{5}{\cancel{100}}} = \frac{2}{5} \rightarrow \frac{2}{3} - \frac{2}{5} = \frac{10-6}{15} = \frac{4}{15}$

$4 \rightarrow 12$

$15 \rightarrow ?$

$\frac{15}{4} \times \overset{3}{12} = \underline{45}$

50. 30% of a number and $\frac{2}{5}$ of the number Sum is 70 Then find that number?

Sol:

$\frac{3}{10} + \frac{2}{5} = \frac{3+4}{10} = \frac{7}{10}$

$7 \rightarrow 70$

$10 \rightarrow ?$

$\frac{\overset{10}{\cancel{70}}}{\underset{1}{\cancel{7}}} \times \overset{10}{70} = \underline{100}$

51. 30% of a 2 number and

51. First two numbers is 10% and 20% more than that of 3rd, 2nd number is what percentage of First number (18)

(i) First and second

(ii) First number is how much % less than that of second number.

(iv) How much percentage second number is more than that of first number.

Sol:

(i) 110 120 100

$$\frac{120}{110} \times 100$$

$$= \frac{1200}{11} = 109\frac{1}{11}\%$$

(ii) $\frac{110}{120} \times 100^{50}$

$$= \frac{550}{6} = 91\frac{2}{3}$$

(iii) $\frac{10}{120} \times 100$

$$= \frac{50}{6} = 8\frac{1}{3}\%$$

(iv) $\frac{10}{110} \times 100$

$$\Rightarrow \frac{1}{11} \times 100$$

$$= 9\frac{1}{11}\%$$

52. First two numbers in 10% and 20% less than that of Third number First number is how much percentage of the second number?

(19)

Sol:

90% 80% 100%

$$\frac{90}{80_4} \times \overset{5}{100} = \frac{450}{4} = 112\frac{1}{2}\%$$

53. A student has to find out $\frac{2}{3}$ of a number but he find out $\frac{3}{4}$ of that number how much percentage increased?

Sol:

$$\frac{2}{3} \times \frac{3}{4}$$

$$\Rightarrow \frac{1}{8} \times 100 \Rightarrow 12\frac{1}{2}\%$$

$$\Rightarrow \frac{8}{9} \Rightarrow 8:9$$

54. A student has to find out $\frac{5}{8}$ of a number but he find out the $\frac{3}{7}$ of that number then find the decreased percentage of that number?

Sol:

$$\frac{5}{8} \times \frac{3}{7}$$

35 : 24

$\vee$

11

$$\frac{11}{35_7} \times \overset{20}{100} = \frac{220}{7} = 31\frac{3}{7}\%$$

55. A person salary first increased 5% and again increased 10% then find the total increased percentage?

Sol:

$$100 \times \frac{\overset{21}{105}}{100} \times \frac{110}{\underset{2}{100}}$$

$$= \frac{231}{2}$$

$$= 115.5$$

56. A person weight first increased 15% and decreased 15% then find the changes of percentage in his weighted.

Sol:

$$x + y + \frac{xy}{100}$$

$$\Rightarrow 15 - 15 + \frac{15 + (-15)}{100}$$

$$\Rightarrow \frac{-225}{100} = -2.25$$

57. A number first decreased 20% again decreased 10%. how much percentage increased to give initial value?

Sol:

$$100 \times \frac{80}{100} \times \frac{90}{100} = 72$$

72 100

28

$$\frac{28}{72} \times 100 = \frac{350}{9} = 38\frac{8}{9}\%$$

58. A bussiness man price's are increased 10%. sales increased by 20%. then find the changes in that bussiness?

Sol:

$$100 \times \frac{90}{100} \times \frac{120}{100} = 108$$

$$108 - 100 = 8$$

59. A value is 90% of B. B is how percentage of A?

Sol:

$$\frac{A}{B} = \frac{90}{100}$$

$$\Rightarrow \frac{100}{90} \times 100 = \frac{1000}{9} = 111\frac{1}{9}\%$$

60. A value is 25% more than that of B how much percentage of B less than that of 3?

Sol:

A B

125 100

$$\frac{25}{125} \times 100 = 20\%$$

61. Latha weight is 10% less than that of Rani. How much percentage Rani weight is more than that of Latha? (21)

Sol:
$$\frac{10}{90} \times 100 = \frac{1}{9} \times 100 = 11\frac{1}{9}\%$$

62. petrol is increased 30%. find the increase of decr-eased then a family should effect in its consu-mption so as not to increase expenditure of these account?

Sol:
$$\frac{30}{130} \times 100 = \frac{300}{13} = 23\frac{1}{13}\%$$

63. If the price of wheat is decrease 20%. find the % of increase that a family should effect in its consumption so as to decrease expenditure of this account?

Sol:
$$\frac{20}{4\,80} \times 100 = \frac{1}{4} \times 100 = 25\%$$

64. Length of a rectangle increased 25%. how much percentage breadth decrease. There is no changes in area?

Sol:
$$100 \xrightarrow{-25} 125$$

$$\frac{25}{125} \times \frac{20}{100} = 20\%$$
$$5$$

65. In an exam 30% marks to pass one mark is student got and 100 marks and failed by 8 marks? then find the total marks in exam?

Sol:
$30\% \rightarrow 100 + 8$

$100 \rightarrow ?$ $\quad \frac{100}{30} \times \frac{36}{108} = 360$

66. In an exam 40% of marks to pass one of the student got 130 marks and he got 10 marks more than the pass mark then find the total mark in exam?

(22)

Sol:

$40\% \longrightarrow 130-10$

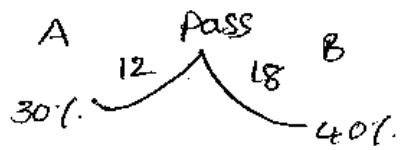
$40 \longrightarrow 120$

$100 \longrightarrow ?$

$\frac{100}{40} \times \overset{3}{\cancel{120}} = \underline{300}$

67. In an exam A got 30% of marks and failed by 12 marks the same exam B got 40% of marks and he got 18 marks more than the pass mark. Then find the pass percentage in that exam?

Sol:



$10 \longrightarrow 30$

$100 \longrightarrow ?$

$\Rightarrow \frac{100}{10} \times 30 = 300$

total marks

$\Rightarrow$ $10 \longrightarrow 30$

$? \longrightarrow 12$

$\frac{12}{30} \times 100 = 4\%$

pass mark $= 30+4 = \underline{34\%}$

68. The election conducted between two candidates one of the candidate got 60% of votes and owned by 1800 votes. Find the total number of votes.

Sol:

A B

60% 40%

20%

$20 \longrightarrow 1800$

$100 \longrightarrow ?$

$\frac{100}{20} \times \overset{90}{\cancel{1800}} = \underline{9000}$

69. In a village elections are conducted in dea 30% members are not participated and 25 votes are invalid. In that remaing one of the person got 45% votes and defined by 800 votes. Then find the total number of votes in that election?

Sol: (23)

A B

45% 55%

10%

10 → 800

100 → ?

$\frac{100}{10} \times 800 = 8000$

⇒ 8000 + 35 + 25 = 8055

total number of votes = 8055

70. The election conducted between two candidates in a village. In that 10% of votes are invalid. In valid votes one of the candidate that 60% votes and ooned by 720 votes. Then find the number of invalid votes?

Sol:

A B

$90 \times \frac{60}{600} = 54$

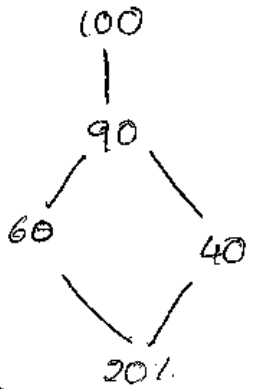
$90 \times \frac{40}{600} = 36$) 18

18 → 720

10 → ?

$\frac{10}{18} \times 720 = 400$

(or)



$\frac{20}{100} \times 90 = 18$

18 → 720

10 → ?

$\frac{10}{18} \times 720 = 400$

71. In an election 75% voters are participated in that 2% votes are invalid and one of the candidates got 75% invalid votes and he got totally 9261 votes. Then find the total number of votes? (24)

Sol:

$$x \times \frac{75}{100} \times \frac{98}{100} \times \frac{75}{100} = 9261$$

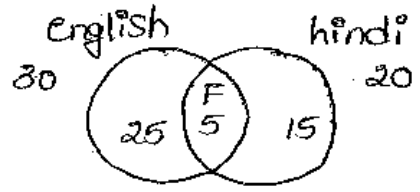
$$x \times \frac{441}{8} = 9261$$

$$\Rightarrow x = \frac{9261 \times 8}{441}$$

$$\Rightarrow x = 16800$$

72. In an exam 30% students failed in english and 20% of students failed in hindi 5% of students failed in both. then find the total pass percentage in in that exam?

Sol:

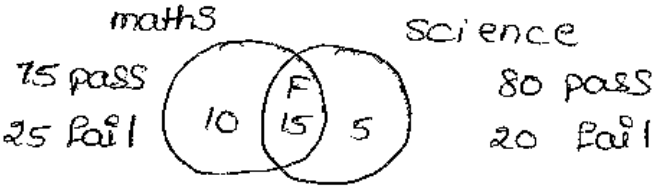


$\Rightarrow$ 25+5+15 = 45% is failed percentage

pass percentage is 55%.

73. In an exam 75% students passed in maths and 80% of students passed in science but 15% students failed both subjects then find the pass percentage in both subjects?

Sol:



$\Rightarrow$ 10+15+5 = 30% Failed percentage

pass percentage 70%.

73. In a office 70% employees take tea and 40% of employees take coffee and 60 members take both tea and coffee how many members total employees in that office.

Sol:

$$\text{Tea} + \text{coffee} = 70 + 40 = 110$$

$$110 - 100 = 10$$

$$10 \rightarrow 60$$

$$100 \rightarrow \underline{600}$$

(2.5)

74. In a fraction numrater decrease 10% and denami-nater increased 20% the value changes into $\frac{3}{5}$ then find the fraction?

Sol:

$$\frac{3 \text{ 90\% of } x}{4 \text{ 120\% of } y} = \frac{3}{5}$$

$$\Rightarrow \frac{x}{y} = \frac{3}{5} \times \frac{4}{3}$$

$$\Rightarrow \frac{x}{y} = \underline{\frac{4}{5}}$$

75. In a fraction 60% of numrater and 75% of dena-minater equal to 5/6 then find the original value?

Sol:

$$\frac{x \times 60}{y \times 75} \; \frac{4}{5} = \frac{5}{6}$$

$$\Rightarrow \frac{x}{y} = \frac{5}{6} \times \frac{5}{4}$$

$$\Rightarrow \frac{x}{y} = \underline{\frac{25}{24}}$$

76. An employee spends 10% income for rent, 20% for food, 30% for education and his still in has 2800 Rl- then find the total income?

Sol:

$$10 + 20 + 30 = 60$$

$$40 \rightarrow 2800$$

$$100 \rightarrow ?$$

$$\frac{100}{40} \times \frac{70}{2800} = \underline{7000}$$

78. In employee spends $12\frac{1}{2}\%$ for transport and $16\frac{2}{3}\%$ for health and 10% of income for other expencives and still it has 3650 Rl- Then find the expenditure and transport?

(26)

Sol:

$12\frac{1}{2}\% + 16\frac{2}{3}\% + 10\%$

$\Rightarrow \frac{1}{8} + \frac{1}{6} + \frac{1}{10}$

$2 \mid 8, 6, 10$

$4 \quad 3 \quad 5 \quad = 120$

$\Rightarrow \frac{15+20+12}{120}$

$\Rightarrow \frac{47}{120} \quad \frac{73}{120}$

$73 \longrightarrow 3650$

$15 \longrightarrow ?$

$\frac{15}{73} \times \overset{50}{3650} = \underline{750}$ transport

79. A person spends 10% of income for rent, and 20% of income for food in the remaing and 30% for health in the remaing and still he save 5040 Rl- then find the total income?

Sol:

$x \times \frac{90}{100} \times \frac{80}{100} \times \frac{70}{100} = 5040$

$\Rightarrow x = \overset{\overset{80}{720}}{\cancel{5040}} \times \frac{1000}{9 \times 8 \times 7}$

$\Rightarrow x = \underline{10,000}$

80. A person spends $66\frac{2}{3}\%$ of is income and he still saving 1200 Rl- then find the total income?

Sol:

$66\frac{2}{3}\% = \frac{2}{3} \downarrow \frac{1}{3}$

$1 \longrightarrow 1200$

$3 \longrightarrow ?$

$\frac{3}{1} \times 1200 = \underline{3600}$

81. In a 600 liters of mixture contain 10% alchol how many liters of alchol should be added to get 25% of Alchol?

Sol:

$$600 \times \frac{10}{100} = 60$$

$$\Rightarrow 600 - 60 = 540$$

$$75 \longrightarrow 540$$

$$100 \longrightarrow ?$$

$$\frac{\overset{4}{\cancel{100}}}{\underset{3}{\cancel{75}}} \times \overset{180}{\cancel{540}} = 720$$

$$\Rightarrow 720 - 600 = \underline{120} \text{ liters}$$

82. 400 liters of mixture in that 30% alchol how much water should be added to get 20% alchol?

Sol:

$$400 \times \frac{30}{100} = 120$$

$$20 \longrightarrow 120$$

$$100 \longrightarrow ?$$

$$\frac{100}{20} \times \overset{6}{\cancel{120}} = 600$$

$$\Rightarrow 600 - 400 = \underline{200} \text{ liters}$$

83. A population of village is 4000 it increases every year 10% then find the number of people after 3 years?

Sol:

$$4000 \times \frac{110}{100} \times \frac{110}{100} \times \frac{110}{100}$$

$$= 4 \times 11 \times 11 \times 11$$

$$= \underline{5324}$$

84. A present population of village is 1440 first year increased $12\frac{1}{2}$ % and second year decreased $16\frac{2}{3}$ %. then find the number of people after 3 years?

Sol:

$12\frac{1}{2}\% = \frac{1}{8}$, $16\frac{2}{3}\% = \frac{1}{6}$ (28)

$1440^{30} \times \frac{9}{8} \times \frac{5}{6}$.

$= 30 \times 9 \times 5$

$= \underline{1350}$

85. The present population of village is 1,44,000 every year increased 20%. then find the number percentage in 2 years ago?

Sol:

$x \times \frac{120}{100} \times \frac{120}{100} = 1,44,000$

$\Rightarrow x = \frac{1000}{144000} \times 100$

$\rightarrow x = \underline{1,00,000}$

(or)

$x = \frac{1000}{144000} \times \frac{100}{144}$

$x = 1,00,000$

86. A price of an artic l is 81,000 in 2002 that price decreased every year 10%.

(i) Find the value 2004

(ii) Find the value 2000

Sol:

(i) $81000 \times \frac{90}{100} \times \frac{90}{100}$

$= 810 \times 9 \times 9 = 65610$

(ii) $\overset{10}{81000} \times \frac{100}{90} \times \frac{100}{90}$

$10 \times 100 \times 100$

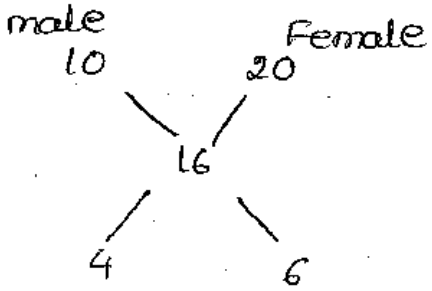
$= \underline{1,00,000}$

87. A population of village 5000 male increased 10% and female increased 20% of increased the number of people is 5800 then find the number of males.

Sol:

$5000 \longrightarrow 5800$

$\frac{16}{5000} \times 100 = 16\%$



2 : 3

$\frac{2}{5} \times 5000^{1000} = \underline{2000}$

(29)

(or)

M	F
10	10+10

$5000 \times \frac{10}{100} = 500$

$800 - 500 = 300$

$F \times \frac{10}{100} = 300$

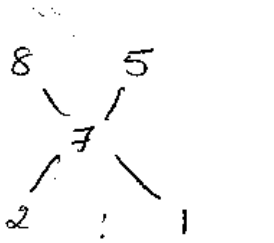
$F = 3000$

$M = 2000$

88. The population of village is 9,600 if the male increased by 8% and female increased by 5% of increasing the total population will 10272 then find the number of males?

Sol:

$9,600 - 10272 = 672$



$\frac{672}{9,600}^{7} \times 100 = 7$

$\frac{2}{5} \times 9,600^{3200} = \underline{6400}$

(or)

M	F
3+5	5

$9,600 * \frac{5}{100} = 480$

$672 - 480 = 192$

$M \times \frac{480}{100} = 192$

$M = \frac{192 \times 10}{48}$

$M = 6400$

89 A sales man is a lode $5\frac{1}{2}$ % discount and the total sales maden by him a bono of $\frac{1}{2}$ percentage on sales over 10,000. If is total earning 1990. Then find the total sales. (30)

Sol:

$5\frac{1}{2}$ % of $x + \frac{1}{2}$ % $(x - 10,000) = 1990$

$\Rightarrow \frac{11}{2} \times 100 \times x + \frac{100}{2 \times 100} (x - 10,000) = 1990$

$\Rightarrow [11x + (x - 10,000)] \frac{1}{2 \times 100} = 1990$

$\Rightarrow 11x + x - 10,000 = 1990 \times 200$

$\Rightarrow 12x - 10,000 = 398000$

$12x = 408000$

$x = \underline{34000}$

(or)

$10,000 \times \frac{1}{2} \times \frac{1}{100} = 50$

$\Rightarrow 1990 + 50 = 2040$

$\text{Sales} \times \frac{6}{100} = 2040$

$\text{Sales} = 340 \times 100$

$\text{Sales} = \underline{34000}$

90. A population of a village first year increased 4%. and second year increased 9%. then find the avera-ge increased percentage?

(31)

Sol:

$$\sqrt[2]{4 \times 9}$$

$$\sqrt[2]{36}$$

$$= \underline{6}$$

91. The population of a village increased first year 5%. increased second year 10%. and third year 20%. increased then find the average increased percenta-ge?

Sol:

$$\sqrt[3]{5 \times 10 \times 20}$$

$$= \sqrt[3]{1000}$$

$$= \underline{10}$$

92. A population of village is 4000 in the $\frac{5}{8}$ part of male 40% males are married how much percen-tage females are unmarried in the total number of people?

Sol:

$$\overset{500}{\cancel{4000}} \times \frac{5}{8} = 2500 \text{ males}$$

1500 females

$$\frac{40}{\cancel{100}} \times \cancel{2500} = 1000$$

Female = 500 members

$$\frac{500}{4000} \times 100 = 12.5\% = \underline{12\frac{1}{2}\%}$$

only females $\frac{500}{1500} \times 100 = \underline{33\frac{1}{3}\%}$

93. In an examination 1500 students one attmented 60%. of students are boys 45%. of boys and 65%. of girls are passed then find the failed percentage in that exam?

Sol: (32)

60% 40%

1500

$\frac{60}{100} \times \frac{1500}{60} = 900$

900 600

1500

9 6

3 : 2

$\frac{3}{5} \times 55 = 33$

$\frac{2}{5} \times 35 = 14$

$\Rightarrow 33 + 14 = \underline{47\%}$.

94. In an exam a student has 35%. out of 180 marks in first paper how much percentage scored in the second paper out of 150 marks If we have to got atleast 50%. of marks if the two exams?

Sol:

I — 180

150

330 $\times \frac{50}{100} = 165$

$\frac{35}{100} \times 180 = 63$

165

63

102

$\Rightarrow \frac{102}{150} \times 100 = \underline{68\%}$.

95. In an exam it is necessary to get 35% of the total marks to pass there are 3 papers a boy get 62 out of 120. In first paper and 35 out of 150 in second paper how many marks a has to get to pass in 180 marks?

(37)

Sol:

$120 + 150 + 180 = 450$

$62 + 35 = 97$

$450 \times \frac{35}{100} = 157.5$

97.0

60.5

96. In a school there are 3 sections students are in the ratio's 2:3:5 In the first section increased 10, second section increased 20, third section increased 30. Find the new ratio?

Sol:

110% of 2 : 120% of 3 : 130% of 5

$\frac{110}{100} \times 2 : \frac{120}{100} \times 3 : \frac{130}{100} \times 5$

$2.2 : 3.6 : 6.5$

97 A is 50% larger than C and B is 25% larger then C how much percentage A value more than that of B?

Sol:

A	B	C
150	125	100

$\frac{25}{125} \times 100 = 20\%$

98. A & B are such that the sum of 5% of A and 4% of B is 2/3 of sum of 6% of A and 8% of B then find A:B? (34)

Sol:

$$5\% \text{ of } A + 4\% \text{ of } B = \frac{2}{3}(6\% \text{ of } A + 8\% \text{ of } B)$$

$$\frac{5}{100}A + \frac{4}{100}B = \frac{2}{3}\left(\frac{6}{100}A + \frac{8}{100}B\right)$$

$$\Rightarrow \quad 15A + 12B = 12A + 16B$$

$$\Rightarrow \quad 3A = 4B$$

$$\frac{A}{B} = \frac{4}{3}$$

$$\Rightarrow A : B = \underline{4:3}$$

99. The sum of the number of boys and girls in a school is 150. The number of boys is x and the number of girls become x% of the total number students. Find the number of boys?

Sol:

$$B + G = 150$$

$$B = x$$

$$G = x\% \text{ of } 150$$

$$x + \frac{x}{100} \times 150 = 150$$

$$\Rightarrow \quad 5x = 150 \times 2$$

$$\Rightarrow \quad x = \frac{150 \times 2}{5}$$

$$\Rightarrow \quad x = 30 \times 2$$

$$\Rightarrow \quad x = \underline{60}$$

100. A sales man is called allowed 12% commision and the total sales made by him and bones of 1% and the sales over 15,000 Rl-. If the total commision of sales man is 7650 Rl-. Find the total sales? (35)

Sol:

$$15,000 \times \frac{1}{100} = 150$$

$$7650 + 150 = 7800$$

$$\text{Sales} \times \frac{13}{100} = 7800$$

$$\text{Sales} = \frac{\overset{600}{\cancel{7800}} \times 100}{13}$$

$$\text{Sales} = \underline{60,000}$$

101 If one number is 80% of the other and more time the sum of the square is 656 then find that numbers?

Sol:

$$4(8^2 + 10^2) = 656$$

$$4(64 + 100) = 656$$

$$164 \times 4 = 656$$

$$656 = 656$$

(i) 7, 10

(ii) 8, 10

(iii) 16, 20

102 The two numbers are $\underline{8, 10}$

102 when 15% of less in grinding wheat a country an export 30 lakhs tons of wheat in the next year 10% loss in grinding it can export 40 lakhs tons of wheat the production of lakhs in the country.

Sol:

$$15\% - 10\%$$

$$5 \rightarrow 10$$

$$100 \rightarrow ?$$

$$\frac{100}{5} \times 10^2 = \underline{200} \text{ lakhs}$$

103. The price of a car is 3,25,000 it was insured to 85% of it's price the car was damaged completely in excedent and the insurens company paid 90% of the insurens what was the difference between the price of the car and the amount recived?

Sol:

$$3,25,000 \times \frac{85}{100} \times \frac{90}{100}$$

$$\Rightarrow 325 \times 85 \times 9$$

$$\rightarrow 2,48,625$$

$$3\,25\,000 - 248625 = \underline{76,375}$$

104. In a compitative examination in state A 6% selected from the total of period and state B and equal number of student appeard and 7% candidate got selected with 80 more candidates then A what was the total number of candidates appeard in each state.

Sol:

$$7 - 6 = 1$$

$$1 \longrightarrow 80$$

$$100 \longrightarrow ?$$

$$\frac{100}{1} \times 80 = \underline{8000}$$

105. A labour works 60 hours for week and he earned 2400 Rs/- as a wages if is per hour wages increased by 40% and duration of work reduced by $16\frac{2}{3}$%. Find the percentage change in is income?

Sol:

Rs/h	hour	
5	6	30) 5
7	5	35)

$$40\% = \frac{2}{3}$$

$$16\frac{2}{3}\% = \frac{1}{6}$$

$$\frac{5}{30} \times 100 = \underline{16\frac{2}{3}\%}$$

106 In a train there are as many wages as day number of seats in each wagon. In one of the wagon carring 25 persons is filled with $71\frac{3}{7}\%$ of the it's capacity find the maximum number of passengers that can be accamidated as it has minimum 20% seats always vacancies?

(37)

Sol:

$25 \longrightarrow 71\frac{3}{7}\%$

$71\frac{3}{7}\% = \frac{5}{7}$

$5 \longrightarrow 25$

$7 \longrightarrow ?$

$\frac{7}{5} \times 25 = 35$

$35 \times 35 = 1225$

$\rightarrow \frac{245}{1225} \times \frac{80}{100}$

$= \underline{980}$

107 A man can type 20 lines in 10 minutes but he lives 8% mergin and each line in how much time he will type 23 pages it 40 lines and each page 25% more mergin then report?

Sol:

10 min $\longrightarrow$ 20 lines

1 $\longrightarrow$ 2 lines

$8 \times \frac{25}{100} = 2$

$8 + 2 = 10 \Rightarrow 100 - 10 = 90$

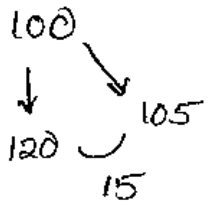
$\frac{23 \times 40 \times 90}{2 \times 92} = \underline{450}$ min

08. The price of sugar is increased by 20%. by how much page is consumption is decreased so as the expendi-ture will increased by 5% only when he originaly consumption 280 kgs sugar?

(38)

Sol:

280 kgs



$\frac{15}{120} \times 100 = 12\frac{1}{2}\% = \frac{1}{8}$

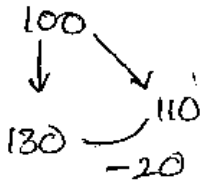
$8 \longrightarrow 280$

$1 \longrightarrow ?$

$\frac{1}{8} \times 280 = \underline{35}$

09. The price of sugar is increased by 30% due to these a family use 40 kgs less sugar so as expenditure will increased by 10% only Find the original consumtion

Sol:



$\frac{-20}{130} \times 100 = \frac{-2}{13}$

$2 \longrightarrow 40$

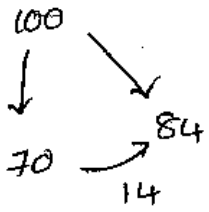
$13 \longrightarrow ?$

$\frac{13}{2} \times \overset{20}{40} = \underline{260}$ kgs

110. The price of sugar is decreased by 30% due to these a family perchase 32 kgs more sugar so as the expenditure decreased by 16% only find the current consumption?

(39)

Sol:



$$\frac{14^{2}}{\cancel{84}} \times 100 = 20 = \frac{1}{5}$$

$1 \rightarrow 32$

$5 \rightarrow ?$

$\frac{5}{1} \times 32 = 160$

$\Rightarrow 160 + 32 = \underline{192}$

111. The price of sugar is increased by 20% due to these a family perchase 12 kgs less sugar for 300 Rs

(i) original consumption

(ii) present consumption

(iii) Original price

(iv) Current price

(v) Find the difference between new price.

Sol:

(iv) $300 \times \frac{20}{100} = 60$

$\frac{60}{12}^{5} = \underline{5}$ Rs- current price.

(iii)

$120 \rightarrow 5$

$100 \rightarrow ?$

$\frac{5}{6}\ \frac{100}{120} \times 5 = \frac{25}{6} = \underline{4\frac{1}{6}}$ Rs- original price.

(ii) $\frac{\overset{60}{\cancel{300}}}{\cancel{5}} = \underline{60}$ kgs current consumtion (40)

(i) $60 + 12 = \underline{72}$ kgs original consumtion

(v) $5 - 4\frac{1}{6} = 1 - \frac{1}{6} = \underline{\frac{5}{6}}$ difference.

112. A, B, C and D purchase a plat for 56 lakhs Rs. the share of B, C and D is 460% of A, The share of A, C and D is $366\frac{2}{3}$% of B and C share is 40% of A, B and D then find share of D?

Sol:

B+C+D	A	A+C+D	B	C	A+B+D
23	5	11	3	2	5

460%
$= 400 + 60$
$= 4 + \frac{3}{5}$
$= \frac{23}{5}$

$\frac{5}{28} \times \frac{2}{\cancel{56}} = 10$ lakhs

$366\frac{2}{3}$%
$= 300 + 66\frac{2}{3}$
$= 3 + \frac{2}{3}$
$= \frac{11}{3}$

$\frac{3}{14} \times \frac{4}{\cancel{56}} = 12$ lakhs

40%
$= 40 \times \frac{1}{100}$
$= \frac{2}{5}$

$\frac{2}{7} \times \frac{8}{\cancel{56}} = 16$ lakhs

$A + B + C = 10 + 12 + 16 = 38$

Total $= 56$

$D = \text{Total} - (A + B + C)$

$D = 56 - 38$

$D = \underline{18}$ lakhs

113 A reduction of 2 Rl- per kg enables a man to perchase 4 kgs more sugar for 16 Rl- Find the original price?

(41)

(a) 3 kg
(b) 5 kg
(c) 4 kg
(d) 6 kg

Sol:

$$\frac{16}{(x-2)} - \frac{16}{x} = 4\text{kg}$$

$$\frac{16}{3} - \frac{16}{4} = 4$$

$$8 - 4 = 4$$

$$4 = 4$$

The original price is 4

114 An employee spends 80% of a income when the salary is increased 20% expenditure increased 10%. Then find the increased percentage of the saving?

Sol:

$$100 \times \frac{80}{100} = 80 \quad 20$$

$$120 \times \frac{80}{100} = 12$$

$$\Rightarrow \frac{12}{20} \times 100^{5} = 60\%$$

(or)

income Expend Salary

100 → 120 | 80 → ×10 → 88 | 20 → 12 → 32

$$80 \times \frac{10}{100} = 8$$

$$\Rightarrow 80 + 8 = 88$$

$$\frac{12}{20} \times 100^{5} = 60\%$$

115 A employee spends 90% of is income increased 30%. expenditure also increased 20%. then find the increased percentage of the saving?

(42)

Sol:

Income	expend	saving
100	90	10
↓	↓ ×20	↓ 12
130	108	22

$$90 \times \frac{20}{100} = 18$$

$$\Rightarrow \quad 90 + 18 = 108$$

$$\frac{12}{10} \times 100 = \underline{120}\,\%$$

116. A solution of salt and water contain 5% salt if 20 liters of water is of evoporate then salt becom -es 15% find the initial solution?

Sol:

	salt		water	
initial	1	:	19 ×3	
	3	:	57	↓ 40
present	3	:	17 ×1	

$5:95 = 1:19$

$15:85 = 3:17$

$40 \rightarrow 20$

$60 \rightarrow ?$

$$\frac{60}{40} \times 20 = \underline{30} \text{ liters}$$

117 12 liters of mixture of water and acid contain 30% acid how much liters of water should be withdraw to make as a 40% ? (43)

Sol:

	acid		water	
initial	3	:	7	$\times 2$
	6	:	14	
present	2	:	3	$\times 3$) 5
	6	:	9	✓

$30 : 70 = 3 : 7$

$40 : 60 = 2 : 3$

$20 \rightarrow 12$

$5 \rightarrow ?$

$\frac{3}{20} \times 12^{3} = \underline{3}$ liters

118 when income of a man is increased by 6000 Rl- tax rate reduced from 18 to 15 percentage while in the both the situations 25% of income is tax free both find initial income if he paid equal taxes in both cases ?

Sol:

$$x \times \frac{18}{100} \times \frac{75}{100} = (x + 6000) \times \frac{75}{100} \times \frac{15}{100}$$

$$18x = 15(x + 6000)$$

$$\Rightarrow 18x = 15x + 90000$$

$$\Rightarrow 3x = 90,000$$

$$\Rightarrow x = \underline{30,000}$$

119. A water melon contain 90% water after some time it contains only 12% water if now it's weight is 150 kgs calculate the original weight? (44)

Sol:

90 : 10

9 : 1 $\times 22$

12 : 88

3 : 22

(or)

198 : 22

195 ↳ 3 : 22

25 → 50

220 → ?

$\frac{220}{25} \times 50^{2} = 440$ kgs

IQ x F = 88 x 50

F = 440 kgs

120. 20 kgs Fresh watermelon contain 96% water after some time water remains 95%. Find the present weight of the watermelon?

Sol:

$20 \times 4 = ? \times 5$

present water melon weight is = 16 kgs

121. In an election kajina and kathrina participated $\frac{2}{5}$ of the voters promised to vote for kajina and the voting day 15% of the voters went back on their promises to vote for kajina and 25% of the voters went back and there promises to vote for kathrina find the total number of voters with kathrina wins by 750 votes?

Sol:

kajina kathrina

$\frac{2}{5}$ $\frac{3}{5}$

$\frac{15}{100}^{3} \times \frac{2}{5} = \frac{3}{50}$ $\qquad$ $\frac{25}{100}^{5} \times \frac{3}{8} = \frac{3}{20}$

50 $\qquad$ 20

(45)

200 $\qquad$ 300

$\frac{15}{100} \times 200 = 30$ $\qquad$ $\frac{25}{100} \times 300 = 75$

$70 + 75 = 245$ $\qquad$ $225 + 30 = 265$

$\Rightarrow$ 265

10 $\rightarrow$ 750

500 $\rightarrow$?

$\frac{500}{10} \times 750 = \underline{37,500}$ voters

122. Ram perchase 6 black and x white balls. The price of black ball is $\frac{5}{2}$ price of white ball the time of making a bill clerk made a mistake and inter change the number of balls due to these the bill amount increased by 45%. Find the x value?

Sol:

black	white
6	x

$B = \frac{5}{2} W$

$\Rightarrow \frac{B}{W} = \frac{5}{2}$

$\frac{30+2x}{12+5x} = \frac{100}{145}^{20}_{29}$

$\Rightarrow 870 + 58x = 240 + 100x$

$42x = 630$

$x = \frac{630}{42}$

$x = \underline{15}$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Profit = SP - CP

Loss = CP - SP

$\text{Profit (\%)} = \frac{\text{Profit}}{CP} \times 100$

$\text{Loss (\%)} = \frac{\text{Loss}}{CP} \times 100$

① A man purchased an article for 800/- and sold it for 900/- Then find the profit (%)?

CP = 800
SP = 900
Profit = SP - CP
= 900 - 800
Profit = 100

$\text{Profit (\%)} = \frac{\text{Profit}}{CP} \times 100$

$= \frac{100}{800} \times 100 = \frac{100}{8} = 12\frac{1}{2}\%$

② A man purchased a cycle for 700/- and spent for Repair 200/- and sold it for 1200/- Then find the Profit (%)?

CP = 700/-
Repair +200/- = 900
SP = 1200/-

Profit = SP - CP
= 1200 - 900
= 300

$\text{Profit (\%)} = \frac{300}{900} \times 100 = \frac{100}{3} = 33\frac{1}{3}(\%)$

(3) A person purchase an article per 1800 Rs/- and sold it for 1600/- Then find loss percentage.

CP = 1800/-

SP = 1600/-

loss = CP - SP

= 1800 - 1600

= 200/-

$\text{Loss}(\%) = \frac{\text{loss}}{CP} \times 100$

$= \frac{200}{1800} \times 100 = \frac{100}{9}$

$= 11\frac{1}{9}\%$

(4) A person purchased 1 Dozen Eggs per 36 Rs/- and sold it each one 3.20 Pa then find the probability of loss percentage?

12 Eggs - 36 Rs/-

$CP = \frac{36}{12} = 3.$

SP = 3.20

profit = SP - CP

= 3.20 - 3 = 0.20 profit

$\frac{0.20}{3} \times 100 = \frac{20}{3} = 6\frac{2}{3}\%$

(5) A Fruit vendor purchased 15 oranges for 70 Rs/- and sold it for each orange for 4 Rs/- then find the probability of loss percentage?

CP - 70/-

SP - 4 × 15 = 60/-

loss = CP - SP

= 70 - 60

= 10/-

$\text{Loss}(\%) = \frac{\text{loss}}{CP} \times 100$

$= \frac{10}{70} \times 100$

$= 14\frac{2}{7}\%$

(6) An Article purchased for 600 Rs/- How much price he has to sale to gained 10% profit

CP = 600/-

Profit = 10%

100% → 600/-

110% → ?

$\frac{110}{100} \times 600 = 660/-$

=

(7) An Article purchased for 70 Rs/- How much price He has to sale to get loss 30%.

CP - 70 Rs/-

loss - 30%

$70 \times \frac{30}{100} = 21$

$70 - 21 = 49/-$

=

(or)

100 → 70

70 → ?

$\frac{70}{100} \times 70 = 49/-$

(8) A person purchased an article for 360/- How much price he has to sale to gain 11 1/9 %.

$\frac{4}{360} \times \frac{100}{9} \times \frac{1}{100} = 40$

$360 + 40 = 400/-$

(or)

gain add 1/9

$\frac{9}{10}$

9 - 360

10 - ?

$\frac{10}{9} \times \frac{40}{360} = 400$

=

(9) Aman purchased an article for 800 Rs/-. How much price he has to sale to get loss of $12\frac{1}{2}\%$?

$12\frac{1}{2}\% = \frac{1}{8}$.

$800 \times \frac{1}{8} = 100$

$800 - 100 = 700$

(or)

$8 - 800$

$7 - ?$

$\frac{7}{8} \times 800 = 700/-$

—x—

(10) A person sold an article for 1320/-. He got 10% profit then find the cost price?

$110\% - 1320/-$

$100\% - ?$

$\frac{100}{110} \times 1320 = 1200/-$.

(11) A person sold an article for 640/- He got 20% loss the find the cost price?

$80\% - 640$

$100\% - ?$

$\frac{100}{80} \times 640 = 800$

(12) A person sold an article for 1200/-. He got $33\frac{1}{3}\%$ profit then find CP?

$4 - 1200/-$

$3 - ?$

$\frac{3}{4} \times 1200 = 900/-$

$33\frac{1}{3}\% = \frac{100}{3} \times \frac{1}{100}$

$= \frac{1}{3}$

$3 - CP$

$4 - SP$

(13) A person sold an article for 750/- He got $16\frac{2}{3}$% loss then find the CP?

$16\frac{2}{3}\% = \frac{1}{6}$

5 - 750/-

6 - ?

$\frac{6}{5} \times \frac{15.0}{750} = 900/-$

—x—

(14) A person sold an article for 840 Rs/- He got 20% profit. then find Profit (or) loss percentage when he sold to 630 Rs/.

840 - 120%

630 - ?

100 - 90% = 10% loss

$\frac{630}{840}^{90} \times 120 = 90\%$

↗

—x—

(15) A man sold an article for 910/- he got 30% Profit when he sold 770/- find the profit (or) loss percentage?

910 - 130%

770 - ?

10% more Profit

$\frac{770}{910}^{110} \times 130 = 110$

↗

(16) A person sold an article for 720/- He got 20% loss. How much price he has to sale to get 30% profit?

80% - 720

130% - ?

$\frac{130}{80} \times \frac{9}{720} = 1170/-$

(17) A person sold an article for he got profit $2/3^{rd}$ of the CP then find the profit percentage.

$$\text{Profit} = \frac{2}{3} CP$$

$$\frac{\text{Profit}}{CP} = \frac{2}{3}$$

$$\text{Profit}(\%) = \frac{\text{Profit}}{CP} \times 100 = \frac{2}{3} \times 100 = 66\frac{2}{3}\%$$

(18) when an article is sold at some price he got loop $\frac{1}{5}$th of the cost price then find the loss percentage ?

$$\text{loss} = \frac{1}{5} \text{ th } CP$$

$$\frac{\text{loss}}{CP} = \frac{1}{5}$$

$$\text{loss}(\%) = \frac{\text{loss}}{CP} \times 100 = \frac{1}{\cancel{5}} \times \frac{20}{\cancel{100}} = 20\% \text{ of loss}$$

(19) The person sold an article at some price. He got profit $\frac{2}{7}$ th of the SP then find the Profit % ?

$$\text{Profit} = \frac{2}{7} \text{ of SP}$$

$$\frac{\text{Profit}}{SP} = \frac{2}{7}$$

$$CP = SP - \text{Profit}$$

$$= 7 - 2 = 5$$

$$\text{Profit}(\%) = \frac{\text{Profit}}{CP} \times 100$$

$$= \frac{2}{5} \times 100 = 40\% \text{ Profit}$$

(20) A person sold an Article at some price. He got loss 3/8th of the SP then find the loss(%) ?

loss = $\frac{3}{8}$ th of SP

$\frac{\text{loss}}{SP} = \frac{3}{8}$ CP = 8+3 = 11

loss(%) = $\frac{\text{loss}}{CP} \times 100 = \frac{3}{11} \times 100 = 27\frac{3}{11}$ %.

(21) cost price is 90% of selling price then find the profit / loss percentage ?

CP = 90%. SP

$\frac{CP}{SP} = \frac{90}{100} = \frac{9}{10}$

$\frac{1}{9} \times 100 = 11\frac{1}{9}$ % profit

(22) cost price is equal to 120% of SP then find the profit / loss % ?

CP = 120% SP

$\frac{CP}{SP} = \frac{120}{100} = 6/5$ $\frac{1}{6} \times 100 = \frac{100}{6} = 16\frac{2}{3}$ % loss

(23) The Ratio's blw CP and SP is 2:3 then find the profit %.

CP : SP = 2 : 3

$\frac{CP}{SP} = \frac{2}{3}$ P = 3-2 = 1

Profit(%) :

$\frac{1}{2} \times 100^{50} = 50\%$

(24) A person sold an article he got Profit 10% and cp. Then find the profit (%) and SP.

P-10%. CP-100

SP-110

$\frac{10}{110} \times 100 = 9\frac{1}{11}$ %.

(25) A person sold an article at 20% loss and cp then find the loss(%) and the SP

CP - 100

SP - 80

$\frac{20}{80} \times \frac{25}{100} = 25\%$ loss

4

**

(26) A person sold an Article he got profit 25% and the SP. Then find the profit % and CP

SP - 100 %

CP - 75 %

P = 25 %

$\frac{25}{75_3} \times 100 = \frac{100}{3} = 33\frac{1}{3}\%$

(27) A person sold an article at some price the he got loss 20% on SP then find the loss % and CP.

SP - 100 %.

CP - 120 %.

loss 20%.

Loss (%) $= \frac{20}{120_6} \times 100 = \frac{1}{6} = 16\frac{2}{3}\%$ loss

(28) The person sold an article for 75 Rs/- In this thime he got profit % equal to CP. Then find the CP ?

① 70 ✓② 50 ③ 60 ④ 40

CP - 50

SP - 75

Profit (%) $= \frac{25}{50} \times \frac{2}{100} = 50$

Here profit (%) = cp.

(or)

75

15 × 5 0

we see difference 10

then we put 0 after 5

50

(29) The person sold an article 144/-. In this time he got Profit (%) is equal to C.P then find C.P

SP = 144

144 - factors

18 x 8 (difference is 10)

So Ans 80 % Profit.

(30) A person sold an article at some price he got 10% loss. when he his sold 60/- more he got 5% profit then find the CP ?

90% } 15% — 60
105% } 100% — ?

$\frac{100}{15} \times 60^{4} = 400/-$

(31) A person sold an article at some price he got at 10% loss. when he sold 40/- less price he got 20% loss. Then How much price he has to sale to gain 20%

90% } 10% — 40
80% } 120% — ?

$\frac{120}{10} \times 40 = 480$

(32) A person sold an article at some price he got loss $12\frac{1}{2}$%. when he so sold 28 Rs/- more he got $16\frac{2}{3}$%. Profit then find the cost price?

$12\frac{1}{2}\% = \frac{1}{8}$) $\frac{7}{8}$

$16\frac{2}{3}\% = \frac{1}{6}$) $\frac{7}{6}$

$\frac{7}{6} - \frac{7}{8} = \frac{28-21}{24} = \frac{7}{24}$

7 - 28
24 - ?

$\frac{24}{7} \times 28^{4} = 96/-$

CP =

(33) Profit obtained by selling an article for 520/- is equal to sale the loss when the same article is sold for 400/- . How much price he has to sale to gain 20% profit.

SP% of 520 profit = SP 400/- loss

profit = loss

$SP - CP = CP - SP$

$520 - CP = CP - 400$

$920 = 2CP$

$CP = \frac{920}{2} = 460$

(or) when profit = loss

Both are adding & divided by 2

$\frac{520+400}{2} = \frac{960}{2} = 460$

20% profit

$\frac{120}{100} \times 460 = 552.$

(34) Profit obtained by selling an article for 420/- is equal twice the loss when the same article is sold for 300/- . Then find the CP.

profit = 2loss

$(SP - CP) = 2(CP - SP)$

$420 - CP = 2CP - 2\times300$

$420 + 600 = 3CP$

$CP = \frac{1020}{3}^{340}$ CP = 340/-

(or) twice loss so divide 3

$\frac{420-300}{3} = \frac{120}{3} = 40$

This value is added to loss SP

300 + 40 = 340/-

(35) The profit earned when article is sold for 800% is 20 times the loss when it is sold for 275/- . find at what price he sold his goods if we wants to earn 80% profit.

Profit = 20% loss

$SP - CP = 20(CP - SP)$

$800 - CP = 20(CP - 275)$

$800 + 5500 = 20CP + CP$

$6300 = 21CP$

$CP = \frac{6300}{21}^{300}$ CP = 300

Profit 20% = $300 \times \frac{20}{100}$

$= 60$

$300 + 60 = 360$

(or) $\frac{800-275}{21}^{25} = \frac{525}{21}$

$275 + 25 = 300$

$300 \times \frac{120}{100} = 360$

$=$

(36) The profit earned by selling a chair to 752/- is 1.2 times the loss incurred when the same chair was sold for 400 Rs/ what was the CP of a chair ?

$\frac{752-400}{2.2} = \frac{352}{22}$ (352 and 22 crossed out; written above and below: 32, 16 and 2)

$= 1.6$

$= 160/-$

$160 + 400 = 560/-$

(37) A person sold at some Prices. If he sold 2/3rd of the selling price they got 10% loss. How much % he get profit sold at 1st price

$\frac{2}{3}$rd

2 - 90

3 - ?

$\frac{3}{2} \times 90 = 135$ (2 and 90 crossed out; 45 written above)

135 - 100

35%

(38) A person sold at some price if he sold 4/5th of the sp. He got 20% loss If he sell at 1st price find the profit (or) loss percentages?

4/5th

4 - 80

5 - ?

$\frac{5}{4} \times 80 = 100$ (4 and 80 crossed out; 20 written above)

no profit / no loss.

(39) A person purchased a pressure cooker 4/5th of the sp. If he sold and at sp then find the profit (or) loss (%)

$CP = \frac{4}{5} \times SP$

$\frac{CP}{SP} = \frac{4}{5}$

profit = 1

$profit(\%) = \frac{1}{4} \times 100$ (4 and 100 crossed out; 25 written above)

profit(%) = 25% profit

(40) A person purchased an article $\frac{5}{8}$ th of the SP. If he sold at SP then find the profit (or) loss(%)

CP = $\frac{5}{8}$ of SP

$\frac{CP}{SP} = \frac{5}{8}$ $\quad \frac{3}{5} \times \frac{20}{100} = 60\%$ Profit

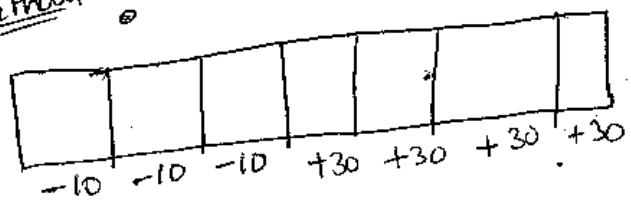
Profit - 3 %.

(41) A person sold $3/7^{th}$ of goods at 10% loss. and the Remaining goods sold at 30% profit then find the profit (or) loss %.

$\frac{3}{7} \times \frac{90}{100} + \frac{4}{7} \times \frac{130}{100}$ $\quad \frac{90}{700} \times 100 = 12\frac{6}{7}\%$.

$\frac{270}{700} + \frac{520}{700} = \frac{790}{700}$

II method



$\frac{90}{7} \times 100 = 12\frac{6}{7}\%$.

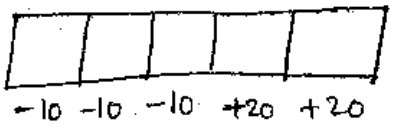
(42) A person sold $5/8$ of goods at 20% loss Remaining goods sold at cp then find the profit / loss percentage.

$\frac{5}{8} \times \frac{80}{100} + \frac{3}{8} \times \frac{100}{100}$

$\frac{1}{2} + \frac{3}{8} = \frac{4+3}{8} = \frac{700}{800}$

$\frac{100}{800} \times 100 = 12\frac{1}{2}\%$

(43) A person sold $3/5^{th}$ of goods at 10% loss. How much % profit he has to say the Remaining goods at to gain overall profit 2%?



$$-30 + 40 = \frac{10}{5} = 2\%$$

(i) $\frac{3}{5} \times \frac{90}{100} + \frac{2}{5} y = \frac{-30+2x}{5} = 2$

$$-30 + 2x = 10$$

$$2x = 40$$

$$x = 20$$

(44) satya purchased a pen and sold to laxmi at 10% profit. laxmi sold to priya at 20% profit. finally priya paid 2640/-. then find the CP?

$$x \times \frac{110}{100} \times \frac{120}{100} = 2640$$

$$x = \frac{\cancel{2640}^{20} \times 1000}{\cancel{132}} = 2000$$

(45) Raja purchased an article and sold at 20% at loss to Siddu. Sindu at 20% profit family Bhavani paid 960/- then find the CP of Siddu.

$$x \times \frac{\overset{4}{80}}{\underset{5}{100}} \times \frac{\overset{6}{120}}{\underset{5}{100}} = 960$$

$$x = \frac{960 \times 5 \times 5}{4 \times 6}$$

$$x = 1000$$

120% - 960

100% - ?

$$\frac{100}{120} \times \overset{8}{960} = 800/-$$

(46) A person sold an article at 10% profit. If he purchased 10% less price and sold 6/- less price. He get 25% profit. Then find Costprice ?

CP	SP
100%	110
90%	112.5

25% - 6 Rs/-
100% - ?

$\frac{100 \times 6}{5/2} = 240/-$

(47) A person sold an article at 20% profit. If he purchased 10% less price and sold 36/- less price. He get 30% profit. Then find the Costprice. ?

CP	SP
100	120
90	117

} 3%

3% - 36
100/- - ?

$\frac{100 \times 36^{12}}{3} = 1200/-$

$\frac{90}{30} \times 90 \times \frac{30}{100} = 27$

(48) A Business sold a watch at 15% profit If he purchased 50% more and sold 10% more. He got 10% profit then find the CP?

CP	SP
100	115
105	115.5

$105 \times \frac{10}{100} = 10.5$

$10.5 + 105 = 115.5$

0.5 - 10/-
100% - ?

$\frac{100}{0.5} \times 10$

$\frac{100}{1/2} \times 100$

$= 2000$

(49) A person purchased 6 chocolates for 1Rs/-. How many chocolates we has to sale to gain 20% Profit

CP - 100%.
SP - 120%.

120% - 6
100% - ?

$\frac{\cancel{100}^{5}}{\cancel{120}_{2}} \times 6 = 5$ chocolates.

(50) A person purchased 4 chocolates for 1Rs/-. How many chocolates we has to sale to gain 20% loss.

CP - 100%. 80% - 4 $\frac{\cancel{100}^{5}}{\cancel{80}_{2}} \times 4 = 5$ chocolates.
SP - 80%. 100% - ?

(51) A Business sold 10 lemmons for 1Rs/- He gain 20% profit. How many lemmons are purchased for 1Rs/-.

CP - 100 100% - 10 $\frac{120}{100} \times 10 = 12$/-
SP - 120 120% - ?

(52) A dishonest dealer pramises to sale at CP but he uses 960gms for 1kg weight. then find the profit percentages ?

1000gm
CP 960 1000 SP
1000 - 960 = 40

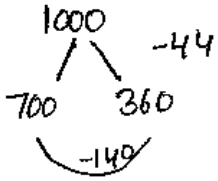
$\frac{40}{\cancel{960}_{24}} \times \frac{\cancel{100}^{25}}{6} = \frac{25}{6} = 4\frac{1}{6}\%$

(53) A dis honest shop keeper promises to sale his goes at its CP but he uses 30% less weight. find the profit percentage

1000
CP 700 SP 1000

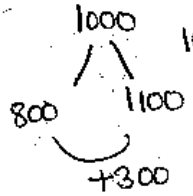
$\frac{300}{700} \times 100 = \frac{300}{7} = 42\frac{6}{7}\%$

(54) A shop keeper promises to sale his books at 44% loss. But he 30% less weight. find the actual loss percentages.



$\frac{140}{700} \times 100 = 20\%$ loss.

(55) A shop keeper promises to sale his goods at 10% profit but he uses 80% less weight find the profit %.



$\frac{300}{800} \times 100 = 37\frac{1}{2}$

(56) A shop keeper promises to sale his goods at x% profit. But he uses 20% less weight. Those gained $37\frac{1}{2}$%. To find x?

1000gm

$37\frac{1}{2}\% = \frac{3}{8}$ — P, $\frac{3}{8}$ — S } SP = 11 (3+8)

8×800 $\frac{800}{1100}$
11×100

$\frac{100}{1000} \times 100 = 10$

$37\frac{1}{2} = \frac{75}{2} \times \frac{1}{100} = \frac{3}{8}$

(57) A shop keeper promises to sale his goods at x%. loss. But he uses 20% loss weight. Those gained 20%. to find x?

1000gm

800 960

$20\% = \frac{20}{100} = \frac{1}{5}$ — P, — SP } SP = 6 (1+5)

CP → 5 SP → 6

$5 \times 160 = 800$ $160 \times 6 = 960$

$\frac{400}{1000} \times 100 = 40\%$

$\frac{400}{1000} \times 100 = 4\%$ loss

(58) Adis honest Dealer promises to sale at cp. How many grms he has to use to giving weight to get 25% Profit ?

① 750 ② 800 ③ 900 ④ 700

(59) A person purchased 5 chocolates for 4 Rs/- and sold 4 chocolates for 5 Rs/- then find the profit / loss percentage.

method(i) ⓐ

Articles	Rs/-
a	b
c	d
5	4/-
4	5/-

$\frac{ad-bc}{bc} \times 100$

$\frac{25-16}{16} \times 100 = \frac{9}{16} \times \frac{25}{4} = \frac{225}{4} = 56\frac{1}{4}$ (or) 56.25 Profit

(60) If we want

method(ii)

Chocolate	Rs/-
5	4/-
4	5/-

5, 4 Lcm - 20

$CP = \frac{4}{5} \times 20^{4} = 16/-$

$SP = \frac{5}{4} \times 20^{5} = 25/-$ } +9

$\frac{9}{16} \times \frac{25}{4} = \frac{225}{4} = 56\frac{1}{4}$ %.

(60) ⓑ If we want to get 27 Rs/- profit of a chocolate he has to sale

$9+9+9 = 27$

$20+20+20 = 60$ - Chocolates

(or) $\frac{27}{9}^{3} = 3$ $3 \times 20 = 60$

(60) A Business man purchased 20 oranges for 30 Rs/- and sale it 40 oranges for 50 Rs/- find the profit / loss percentage.

20 oranges 30/-

40 " 50/-

$\frac{ad-bc}{bc} \times 100$

$\frac{20 \times 50 - 30 \times 40}{30 \times 40} = \frac{1000-1200}{1200} = \frac{-200}{1200_{6}} = -1/6$

$-1/6 \times 100 = -16\frac{2}{3}$ % loss

(61) A Business man purchased 5 chocolates for 4 Rs/- & sale it 4 chocolates for 5 Rs/- . In this Transaction he got 72% Profit . How many chocolates to sale.

Article	Rs/-
5	4
4	5

5,4 Lcm - 20

CP = $\frac{4}{5} \times 20^{4} = 16$

SP = $\frac{5}{4} \times 20^{5} = 25$ } +9

$\frac{9}{16} \times 100 = \frac{225}{4}$ (or) $56\frac{1}{4}$

$\frac{72}{9}^{8} = 8$

$8 \times 20 = 160$ chocolates

(62) Ratini purchased one type of eggs, 3 eggs per 1 Rs/- and another type of eggs purchased same quantity 5 per/Rs/-. He mixed Both and sale 4 eggs per 1 Rs/-. Then find the profit/loss percentage.

Eggs	Rs/-
1type 3	1/-
2Type 5 Eg	1/-
1.2 Type 4 Eg	1/-

Lcm 3,5 = 15

$\frac{1}{3} \times 15^{5} + \frac{1}{5} \times 15^{3} = 8$ Rs/-

15+15 = 30

SP $\frac{1}{4} \times 30^{15} = 7.5$

8 - 7.5 = 0.5 loss

$\frac{0.5}{8_2} \times 100^{25} = \frac{1}{2} \times \frac{1}{2} \times 25$

$= \frac{25}{4} = 6\frac{1}{4}\%$

(63) Teja purchased 7 clips/. 1 Rs/- and another type of clips 5 per 1 Rs/- He mixed to and sold 4 per 1 Rs/- Then find the profit/loss(%)

7,5 Lcm = 35

7 clip - 1 Rs/-

$\frac{1}{35} \times 7 + \frac{1}{35} \times 5$ 5 clip - 1 Rs/-

$\frac{1}{7} \times 35^{5} + \frac{1}{5} \times 35^{7} = 12$/-

35+35 = 70

SP = $\frac{1}{4} \times 70^{35} = 17.1/2$

17.5 - 12 = 5.5

$= 5\frac{1}{2} = \frac{11}{2}$

$\frac{5.5}{12} \times 100 = \frac{11}{2 \times 12} \times 100^{25}$

$= \frac{275}{6} = 45\frac{5}{6}\%$

(64) A man Bought a no'b clips at 3per/Rupee and an equal no'of clips at 2 per a 1 Rupee. at what price for Dozen should he sale to make Profit of 20%?

Article	Rs/-
3	1/-
2	1Rs/-
12	?

100% - 5 Rs/-

120% - ?

$\frac{120^{6}}{100} \times 5 = 6$ Rs/-

Lcm of 3, 2 = 6

$\frac{1}{3} \times 6^{2} + \frac{1}{2} \times 6^{3} = 5$ Rs/-

(65) A man Bought some oranges at 10/- Dozen and Bought same number of oranges at 8 Rs/- Dozen. He sold those oranges at 11/- per Dozen. How many Dozens he has to sale to get 120% Profit.

12 - 10/-

12 - 8/-

2 Dozens

$10 + 8 = \frac{18^{9}}{2} = 9$/-

9/- → 11/- (+2)

$\frac{120}{2}^{60} = 60$ Dozens

(66) By selling 45 lemmans for 40 Rs/- a man looses 20%. How many he sale for 24/- to gain 20% profit

80% - 40

120% - ?

$\frac{120^{6}}{80} \times 40 = 60$ Rs/-

60 - 45

24 - ?

$\frac{24}{60}^{2} \times 45^{9} = 18$.

(67) Cost price of 20 Articles equal to selling price of 18 Articles then find the profit (or) loss %?

20 A CP = 18 A SP

$2\left(\frac{20}{18}\right) = \frac{SP}{CP}$

$\frac{2}{18} \times 100$

$= 11\frac{1}{9}$% Profit

CP(20) = SP(18)

$\frac{CP}{SP} = \frac{18}{20}$ } 2

$\frac{2}{20} \times 100 = 10$%

(68) Cost Price of 10 Articles equal to selling price of 12 Articles then find the Profit (or) loss percentage.

$CP(10) = 12(SP)$

$\frac{CP}{SP} = \frac{12}{10}$) 2

$\frac{2}{12} \times 100 = \frac{1}{6} \times 100 = 16\frac{2}{3}$ % loss

(69) cp of 20 Articles equal to sp of x Articles he got 25% Profit then find the value of x.

✓(a) 16 (b) 24 (c) 15 (d) 18

$20(CP) = SP(x)$

$\frac{CP}{SP} = \frac{x}{20}$

16-20

$x = 16$

$\frac{4}{16} \times \frac{25}{100} = 25\%$

(70) cost price of 10 Articles is equal to selling price of x article. In this transaction we got $33\frac{1}{3}$% loss. Then find the loss.

(a) 14 ✓(b) 15 (c) 16 (d) 8

$10(CP) = x(SP)$

$\frac{CP}{SP} = \frac{x}{10}$

$x = 15$, $15 - 10 = 5$

$\frac{5}{15} \times 100 = \frac{100}{3} = 33\frac{1}{3}\%$

(71) By selling 60 managoes a fruit seller gain the CP of 20 mangoes then find the Profit or loss %. ?

Profit = SP - CP

$CP(20) = SP(60) - CP(60)$

$CP(80) = SP(60)$

$\frac{SP}{SP} = \frac{60}{80}$ } diff 20

$\frac{20}{60} \times 100 = 33\frac{1}{3}\%$

(12) By selling 50 Articles a person loss cost price of 10 Articles then find the loss percentage.

$\frac{10}{50} \times \frac{20}{100} = 20\%$ loss

(13) By selling 55 Articles A person gained selling price of 5 articles then find the profit %. ?

$\frac{5}{5p} \times 100 = 10\%$ profit

(14) By selling 44 articles a person loss selling price of 11 Articles then find the loss percentage.

$44 + 11 = 55$

$\frac{11}{55_5} \times \frac{20}{100} = 20\%$ loss

(15) By selling 100 meters cloth a man gain the selling price of 20 cm of cloth. Then find the profit (or) loss percentage.

SP (100m) = SP (20m)

$\frac{20}{80_4} \times \frac{25}{100} = 25\%$

(16) A person sold 18 cots for 16800/- In this transaction he got 3 cots profit in CP. Then find the cost of the cot.

Profit = SP − CP

3 cots CP = 18 SP − CP(18)

21 CP = 18 SP

$CP = \frac{16800^{800/-}}{21} = 800/-$

(77) A Business man sold 17 balls for 720/-. In this transaction He got loss equal to CP of 5 balls. Then find the cost of one a ball.

17 ball - 720/-

loss = CP - SP

CP(5 balls) = 17 CP - 17SP

5CP - 17CP = -17SP

12 CP = 17 SP

$\frac{720^{60}}{12}$ = CP

CP = 60/-

—x—

(78) A former purchased a cow per 30,000 and a bull for 50,000/- cow sold for 30% profit and bull sold for 10% loss. Then find the profit (or) loss %

$30,000 \times \frac{130}{100} = 39,000$

$50,000 * \frac{90}{100} = 45,000$

80,000

84,000

$\frac{4000}{80,000} \times \frac{5}{2} = 5\%$

(79) A person purchased two Articles for 5000/- each one one article sold for 10% profit and another one at 10% loss. Then find the overall profit and loss %?

$5000 \times \frac{110}{100} = 5500$

$5000 \times \frac{90}{100} = 4500$

10,000

10,000

no profit (or) loss

when we get purchased profit is equal to loss & same then no loss & no profit

(80) A Business man sale two Articles each one 5000/-. one Article at 10% profit another one sale of 10%. loss. Then find the profit or loss %.

sale $\frac{-x^2}{100} = \frac{-(10)^2}{100} = \frac{-100}{100} = -1\%$ loss

Sale → profit (or) loss same always loss

(81) A person sold 2 Articles 455/- each one. one Article sale at 30%. loss in this transation. How much money when we got profit or loss?

$$\frac{-x^2}{100} = \frac{-(30)^2}{100} = \frac{-900}{100} = -9\%$$

$455 + 455 = 910$

91% — 910

9% — ?

$\frac{9}{91} \times 910^{10} = 90$.

(82) A person sold 2 Articles each one 360/-, x article sold at 10% loss another at 20% profit %. Then find the profit and the loss in the transaction

90% — 360

100 — ?

$\frac{100 \times 360^{40}}{90} = 400$

120% — 360

100% — ?

$\frac{100}{120} \times 360^{3} = 300$

700 − 720

$\frac{20}{700} \times 100 = 2\frac{6}{7}\%$

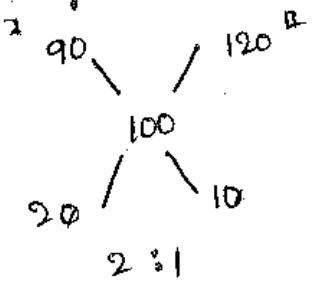
$\frac{2xy}{x+y} = \frac{2 \times 90^{3} \times 120}{210_{7}} = \frac{720}{7}$

$= 102\frac{6}{7}\%$

-100

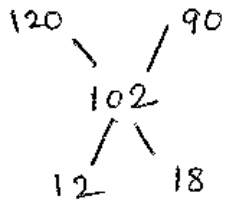
$2\frac{6}{7}\%$

(83) A person purchased two articles for 6000/- one Article sold at 10%. loss another one sold at 20%. profit. In this transaction he doesn't get any profit or loss. Then find the cost price of the 1st Article.



$\frac{2}{3} \times 6000^{2000} = 4000/-$

(84) cost price of two Articles 30,000/- 1st Article sold at 20% profit, another one sold at 10% loss. In this transaction he got 2% profit. Then find the cost price of the 2nd article.



12% : 18

2 : 3

$\frac{3}{5} \times 30{,}000^{6000} = 18{,}000/-$

(85) Cost price of two articles is 840/- . 1st Article sold at 20% loss another article sold at 30% profit . In this transaction selling Prices are equal then find the cost price of Article.

$SP_1 = SP_2$

$\frac{80}{100}$ of x % = $\frac{130}{100}$ % of y

$\frac{x}{y} = \frac{13}{8}$

$\frac{13}{21} \times 840^{40} = 520$

$\frac{8}{21} \times 840^{40} = 320$

(86) A person purchased two article with 7000/- 1st Article sold at 30% profit and 2nd article sold at 10% loss. Then selling prices are equal. Then find the cost prices of the Article?

$SP_1 = SP_2$

SP of x = SP % of y

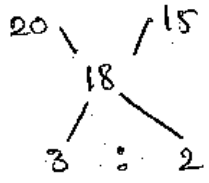
$\frac{120}{100}$ of x = $\frac{90}{100}$ of y

$\frac{x}{y} = \frac{3}{4}$

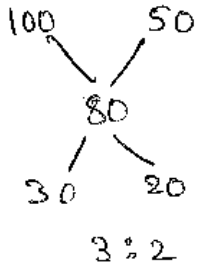
$\frac{3}{7} \times \frac{1000}{7000} = 3000/-$

$\frac{4}{7} \times \frac{1000}{7000} = 4000/-$

(87) A man purchased two types wheels 20Rs/- per kg and 15Rs/- per kg . which Ratio it has to makes to sale 18/- per kg



(88) A person purchased two types of oils 100 Rs/- and 50 per kg. It mixes and sale 96/- per kg. In this transaction he got 20% profit, which Ratio he has to mix



120% - 96

100 - ?

$\frac{100}{120} \times 96^{8} = 80$

(89) A Businessman purchased 8kg's of wheat 30 Rs/- kg and another type of wheat 12kg's of wheat 25 Rs/kg. How much price he has to sale there is no profit (or) loss in this Business.

$8 \times 30 = 240$
$12 \times 25 = 300$
$\overline{20}$ $\quad \frac{540}{20} = 27$ Rs/-

(90) A man purchased 7kg/ of sugar 10 Rs/- kg. and 8kg of sugar 15 Rs/- kg and 5kg of sugar 20/- kg. all are mixed How much price he has to sale to gain 20% Profit/kg.

$7 \times 10 = 70$
$8 \times 15 = 120$
$5 \times 20 = 100$
$\overline{20}$ $\quad \overline{290}$

$\frac{290}{20} = \frac{29}{2}$

100 – 29/2
120 – ?

$\frac{120}{100} \times \frac{29}{2} = \frac{174}{10} = 17.4/-$

(91) A man sale two Horses for 4000/- each one neither loss (or) gain in this deal. If he sold 1 horse at 25% profit then the other Horse is sold at the loss of

$4000 + 4000 = 8000$

125 – 4000
100 – ?

$\frac{100}{125} \times 4000 = 3200$

$8000 - 3200 = 4800$ } 800
4000

$\frac{800}{4800} \times 100$

$\frac{1}{6} \times 100 = 16\frac{2}{3}\%$ loss

(92) A man sales two articles for 6000/- each one. In this transaction no loss no gain. If he sold 1st article at 20% profit and the 2nd article is sold at a loss of

$6000 + 6000 = 12000/-$

120 - 6000
100 - ?

$\frac{100}{120} \times \overset{500}{\cancel{6000}} = 5000/-$

12,000 - 5000 = 7000/- } 1000
6000/- }

$\frac{1000}{7000} \times 100 = 14\frac{2}{7}/-$

(93) A Business man purchased two articles 10,000/- each one at sale 20% Profit and other on scale at 30% Profit. Then find the overall Profit % ?

10,000 + 10,000 = 20,000

20 + 30 = 50

$\frac{50}{2} = 25\%$

(or) $\frac{5000}{20,000} \times 100 =$

(94) A Business man purchased two Bicycle each one 5000/- . one at loss of 10%. and another one at loss of 6%. then find the overall loss (%)

$\frac{10+6}{2} = \frac{\overset{8}{\cancel{16}}}{\cancel{2}} = 8\%$ loss.

(95) A Business man purchased two horses equal 2,50,000/- one at sale 28% Profit another one at 18% loss. Then find the overall profit or loss(%)

$\frac{28-18}{2} = \frac{10}{2} = 5\%$

(96) A Person purchased 100 mangoes for 80 Rs/- . He purchased total 400 mangoes in that 10% fruits are damaged. Remaing fruits sold 16 Rs for Dozen then find the profit (or) loss percentage.

100 - 80 .
400 - ?

$\frac{400}{100} \times 80 = 320/-$

$400 \times \frac{10}{100} = 40$ mangoes damage

$400 - 40 = \frac{360}{12} = 30 \times 16 = 480$

480 - 320 = 160

$\frac{160}{320} \times \frac{50}{100} = 50\%$

(97) Kiran purchased 100 mangoes for 65/- But he purchased 800 mangoes in that 25% fruits are damaged. and the Reaming fruits in 15/- for Dozen the find the profit / loss % ?

100 - 65/-

800 - ?

$\frac{800}{100} \times 65 = 520$

$800 \times \frac{25}{100} = 200$ mangoes damage

$800 - 200 = \frac{600}{12}^{50} = 50 \times 15 = 750$ Profit

$\frac{230}{520} \times 100^{25} = \frac{575}{13}$

$= 44\frac{3}{13}\%$

(98) cost price of 3apples is equal to 5 oranges, 6 oranges are equal to 9 sappotas. 10 sappotas are equal to 8 Bannans, 4 Bananas are equal to 3 Mangoes, one mango cost is 5 Rs/-. Then find the cost 1 Apple.

$3A = 5\phi$

$6\phi = 9S$

$10S = 8B$

$4B = 3M$

$1M = 5$ Rs/-

If they then $\frac{5}{3} \times \frac{9}{6} \times \frac{8}{10} \times \frac{3}{4} \times 5 = \frac{15}{2} = 7.5$

(99) A Business man purchased some litters of milk when his sale 50/- litter he got 2000/- loss when his sale 60/- litter he gained 1500/-. Then find the no' of litters.

$50x = -2000$

$-60x = +1500$

$10x = 3500$

$x = 350$ litters

$-2000 \overset{CP}{\smile} +1500$

(100) Raju purchased an article 12,500/- he sold at 20% profit. He paid tax on the profit 1250/- Then find the profit.

CP - 12,500/-

$12500 \times \frac{20}{100} = 2500$

-1250 tax.

1250 profit

(101) A shopkeeper helps a profit of 12% on selling a book at 10% discount and printed price. The Ratios of the cost price and printed price. (MRP)

CP MRP 10% D

$100 \times \frac{x}{100} \times \frac{90}{100} = 112$

$x = 112 \times \frac{100}{90}$

$x = \frac{1120}{9}$

CP : MRP

$100 : \frac{1120}{9}$

$900 : 1120$

$90 : 112$

$45 : 56$

(1) Two successive discounts 10% and 20%. Then find the single equivalent Discount?

$100 \times \frac{90}{100} \times \frac{80}{100} = 72\%$

$100 - 72\% = 28\%$

$+x + y + \frac{xy}{100}$

$-10 - 20 + \frac{(-10)(-20)}{100}$

$-30 + \frac{200}{100} = -30 + 2$

$= -28\%$

(2) Three successive Discounts 10%, 20% & 30%. Then find the single equivalent Discount?

$100 \times \frac{90}{100} \times \frac{80}{100} \times \frac{70}{100} = \frac{504}{100} = 50.4$

$100 - 50.4 = 49.6$

(or) 10, 20, 30

$x + y + \frac{xy}{100}$

$-10 - 20 + \frac{(-10)(-20)}{100}$

$-30 + 2 = -28$

$-28, 30$

$-28 - 30 + \frac{-28 \times -30}{100}$

$-58 + \frac{84}{10}$

$-58 + 8.4 = 49.6$

(3) MRP of an article is 900/-. It gives 10% Discount then find the Discount price?

$900 \times \frac{10}{100} = 90/-$

(4) MRP of an Article is 1200/-. He gives $12\frac{1}{2}\%$ Discount Then find the Discount price.

$1200 \times \frac{25}{2} \times \frac{1}{100} = 150$

(5) MRP of an article is 1500/-. He give 20% Discount then find the selling Price?

$1500 \times \frac{20}{100} = 300/-$

$1500 - 300 = 1200/-$

(or) $\frac{1500 \times 80}{100} = 1200/-$

(6) MRP of an article is 270/- . He gives $11\frac{1}{9}\%$ Discount Then find the selling price.

$11\frac{1}{9}\% = \frac{1}{9}$

$\overset{30}{\cancel{270}} \times \frac{\cancel{100}}{9} \times \frac{1}{\cancel{100}} = 30$ (or) $\overset{30}{\cancel{270}} \times \frac{8}{9} = 240/-$

$270 - 30 = 240/-$

(7) MRP of an article is 7000/- . He sales for 6000/- Then find the Discount %. ?

7000 — 6000

1000

$\frac{1000}{7000} \times 100 = 14\frac{2}{7}\%$

(8) MRP of a saree is 20,000/- . He give 2 successive Discounts 50%, 10%. then find the selling price

$20,000 \times \frac{60}{100} = 12000$

$20000 - 12000 = 8000/-$

(9) A Business man sold a Freeze after 2 discounts 10% & 20%. is 14,400/- then find the MRP.

$x \times \frac{90}{100} \times \frac{80}{100} = 14,400$

$x = \frac{\overset{162}{\cancel{14,400}} \times 100 \times 100}{90 \times 80}$ $\quad x = 20,000/-$

(10) MRP of an article is 9000/-. He sale after 2 discounts 6480/- one discount is 10%. Then find the 2nd Discount.

$9000 \times \frac{90}{100} \times \frac{x}{100} = 6480$

$x = \frac{\overset{720}{\cancel{6480}} \times 100 \times 100}{\underset{80}{\cancel{9000}} \times 90}$

$x = 80$ $\quad 100 - 80 = 20\%$ / 2nd Discount.

(11) A person printed 20% more than the cost price and he give 10% Discount. Then find the profit (or) loss Percentage.

$$100 \times \frac{120}{100} \times \frac{90}{100} = 108$$

$100 - 108 = 8\%$ profit.

(12) A Business man sale an article after 80% Discount he got 4% profit. Then find the MRP.

$$100 \times \frac{x}{100} \times \frac{80}{100} = 104$$

$$x = \frac{104 \times 109}{80} = 130$$

$130 - 100 = 30\%$ MRP

(13) MRP of an article is 6000/- his sale after 30% Discount. In this Transaction he loss 500/-. Then find the cost price?

$$6000 \times \frac{70}{100} = 4200$$

loss $4200 + 500 = 4700$ - CP

(14) MRP of an article is 800 Rs/- his sale after 10% Discount he got 50Rs/- Profit. Then find the cost price?

$$800 \times \frac{90}{100} = 720$$

$720 - 50 = 670/-$

(15) MRP of an article is 4000/-. His sale with 10% Discount he got 20% profit. Then find the cost price?

$$4000 \times \frac{90}{100} = 3600/-$$

100 — 4000/-
90 — ?

(or)

$$\overset{10}{4000} \times \frac{\overset{3}{90}}{100} \times \frac{100}{\underset{4}{120}} = 3000/-$$

120% — 3600
100% — ?

$$\frac{100}{120} \times \overset{300}{3600} = 3000/-$$

(16) A Business man sale after 10% discount he gained 5% profit. If there is no Discount then find the Profit (%)?

$MRP \times \frac{90}{100} = 105$

$MRP = \frac{10500}{90} = 116\frac{2}{3}\%$

No Discount $100 - 116\frac{2}{3}\%$

Profit $16\frac{2}{3}\%$

(17) The difference blw 30% single discount and 10 & 20% successive discount is 60/- Then find the CP?

$100 \times \frac{80}{100} \times \frac{90}{100} = 72$

$100 - 72 = 28\%$

$30\% - 28\%$

$2\% - 60/-$

$100\% - ?$

$\frac{100}{2} \times 60^{30} = 3000/-$

(18) A Business man purchased an article for 3600/-. He printed 40% more the cost price and he give 20% Discount. Then find the Profit (%)?

$100 \times \frac{140}{100} \times \frac{80}{100} = 112$

$112 - 100 = 12\%$

(or) $3600 \times \frac{140}{100} \times \frac{80}{100} = 4032$

$4032 - 3600 = 432$

$\frac{432}{3600}^{12} \times 100 = 12\%$

(19) MRP of an article is 4000/-. He sale after 2 discounts 2550/- one of the Discount is 25%. then find the 2nd discount.

$4000^{1} \times \frac{3}{75} \times \frac{x}{100_{4}} = 2550^{85}$

$x = 85$

$100 - 85 = 15\%$ Discount

2nd.

(or) $4000 \times \frac{75}{100} \times \frac{x}{100} = 2550$

(20) MRP of an article is 750/-. He sale after 12% Discount. He got 10% profit. If there is no Discount then find the profit (%)

$$750 \times \frac{88}{100} \times \frac{100}{110} = 600 \text{ - CP}$$

CP 600 — MRP 750

$$\frac{150}{600} \times 100 = 25\% \text{ profit}$$

(21) MRP of a shirt is 480/-. He sale with 10% Discount. He got 8% profit. If there is no Discount find the profit (%)

$$100 \times \frac{x}{100} \times \frac{90}{100} = 108$$

$$x = \frac{108 \times 100}{90} = 120$$

$100 - 120 = 20\%$ profit

(or)

$$480 \times \frac{90}{100} \times \frac{100}{108} = 400$$

$480 - 400 = 80$

$$\frac{80}{400} \times 100 = 20\%$$

(22) A Businessman printed 20% more than the cost price in that half of the goods sale at MRP and 1/4th of the goods at 20% Discount and Remaining goods sold 40% Discount. Then find the profit (%)

120%

half of goods at MRP + 1/4th of goods 20% Discount + 40% Discount

$$60 + 30 + 24 + 18 = 102$$

$102 - 100 = 2\%$ profit.

(23) The Ratios b/w MRP of shirt and pant is 2 : 3. A shopkeeper gives 25% Discount on shirt. But Both shirt and pant purchased shopkeeper gives 20% Discount. Then find the Discount and pant.

MRP = 2 (S) : 3 (P)

200 : 300

$500 \times \frac{80}{100} = 400$

Both 20%.

25% Discount Shirt

$200 \times \frac{75}{100} = 150$

$400 - 150 = 250$ fast

$\frac{50}{300} \times 100$

$= 16\frac{2}{3}\%$

(24) The Businessman sold an article after 20% Discount. He got 20% profit. If he give 25% Discount then find the profit (%)

$MRP \times \frac{80}{100} = 120$

$MRP = \frac{120 \times 100}{80} = 150$

$150 \times \frac{75}{100} = \frac{225}{2} = 112\frac{1}{2}\%$

-100

$= 12\frac{1}{2}\%$

(or)

80 — 120

75 — ?

$\frac{75 \times 120}{80} = \frac{225}{2} = 112\frac{1}{2}\% - 100 = 12\frac{1}{2}\%$

(25) A Business man sold a TV 17,940/- after 8% percentage Discount. In this transaction, he got 19.6% profit. If there is no discount then find the profit (%) ?

$100 \times \frac{x}{100} \times \frac{92}{100} = 119.6$

$x = \frac{119.6 \times 100}{92} = \frac{1196 \times 10}{92} = 130$

$100 - 130 = 30\%$

(26) If 5 get 4 free

(a)

$5+4 = 9 \times 10 = 90$ (MRP)

$5 \times 10 = 50$

$\frac{40}{90} \times 100 = 44\frac{1}{9}\%$

(b) If 3 get 3 free

$3+3 = 6 \times 10 = 60$ (MRP)

$3 \times 10 = 30$

$\frac{30}{60} \times 100 = 50\%$

(c) If 5 get 4 free with 20% Discount then find profit (%)

$5+4 = 9 \times 10 = 90$

$5 \times 10 = 50$

$50 \times \frac{80}{100} = 40$

$\frac{50}{90} \times 100 = 55\frac{1}{9}\%$

(d) By 4 get 5 free with 50% more discount.

$4+5 = 9 \times 10 = 90$

$4 \times 10 = 40$

$40 \times \frac{50}{100} = 20$

$\frac{70}{90} \times 100 = 77\frac{7}{9}\%$

(27) A shopkeeper allows with 25% Discount on marked price and earned 30% profit. If he get 90/- as a profit. find the amount of Discount.

$25\% = \frac{1}{4}$ — D, MRP

$30\% = \frac{30}{100}$ — Profit, CP

CP	SP	MRP	
	3	4	-①
10	13		-②

If SP are equal to multiply ① × 13 ; ② × 3

CP	SP	MRP
	3×13	4×13
10×3	13×3	

CP	SP	MRP
30	39	52
	9×10	13×10
	90/-	130/-

(28) By How much percentage A shopkeeper mark his goods above his cost price. so as by giving 20% Discount. He may gain 10%.

(100-D) (100+P%)

CP	MRP
80	110

$\frac{30}{80} \times 100 = 37\frac{1}{2}\%$

(or) $100 \times \frac{x}{100} \times \frac{80}{100} = 110$

$x = \frac{110 \times 100 \times 5}{8 \times 2} = \frac{275}{2} = 137\frac{1}{2}\%$

$137\frac{1}{2} - 100 = 37\frac{1}{2}\%$

(29) By How much (%) A shopkeeper marks his goods above its costprice so as by giving 10% Discount. he may gain 30%.

CP	MRP
90	130

$\frac{40}{90} \times 100 = \frac{400}{9} = 44\frac{4}{9}\%$

(30) A shopkeeper marks is goods at such a price that after allowing Discounts of 12.5% and the marked price. He can earn a profit of 20%. If the article cost him 1400/-. Then find its marked price.

(100 - D) (100 + P)

$\frac{7}{8}$ $\times$ $\frac{6}{5}$

35 : 48

35 — 1400

48 — ?

$\frac{48}{35} \times 1400^{40} = 1920$

$12\frac{1}{2}\% = \frac{25}{2} \times \frac{1}{100_4} = \frac{1}{8}$

$20\% = 20 \times \frac{1}{100_5} = \frac{1}{5}$

(31) A shopkeeper gives 25% discount to his customer. But his sells only smuggling goods and as bride he pay 10% and the cost price. Find what should by the marked price. If a deproves to make a profit of $9\frac{1}{11}$% and cost price of the article is ₹500.

CP MRP

$\frac{25}{4}$ $\frac{12\frac{1}{2}}{11}$

11 : 16

11 - 2750

16 - ?

$\frac{16}{11} \times 2750^{250} = 4000$

$2500 \times \frac{10}{100} = 250$

$\begin{array}{r} 2500 \\ -\ 250 \\ \hline 2750 \end{array}$

$9\frac{1}{11}\% = \frac{100}{11} \times \frac{1}{100} = \frac{1}{11}$

$25\% = \frac{1}{4}$

(32) Ramu purchased an Article per ₹500/- . He then label price in such way so as to earn 25/- profit. However. wire selling he offered 8% discount on label price what is the actual (%) profit earned.

$100 \times \frac{125}{100} \times \frac{92}{100}^{23} = 115$

$115 - 100 = 15\%$ profit

(33) By selling an Article 1170/- A man allows 10% discount earned 30% profit. If the article is sold at 0% discount what should be the profit (%)

CP MRP

90 130

$\frac{40}{90} \times 100 = 44\frac{4}{9}\%$

(or)

$1170 \times \frac{90}{100} \times \frac{100}{130} = 810$

$1170 - 810 = 360$

$\frac{360}{810} \times 100$

$\frac{400}{9} = 44\frac{4}{9}\%$

(34) By selling an article for 15,600/-. A man allows 8% discount and 105% Rs 19.6% profit. If the article is sold at 0% discount what should be profit (%) ?

CP MRP

92 119.6

$\frac{27.6}{92} \times 100 = \frac{276}{920} \times 100 = 30\%$

119.6
92.0
27.6

(35). By selling an article for 11,70/- Aman allows 10% discount and earned 30% profit. If the article is sold at 5% discount what should be the profit (%) ?

CP MRP

90 130

335 ↓ 6.5

123.5

$\frac{33.5}{90} \times 100 = 37\frac{2}{9}\%$

$130 \times \frac{5}{100} = \frac{65}{100} = 6.5$

(36) A shop keeper give 3 Articles free on purchase of 5 Articles he also allows a discount of 20%. still earned 25% profit. find the ratio of the cost price and marked price.

Buy 5 get 3 Free + 20% D

MRP — 80

↓

50 — 20%

SP 40

CP : MRP

32 : 80

2 : 5

(or)

CP / MRP

80/8 (10) 2 / 125/8 (25) 5

2 : 5

=

$25\% = \frac{1}{4} - \frac{P}{CP}$ SP-5

5 .. 40

4 - ?

$\frac{4}{5} \times 40^{8} = 32$

(37) A shopkeeper give 1 Article free and the purchase of every 15 Articles He also allow a discount 4% to 1st and still earn 35% profit. find the Ratios of cost price and marked price

CP MRP

$\frac{96}{16}$ 6 $\frac{135}{15}$ 9

6 : 9
2 : 3

(38) Harshith publication published 3500/- books for 3,50,000/- at cost price. He give 500 books free to some book shop. He also allowed a discount of 25% and marked price and give 1 Book free for every purchase of 29 Books. find the amount of profit (or) loss. If the marked price of each book is 160/- ?

CP = 3,50,000

$160 \times \frac{1}{4} = 40$ $160 - 40 = 120$

$2900 \times 120 = 34,8000$

$3,50,000 - 34,8000 = 2000$ loss.

(39) A Rickshaw Dealer Buys 30 Rickshaws for 4725/- In that 8 are 4 sitters and the Rest are 2 seaters. At which price must he sale the 4 seaters so that If he sales the two sitters at 3/4th of the price this price to make a profit of 40% is an outlay.

2 seat = $\frac{3}{4}$ 4 seats

$\frac{2 seat}{4 seat} = \frac{3}{4}$

4 seat 2 seat
8 22
CP 4x 3x
SP 32x 66x

$40 \times \frac{1}{100} = \frac{2}{5}$ - profit, 5 - CP, SP = 7

5 - 4725
7 - ?
$\frac{7}{5} \times 4725 = 6615$ (945)

$32x + 66x = 6615$
$98x = 6615$
$x = \frac{6615}{98} = 67$ (approximate)

$4x = 4 \times 67$
$= 268$

(40) A man sold a Book 9% Profit and pen at 13% Profit. If he sold the Book at 13% profit and the pen at 9% profit he gained 80 Rs/- more. find the cost price of the Book and a pen. If he purchase both at 20,000/-

B 9% Profit + pen 13% Profit = Profit
B 13% Profit + pen 9% Profit = Profit + 80

-4% B profit + 4% pen profit = -80/-

$+4$ (- Book profit + pen profit) = -80

$-B\text{profit} + \text{pen profit} = \frac{80}{4}^{20}$

$-B\text{ profit} + \text{pen profit} = 20$

$B - P = 2000$
$B + P = 20{,}000$

$2B = 22{,}000$
$B = 11{,}000$
$P = 9000$

(41) A man purchase a book and a pen for 25000/-. He sold the Book at 13% profit. and pen at 17%. He sold the book at 17% profit & pen at 13% profit. He aims 80/- more. find the Individual cost price.

B 13% Pr + Pen 17% Pr = Profit
B 17% Pr + Pen 13% Pr = Profit + 80%

-4% B Pr + 4% Pen Pr = -80/-

$+4$ (B Pr − P Pr) = +80

$B - P = 80/4 = 20\%$

$B - P = 20{,}000$
$B + P = 25{,}000$

$2B = 27{,}000$
$B = 13{,}500$/-
$P = 13{,}500$/-

(42) A shopkeeper bought two cycles for 1600/-. If he sold 1st cycle at 10% profit and second at 20% profit. He earns a certain profit If he sold 1st at 20% profit and second at 10th profit. He get 5 Rs/- more. Then find the prices of Book cycle.

1st cy 10% Pr + 2nd cy 20% Pr = Profit

1st 20% Pr + 2nd 10% Pr = Profit + 5

$-10\%\,Pr\ 1st + 10\%\,Pr\ 2nd = -5$

$-\frac{10}{100}\,Pr\ 1st + \frac{10}{100}\,Pr\ 2nd = -5$

$C_1 - C_2 = 50$

$C_1 + C_2 = 1600$

$2C_1 = 1650$

$C_1 = \frac{1650}{2}$

$C_1 = 825$

$C_2 = 775$

(43) The total cost of 8 Books and 5 pens is 92 Rs/-. Then find the cost of 3 Books and 2 pens. If the cost of 5 Books and 8 pens is 77/-?

$8B + 5P = 92$

$5B + 8P = 77$

$13B + 13P = 169$

$13(B+P) = 169$

$B+P = 13$

$B-P = 5$

$2B = 18$

$B = \frac{18}{2} = 9.$

$8B + 5P = 92$

$5B + 8P = 77$

$3B - 3P = 15$

$B - P = 5$

$B+P = 13$

$P = 13-9$

$P = 4$

$3B + 2P$

$3\times9 + 2\times4$

$27 + 8$

$= 35$

(44) Raju has two bats and one ball. The cost of ball is 96/- his sale the ball along the value of the 1st bat. The amount Received will be twice the value of the 2nd bat. But he sale the ball with the second bat the amount Received will be less than the value of the 1st bat by 306/-. what is the value of the 1st Bat)

I Bat	II Bat	Ball
a	b	96/-

Bat (I) + Ball = 2 Bat (II)

$a + Ball = 2b$

$a + 96 = 2b$

$A = 2b - 96$

$A + 96 = 2B$

$A + 96 = 2 \times 498$

$A + 96 = 996$

$A = 996 - 96 = 900$

$Ball + B = A - 306$

$B + 96 = A - 306$

$B + 96 = 2B - 96 - 306$

$B + 96 = 2B - 402$

$96 + 402 = 2B - B$

$B = 498$

(45) Vijay sales apen at 5%. loss and a Book at 15%. Profit He get 7Rs/- as a profit. If he sales the pen at 5% profit and the Book at 10%. Profit. He get 6 Rs/- more. Then find the price of book & pen.

$-5 pen + 15\%.B = 7 Rs/-$

$5 pen + 10\%.B = 13 Rs/-$

$25\%.B = 20/-$

$\frac{25}{100} B = 20$

$B = 80/-$

$-5 pen = 700 - 15 \times 80$

$5 pen = 700 - 1200 = 500$

$pen = 100$

(46) A man Sale atable at 12%. loss and book 19% profit. He earnes profit of 160/- But he sale the table 12%. profit and book at 16%. loss then he loss 40/-. find the price of the Book?

$-12\%.table + 19\%.book = 160/-$

$12\%.table - 16\%.Book = -40$

$\frac{3\%.B}{100} = 120$

$B = 4000/-$

(47) A man sales a table and chair 15% profit and 12% loss. He earns 540 Rs/- If the sale the table at 12% loss and chair at 15% profit. Then he earnes no profit & no loss. Then find the price of the Chair & Table.

$-12\%\ T + 15\%\ C = 0$

$\frac{15}{100} C = \frac{12}{100} T$

$\frac{C}{T} = \frac{4}{5}$

T : C

500 : 400

↓ 15% ↓ -12%

76 48

27 - 540

500 - ?

$\frac{500}{27} \times 540^{20} = 10{,}000$

27 - 540

400 - ?

$\frac{400}{27} \times 540^{20} = 8000$

(48) A man sales a Bookand Table at 13% and 9% profit. He earnes 1060/- profit. But If he sales the Book at $7\frac{6}{13}\%$ profit and table $11\frac{1}{9}\%$ loss. There is no profit and loss. Then find the cost prices.

$\frac{1}{6} B - \frac{1}{9} T = 0$

$\frac{1}{6} B = \frac{1}{9} T$

$\frac{B}{T} = \frac{6}{9} = \frac{2}{3}$

B : T

200 : 300

+13% ↓ ↓ +9%

26 27

$16\frac{2}{3}\% = \frac{56}{3} \times \frac{1}{100} = \frac{1}{6}$

$11\frac{1}{9}\% = \frac{100}{9} \times \frac{1}{100} = \frac{1}{9}$

53 - 10,60/-

200 - ?

$\frac{200}{53} \times 10{,}60^{20} = 4000$

$53 \times 20 - 1060$

$200 \times 20 - 4000$

$300 \times 20 - 6000$

(49) A man sale two Articles 1st at 15% loss, 2nd at 19 % Profit. If During the whole transaction If Dearer a loss of 90/-. If we sale the Both articles. at same price then find the cost of the 2nd article.

-15% A + 19% B

$-15\frac{3}{100} = -\frac{3}{20}$ $\quad 19 \times \frac{1}{100} = \frac{19}{100}$

	I	II		I	II
CP	20x	100	CP	140	100
P/L	-3x	+19	P/L	-21	+19
SP	17x	119	SP	119	119

(Selling Price are equal)

2% - 90

100 - ?

$\frac{100}{2} \times 90^{45} = 4500/-$

(50) A man sales two articles at same price 1st on 20% loss and 2nd on 60% profit. find their selling prices if the Difference b/w the cost price 3200/-. If the selling price of both Articles is sale.

$\frac{20}{100} = \frac{1}{5}$ - loss

5 - CP

$\frac{60}{100} = \frac{3}{5}$ - Profit

5 - CP

	I	II
CP	5	5
P/L	-1	+3
SP	4	8

5 - 3200/-

8 - ?

$\frac{8}{5} \times 3200^{640} = 5120/-$

(51) A math 3 Articles the same price 1st on 20% profit 2nd on 10% loss 3rd on 25% loss. During the old transaction he got loss on 120/-. Find the selling price of Recharge.

$20\% = \frac{1}{5}$ I $10\% = \frac{1}{10}$ II $25\% = \frac{1}{4}$ III

CP	9	$10_{\times 2}$	$4_{\times 6}$
P/L	$+1_{\times 3}$	$-1_{\times 2}$	$-1_{\times 6}$
SP	$6_{\times 3}$	$9_{\times 2}$	$3_{\times 6}$

$+3-2-6=5$

$5 - 120$

$18 - ?$

$\frac{18 \times 120^{24}}{5} = 432$

(52) A man sales 2 Articles for 1710/-. He sale first Article at 10% loss and second at 25% Profit. Find the amount of loss. If the cost price of 1st Article. The selling price of the 2nd Article is.

$25\% = \frac{1}{4}$

$10\% = \frac{1}{10}$

	I	II
CP	10	$4_{\times 2}$
P/L	-1	$+1_{\times 2}$
SP	9	$5_{\times 2}$

$-1+2=1$

$9+10$

$19 - 1710$

$1 - ?$

$\frac{1}{19} \times 1710^{90} = 90/-$

(53) The selling price of A and B are 1800/-. A calculate in profit & SP while B on cost price. find the difference blw their cost price. If both claims 20% profit.

	A	B
CP	4	5
P/L	+1	+1
SP	$5_{\times 6}$	$6_{\times 5}$
LCM	5, 6 = 30	

A = 20%

SP = 100 - 20

$= \frac{20}{80} = \frac{1}{4} - P_1$

$= \frac{1}{4} - SP$

B = 20

$\frac{20 \times 1}{100} = \frac{1}{5} - P_1$

$\frac{1}{5} - CP$

30 - 1800

1 - ?

$\frac{1}{20} \times \frac{60}{1800} = 60/-$

(54) A company allows 15% Discount to his customer and still earn 19% profit. If the production cost of the product is increased by 12%. Therefore company issued a new list price is 10% higher than the previous least price and company still allows 15% discount to his customers. Find the new profit percentage of the company.

CP	MRP
$\frac{85}{5}$	$\frac{119}{7}$

500 : 700

+12% ↓ 560 ; ↓ 10% 10×7 = 70 → 770

$770 \times \frac{18}{100} \times \frac{3}{2} = \frac{231}{2} = 115.5$

-115.5

654.5

$\frac{94.5}{560} \times 100 = \frac{945}{56}$

(55) A shopkeeper got some Books at a Discount at 20%. and least price. If we want to mark them at such a price that after giving a discount 20%. his still makes a profit 25%. find the % of the least price he should mark on its goods above its cost price.

$$100/x \times \frac{x}{100} \times \frac{80}{100} = 125$$

$$x = \frac{125 \times 100^{5}}{80_{4}} = \frac{625}{4}$$

$$x = 156\tfrac{1}{4}$$

$$156\tfrac{1}{4} - 100 = 56\tfrac{1}{4}\ \%$$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SIMPLE INTEREST

12/6/2020

$$SI = \frac{PTR}{100}$$

P → Principal.
T → Time
R → Rate of Interest.

$$\text{Amount} = P\left(1 + \frac{TR}{100}\right)$$

Amount = Principal + Interest.

Always Consider Principal as 100/-.

1. Find SI, on 4000/- at 10% per Annum for 3 years.

$$SI = \frac{4000 \times 3 \times 10}{100} = 1200/-$$

(or)

100 → 4000. (10 × 3 = 30%)

30 → ?

= 1200/-

2. Find the Amount when 7000/- at 12% per Annum for 2 years.

$$SI = \frac{PTR}{100} = \frac{7000 \times 2 \times 12}{100} = 140 \times 12 = 1680/-$$

7000 + 1680 = 8680/-

(or)

$$\text{Amount} = P\left(1 + \frac{TR}{100}\right)$$

$$= 7000\left(1 + \frac{2 \times 12}{100}\right)$$

$$7000\left(\frac{124}{100}\right) = 8680/-$$

(or) 100/- → 7000.

124/- →

⇒ 8680/-

3. find the SI, on 8000/- at 9% per Annum for $8\frac{1}{2}$ years. 231

(2)

$$\Rightarrow \frac{\overset{40}{\cancel{8000}} \times 17 \times 9}{\cancel{2} \times \cancel{100}} = 360 \times 17 = 6120/-$$

4. find the SI, on 9000/- at $16\frac{2}{3}$ %, per Annum for $1\frac{1}{2}$ year.

$16\frac{2}{3} \rightarrow \frac{50}{3}$.

$1\frac{1}{2} \rightarrow \frac{3}{2}$.

$$\frac{\overset{25}{\cancel{9000}} \times \cancel{50} \times \cancel{3}}{\cancel{3} \times \cancel{2} \times \cancel{100}} = 2250/-$$

(or) $16\frac{2}{3}\% \rightarrow 1/6$.

$$\frac{9000 \times 1 \times \cancel{3}}{2 \times \cancel{6}_{2} \times \cancel{100}} = 2250/-$$

5. find the SI, on 8000/- at 20% per Annum, for 9 months.

9 months $= \frac{9}{12} = \frac{3}{4}$

$$\frac{\overset{5}{\cancel{8000}} \times 20 \times 3}{\cancel{100} \times \cancel{4}} = 1200/-$$

6. find the SI on 12,000/- at 15% per Annum for 1 year 4 months.

1 year 4 months

4 months $= \frac{4}{12} = \frac{1}{3}$.

$1\frac{1}{3}$.

(or)

1 year = 12 months
+ 4 months
16 months.

$\frac{16}{12} = \frac{4}{3}$.

$$\frac{12000 \times 15 \times 4}{3 \times 100} = 2400/-$$

7. for the SI on 20,000/-, at 13% per Annum for 146 days.

73 days = 1/5.
146 days = 2/5.
219 days = 3/5.
292 days = 4/5.

$$\frac{20,000 \times 13 \times 2}{100 \times 5} = 1040/-$$

8. find the Amount, on 30,000/-. A person deposited on Jan 1st 2016, in a Bank at 15% per Annum, He with drew on March 14th 2016.

31
28
13
72+1 = 73

73 days = 1/5

$$\frac{30,000 \times 15 \times 1}{5 \times 100} = 900/-$$

Amount = 30,000 + 900 = 30,900/-.

9. A person deposited 7,300/- from 11th May 1987, to 10 Sep 1987 at 5% per Annum then find the SI. (4) 233

31 May - June.
31 June - July.
31 July - Aug.
30 Sep
123

$$\frac{7300 \times 123 \times 5}{100 \times 365} = 123/-$$

10. find the SI, on 8000/- for 2 years, for every 100/-, 3/- per month.

$3 \times 12 = 36.$

$$\frac{8000 \times 2 \times 36}{100} = 5760/-$$

11. find the SI, on 12,000/- for 8 months, Interest is calculated for every 1/-, 2 paisa per month.

$2 \times 12 = 24.$

$$\frac{12000 \times 24 \times 2}{100 \times 3} = 1920/-$$

12. A person took a sum of money, at 20% per Annum, after 3 years he pays 1800/- as SI. find the Principal.

$$1800 = \frac{P \times 3 \times 20}{100}$$

$$\frac{9000}{3} = P \rightarrow 3000/-$$

(or)

60% → 1800
100% → ?

→ 3000/-

13. A person took 6000/- at 10% per Annum for how many years, he pays 2400 as SI.

(T)

934

$$2400 = \frac{6000 \times x \times 10}{100}$$

$$\frac{24}{6} = x = \underline{4 \text{ yrs}}.$$

14. A person gave 4000/- for 2 years, and got SI as 6000/-. Then find rate of Interest.

[6000 - 4000 = 2,000/-].

$$2000 = \frac{4000 \times 2 \times R}{100}$$

$$25\% \quad \frac{200}{8} = R$$

$$R = \underline{25\%}$$

15. A person takes a sum of money at 10% per Annum, after 3 years the Amount will be 7800/-. Then find the Principal.

$3 \times 10\% \rightarrow 30\%$

$130 \rightarrow 7800$ (60)

$100 \rightarrow ?$

$= \underline{6000/-}$

16. A person takes a sum of money at 10% per Annum for I year, 15% for II year, after 2 years, the Amount will be 6,250/-. Then find the Principal.

(6)

235

(15% + 10% → 25%)

~~5~~ 1250
~~+25~~% → ~~6250~~

4 ~~100~~% → ?

→ 5000/-

17. A person takes a sum of money at $12\frac{1}{2}$% for I year, ₹ $16\frac{2}{3}$% for the II year, after 2 years, the Amount will be 6,200/-. find the Principal.

$12\frac{1}{2}\% = \frac{1}{8}$

$16\frac{2}{3}\% = \frac{1}{6}$

$12\frac{1}{2} + 16\frac{2}{3} = \frac{25}{2} + \frac{50}{3}$

$\Rightarrow \frac{75+100}{6} = \frac{175}{6}$

$100 + \frac{175}{6} = \frac{600+175}{6} = \frac{775}{6}$

$\frac{775}{6} \rightarrow 6200$

100 → ? 800
~~24800~~
~~+124000~~
~~620000~~ × 6

$\frac{}{775} = 4800/-$
~~+155~~
~~31~~

(or)

$12\frac{1}{2}\% + 16\frac{2}{3}\%$

$\frac{1}{8} + \frac{1}{6} = \frac{3+4}{24} = \frac{7}{24}$

7 → 200

24 → ?

→ 4800/-

18. A person takes 10,000/- at some rate of Interest, after 1 year, the Amount will be 12,500/-, when rate of Interest increased, 5%, then find the Amount.

$$\frac{10,000 \times 1 \times 5}{100} = 500/-$$

A = P + I → 12,500 + 500 = 13,000/-

19. A person takes a sum of money for 6 years & some money for 9 years. Then find the ratios of SI.

6 : 9

2 : 3

20. A person takes some money at $12\frac{1}{2}$ % rate of Interest Per Annum for 3 years & Some money at $11\frac{1}{9}$ % for 4 years. Then find the ratios of SI. (₹) 237

$$\frac{1}{8} \times 3 : \frac{1}{9} \times 4$$

$$27 : 32.$$

21. A person takes 9000/- at 10% per Annum, for 1 year & takes 12,000/- at 15% per Annum for 2 years, then find the ratios of SI.

$$9000 \times 10 \times 1 : 12000 \times 15 \times 2.$$

$$90 : 12 \times 15 \times 2$$

$$1 : 4.$$

22. A person takes 9,000/- at 15% per Annum for 2 years and Other person takes 12,000/- at 10% per Annum for some years. Here, SI's are equal, then find the time of IInd person.

$$9000 \times 15 \times 2 = 12000 \times 10 \times T$$

$$27 = 12T$$

$$\frac{27}{12} = T$$

$$\frac{9}{4} = T = 2\frac{1}{4}$$

$$\frac{1}{4} \times 12 = 3 \text{ months}$$

$\Rightarrow$ 2 years 3 months.

23) A person takes 4000/- for 2 years at some rate of Interest, gets SI of 9000/- & that 9000/- for 1 year with another rate of Interest is given to other person = to the SI. Then the ratio b/w the rate of Interests is? (Both the SI's are equal). 238

$$4000 \times 2 \times R_1 = 9000 \times 1 \times R_2$$

$$8R_1 = 9R_2.$$

$$\frac{R}{R_2} = \frac{9}{8}.$$

$$9:8$$

24) A person gave 1/- for 10 years & got an Amount of 16/-, then find the rate of Interest.

$A = P + I$. ; $A - P = I$.

$16 - 1 = 15 = SI$.

$$15 = \frac{1 \times 10 \times R}{100}.$$

$$150/- = R.$$

25) A person takes 'x'/-, after 'x' years, he will pay x/- as SI. find the rate of Interest?.

$$SI = \frac{PTR}{100}.$$

$$x = \frac{x \times x \times R}{100}$$

$$\frac{100}{x} = R.$$

26. The SI on $y = x$, The SI on $z = y$, then x, y, z's relation is?

(10)

239

$$SI = \frac{PTR}{100}$$

$$SI = \frac{PTR}{100}$$

$$x = \frac{y \times T \times R}{100}$$

$$y = \frac{z \times T \times R}{100}$$

$$\frac{x}{y} = \frac{TR}{100}$$

$$\frac{y}{z} = \frac{TR}{100}$$

$$\frac{x}{y} = \frac{y}{z}$$

$$y^2 = xz.$$

27. A person takes sum of money for 2 years. When Interest increased from 10% to 15%, he has to pay 400/- more, then find the Principal?

$10\% \rightarrow 15\%$

$5\% \times 2 = 10\%$

$10\% \rightarrow 400$

$100\% \rightarrow ?$

$\Rightarrow$ 4000/-

28. A person takes sum of money for 2 years, when rate of Interest increased $2\frac{1}{2}$ %, he has to pay 800/- more then find the Principal.

940

$2.5 \times 2 = 5$.

5 → 800

100 → ?

20

⇒ 16,000/-

29. A person takes sum of money for 1 year. Interest decreased to $12\frac{1}{2}$ % from $16\frac{2}{3}$ %. He has to pay 120/- less Interest, find the Principal?

$12\frac{1}{2}\% \rightarrow \frac{1}{8}$; $16\frac{2}{3}\% \rightarrow \frac{1}{6}$.

$$\frac{1}{6} - \frac{1}{8} = \frac{4-3}{24} = \frac{1}{24}$$

1 ⟶ 120

24 → ?

2880/-

30. A person takes sum of money for 7 years. 1st 2 years, Rate of Interest is 20·/. , next 3 years, 10·/. Rate of Interest. After 5 years (or Behind 5 years), at 30·/. per Annum. finally got 780/- as SI, then find the Principal? 241

$2 \times 20 = 40$
$3 \times 10 = 30$
$2 \times 30 = 60$
$130·/.$

$130·/. \rightarrow 780$ (6)

$100·/. \rightarrow ?$

$\rightarrow 600/-$

31. A person borrowed sum of money, at a rate of 8·/. per Annum for 1st 2 years. Next 3 years 11·/. per Annum. After 5 years, the rate of Interest is 14·/. per Annum, He will pay 19,100/- as Amount for 8 years. Then find the Principal?.

$2 \times 8 = 16$
$3 \times 11 = 33$
$3 \times 14 = 42$
91

$100 + 91 = 191$.

$191 \rightarrow 19100$ (100)

$100 \rightarrow ?$

$\rightarrow 10{,}000/-$

32. A person gave $\frac{1}{4}$ th sum of money at 10% per Annum and other $\frac{1}{3}$rd at 20% and the remaining at 30% and received an Interest of 13,000/- per 2 year. find the Principal?

$\frac{1}{4}+\frac{1}{3}=\frac{3+4}{12}=\frac{7}{12}$] $\frac{5}{12}$.

942

$$\frac{\frac{x}{4}\times 10\times 1}{10\phi}+\frac{\frac{x}{3}\times 20\times 1}{10\phi}+\frac{\frac{5}{12}x\times 30\times 1}{10\phi}=13,000.$$

$$\frac{x}{4}+\frac{2x}{3}+\frac{5x}{4}=13,000.$$

$\begin{array}{r|l} 4 & 4,3,4 \\ \hline 3 & 1,3,1 \end{array}$ $\frac{4\times 3}{12}$

$$\frac{3x+8x+15x}{12}=13,000.$$

$$26x=\frac{5000}{13,000}\times 12$$

$$x=60,000/-$$

33. A person gives $\frac{1}{4}$th of his money at 15% per Annum and $\frac{1}{5}$th of money at 20% per Annum. The remaining money is given at 10% per Annum. He got totally 530/- as SI. Then find the Principal?

$\frac{1}{4}+\frac{1}{5}=\frac{5+4}{20}=\frac{9}{20}$] $\frac{11}{20}$.

$$\frac{\frac{x}{4}\times 15\times 1}{20}+\frac{\frac{x}{5}\times 20\times 1}{100}+\frac{\frac{11x}{20}\times 10\times 1}{100}=530.$$

$$\frac{3x}{80}+\frac{x}{25}+\frac{11x}{200}=530.$$

$\begin{array}{r|l} 5 & 80,25,200 \\ \hline 5 & 16,5,40 \\ \hline 5 & 4,5,10 \\ \hline 2 & 4,1,2 \\ \hline & 2,1,1 \end{array}$ 400

$$\frac{15x+16x+22x}{400}=530.$$

$$53x=212090,\quad \frac{212000}{53}=4,000$$

$$x=4,000/-$$

34. A Business Man has 10,000/-, he gave 3,000/- at 8% per Annum 5000/- at 12% per Annum and remaining money at some rate of Interest. After 1 year, he got 10% on Principal as SI. Then find the rate of Interest of the last One. (14)

243

$$\frac{3000 \times 8 \times 1}{100} = 240.$$

$$\frac{5000 \times 12 \times 1}{100} = 600$$

$$\frac{2000 \times 10 \times R}{100} = 160.$$

$$20R = 160$$

$$R = \frac{16}{2} = 8\%.$$

$10 - 8 = 2,000$

$\frac{10}{100} \times 10,000 = 1,000/-$.

$240 + 600 = 840.$

$1000 - 840 \rightarrow 160.$

35. A person takes sum of money at 10% per Annum. After some years, he got $\frac{3}{5}$ of the Principal as SI. Then find the time.

$$SI = \frac{PTR}{100}$$

let $P = 1$.

$$\frac{3}{5}(1) = \frac{1 \times T \times 10}{100}$$

$$6 = T.$$

$6 \text{ yrs} = T$

36 A person takes a sum of money, after 10 years, the Amount will be 3 times. Then find the Rate of Interest. (15)

Amount = 3.

P = 1.

A − P = SI

3 − 1 = 2.

944

$$SI = \frac{PTR}{100}$$

$$2 = \frac{1 \times 10 \times R}{10}$$

20% = R.

(or)

$$R = \frac{100(n-1)}{T}$$

$$R = \frac{10(3-1)}{10}$$

R = 20%.

37. A person takes sum of money at 20% per Annum as SI. After some years, the Amount is doubled. Then find time?

n = 2.

$$T = \frac{100(n-1)}{R}$$

$$= \frac{100(2-1)}{20}$$

T = 5 yrs

38 A person takes sum of money, after 6 years, it will be 4 times, then find the rate of Interest.

n = 4

$$R = \frac{100(n-1)}{T}$$

$$= \frac{100(4-1)}{6}$$

$$R = \frac{300}{6} = 50\%$$

39. A person takes sum of money, it will be doubled for every 5 years. In How many years, can he get 4 times of money.

(16)

245

1/- → 2/- 1/- → 4/-

1 (5 yrs) 3

1 → 5.

3 → ?

⇒ 15 yrs

40. A person takes sum of money, it will be tripled for every 6 years. In How many years, it will be 8 times?.

1 → 3 1 → 8

2 7.

~~2~~ → ~~6~~ 3

7 → ?

⇒ 21 yrs

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41. A person takes sum of money, it will be tripled for every 10 years. How many times can he get in 20 years.

1 → 3

~~2~~ → ~~10~~ 5 yrs

? ← ~~20~~ yrs 4

4+1 → 5 times.

42. A person takes sum of money, it will be doubled for every 6 years. How many times can he get in 18 years.

246

1 → 2

1 → 6yrs.

? ← 18yrs / 3

3 + 1 → 4 times.

43. A sum of money will be doubled at some rate of Interest for some years. In the given below options, find the correct matching?

1.) 10·/.
2) 15·/.
3) 20·/.
4) $16\frac{2}{3}$·/.

i) 6 yrs
ii) $6\frac{2}{3}$ yrs.
iii) 5 yrs.
iv) 10 yrs.

$n = 2$

$T = \frac{100(n-1)}{R}$ $\quad n = 2-1 =$

$10·/. = \frac{100}{10} = 10$ yrs.

$15·/. = \frac{100}{15}\frac{20}{3} = 6\frac{2}{3}$ yrs

$20·/. = \frac{100}{20} = 5$ yrs.

---

44. 1 → 3 times.

1) 10·/.
2) 15·/.
3) 20·/.
4) $16\frac{2}{3}$·/.

i) 20 yrs.
ii) 12 yrs.
iii) $13\frac{1}{3}$ yrs.
iv) 10 yrs.

$n = 3$.

$n - 1 = 3 - 1 = 2$.

$T = \frac{100(n-1)}{R}$

$10·/. = \frac{100(2)}{10} = 20$ yrs.

$15·/. = \frac{\overset{20}{\cancel{100}}(2)}{\cancel{15}\,3} = 13\frac{1}{3}$ yrs.

$20·/. = \frac{100(1)}{20} = 10$ yrs.

45 A Person takes sum of money, after 4 years, the Amount will be 7000/- and after 6 years, the Amount will be 8000/- then find the Principal?

(1E)

247

4 yrs — 7000

6 yrs — 8000

(-)

2 yrs — 1000 → Interest.

1 yr — 500.

4 yrs — 4 × 500 → 2000/- → Interest.

Then,

Principal = 5000/-

46. A Person takes sum of money, as SI, after 3 years, the Amount will be 10,000/- and after 6 years, the Amount will be 14,500/-. find the Principal & Rate of Interest.

3 yrs → 10,000.

6 yrs → 14,500

(-) (-)

3 yrs → 4,500 → Interest.

10,000 − 4,500 = 5,500 → Principal.

If for 1 yr,

3 yrs → 4,500, } → SI

1 yr → 1500. }

$$SI = \frac{PTR}{100}$$

$$1500 = \frac{5,500 \times 1 \times R}{100} \quad = \frac{1500}{55} = 27\frac{3}{11}\%$$

$$R = 27\frac{3}{11}\%.$$

47 A person takes an Article at 5% of Interest. After 5yrs, the Amount will be 7,700/-. It will be payed in equal installments. Then find each installment.

(19)

218

I method

$$\text{Installments} = \frac{100 \times P}{100 \times T + \frac{T \times (T-1) R}{2}}$$

$$= \frac{100 \times 7,700}{100 \times 5 + \frac{5 \times (4) 5}{2}} = \frac{100 \times 7,700}{500 + 50}$$

$$\Rightarrow \frac{100 \times 7,700}{550} = 1400/-$$

II method

P = 100.

100 × 5 = 500.

R.

1 × 5 = 5

2 × 5 = 10

3 × 5 = 15

4 × 5 = 20

50

500 + 50 = 550.

5 ~~550~~ → ~~7,700~~ (70)

100 → ?

$$\frac{7000}{5} = 1400/-$$

48) A person takes an Article at 12% /Annum as SI. After 3 years, the Amount will be 1092/-. With equal Installments. Then find each Installment.

(20)

249

I method

$$\text{Installments} = \frac{100 \times P}{100 \times T + \frac{T \times (T-1) R}{2}} = \frac{100 \times 1092}{100 \times 3 + \frac{3 \times (3-1) \times 12}{2}}$$

$$\Rightarrow \frac{100 \times 1092}{336} = 325/-$$

II method

$100 \times 3 = 300$.

$1 \times 12 = 12$.

$2 \times 12 = 24$

36.

$300 + 36 = 336$.

$336 \longrightarrow 1092$.

$100 \longrightarrow ?$

$$\frac{1092 \times 100}{336} = \frac{109200}{336} = 325/-$$

49 The Annual Payment of 700/- in 5yrs, at 10% per Annum, SI will be charged at a debit of what Amount.

250

I method

$$700 = \frac{100 \times P}{100 \times 5 + \frac{5(5-1) \times 5}{2}}$$

$$700 = \frac{100 \times P}{500 + 100}$$

$$700 = \frac{100P}{600}$$

$$4200 = P$$

II method

$100 \times 5 = 500$

$500 + 100 = 600$

$1 \times 10 = 10$
$2 \times 10 = 20$
$3 \times 10 = 30$
$4 \times 10 = 40$
100

$100 \rightarrow 700$

$600 \rightarrow ?$

$700 \times 6 = 4200/-$

50. A person has 600/-, in that, some money is given at 15% per Annum for 2 yrs, & the remaining is given at 10% per Annum for 2 yrs. But, he Collected equal installments Then find the Principal of the 1st Person. 251

$$A \times 15 \times 2 = B \times 10 \times 2$$

$$3A = 2B$$

$$\frac{A}{B} = \frac{2}{3}$$

$$A : B = 2 : 3.$$

$$\frac{2}{5} \times 600 = 240/-$$

51. A person has 2,600/-, in that, some money is given at 10% per Annum, for 5 yrs, & the remaining is given at 9% per Annum, for 6 yrs. He Collected equal installments from both of them. Then find the II Part.

$$A \times 10 \times 5 = B \times 9 \times 6.$$

$$50A = 54B.$$

$$\frac{A}{B} = \frac{54}{50} = \frac{27}{25}$$

$$A : B = 27 : 25$$

$$\frac{25}{52} \times 2600 = 1250/-$$

52) A person has 5,000/-. In that, some money is given at 5% per Annum for 2yrs. And the remaining is given at 8% per Annum per year. He collected from both of them 440/- as SI. Then find the Principal of the 1st Part.

259

A = B
A − B
A + B ✓

Take Interest as x.

$$\frac{x \times 5 \times 2}{100} + \frac{(5000 - x) \times 8 \times 1}{100} = 440.$$

$$10x + 40000 - 8x = 44000.$$

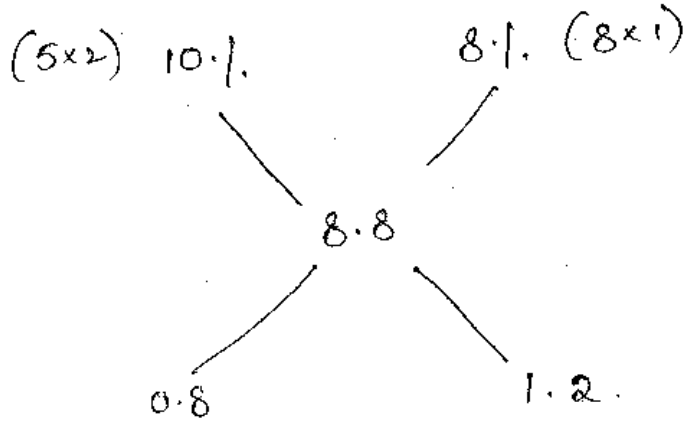
$2x = 4000$; $x = 2000$/- → Interest → 1 part

$5000 - 2000 = 3000$ → II Part.

II method

Find 440 is what % of 5000.

$$\frac{440}{5000} \times 100 = 8.8\%$$



2 : 3.

$$\frac{2}{5} \times \frac{1000}{5000} = 2000/-$$

53. A Business man gives 5,000/- to A for 2yrs, and given 3000/- to B for 3yrs. At some rate of Interest. But he collected Interest from A, 60/- more than that of B Then find the rate of Interest.

(24)

253

$R_1 = R_2$.

A - B.

$$R\left(\frac{5000 \times 2}{100} - \frac{3000 \times 3}{100}\right) = 60.$$

$$R(100 - 90) = 60.$$

$$R(10) = 60$$

$$R = 6\%.$$

54. A person takes some money at some rate of Interest. After some yrs, he will pay $\frac{16}{25}$ th of the SI of the Principal. Here time & Rate of Interest are equal. Then find Rate of Interest.

$$SI = \frac{PTR}{100} \quad (\because T = R)$$

$$\frac{16}{25}x = \frac{x \times R \times R}{100}$$

$$\frac{1600}{25} = R^2$$

$$\sqrt{64} = R, \quad R = 8\%; \quad T = 8\text{yrs}$$

II method

$$\sqrt{n \times 100}$$

$$= \sqrt{\frac{16}{25} \times 100^4}$$

$$= \sqrt{64} = 8\%$$

55. A Person takes some money at some rate of Interest. After some years, he will pay $\frac{9}{25}$ th of the SI of the Principal. Here, time & Rate of Interest are equal, then find the rate of Interest & time. (25)

254

I method

$$SI = \frac{PTR}{100} \qquad T = R$$

$$\frac{9}{25}x = \frac{x \times R \times R}{100}$$

$$\frac{\cancel{900}^{36}}{\cancel{25}} = R^2$$

$\sqrt{36} = R$; $R = 6\%$, $T = 6$ yrs.

II method

$$\sqrt{n \times 100} = \sqrt{\frac{9}{\cancel{25}} \times \cancel{100}^{4}} = \sqrt{36} = 6\% = R, \quad T = 6 \text{ yrs.}$$

56 A father deposited 18,750/- for his sons, at the age of 14 yrs, at 5% Per Annum & 12 yrs at some rate of Interest. In such a way, that they will get equal Amount at the age of 18 yrs. find the share of the younger child.

y → younger
E → Elder.

$$y + \frac{y \times 6 \times 5}{\cancel{100}} = E + \frac{E \times 4 \times 5}{\cancel{100}}$$

$$100y + 30y = 100E + 20E$$

$$13\cancel{0}y = 12\cancel{0}E$$

$$\frac{y}{E} = \frac{12}{13}$$

$$\frac{12}{\cancel{25}} \times \cancel{18750}^{750} = 9000/-$$

57. If the SI on certain sum of money for 3 yrs, at 12.5% is 3,500/- less than its Principal. find the Sum & SI.

255

Given, SI = P - 3500

$$(P - 3500) = \frac{P \times 125 \times 3}{1000}$$

$$40$$

$$40P - 140000 = 15P$$

$$40P - 15P = 140000$$

$$25P = 140000$$

$$P = \frac{140000}{25} = 5600/-$$

ii method

$12.5\% = \frac{1}{8} \times 3$ yrs.

$= \frac{3}{8} > 5 \longrightarrow 3500$ (700)

$8 \rightarrow ?$

$= 5600/-$

58. If the SI on a certain sum of money at $6\frac{2}{3}\%$ for 4 yrs is 4,400/- less than its Principal. find the SI & Principal?

$6\frac{2}{3}\% \rightarrow \frac{1}{15} \times 4$

$\frac{4}{15} > 11 \rightarrow 4400$ (400)

$15 \rightarrow ?$

$= 6000/-$

$6000 - 4,400 = 1600/-$

59 If the SI on a certain sum of money for 6yrs at 11% is 2720/- more than its principal. Find the sum & SI.

256

$$\frac{11}{100} \times 6 = \frac{66}{100} > 34 \rightarrow 2720$$

$$100 \rightarrow ?$$

$$= 8000/-$$

60 A man gives loan at 10% per Annum as a SI, but Kumar asked 8% per Annum as SI. After verification, the Amount will be 2 times of 10% on 4,00,000. Then find the Principal of Kumar as he asks at some Interest.

$$SI = \frac{PTR}{100}$$

$$\frac{PTR}{100} = 2 \times 4,00,000 \times \frac{10}{100} \times T.$$

$$\frac{P \times 1 \times 8}{100} = 2 \times 40000 \times 1$$

$$P = 10,00000 \times \frac{8}{100} = 80,000/-$$

$$4,00,000 \times \frac{10}{100} = 40,000/-$$

61. A Bicycle can be purchased on Cash payment of 1500/- but the same cycle can also be purchased on the cash down payment of 350/- & the rest can be paid in 3 equal monthly installments of 400/- for next 3 yrs. find the rate of SI.

(28)

257

350.

$400 \times 3 = 1200$.

350

1550

$50 \rightarrow SI$.

$1500 - 350 = 1150$.

$1150 - 400$.

$750 - 400$.

$350 - 400$.

2250

$$\frac{1150 \times r \times 1}{100 \times 12} + \frac{750 \times r \times 1}{100 \times 12} + \frac{350 \times r \times 1}{100 \times 12} = 50.$$

$$\frac{r}{10\cancel{0} \times 12}(225\cancel{0}) = 50.$$

$$\frac{225r}{120 \times 50} = \frac{225r}{6000} = 26\frac{2}{3}\%.$$

62. The Cash price of a pen is 60/-, but it can also be purchased on Cash down payment of 20/- & 6 monthly equal Installments @ 8/- month. find the rate of Interest.

$60 - 20 = 40$. $6 \times 8 = 48$.

$8 \rightarrow SI$.

$40 - 8$.

$32 - 8$

$24 - 8$

$16 - 8$

$\frac{28}{120}$

$$\frac{r}{12\cancel{0}_{10}} \times 12\cancel{0} = 8$$

$r = 80\%$.

63. The cash price of a pen is 10/-. But it can also be purchased on 11 monthly equal Installments of 1/- each month. find the rate of SI.

10 — 11×1 = 1

1 — SI.

$\frac{r}{1200} \times 55 =$ 240

$\frac{r}{1200} \times 55 = \frac{240}{11} = 21\frac{9}{11}$ /-

10 − 1
9 − 1
8 − 1
7 − 1
6 − 1
5 − 1
4 − 1
3 − 1
2 − 1
1
55

64. A man borrowed a sum of 7000/- from a Bank at SI, after 3yrs, he payed 3000/- to the Bank & at the end of 5yrs he paid 5450/- & cleared all his dues. Find the rate /.

7000 − 3000 = 4000.

5450 − 4000 = 1450 → SI.

7000
7000
7000
4000
4000
29000

$\frac{r}{100} \times 29000 = 1450$

yearly so.

$r = \frac{1450}{290} = 5$ /.

65 A man borrowed a sum of 6000/- from a bank at SI, after 4 yrs, he payed 2500/- & at the end of 5th yr, he paid 4,550/- & cleared all his dues. find the Rate %.

259

$$6000 - 2,500 = 3500$$

$$4,550 - 3500 = 1050 \rightarrow SI.$$

6000
6000
6000
6000
3500
27,500

$$\frac{R}{100} \times 27,500 = 1050$$

$$\Rightarrow \frac{1050}{275} \quad 210 \cdot 42$$
$$55 \quad 11$$

$$= 3\frac{9}{11}\ \%$$

11) 42 (3
33
9

66 A former lent out 2 equal sums in 2 parts at 8% & 7% per Annum on SI. If the former received 6 months earlier than the later & he received equal Amount of 2560/- each from both the parts. find the Principal?

I part	II part
8%	7%
$\left(t - \frac{1}{2}\right)$	(t)

$$P + \frac{PTR}{100} = P + \frac{PTR}{100}$$

$$\left(t - \frac{1}{2}\right) \times 8 = t \times 7$$

$$8t - 4 = 7t$$

$$t = 4.$$

260

8·1.

$P + \frac{PTR}{100} = 2560$

$P + \frac{P \times 8 \times 4}{100} = 2560$

$100P + 32P = 256000$

$132P = 256000$

$P = \frac{256000}{132} \quad 128000 \quad 66$

7·1.

$P + \frac{PTR}{100} = 2560.$

$P + \frac{P \times 4 \times 7}{100} = 2560.$

$100P + 28P = 256000.$

$128P = 256000$

$P = 2000/-$

6) Ramu borrowed a sum of 6300/- from Sita at 14·7·/. per Annum for 3yrs. He added some more money in it & let it together at 16·/. per Annum for 3yrs, in this process, he earn a total Profit of 618/-. find how much amount does he add?.

I method

$\frac{(6300+P) \times 16 \times 3}{100} - \frac{6300 \times 14 \times 3}{100} = \frac{206.}{618.}$

$100800 + 16P - 88200 = 20600$

$16P = 20600 - 12600$

$P = \frac{8000}{16} = 500$

II method

$\frac{618}{3} = 206.$

$16 - 14 = 2·/.$

$6300 \times \frac{2}{100} = 126 \rightarrow 206 - 126 = 80.$

$\frac{P \times 16 \times 1}{100} = 80. \;;\; P = 500.$

68. 1000/- is invested at 5% per Annum at SI, if the interest is added to the principal after every 10 yrs, the Amount will become 2000, after ?.

$P = 1000/-$

$R = 5\%$

$T = 10$ yrs.

$A = P + I$.

$A - P = I$.

$A = 2000 - 1000 = 1000$

$A = 1000 + 500 = 1500$.

$I = PTR/100$.

$500 = \frac{1000 \times 10 \times 5}{100}$

$\frac{1500 \times T \times 5}{100} = 500$.

$75T = 500$

$T = \frac{500}{75} = 6\frac{2}{3}$ yrs $+ 10 = 16\frac{2}{3}$ yrs

69. A man deposited a total Amount of 65,000/- in 3 Banks, A, B & C at 12%, 16% & 18% respectively, & earn a total SI of 10,180/- in 1yr. If the Amount invested in Bank A was $7\frac{1}{7}\%$ of Amount invested in Bank C, find the Amount invested in Bank B?

$A = 7\frac{1}{7}\%$

$A = \frac{5}{7}C$.

$\frac{A}{C} = \frac{5}{7}$.

$A = x$, $C = 7x$, $B = (65000 - 12x)$

$A + B + C = 10,180/-$.

$\frac{5x \times 12}{6} + \frac{(65000 - 12x) \times 16}{8} + \frac{7x \times 18}{9} = 509000$.

$30x + 52000 - 96x + 63x = 509000$.

$93x - 96x + 52000 = 509000$.

$\frac{11000}{3} = x$

$B = 65000 - 12x \times \frac{11000}{3} = 65000 - 44000 = 21000$

10. 12,600/- is invested in 3 parts in such a way, that SI on Ist part at 2% per Annum for 3yrs = SI on II part at 3% per Annum for 4yrs = SI on III part at 4% per Annum for 5yrs are equal.

262

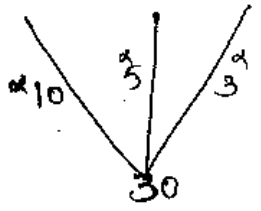
→ find the SI on each part.

→ find the ratios of Investment.

$$\frac{P_1 \times 2 \times 3}{100} = \frac{P_2 \times 3 \times 4}{100} = \frac{P_3 \times 4 \times 5}{100}$$

$$6P_1 = 12P_2 = 20P_3.$$

$$3P_1 = 6P_2 = 10P_3.$$



3 | 3, 6, 10
2 | 1, 2, 10
1, 1, 5

$10+5+3 = 18.$

$A = \frac{10}{18} \times 12600^{700} = 7000/-.$

$B = \frac{5}{18} \times 12600^{700} = 3500/-.$

$C = \frac{3}{18} \times 12600^{700} = 2100/-$

SI on each part.

$A = \frac{7000 \times 2 \times 3}{100} = 420/-.$

$B = 420/-$

$C = 420/-$

ii) Ratios of Investment

10 : 5 : 3

71. If 64/- Amount to 83.20/- in 2yrs. What will 86/- Amounts to in 4yrs at the Same rate present Per Annum.

(24)

263

$$SI = \frac{PTR}{100}$$

$$19.20 = \frac{64 \times 2 \times R}{100}$$

$$1920 = 64 \times 2 \times R.$$

$$\frac{960}{64} = R$$

$$15/- = R.$$

$$SI = \frac{86 \times 4 \times 15}{100} = \frac{258}{5} = 51.6.$$

$$86 + 51.6 = 137.6/-$$

P + I.

(or)

$100/- \longrightarrow 86$

$(15 \times 4)\ 160/- \rightarrow ?$.

$$\frac{1376}{10} = 137.6$$

72. A man borrowed a total Amount of 30,000/- apart of it on SI at 12% per Annum and the remaining on SI at 10% per Annum. If at the end of the 2 yr, he paid in all 36,480/- to settle the loan Amount then, find the I part of the Principal?

(3C) 264

I method

$$36,480 - 30,000 = 6480 = SI.$$

$$\frac{A \times 12 \times 2}{100} + \frac{(30,000 - A) \times 10 \times 2}{100} = 6480$$

$$\frac{6A}{25} + \frac{30,000 - A}{5} = 6480$$

$$\frac{6A - 5A + 150000}{25} = 6480$$

$$A = 162000 - 150000 = 12,000/-$$

$$B = 30,000 - 12,000 = 18,000/-$$

II method

$$1yr = \frac{6480}{2} = 3240/-$$

30,000

10% | 10% + 2%

10% → 3,000.

5,240 − 3000 = 240.

(12% − 10%) → 2 → 240 120

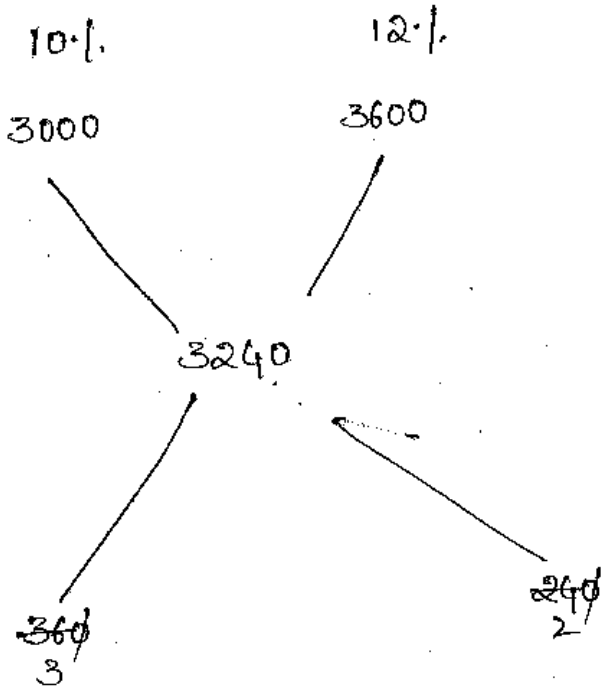
100 → ?

I ⇒ 12,000/-

II → 30,000 − 12,000 = 18,000/-.

III method

265



I II

3 : 2

I → $\frac{2}{5} \times \overset{6000}{\cancel{30,000}} = 12,000/-$

II → $\frac{3}{5} \times \overset{6,000}{\cancel{30,000}} = 18,000/-$

COMPOUND INTEREST 22/6/20

Cubes:

$1^3 = 1$
$2^3 = 8$
$3^3 = 27$
$4^3 = 64$
$5^3 = 125$
$6^3 = 216$
$7^3 = 343$
$8^3 = 512$
$9^3 = 729$
$10^3 = 1000$.
$11^3 = 1331$
$12^3 = 1728$.
$13^3 = 2197$.
$14^3 = 2744$.
$15^3 = 3375$.
$21^3 = 9261$
$22^3 = 10648$.
$23^3 = 12167$.
$24^3 = 13824$.
$25^3 = 15625$.

Squares:

$21^2 = 441$
$22^2 = 484$
$23^2 = 529$
$24^2 = 576$.
$25^2 = 625$.

$10\% = \frac{10}{100} = \frac{1}{10}$
$5\% = \frac{5}{100} = \frac{1}{20}$
$4\% = \frac{4}{100} = \frac{1}{25}$
$11\frac{1}{9}\% = 1/9$
$9\frac{1}{11}\% = 1/11$
$16\frac{2}{3}\% = 1/6$
$14\frac{2}{7}\% = 1/7$
$15\% = \frac{15}{100} = \frac{3}{20}$
$8\% = \frac{8}{100} = \frac{2}{25}$
$12\frac{1}{2}\% = \frac{1}{8}$

$$CI = P\left[1 + \frac{R}{100}\right]^T - P.$$

$$\text{Amount} = P\left[1 + \frac{R}{100}\right]^T$$

1 method

10% for 2 years.

SI → $2 \times 10\% = 20\%$

But for CI, → $x + y + \frac{xy}{100}$ → only for 2 yrs.

→ $10 + 10 + \frac{10 \times 10}{100} = 20 + 1 = 21\%$.

ii) 20·/. for 2 years.

$$20 + 20 + \frac{20 \times 20}{100} = 40 + 4 = 44 \cdot /.$$

I method

Principal. Amount.

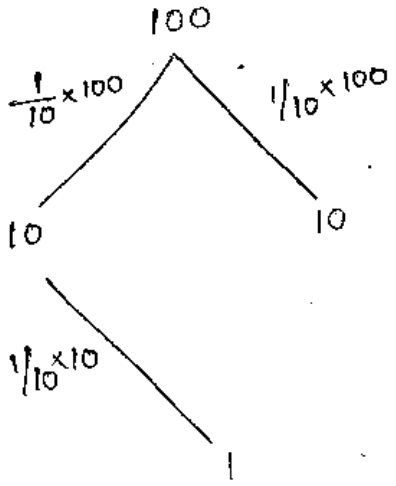
$$100 \xrightarrow[+10\cdot/.]{10} 110 \xrightarrow[+10\cdot/.]{11} 121$$

P Amount.

$$100 \xrightarrow[+20\cdot/.]{20} 120 \xrightarrow[+20\cdot/.]{24} 144$$

II method for 2 yrs

$10\cdot/. = \frac{1}{10}$ → for 2 yrs so, $10^2 = 100$.



P → 100.
SI → 20.
CI → 21.
A → 121

10% for 3yrs, so $10^3 = 1000$.

I method

$$\frac{110}{100} \times \frac{110}{100} \times \frac{110}{100} = \frac{1331}{1000} =$$

II method

10, 10, 10.

21% 10%

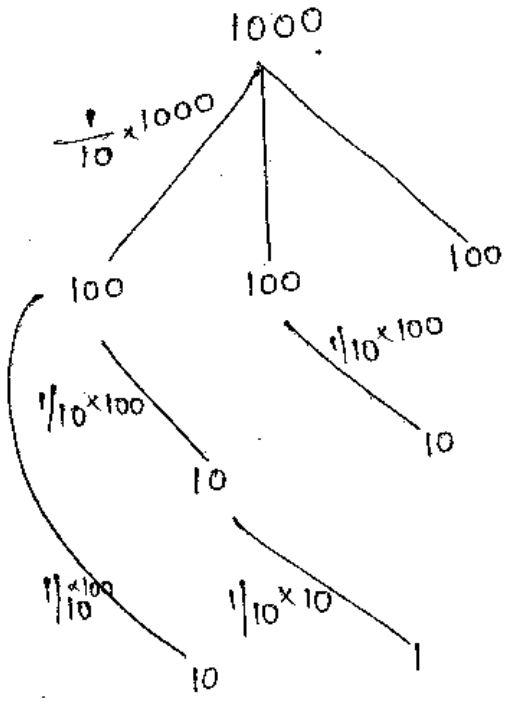
$$21 + 10 + \frac{21 \times 10}{100} = 31 + 2.1 = 33.1$$

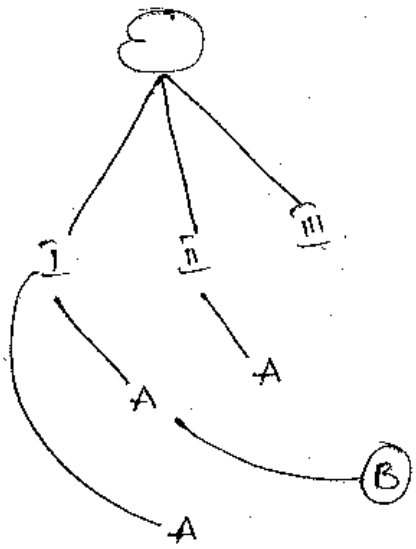
III method

P

$$100 \xrightarrow[10\%]{+10} 110 \xrightarrow[10\%]{11} 121 \xrightarrow[10\%]{12.1} 131.1$$ A.

$10\% \rightarrow \frac{1}{10} \rightarrow 3yrs - 10^3 = 1000$.





P = 1000

SI = 300.

CI = 331

Difference b/w SI & CI → 331 − 300 = 31.

⇒ 10 % for 4 yrs.

10, 10, 10, 10

21 21

$$21 + 21 + \frac{21 \times 21}{100} = 42 + \frac{441}{100} = 46.41.$$

difference b/w CI & SI = 46.41 − 40 = 6.41.

⇒ 2 %, 3 %, 4 %

x y

$x + y + \frac{xy}{100}$ SI = 2 + 3 + 4 = 9 %

$$2 + 3 + \frac{2 \times 3}{100} = 5 + \frac{6}{100} = 5.06.$$

5.06, 4

$$5.06 + 4 + \frac{5.06 \times 4}{100} = 9.06 + \frac{20.24}{100} = 9.06 + 0.2024.$$

→ 9.2624

difference b/w CI & SI.

→ 9.2624
− 9.0000
0.2624

270

1. find the CI on 20,000/- @ 10% per Annum for 2yrs.

$$10+10+\frac{10\times10}{100} = 20+1 = 21.$$

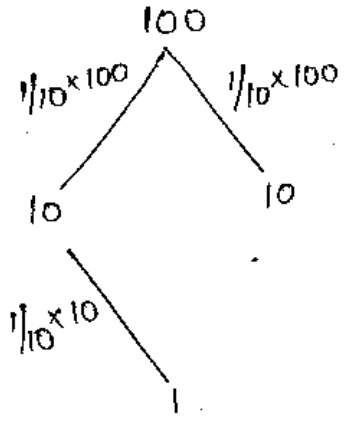
P → 100
I → 21
A → 121

$$20,000 \times \frac{21}{100} = 4200/-$$

(or) $$20,000 \times \frac{110}{100} \times \frac{110}{100} = 24200/-$$

$$24200 - 20,000 = 4,200/-$$

(or) $10 = \frac{1}{10} = 10^2 = 100$ (for 2yrs)



100 → 20,000

21 → ?

$$\frac{20,000 \times 21}{100} = 4200/-$$

2. A person takes a sum of money @ 20% per Annum as a CI. After 2 yrs, the Amount will be 14,400/-. find the Principal?.

271

I method

$$x \times \frac{12\cancel{\%}}{10\cancel{\%}} \times \frac{12\cancel{\%}}{10\cancel{\%}} \times \frac{\cancel{120}}{\cancel{100}} = 14,400/-.$$

$$\frac{\cancel{144}}{100} x = \cancel{14,400} = 10,000/-$$

II method

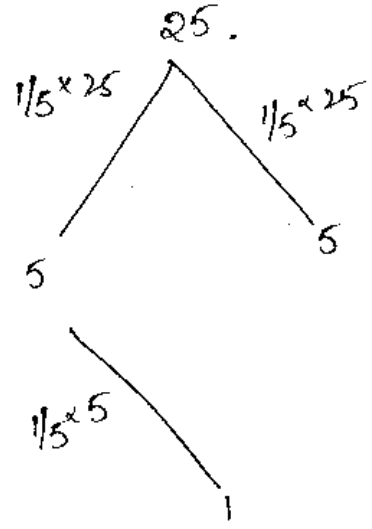
$$20 + 20 + \frac{20 \times 20}{100} = 40 + 4 = 44$$

$$144 \longrightarrow 14400$$
$$100 \longrightarrow ?$$

$$\longrightarrow \frac{\cancel{14400} \times 100}{\cancel{144}} = 10,000/-$$

III method

$20/- \rightarrow \frac{20}{100} = \frac{1}{5} = 5^2 = 25$ (for 2yrs)



$$25 + 5 + 5 + 1 = \cancel{36} \longrightarrow \cancel{14400}$$

$$25 \longrightarrow ?$$

$$\Rightarrow \underline{10,000/-}$$

3. find the CI on 4000/- @ 40% per Annum for 1yr 6 months.
→ find difference b/w SI & CI.

4
272

I method

$$4000 \times \frac{14\phi}{10\phi} \times \frac{12\phi}{10\phi} = 2720/-$$

II method

$$40 + 20 + \frac{4\phi \times 2\phi}{10\phi} = 60 + 8 = 68$$

$$4000 \times \frac{68}{100} = 2720/-$$

(or)

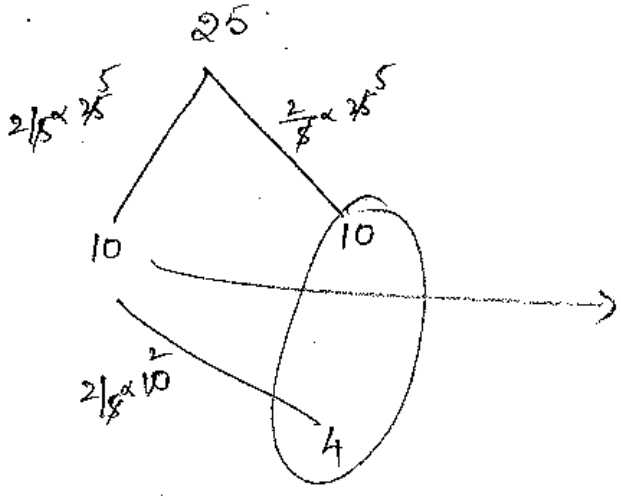
100 → 4000

68 → ?

$$\frac{68 \times 4000}{100} = 2720/-$$

III method

$$\frac{40}{100} = \frac{2}{5} \rightarrow 5^2 = 25$$



40% for 6 months

$$\overset{20}{\cancel{40}} \times \frac{6}{\cancel{12}} \frac{1}{2} = 20\%$$

If for 73 days,

$$\overset{8}{\cancel{40}} \times \frac{73}{365} \frac{1}{\cancel{5}} = 8\%$$

for 3 months

$$\overset{10}{\cancel{40}} \times \frac{3}{\cancel{12}} \frac{1}{\cancel{4}} = 10\%$$

for 2 yrs,

$$40 \times \frac{24}{\cancel{12}}^{2} = 80\%$$

6 months

10 + 4 = 14

$$14 \times \frac{6}{\cancel{12}\ 2} = 7$$

10 + 7 = 17.

160

~~25~~ → ~~4000~~

17 → ?

$$160 \times 17 = 2720/-$$

ii) 1yr 6 months.

SI → 40 + 20 = 60·/.

CI → 68·/.

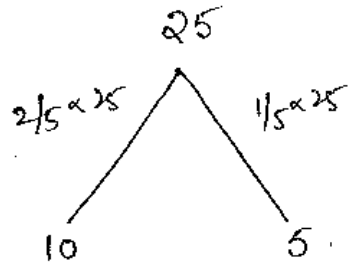
68 − 60 = 8·/.

100 → 4000

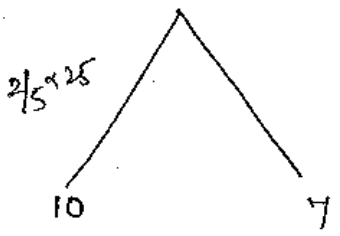
8 → ?

320/-

(or) SI



CI 25



→ 17

17 − 15 = 2.

25 → 4000 (160)

2 → ?

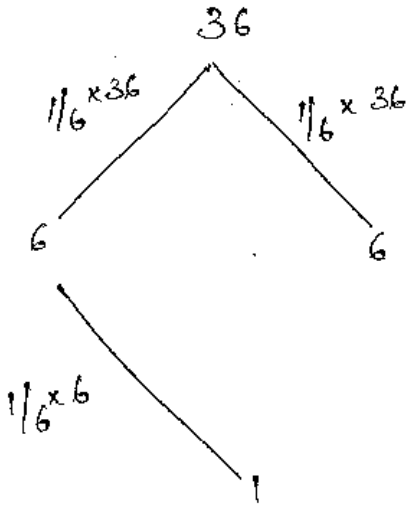
= 320/-

4. find the CI on 18000/- @ $16\frac{2}{3}$·/. per Annum for 1yr 73days.

ii) find the difference between CI & SI.

$16\frac{2}{3}$/. → $\frac{1}{6}$, 73 days → $\frac{1}{5}$

$\frac{1}{6}$ → 6^2 (2 yrs)



6 + 1 = 7

$7 \times \frac{73}{365} \frac{1}{5} = 1.4$

6 + 1.4 = 7.4.

$36 \longrightarrow 18000$

$7.4 \rightarrow ?$.

$$\frac{\overset{100}{\cancel{18000}} \times \overset{37}{\cancel{74}}}{\underset{2}{\cancel{360}}} = 3700/-$$

ii) $SI = 6 \times \frac{1}{5} = 1.2$; $6 + 1.2 = 7.2$.

$CI = 7.4$.

$7.4 - 7.2 = 0.2$.

$36 \longrightarrow 18000$

$0.2 \rightarrow ?$.

$$\frac{\cancel{18000} \times 2}{\underset{+8}{\cancel{360}}} = 100/-$$

5. find the CI on 10,000/- @ 10% for 1yr, & 20% for the II yr.

I method

$$10,000 \times \frac{11}{100} \times \frac{12}{100} = 13200 - 10,000 = 3200/-$$

II method

$$10 + 20 + \frac{10 \times 20}{100} = 30 + 2 = 32$$

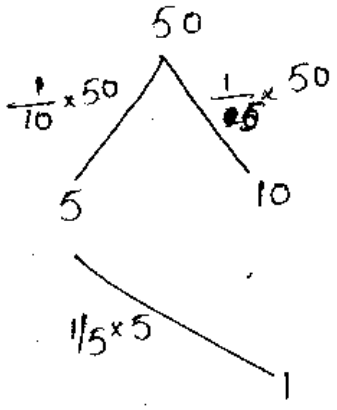
$100 \longrightarrow 10,000$

$32 \longrightarrow ?$

$\Rightarrow 3200/-$

II method

$10\% \rightarrow \frac{1}{10}$, $20\% \rightarrow \frac{1}{5}$ $10 \times 5 = 50$.



~~50~~ $\longrightarrow$ ~~10,000~~ 200.

16 $\rightarrow$?

$\Rightarrow$ 3200/-

difference b/w CI & SI.

SI $\rightarrow$ 30.

CI $\rightarrow$ 32.

$32 - 30 = 2 \times 100 = 200$/-

6. A person takes a sum of money as a CI, at $12\frac{1}{2}\%$, after 2 yrs, the CI is 6.8/-. Then find the Principal and also find the SI.

$12\frac{1}{2}\% \rightarrow \frac{1}{8}$.

$\frac{1}{8} \rightarrow \frac{8+1}{8} \rightarrow \frac{9}{8}$ (increased)

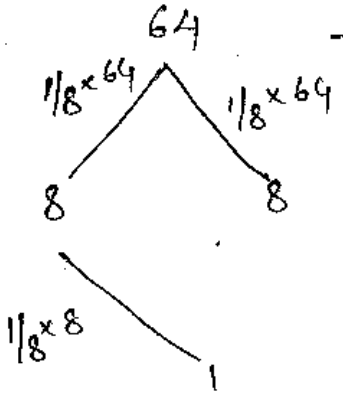
$\frac{1}{8} \rightarrow \frac{8-1}{8} \rightarrow \frac{7}{8}$ (decreased)

I method

$$x \times \frac{9}{8} \times \frac{9}{8} = x + 6.8$$

II method

$12\frac{1}{2}\% \rightarrow \frac{1}{8} = 8^2 = 64$.



— P → 64

— SI → 16

— CI → 8+8+1 → 17.

Amount → 64+17 = 81

CI − SI = 17 − 16 = 1

Principal

17 → 6.8.

64 → ?.

$\frac{64 \times 68}{170} = 25.6$

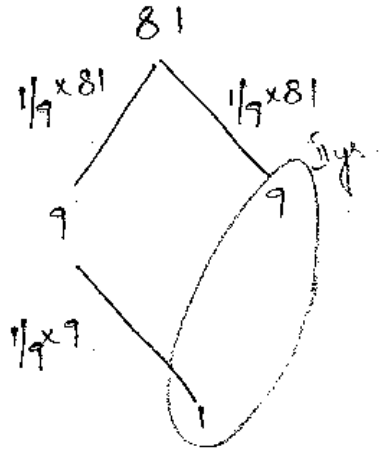
17 → 6.8.

16 → ?.

$\frac{16 \times 6.8}{17} = 6.4$

7. A person takes sum of money at $11\frac{1}{9}\%$ for 2 yrs, CI of 2 yrs is 70/-. Then find the Principal?.

$11\frac{1}{9}\% \rightarrow \frac{1}{9} \rightarrow 9^2 = 81$



70 → 70^7

81 → ?

= 567

$P \rightarrow 81 \xrightarrow{\times 7} 567$.

$A \rightarrow 81+9+9+1 \rightarrow 100$.

$A \rightarrow 100 \xrightarrow{\times 7} 700$

SI → 18

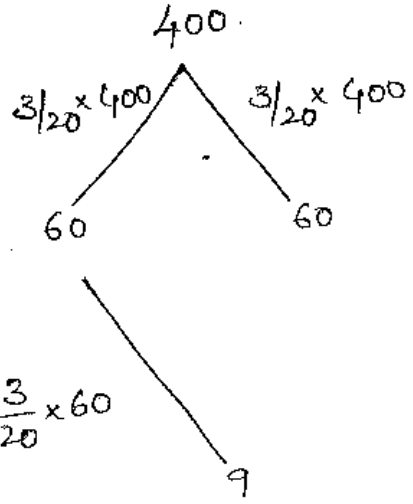
CI → 19

CI − SI = 19 − 18 = 1

SI → 18 × 7 = 126/-

8. A person takes sum of money @ 15% per Annum for 2yrs. The difference b/w CI & SI is 2.70/-. Then find the Principal & SI.

$15\% \rightarrow \frac{15}{100} \rightarrow \frac{3}{20}$ $(20)^2 = 400$.



SI = 120.

CI = 129

CI − SI = 9

9 → 2.70

400 → ?

$\frac{400 \times 270}{900} = 120 \rightarrow P$

CI →

9 → 2.70.

129 → ?

$\frac{129 \times 270}{100} = \frac{387}{10} = 38.7$

II method

difference b/w CI & SI.

$\frac{24}{100} = \frac{15\times15}{100} = 2.25.$

$2.25 \longrightarrow 2.70$

$100 \longrightarrow ?$

$\frac{100\times270}{2.25} = 120$ =.

III method

$P\times\frac{2.25}{100} = 2.70.$

$2.25P = 270.$

$\frac{225}{100}P = \frac{270}{100}$

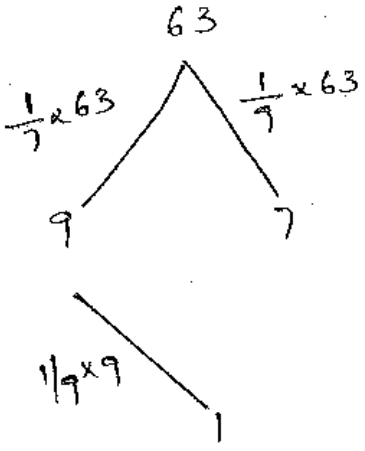
$P22500 = 27000$

$P = \frac{270}{225} = 120$ =.

9. A person takes sum of money for 2yrs, as a CI, for the Ist yr @ $14\frac{2}{7}$ % & II yr at $11\frac{1}{9}$ %. & the difference b/w CI & SI is 40/-. find the principal.

$14\frac{2}{7}\% \rightarrow \frac{1}{7}$; $11\frac{1}{9}\% \rightarrow \frac{1}{9}$

$\frac{1}{7}\times\frac{1}{9} \rightarrow 7\times9 \rightarrow 63.$



$P \rightarrow 63.$

$SI \rightarrow 16.$

$CI \rightarrow 17.$

$CI - SI = 40/-.$

$1 \longrightarrow 40$

$63 \rightarrow ?$

$63\times40 = 2520/-$

10. A person takes sum of money as CI, it will be doubled for every 4 yrs, In how many years, it will be 16 times.

279

1 → 2 → 4 yrs.

2 → 4 → 4 yrs.

4 → 8 → 4 yrs.

8 → 16 → 4 yrs

16 yrs

11. A person takes sum of money as a CI, it will be 4 times for every 5 yrs. How many times can he get in 20 yrs.

1 → 4 → 5 yrs.

4 → 16 → 5 yrs.

16 → 64 → 5 yrs.

64 → 256 → 5 yrs

20 yrs → 256 times.

12. A person takes sum of money, it will be thrice for every 5 yrs, In how many yrs, can he get 81 times.

1 → 3 → 5 yrs.

3 → 9 → 5 yrs.

9 → 27 → 5 yrs.

27 → 81 → 5 yrs

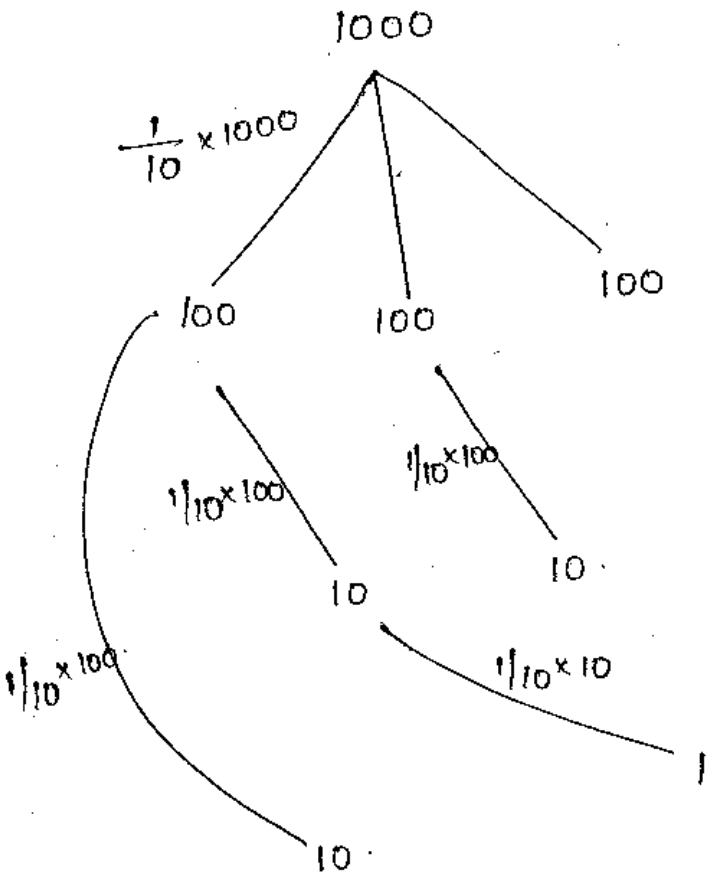
20 yrs

13. A person takes 20,000/- @ 10% rate of CI/Annum for 3yrs. find CI.

8

280

III method $\frac{1}{10} = 10^3$ (3yrs)



P → 1000

SI → 300

CI → 331

1000 → 20,000

331 → ?

= 6620/-

I method

$$20{,}000 \times \frac{110}{100} \times \frac{110}{100} \times \frac{110}{100} = 26620 - 20000 = 6620/-$$

II method

10, 10, 10.

21 10.

$$21 + 10 + \frac{21 \times 10}{100} = 31 + 2.1 = 33.1$$

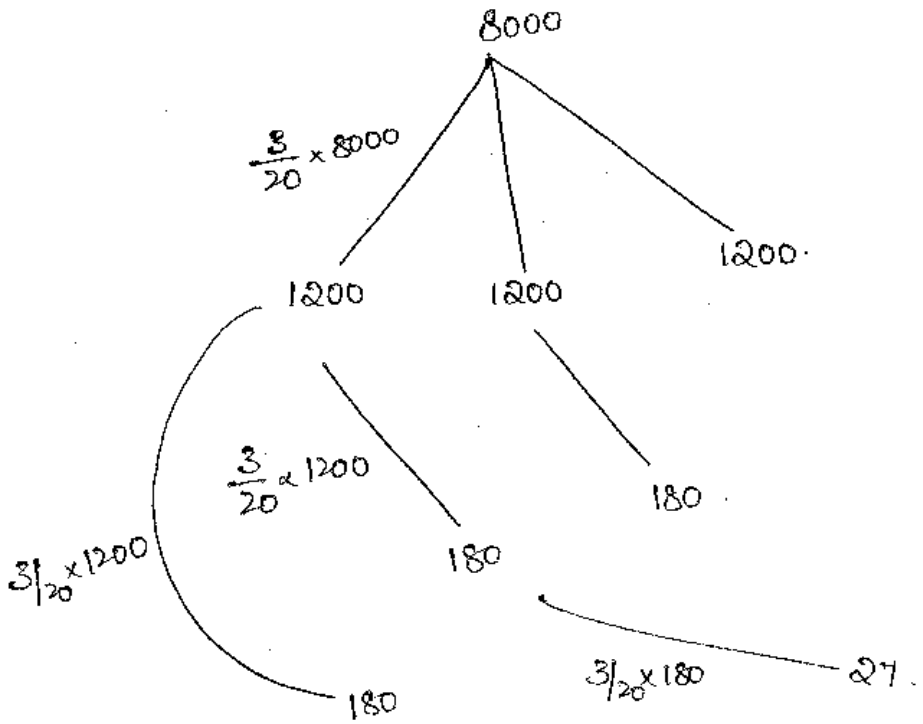
$$100 \longrightarrow 20000$$

$$33.1 \longrightarrow ?$$

$$\frac{20000 \times 331}{1000} = 6620/-$$

16. A person takes some money @ 15% rate of CI, for 3yrs, CI − SI = 1701/-. Then find the Principal.

$$\frac{15}{100} = \frac{3}{20} \rightarrow 20^3 = 8000.$$



$3600 \rightarrow SI$.

$3600 + 567 \rightarrow CI$.

282

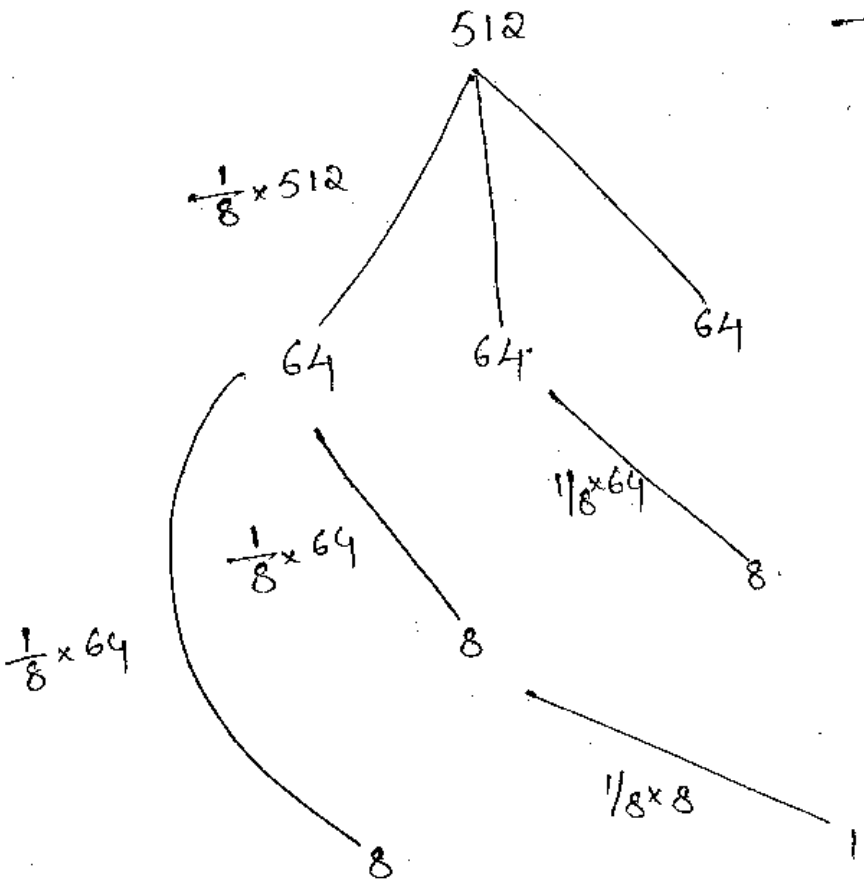
$567 \rightarrow 1701$

$8000 \rightarrow ?$

$$\frac{8000 \times 1701}{567} = 24000/-$$

15 A person takes sum of money @ $12\frac{1}{2}$ % per Annum for 3yrs. difference b/w SI & CI = 12.50/-. Then find the Principal, SI, CI & Amount.

$12\frac{1}{2}\% \rightarrow \frac{1}{8} \rightarrow 8^3 = 512$.



$\rightarrow P$

$\rightarrow SI \rightarrow 64 \times 3 = 192$

$\rightarrow CI = 192 + 25 = 217$.

$CI - SI = 25$

$(8+8+8+1)$

$25 \rightarrow 12.50$

$512 \rightarrow ?$

$$\Rightarrow \frac{512 \times 125\cancel{\phi}}{250\cancel{\phi}} = \frac{2560}{10}$$

$= 256/-$

(or) $25 \xrightarrow{1/2} 12.50$

$512 \xrightarrow{1/2} 256/-$

SI

$25 \xrightarrow{1/2} 12.5$

$192 \xrightarrow{1/2} 96$

CI

$217 \xrightarrow{1/2} 108.6$

Amount → P + I.

$512 + 217 \rightarrow 729 \times \frac{1}{2} = 364.5/-$

* If only SI − CI is given, then,

SI − CI = 12.5.

$12\frac{1}{2}/- \rightarrow \frac{1}{8}\ \begin{matrix} B \\ A \end{matrix}$

$3A + B \rightarrow 3(8) + 1 = 25$

$25 \rightarrow 12.5$

$8 \xrightarrow{3} 512 \rightarrow ?$

$\Rightarrow 256/-$

16. A person took a sum of money @ $16\frac{2}{3}$ ·/. per Annum for 3yrs. The difference b/w CI & SI = 5.70/-. find the Principal.

10

284

$16\frac{2}{3}$ ·/. $\rightarrow \frac{1}{6} \rightarrow 6^3 \rightarrow 216$.

$\frac{1}{6}$ B

A.

$3(A)+B = 3(6)+1 = 19$.

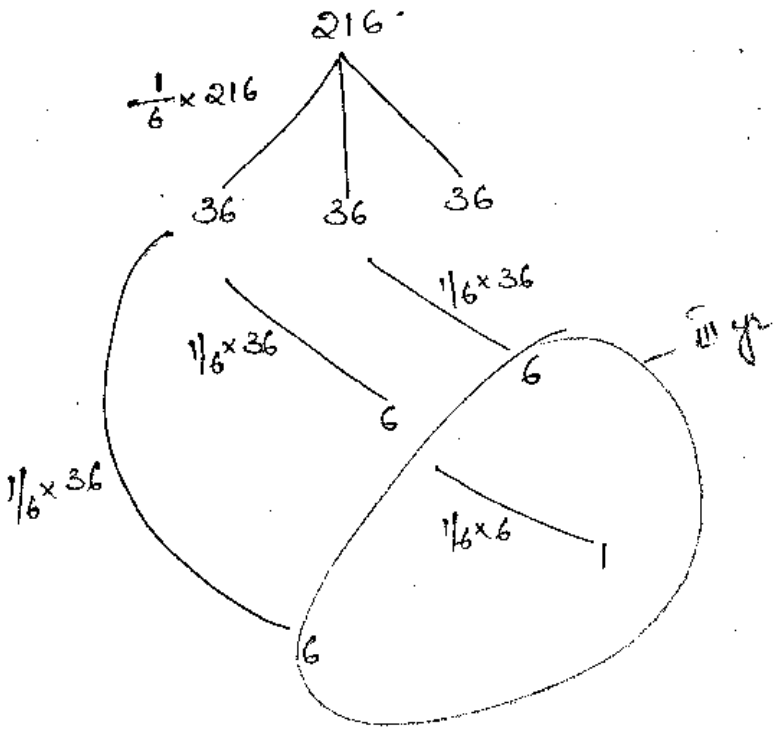
$19 \xrightarrow{\times 0.3} 5.70$

$216 \xrightarrow{\times 0.3} 64.8$.

Principal $\rightarrow$ 64.8/-

17. A person takes sum of money @ $16\frac{2}{3}$ ·/. per Annum for 3yrs. The difference b/w CI for III yrs & CI for II yrs is 420/-. find the Principal?.

$16\frac{2}{3}$ ·/. $\rightarrow \frac{1}{6}$. $6^3 = 216$.



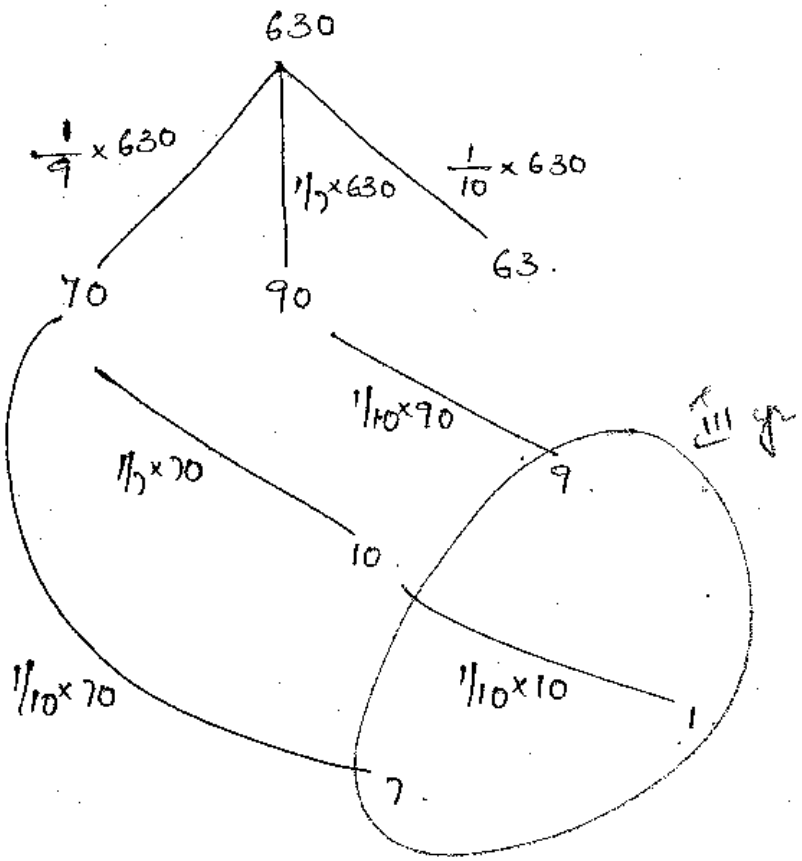
$13 - 6 = 7$.

$7 \xrightarrow{\times 60} 420$.

$216 \xrightarrow{\times 60} 12960/-$

18. A person takes some money for the Ist yr @ $11\frac{1}{9}$ ·/- ₹ IInd yr @ $14\frac{2}{7}$ ·/- ₹ IIIrd yr @ 10·/- for 3yrs. payed the Interest. CI − SI = 5.40/- find the Principal.

$\frac{1}{9} + \frac{1}{9} + \frac{1}{10}$



SI → 70+90+63 → 223.

difference → 10+9+7+1 → 27.

CI → 223+27 = 250.

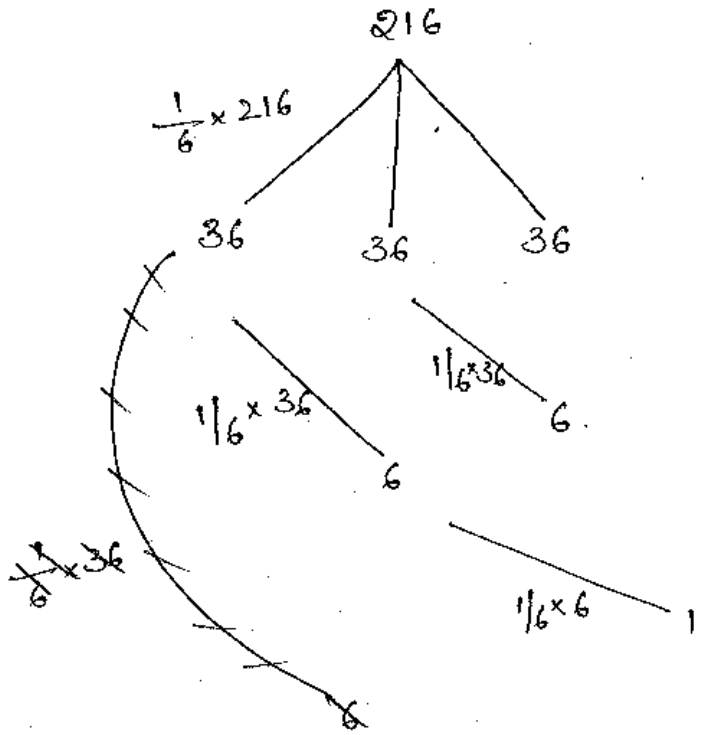
CI − SI → $27 \xrightarrow{\times 0.2} 5.40$

$630 \xrightarrow{0.2} 126/-$

19. find the CI on 10,800/- @ $16\frac{2}{3}$ % per Annum, time 2yrs 73 days?

$P = 10,800/-$

$R = 16\frac{2}{3}\% \rightarrow \frac{1}{6}$ $\quad 6^3 \rightarrow 216$



$36 + 13 \rightarrow 49$

$49 \times \frac{73}{365} \frac{1}{5} = 9.8$

$36 + 36 + 6 + 9.8 = 87.8$

$216 \longrightarrow 10,800$

$87.8 \rightarrow ?$

$$\frac{878 \times 1080}{216} = 4390/-$$

20. find the CI on 20,000/- @ 20% per Annum for 1yr 6 months. Interest is Calculated for every 6 months or Half yearly?

$$R = 20\% \times \frac{6}{12} \frac{1}{2} = 10\%.$$

I method.

10, 10, 10.

$x + y + \frac{xy}{100}$

$10 + 10 + \frac{10 \times 10}{100}$

$20 + 1 \rightarrow 21$

21, 10.

$21 + 10 + \frac{21 \times 10}{100}$

$31 + 2.1 \rightarrow 33.1$

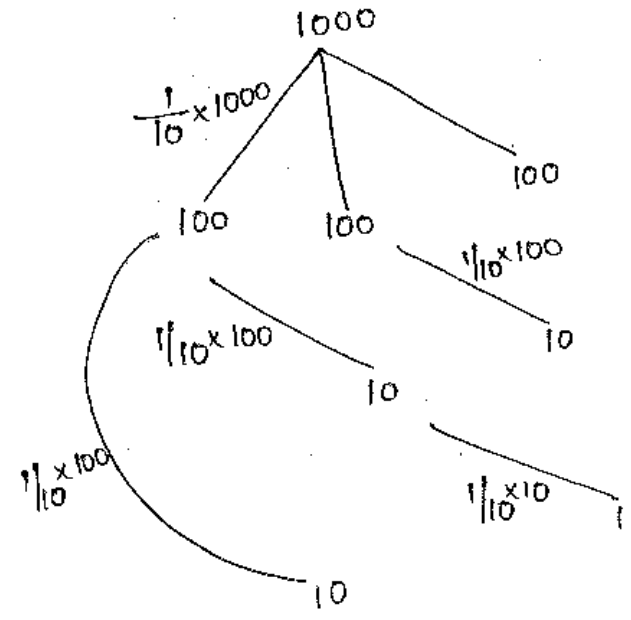
100 → 20,000.

33.1 → ?.

$\frac{20,000 \times 331}{1000} = 6620/-$

II method

$10^3 = 1000$.



100 → 20,000

331 → ?

→ 6620/-

21. find the CI on 10,000/- @ 20·/. per Annum, for 9 months.
Interest is calculated every Quarterly.

ii) find the difference b/w SI & CI.

$R \to 20 \overset{5}{\cdot}/. \times \frac{3}{12} \frac{1}{4} \to 5·/.$

5 5 5
x y

$5 + 5 + \frac{5 \times 5}{100} = 10 + 0.25 = 10.25$

10.25, 5

$10.25 + 5 + \frac{10.25 \times 5}{100}$

$15.25 + \frac{5125}{100}$

~~15.25 + 51.25~~

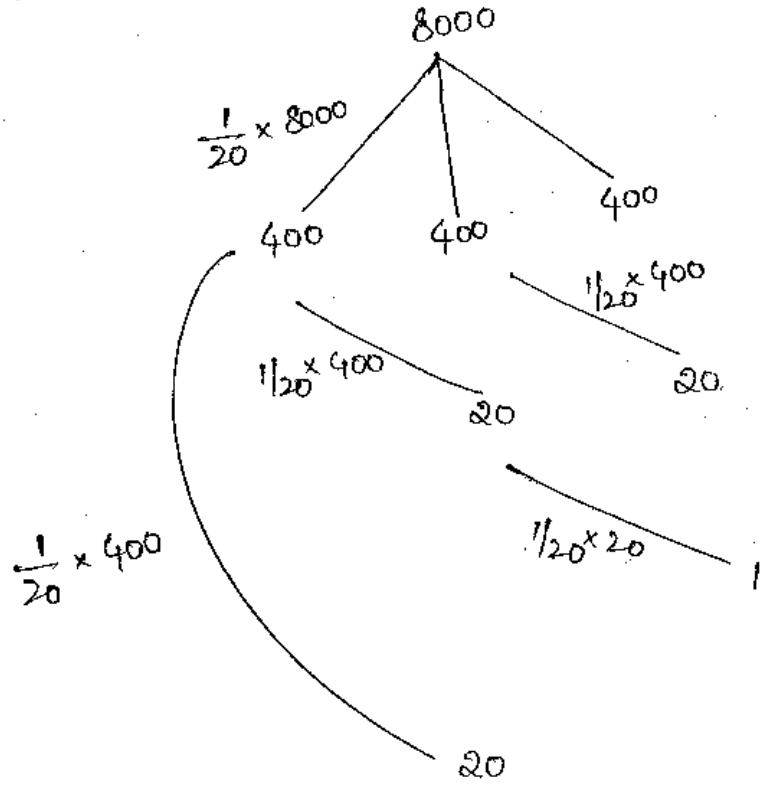
15.25 + 0.5125

15.7625

$100 \xrightarrow{\times 100} 10,000$

$15.7625 \xrightarrow{\times 100} ?$ 1576.25

II Method $5 \times \frac{1}{100} = \frac{1}{20} \to 20^3 = 8000$



8000 ⟶ 10,000

1261 ⟶ ?

$$\frac{1261 \times 10{,}000}{8000} = \frac{12610}{8} = 1576.25.$$

Q2 find the CI on 20,000/- for 2yrs. Interest is calculated for every 6 months @ 40/. per Annum (Half yearly).

$$40 \times \frac{6}{12} \frac{1}{2} = 20/.$$

20, 20, 20, 20.

x y

$$20 + 20 + \frac{20 \times 20}{100}$$

→ 44, 44.

x y.

$$44 + 44 + \frac{44 \times 44}{100} = 44 + 44 + 19.36 = 107.36.$$

100 ⟶ 20,000

7.36 → ?

$$\frac{7.36 \times 20{,}000}{100} = 1472$$

20,000
+1472
21472

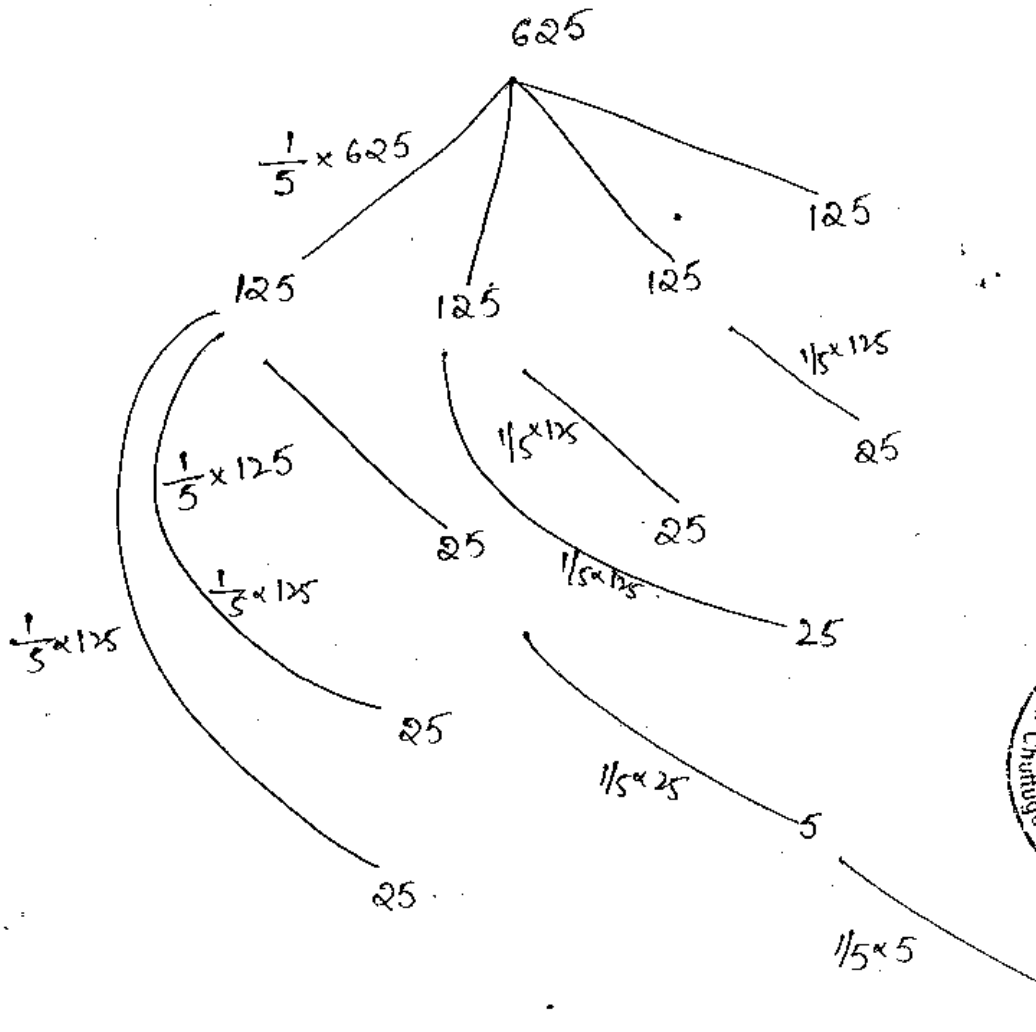
II method

$20 \times \frac{1}{100} = \frac{1}{5}$ $5^4 = 625$.

4yrs → 6A + 4B + C

13

290



625 → 20,000

671 → ?

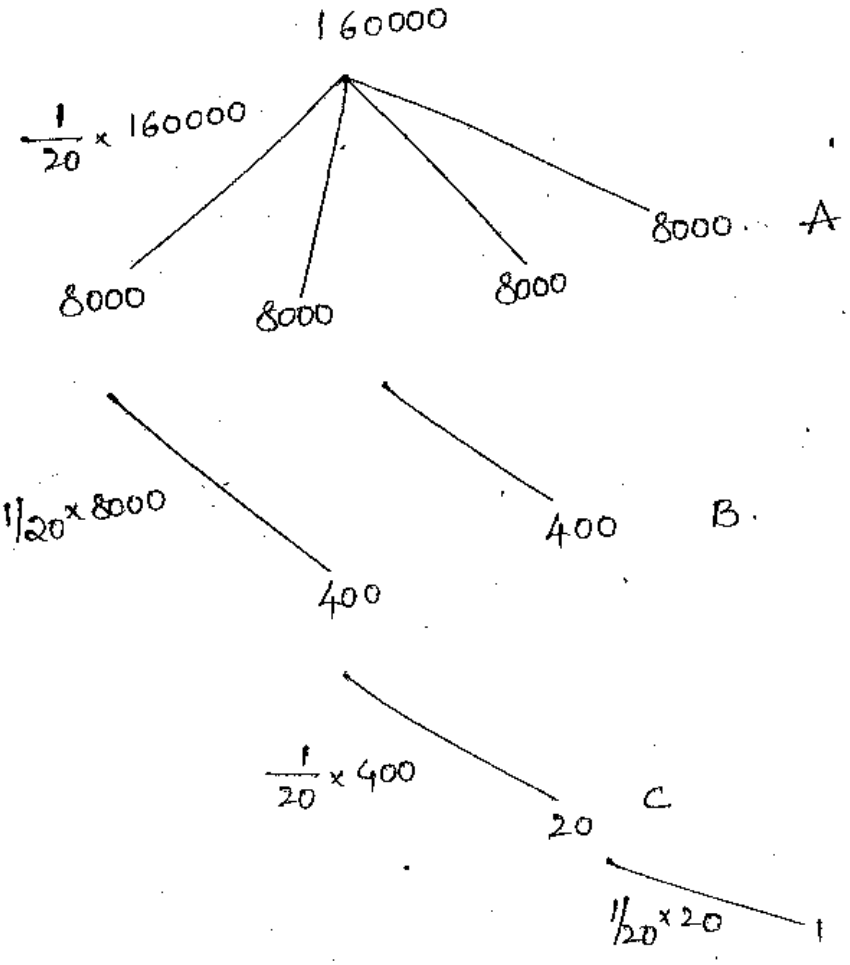
$$\frac{671 \times 20{,}000}{625} = 21472/-$$

23. find the CI on 8000/- @ 20% per Annum for 1yr. Interest is calculated for every 3 months.

291

$5\% \times \frac{1}{100} = \frac{1}{20} = 20^{4} = 160000.$

$4A + 6B + 4C + D.$



$4(8000) + 6(400) + 4(20) + 1 = 34481$

$160000 \longrightarrow 8000$

$34481 \longrightarrow ?$

$$\frac{34481 \times 8000}{160000} = 17240.5$$

172405

20 10

(or)

$4A + 6B + 4C + D$

directly Calculate 5% on 1,60,000

$\frac{5}{100} \times 1,60,000 = 8000 \rightarrow A.$

$\frac{5}{100} \times 8000 = 400 \rightarrow B.$

$\frac{5}{100} \times 400 = 20 \rightarrow C.$

$\frac{5}{100} \times 20 = 1 \rightarrow D.$

$1600 + 120 + 4 + 0.05 = 1724.05.$

$$\begin{array}{r} 1724.05 \\ - \ 1600.00 \\ \hline 124.05 \end{array} \rightarrow \text{difference b/w CI \& SI.}$$

24. A Certain Sum of money of 225/- Amounts to 256 in 2yrs. find the rate of CI.

$2\sqrt{225} : 2\sqrt{256}$

$15 : 16$

(2yrs — square root)

$\frac{1}{15} \times 100 = 16\frac{2}{3}\%$

25. A person takes sum of money @ some rate of Interest. After 4yrs, the Amount will be 10,000/- & after 6 yrs, the Amount will be 14,400/-. Then find the rate of Interest.

$2\sqrt{100} : 2\sqrt{144}$

$10 : 12$

$\frac{2}{10} \times 100 = 20\%$

26. If Certain sum of money of 102400/- Amounts to 1,45,800/- in 3yrs. find the rate of Interest.

$$\begin{matrix} 512 & 729 \\ 102400 & : 145800 \end{matrix}$$

$3\sqrt{512} : 3\sqrt{729}$

$8 : 9$

$\frac{1}{8} \times 100 = 12\frac{1}{2}\%$

27. A person takes sum of money, after 2yrs, the Amount will be 12,960/- & after 3yrs, the Amount will be 13,176/- then find

$$\begin{matrix} 13176 \\ -\ 12960 \\ \hline 216 \end{matrix}$$

$12960 \longrightarrow 216$

$100 \longrightarrow ?$

$\frac{216 \times 10\phi}{1296\phi} = \frac{10}{6} = \frac{5}{3} = 1\frac{2}{3}\%$

28. If certain sum of money becomes 8 times of itself in 3yrs, find the rate of CI. 294

$100 \rightarrow 800$

$3\sqrt{1} : 3\sqrt{8}$

$1 : 2$

$\frac{1}{1} \times 100 = 100\%$

29. At what rate per Annum will rupees 32,000/- held at a CI of 5,044/- in 9 months, interest being Compounded Quarterly?

$32,000 + 5,044 = 37,044$

$32000 : 37,044$

$3\sqrt{8000} : 3\sqrt{9261}$

$20 : 21$

$\frac{1}{20} \times 100 = 5\%$ (quarterly)

$5\% \times 4 = 20\%$ (1 year)

30. A person takes 1000/- @ 10% per Annum at CI. After some years, the Amount will be 331/-. find the time?

$$A = P\left[1 + \frac{R}{100}\right]^T$$

$$\frac{1331}{1000} = \left[1 + \frac{10}{100}\right]^T$$

$$\frac{1331}{1000} = \left[\frac{11}{10}\right]^T$$

$$\frac{11^3}{10^3} = \left[\frac{11}{10}\right]^T \Rightarrow 3 \text{ yrs}.$$

31. A person takes 1,00,000/- @ 10% per Annum. After some years, the Amount will be 1,21,000/-. find the time?

295

$$A = P\left[1 + \frac{R}{100}\right]^T$$

$$\frac{121}{100} = \left[1 + \frac{10}{100}\right]^T$$

$$\frac{121}{100} = \left[\frac{11}{10}\right]^T$$

$$\frac{11^2}{10^2} = \left[\frac{11}{10}\right]^T$$

$$T = 2\text{yrs}$$

32. A person takes 80,000/- @ 10% per Annum. After some years interest is 16,800/- as CI. Then find the time.

80,000
16,800
96,800

~~484~~ ~~242~~ 121
~~96,800~~
~~80,000~~
~~400~~
~~200~~
100

$$\frac{96,800}{80,000} = \left[1 + \frac{10}{100}\right]^T$$

$$\frac{121}{100} = \left[\frac{11\phi}{10\phi}\right]^T$$

$$\left[\frac{11}{10}\right]^2 = \left[\frac{11}{10}\right]^T$$

$$T = 2\text{yrs}.$$

33. If a certain sum of money Amounts to 4500/- in 5yrs, & 6750/- in 10yrs. find the Principal.

296

I method

$$\frac{6750}{4500} = \frac{3}{2}$$

$$P \times \frac{3}{2} = 4500$$

$$3P = 9000$$

$$P = 3000/-$$

II method

$$A = P\left[1+\frac{R}{100}\right]^T \quad ; \quad \text{Given } A = P\left[1+\frac{R}{100}\right]^5$$

$$A = P\left[1+\frac{R}{100}\right]^{10}$$

$$\frac{P\left[1+\frac{R}{100}\right]^{10}}{P\left[1+\frac{R}{100}\right]^5} = \frac{6750}{4500} = \frac{3}{2}$$

$$P\left[1+\frac{R}{100}\right]^5 = 4500$$

$$P \times \frac{3}{2} = 4500$$

$$3P = 9000$$

$$P = 3000/-$$

34. If a certain sum of money Amounts to 66300/- in 10yrs, 99,450/- in 20yrs, find the Principal?

$$\frac{99450}{66300} = \frac{3315}{2210}$$

$$P\left(\frac{3315}{2210}\right) = \frac{20}{66300}$$

$$P = 44200/-$$

35. If a certain sum of money becomes 8000/- in 2yrs & 27,000/- in 5yrs, find the principal?

$$3\sqrt{8} : 3\sqrt{27}$$

$$2 : 3$$

$$R = \frac{1}{2} \times 100 = 50\%$$

$$50 + 50 + \frac{5\phi \times 5\phi}{10\phi} = 125\%$$

$$125\% \longrightarrow 8000$$

$$100\% \longrightarrow ?$$

$$\frac{100 \times 8000}{225} = \frac{32000}{9} = 3555.5$$

36. 3903 share to A & B @ 4% per Annum. He collected a sum Amount from A after 5yrs it is equal to Amount of B for 7yrs. Then, find the share of A.

17
298

$$7-5 = 2 \text{ yrs.}$$

$$\frac{A}{B} = \frac{104}{100} = \left(\frac{26}{25}\right)^2 = \frac{676}{625}$$

$676 + 625 = 1301$

$$\frac{676}{1301} \times 3903 = 2028/-$$

37. A person gives 23,310/- to A & B @ 10% per Annum. He collected some Amount from A after 5yrs, it is equal to the Amount of B after 8yrs. Then find share of B.

$$8-5 = 3 \text{ yrs.}$$

$$\frac{A}{B} = \left(\frac{110}{100}\right)^3 = \frac{1331}{1000}$$

$$\frac{1000}{2331} \times 23310 = 10,000/-$$

38. A person took sum of money @ 10% per Annum, after 2yrs, the Amount will be 840/-. If he pays equal installments, then find each installment?

$$\frac{A}{B} = \left(\frac{110}{100}\right)^2 = \frac{121}{100}$$

$$\Rightarrow \frac{100}{221} \times 840 = \frac{84000}{221}$$

$$\frac{x}{\frac{110}{100}} + \frac{x}{\left(\frac{110}{100}\right)^2} = 840$$

$$\frac{10}{11}x + \frac{100}{121}x = 840.$$

$$\frac{110x + 100x}{121} = 840.$$

$$210x = 840 \times 121 = 484$$

(or)

$$840 \times \frac{10}{100} = 84$$

$840 + 84 = 924 - 484 = 440 \times \frac{10}{100} = 44$, $440 + 44 = 484$.

(or) $210x = 840 \times 121$

$x = 484$

1) 484
2) 480
3) 420
4) 450.

39. A Person takes a sum of money @ 5% per Annum, for 2yrs, the Amount will be 1025/-. If he pays in equal installments then find each installment.

$$1025 \times \frac{5}{100} \times \frac{20}{4} = 51.25$$

$$525 \times \frac{5}{100} \times \frac{20}{4} = 26.25$$

51.25
1025.00
1076.25
551.25
525.00

525
26.25
551.25

40 find the difference b/w SI & CI on 20,000/- @ 10% per Annum.

18
300

SI → 2 × 10% = 20%

20 + 1 = 21

21 − 20 = 1%

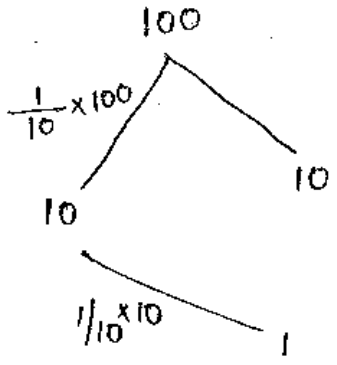
100 → 20,000

1 → 200

I method

$$D = \frac{P \times P^2}{100^2}$$

$$10\% \rightarrow \frac{10}{100} = \frac{1}{10^2}$$



100 ⟶ 20,000.

1 ⟶ ?.

$$\frac{1 \times 20,000}{100} = 200$$

41 find the differences b/w SI & CI on 10,000/- @ 10% per Annum, Interest is calculated for every half year.

$$SI = \cancel{10}^{5} \times \frac{6}{\cancel{12}_{2}} = 5$$

$$\frac{5 \times 5}{100} = \frac{25}{100}$$

100 ⟶ 10,000

$\frac{25}{100}$ ⟶

$$\frac{25}{\cancel{100}} \times \frac{10,000}{100} = 25$$

42 The difference b/w SI & CI is ₹50/- & sum of money @ 5% per Annum for 2 yrs. find the Principal.

$$SI = \frac{5 \times 5}{100} = \frac{25}{100}$$

$$\frac{25}{100} \rightarrow 50$$

$$100 \rightarrow ?$$

$$\frac{100 \times 50 \times \overset{4}{\cancel{100}}}{\cancel{25}} = 20,000/-$$

43 The difference b/w SI & CI is 96/- on 15,000/- @ some rate of Interest for 2 yrs.

$$\cancel{100} \rightarrow \cancel{15,000} \qquad \frac{96 \times \cancel{15000}}{\cancel{100}} =$$

$$\cancel{96} \rightarrow ?$$

$$100 \longrightarrow 15,000$$

$$? \longleftarrow 96$$

$$\frac{96 \times 100}{15000} = \frac{96}{150} = \frac{32}{50} = \frac{16}{25}$$

$$\frac{xy}{100} = \frac{16}{25}$$

$$xy = \frac{16}{25} \times \overset{4}{\cancel{100}} = 64 = xy$$

$$x = y = 8/-$$

45. find the difference b/w SI & CI @ 20% per annum on 20,000/- for 3yrs.

302 19

$SI = 20 \times 3 = 60/-$

$CI = 20, 20, 20$

$20 + 20 + \frac{20 \times 20}{100} = 44$

44, 20

8.8

$44 + 20 + \frac{44 \times 20}{100} = 64 + 8.8 = 72.8$

$72.8 - 60 = 12.8/-$

∴ Difference b/w CI & SI = 12.8/-

12.8/- → ?

100/- → 20,000

$\frac{20,000 \times 128}{1000} = 2560/-$

(or)

20/- = R

D → difference

P → Principal.

$D = \frac{P \times R^2}{100^2}\left(\frac{300+R}{100}\right)$

$= \frac{20,000 \times 20^2}{100^2}\left(\frac{300+20}{100}\right)$

$= \frac{20,000 \times 400}{10000}\left(\frac{320}{100}\right)$

$= 80 \times 32 = 2560/-$

II method

Difference, $D = P \times \frac{R^2}{100^2}$ → for 2 yrs.

$$R^2 = \frac{32 \quad 2}{\cancel{96} \times \cancel{10\phi} \times \cancel{100}} = 64$$
$$\cancel{15\phi\phi}$$
$$\cancel{5}$$

$$R = \sqrt{64} = 8$$

44. The difference b/w SI & CI is 10/- per Annum on 10,000/- for 3 yrs.

10/-

I = 10, 10, 10

21/- 10/-

33.1/-

SI = 30/-

CI − SI = 3.1/-

100/- → 10,000

3.1/- → ?.

$$\frac{10,000 \times 3.1}{100} = 310$$

CI = 10, 10, 10

x y

$$10 + 10 + \frac{10 \times 10}{100} = 21$$

$$21 + 10 + \frac{21 \times 10}{10\phi} = 33.1$$

3 yrs.

$$D = \frac{P \times R^2}{100^2} \times \frac{(300 + R)}{100}$$

for 10/- → $D = \frac{P \times 31}{100}$

for 5/- → $D = \frac{P \times 61}{8000}$

D → difference.

(or) $D = \frac{P \times 31}{100}$

$$= \frac{10,000 \times 31}{100} = 310$$

45 find the difference b/w SI & CI @ 20% per Annum on 20,000/- for 3yrs.

304 19

$SI = 20 \times 3 = 60/-$

$CI = 20, 20, 20$

$a \quad r$

$$20 + 20 + \frac{20 \times 20}{100} = 44$$

44, 20

8.8

$$44 + 20 + \frac{44 \times 20}{100} = 64 + 8.8 = 72.8$$

$$72.8 - 60 = 12.8/-$$

Difference b/w CI & SI = 12.8/-

12.8/- → ?

100/- → 20,000

$$\frac{20,000 \times 128}{1000} = 2560/-$$

(or)

20% = R

D → difference

P → Principal.

$$D = \frac{P \times R^2}{100^2}\left(\frac{300 + R}{100}\right)$$

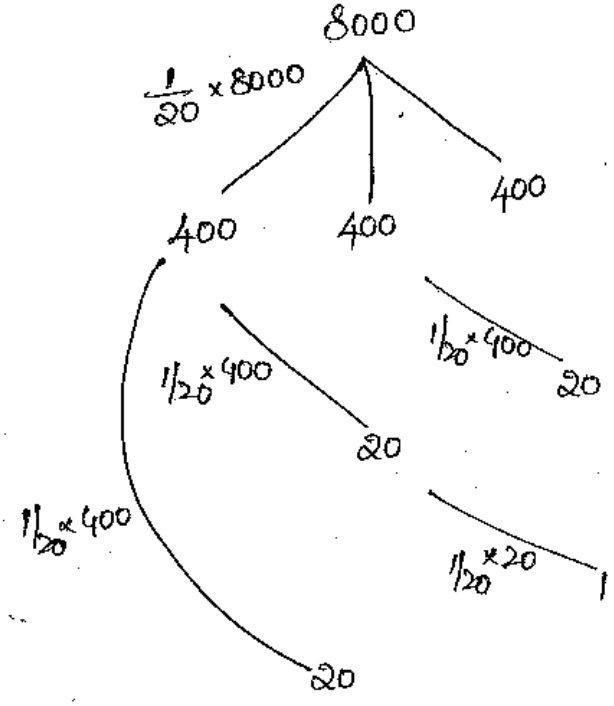
$$= \frac{20,000 \times 20^2}{100^2}\left(\frac{300 + 20}{100}\right)$$

$$= \frac{20,000 \times 40}{10000}\left(\frac{35}{10}\right)$$

$$= 80 \times 35 = 2560/-$$

46. A person takes sum of money @ 5% per Annum for 3yrs SI is 1200/- then find CI on same money, same rate of interest, same time.

$5\% \rightarrow \frac{5}{100} = \frac{1}{20}$ 3yrs. $20^3 \rightarrow 8000$



1200 → 1200

1261 → ?

$$\frac{+200 \times 1261}{+200} = 1261$$

47. Find R → Rate of Interest.

2200 + 2200

SI → 4400/- } difference = 400.
CI → 4800/- }

→ 2200 + 2600.

T → 2yrs.

2200 → 400

100 → ?

$$\frac{200}{\cancel{400} \times 100} = \frac{200}{11} = 18\frac{2}{11}\%$$
$$\cancel{2200}$$
$$11$$

48. A person take some money @ some rate of Interest for 2yrs. When he pays SI he has to pay 600/- & when he pays CI, he has to pay 630/-. Then find the rate of Interest on Principal?

SI → 600; CI → 630.

↓ ↓

300 + 300 300 + 330.

30 → 300

? ← 100

$$\frac{10}{\frac{300 \times 100}{300}} = 10\text{/-}$$

$$\frac{PTR}{100} = SI.$$

$$600 = \frac{P \times 1 \times 10}{100} = 6000\text{/-}$$

49. find CI on 25,000/- @ 4% for 1yr, 5% for 2nd yr, & 6% per III yr

ii) difference b/w SI & CI.

4, 5, 6 9.2, 6

$4 + 5 + \frac{4 \times 5}{100} = 9.2$. $9.2 + 6 + \frac{9.2 \times 6}{100} = 15.2 + 0.552$

$\Rightarrow 15.752\text{/-}$

15.752/- → ?

100/- → 25,000

$$\frac{15.752 \times 25000}{100} = \frac{15.752 \times 100 \times 10}{4} = 3938$$

$CI - SI = 15.752 - 15 = 0.752\%$

$0.752\% \rightarrow ?$

$100\% \rightarrow 25{,}000$

$$\frac{25{,}000 \times 752}{1000000} = \frac{188}{10} = 18.8$$

50. $P = 8000/-$, $R = 1\%, 2\%, 3\%$ for 3yrs.

find SI - CI (difference)

$$1 + 2 + \frac{1 \times 2}{100} = 3 + \frac{2}{100} = 3.02$$

$$3.02 + 3 + \frac{3.02 \times 3}{100} = 6.02 + \frac{9.06}{100} = 6.02 + 0.0906$$

$$= 6.1106\%$$

$SI = 1 + 2 + 3 = 6.$

$CI - SI = 6.1106 - 6 = 0.1106.$

$0.1106 \rightarrow ?$

$100 \rightarrow 8000/-$

$$\frac{8000 \times 0.1106}{100} = 8.848.$$

51. Table 1 – Principal

Table-2 – CI.

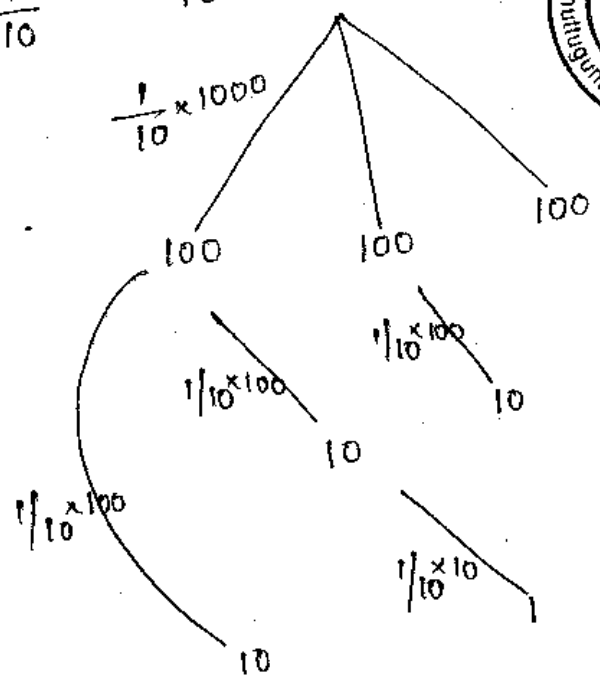
a) 20,000
b) 15,000
c) 10,000

i) 7850
ii) 3310
iii) 4865
iv) 4965
v) 6620.

find Correct matching @ 10% Per Annum for 3yrs.

$21 + 10 + \frac{21\phi}{10\phi} = 31 + 2.1 = 33.1$

$10\% = \frac{1}{10}$



1000 — 20,000

331 → ?

6620

1000 → 15,000

331 → ?

4965

1000 → 10,000

331 → ?

3310

52 A man borrowed a sum of 3000/- from a bank @ 30·/. CI Per Annum, if he pay 1000/- at the end of each year, Calculate How much amount he will pay @ the end of 3rd year to clear all his dues.

(22)

I yr $3000 \xrightarrow[900]{+30\cdot/.} 3900$
-1000

II yr $2900 \xrightarrow[+870]{+30\cdot/.} 3770$
-1000

III yr $2770 \xrightarrow[+831]{+30\cdot/.} 3601$ → This is the Amount to be paid at the end of III yr.

53 Ramu invested total sum of 18,000/- in two Schemes A & B for 2 years. Scheme A offers CI of 10·/. Per Annum & B offers SI of 8·/. per Annum. If the total Interest earned by both the Schemes is 3510/-. How much money is invested in Scheme B?

CI → 10·/. for 2yrs → $10+10+\frac{10\times10}{100} = 21\cdot/.$

SI → 10·/. × 2 = 2· 8·/. for 2yrs = 16·/.

$\frac{3510}{18000} \times 100 = 19.5\cdot/.$

A = 21·/. 16·/. = B

19·5

3·5·/. 1·5·/.

35 : 15

7 : 3

$\frac{3}{10} \times 18000 = 5400/-$

$$SI = \frac{21}{100} \times 18,000 = 3780$$

$$-\ 3510$$

$$270 \longrightarrow 5\%\ (21\% - 16\%)$$

$$? \longleftarrow 100\%$$

$$\frac{270 \times 100}{5} = 5400/-$$

5q) 1500 was invested for 5yrs in Scheme A which offers SI @ 14%, the Amount recieved after 5yrs & some additional money then is invested in Scheme B for 2yrs, which offers CI @ a rate of 20%. If the CI recieved in Scheme B after 2yrs is 1408/-, what was the additional money invested in Scheme B apart from the Amount received from Scheme A.

$$1500 \xrightarrow[(5\times14)]{+70\%} 1050 \qquad (2550+x) \longrightarrow 1408$$

B's investment — Profit CI.

20% CI for 2yrs →

$$20 + 20 + \frac{20 \times 20}{100} = 44\%$$

$$44\% \longrightarrow 1408$$

$$100\% \longrightarrow ?$$

$$\frac{1408 \times 100}{44} = 3200/-$$

55. Ramu has a certain sum of money, 3/5th of the total money he invested in Scheme A for 8yrs. & rest of the money he invested in Scheme B for 2yrs. Scheme A offers SI @ 18% per Annum & Scheme B offers CI @ 10% per Annum. If the total Interest recieved by Ramu is 1422/-. What was the total Amount invested in Scheme A & B together.

P = 100

60 — A 8yrs (SI, 18%)

40 — B 2yrs (CI, 10%)

$\frac{18 \times 8}{100} = 1.44$ 21%

$60 \times 1.44 = 86.4$ ~~40x10~~ 40×21

$100 \rightarrow 94.8$

$? \leftarrow 1422$

$\frac{100 \times 1422}{94.8} = 1500/-$

56) Rani invested 16,800/- in Scheme A for 4 yrs, SI2 Scheme A offers SI 8% P.A for 2 yrs & CI 10% P.A for the next 2 yrs. What will be the total interest earned by Rani after 4 yrs from Scheme A.

$$\left.\begin{matrix}1\\2\end{matrix}\right] 2\times 8 = 16\%\ SI \left.\begin{matrix}\\\\\end{matrix}\right] 37\%$$

$$\left.\begin{matrix}3\\4\end{matrix}\right] \begin{matrix}10\\10\end{matrix} = 21\%\ CI$$

$$100\% \rightarrow 16,800$$

$$37\% \rightarrow ?$$

$$168 \times 37 = \underline{6216/-}$$

57) Sunitha invested an Amount with Company 'Y' for 2 yrs @ SI @ 20% P.A. The entire Amount obtained from Company 'Y' after 2 yrs, She invested in Company 'Z' @ CI @ 10% P.A. for 2 yrs. If the Amount finally received by her was 93,170/- What was the Principal invested by her originally with Company 'Y'.

Assume P to be.

$$100 \xrightarrow{+20\times 2\text{yrs}} 140 \xrightarrow[+10\%]{} 154\% \xrightarrow[15.4]{+10\%} 169.4$$

$$100 \longrightarrow 169.4$$

$$? \leftarrow 93170$$

$$\frac{100 \times 93170}{169.4} \times \frac{10}{10} = \frac{93170000}{1694} = 55,000/-$$

57. Vanitha invested Certain Amount @ 8% P.A for 5yrs and obtained SI of 3,800/-, had she invested the same Amount at the same rate of interest for 2yrs, How much Amount would she have obtained as a CI @ the end of 2 yrs.

$$x \xrightarrow[40\%]{5y-8\%} 3,800 \text{ — SI}$$

CI 8% PA for 2yrs 16.64%

40% → 3800

16.64 → ?

$$\frac{190 \quad 832}{\cancel{3800} \times \cancel{16.64}}{\cancel{40}} = 1780.8$$

Ramu invested a Certain Amount in 2 different Schemes A & B in the ratios of 5:7 respectively. Scheme A offers CI @ 12% P.A. & Scheme B offers SI @ 18% P.A. If Amount invested in Scheme B is more than the Amount invested in Scheme A, by 4,800/-. find the total Amount for both the schemes together in 2yrs.

A : B

5 : 7

CI: 500 → 25.44 | 700 → 36X7 SI

127.20 + 252 = 379.20

200 — 379.20

4500 — ?

$$\frac{4500 \times 379.20}{\cancel{200}}$$

= 8532

* A man purchase a motor bike for certain and promise to pay the price in 3 Equal Annual installment of 10,800₹ at the rate 20% per annum find the motor bike?

Sol:- $\frac{20}{100} = 1/5$

5+1=6

$(6)^3 = 216$

125 216

5 × 36 6 × 36

25 × 6 36 × 6

125 216.

80

150

125

5 × 36 = 180

180

25 × 6 = 150

150

A memory

180
150
125
455

216 → 10,800

455 → ?

$\frac{455 \times 10,800}{216} = 22750$.

* A man borrowed a sum of 25,200₹ from a bank, and Promise to pay the amount in 3 annual Equal installments at the rate of 5% per (Amount) annum find the Value of Each installment?

Sol:- $5\% \times \frac{1}{100} = 1/20$

20+1 = 21

$(21)^2 = 441$

20 × 441 = 8820

$(23)^2 = 9261$

440 × 21 = 8400

8000

25220

25220 ⟶ 25220

9261 ⟶ ?

$$\frac{9261 \times 25220}{25220} = 9261.$$

* A person takes Sum of money at 4% per annum as a compound interest for 1 Year 6 months the difference between Compound interest annually & Compound interest properly is 20 ₹/- then find the principle?

Sol:- 2, 2, 2 R=4%

$$2+2+\frac{2\times2}{100}$$

$$4+\frac{4}{100} = 4+0.04$$
$$= 4.04$$

4, 2

$$x+y+\frac{xy}{100}$$

$$4.04, 2$$

$$4.04+2+\frac{4.04\times2}{100}$$

$$4+2+\frac{4\times2}{100}$$
$$= 6.08$$

$$6.04+\frac{8.08}{100} = 6.04$$
$$0.0808$$
$$6.1208$$

$$= 6.1208$$
$$6.08$$
$$0.0408$$

$$0.0408 \longrightarrow 20$$

$$100 \longrightarrow ?$$

$$\frac{50}{100} \times \frac{1}{20} \times 4 \times 10000 = 50,000$$

* A person take 4000₹ and 6% per annum as a compound interest for 1 year 6 months find the difference between interest is calculated half yearly and yearly?

Sol:- R = 6%.

$6+3+\frac{18}{100}$

$9+0.18$

$= 9.18$

3 3 3

6.09 3

$6.09+3+\frac{6.09\times3}{100}$

$9.09+\frac{18.27}{100}$

$9.09+0.1827 = 9.2727$

difference $= 9.2727 - 9.18 = 0.0927$

100 → 4000

0.0927 → ?

$\frac{0.0927}{100} \times 4000 = 3.708$

* A sum interset at Compound interest for 2 years at 20% per annum would which the 482₹ more if the interset was payable halfyeasly then if it was payable annualy sum is?

Sol:- 20 20

$20+20+\frac{20\times20}{100}$

$= 40+4 = 44$

10 10 10 10

21 21

$= 21+21+\frac{21\times21}{100}$

$= 42+4.41$

$= 46.41$

difference = 46.41 − 44 = 2.41

2.41 = 482

100 → ?

$\frac{100}{2.41} \times 482 = 20,000$

$100 \times 2 \times 100 = 20,000$.

* A man get an simple interest of 1000 ₹/- on certain principle at the rate of 5% per annum in 4 years what Compound interest will the man gets on twice the principle in 2 years at same rate?

Sol:- 500 → 1000 20% → 1000

100% → ?

$\frac{100}{20} \times 1000 = 5000$

5,5

Compound interest = 10.25

$10000 \times \frac{10.25}{100}$

= 1025

* Sai Ram invested Equal Some of money in two schemes under Scheme "x" the Compound interest at 10% per annum and Scheme "y" the Compound interest at the rate of 12% per annum the interest after 2 years on the sum of invested of the scheme x was 63 ₹. how much interested Earned of y?

Sol:- $10 + 10 + \frac{10 \times 10}{100}$ $\quad 12+12+\frac{12\times12}{100}$

$21 - 63$ $\quad 24+1.44$

25.44 $\quad 25.44$

$25.44 \rightarrow ?$

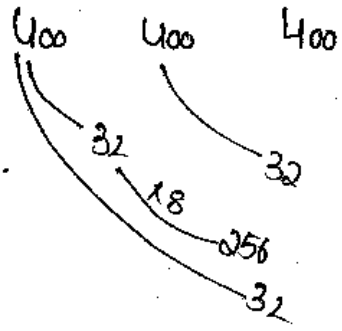
$\frac{25.44 \times 63}{21} = 76.32$

* The Compound Interest on Sum of money for 2 years is 832 And simple Interest and the Sum and for Same period is 800 the difference between the Compound And simple Interest is for 3 years Same?

Sol:- $SI = \frac{800 \times 4}{2 \times 1}$

$\frac{32^{8}}{400} \times 100$

$= 8\%$



$32 \times \frac{8}{100} = 2.56$

96

2.56

98.56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Ratio & Proportions

19/7/18

Ratios:

Ratios are used to compare two objects, and it is denoted by $A:B$ (or) $\frac{A}{B}$.

→ 'A' is called Anticedent. (or) 1st term.

→ 'B' is called Consequent. (or) 2nd term.

→ 'A' & 'B' should be of same Units.

Inverse Ratio:

$$A:B \Rightarrow \frac{1}{A}:\frac{1}{B} \Rightarrow B:A.$$

$$a:b:c = \frac{1}{a}:\frac{1}{b}:\frac{1}{c}$$

Compound Ratio:

$$a:b,\ c:d,\ e:f.$$

$$\frac{a}{b}\times\frac{c}{d}\times\frac{e}{f}$$

Duplicate Ratio:

$$a:b = a^2:b^2.$$

Sub-duplicate Ratio:

$$a:b = \sqrt{a}:\sqrt{b}$$

Triplicate Ratio:

$$a:b = a^3:b^3.$$

Sub-triplicate Ratio:

$$a:b = \sqrt[3]{a}:\sqrt[3]{b}.$$

Proportion:

→ The equality of 2 ratios is Proportion.

→ When 2 ratios are equal, they are in Proportion.

$a:b = c:d \Rightarrow \frac{a}{b} = \frac{c}{d}$

$ad = bc$.

→ Product of extremes = Product of means.

4th Proportion → $\frac{bc}{a}$

3rd Proportion → $\frac{b^2}{a}$

2nd / mean Proportion → $\sqrt{ab}$

→ If 'x' is Proportional to 'y', then $x \propto y$, $x = ky$.

→ If 'x' is inversely Proportional to 'y', then $x \propto \frac{1}{y}$, $x = \frac{k}{y}$.

1. Find the inverse ratio of 5:3.

$\frac{1}{5} : \frac{1}{3} = 3:5$

2. find the inverse ratio of $\frac{2}{3} : \frac{3}{5}$.

$\frac{3}{2} : \frac{5}{3}$

$9:10$.

3. find the inverse ratio of $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$

$\frac{12}{2} : \frac{12}{3} : \frac{12}{4}$

$\Rightarrow 6:4:3$.

$2 \mid 2, 3, 4$

$1, 3, 2$

12.

5.8. find the Compound ratio of 3:2, 8:9, 5:6.

$$\frac{3}{\cancel{7}} \times \frac{\overset{4}{\cancel{8}}}{9} \times \frac{5}{\cancel{6}} = \frac{10}{9} = 10:9$$

5.8. find the Compound ratio of $\frac{1}{2}:\frac{1}{3}, \frac{3}{4}:\frac{2}{5}, 1:5$.

$3:2, 15:8, 1:5$.

$$\frac{3}{2} \times \frac{\overset{3}{\cancel{15}}}{8} \times \frac{1}{\cancel{5}} = \frac{9}{16} = 9:16.$$

6.8. The Compound ratio of 2:3, x:4 is 1:2. find the Value of 'x'.

$$\frac{2}{3} \times \frac{x}{4} = \frac{1}{2}.$$

$$\frac{2x}{12} = \frac{1}{2}.$$

$$4x = 12$$

$$x = 3.$$

7.8. Which one is in Proportion?

a) 10, 15, 20, 30.

b) 8, 6, 4, 7.

c) 2, 5, 8, 3.

d) 1, 6, 3, 8.

$ad = bc$.

$30 \times 10 = 20 \times 15$

$300 = 300$

8.8. $x:4 :: 5:2$, find 'x'.

[$::$ means $=$]

$$\frac{x}{4} = \frac{5}{2}$$

$$2x = 20$$

$$x = 10.$$

9. $\frac{1}{5} : \frac{1}{x} :: \frac{1}{x} : \frac{1}{1.25}$

$x : 5 = 1.25 : x$

$\frac{x}{5} = \frac{1.25}{x}$

$x^2 = 6.25$

$x = 2.5$

10. 10, 13, 2, 3, What should be added, to make it a Proportion (ad = bc)

a) 1 b) 2 c) 3 d) 9.

11. 21, 18, 15, 13. What should be subtracted to make it a Proportion. (ad = bc)

a) 2 b) 3 c) 1 d) 9

12. find the 4th Proportion of 25, 30, 40.

$\frac{bc}{a} = \frac{30 \times 40}{25} = \frac{1200}{25} = 48$

13. find the 3rd Proportion of 25, 30.

$\frac{b^2}{a} = \frac{30 \times 30}{25} = \frac{900}{25} = 36$

14. find the 3rd Proportion of $x^2 - y^2$, $x + y$.

$\frac{(x+y)^2}{x^2-y^2} = \frac{(x+y)(x+y)}{(x+y)(x-y)} = \frac{x+y}{x-y}$

15. find the mean / 2nd proportion of 9, 16.

$\sqrt{ab} = \sqrt{9 \times 16} = \sqrt{144} = 12$

16. Mean Proportion of 0.8, 1.8.

$\sqrt{ab} = \sqrt{1.44} = 1.2$

17. $2A = 3B$, find $A:B$.

$$\frac{A}{B} = \frac{3}{2} = 3:2$$

18. $\frac{3}{4}A = \frac{5}{7}B$, find $A:B$.

$$21A = 20B.$$

$$\frac{A}{B} = \frac{20}{21} \Rightarrow 20:21.$$

19. $A:B = 3:4$, $B:C = 5:2$, $A:B:C = ?$.

$A:B = 3:4$ (4 → 2)

$B:C = 5:2$ (5 → 1)

$A:B:C = 15:20:8$.

20. $x:y = 3:1$, $y:z = 5:6$, $x:y:z = ?$.

$x:y = 3:1$ (1 → 5)

$y:z = 5:6$ (5 → 1, 6 → 3)

$x:y:z = 15:5:6$

21. $P:Q = 4:3$, $R:Q = 1:2$, $P:Q:R = ?$.

$P:Q = 4:3$

$Q:R = 2:1$ (3 → 6)

$P:Q:R = 8:6:3$.

22. $A:B = \frac{1}{2}:\frac{1}{3}$, $B:C = \frac{3}{5}:\frac{2}{3}$, $A:B:C = ?$.

$A:B = 3:2$

$B:C = 9:10$ (3 → 9)

$27:18:20 \rightarrow A:B:C$

28. $A:B = 1:3$, $B:C = 3:2$, $C:D = 4:5$, $D:E = 1:2$, $A:B:C:D:E = ?$

$A:B = 1:3$ | 4 | 5
$B:C = 3:2$
$C:D = 4:5$
$D:E = 1:2$

~~12 : 36 : 24 : 30 : 60~~

$2:6:4:5:10$

30. $A:B = 3:4$, $B:C = 1:2$, $C:D = 2:1$, $D:E = 1:4$, $A:E = ?$

29. $\frac{3}{4} \times \frac{1}{2} \times \frac{2}{1} \times \frac{1}{4} = \frac{3}{16} = \frac{A}{E} = 3:16 = A:E$

30. $x:y = 3:2$, find $(x^2+y^2):(x^2-y^2)$

$(9+4):(9-4)$

$13:5$

31. $a:b = 5:3$, find $(3a+b):(2a-b) \rightarrow ?$

$(3\times5+3):(2\times5-3)$

$(15+3):(10-3)$

$18:7$

32. $A:B:C = 2:3:4$, find $\frac{A}{B} : \frac{B}{C} : \frac{C}{A} = ?$

$\frac{2}{3} : \frac{3}{4} : \frac{4}{2}$ (2)

3, 4 | 12

$\frac{2}{3} : \frac{3}{4} : 2$

$3 \quad \frac{24}{3} : \frac{36}{4} : 24$ (9)

$8:9:24$

33. $\frac{1}{x} : \frac{1}{y} = \frac{1}{z} = 3:4:5$, then find $x:y:z$.

$\frac{1}{3} : \frac{1}{4} : \frac{1}{5}$ $\quad$ 3, 4, 5 → 60.

$\frac{60}{3} : \frac{60}{4} : \frac{60}{5}$

$20 : 15 : 12$

34. $(4x^2 - 3y^2) : (2x^2 + 5y^2) = 12:19$, $x:y = ?$

$$\frac{4x^2 - 3y^2}{2x^2 + 5y^2} = \frac{12}{19}$$

$$76x^2 - 57y^2 = 24x^2 + 60y^2$$

$$52x^2 = 117y^2$$

$$\frac{x^2}{y^2} = \frac{117}{52} = \frac{9}{4}$$

$$\frac{x}{y} = \sqrt{\frac{9}{4}} = \frac{3}{2}$$

$x:y = 3:2$

35. $\frac{1}{a} : \frac{1}{b} : \frac{1}{c} = \frac{2}{3} : \frac{3}{4} : \frac{1}{5}$

$a:b:c = \frac{3}{2} : \frac{4}{3} : 5$ $\quad$ 2, 3 → 6

$9 \quad \frac{18}{2} : \frac{24}{3} : 30$ $\quad$ 8

$9:8:30$

36. $4x^2 - 12xy + 9y^2 = 0$. find $x:y = ?$.

This is in the form $(2x-3y)^2$

$[(a-b)^2 = a^2+b^2-2ab]$

$= (2x)^2 + (3y)^2 - 2(2x)(3y)$

$= 4x^2 + 9y^2 - 12xy$.

$2x = 3y$

$\frac{x}{y} = \frac{3}{2}$.

37. 560/- is shared to A & B in the ratio 3:4, find the share of A.

$\frac{3}{7} \times \overset{80}{\cancel{560}} = 240/-$

38. Some Amount is shared among A:B:C, $\frac{1}{3} : \frac{1}{4} : \frac{1}{5}$, A's share is 400/-. find the difference b/w B & C.

3, 4, 5 | 60

$\frac{60}{3} : \frac{60}{4} : \frac{60}{5}$

20 : 15 : 12.

$\overset{20}{\cancel{20}} \rightarrow \overset{20}{\cancel{400}}$

$3 \rightarrow ?$

$\Rightarrow 60/-$

39. A sum of money is shared among A, B & C in the ratio 3:2:7 $\frac{2}{3} : \frac{3}{4} : \frac{1}{5}$. C's share is 360/-. find the total share?

3, 4, 5 | 60

$\frac{120}{3} : \frac{180}{4} : \frac{60}{5}$

40 : 45 : 12

30

12 → 360

94 → ?

2910/-

40. An Amount is shared to A : B = 3 : 2, B : C = 5 : 6. Share of A is 900/-. find total share?

A : B : C = 15 : 10 : 12

60

15 → 900

34 → ?

2220/-

41. B's share is $2\frac{1}{2}$ times of A, C's share is $\frac{3}{4}$ th of B, find the share of B, in the total Profit of 860/-.

A : B : C,

A : B

1 : $2\frac{1}{2}$

1 : $\frac{5}{2}$

2 : 5 → A : B

$C = \frac{3}{4} B$

4C = 3B

$\frac{C}{B} = \frac{3}{4}$

B : C = 4 : 3

A : B = 2 : 5

B : C = 4 : 3

8 : 20 : 15

=

20

43 → 860

20 → ?

⇒ 400/-

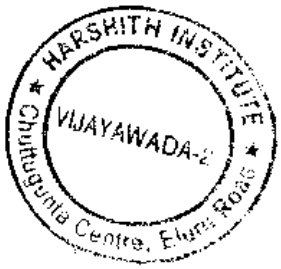
42. B's share is 10/- more than A, & 10/- less than that of C. A's share is 900/-. find C's share.

43. 600/- is shared b/w A, B & C. After increasing A = 150/-, B = 100/-, C = 50/-. Ratios, 5:3:1. find A's share.

600
A - 150
B - 100
C - 50
900

5:3:1.

$\frac{5}{9} \times \overset{100}{\cancel{900}} = 500 - 150 = 350.$



44. 900/- is shared b/w A, B & C. After decreasing A = 30/-, B = 20/-, C = 10/-, Ratios 3:4:5. find the share of C.

900
A - 30
B - 20
C - 10
840

3:4:5

$\frac{5}{12} \times \overset{70}{\cancel{840}} = 350 + 10 = 360/-.$

46. A's share is $\frac{2}{3}$rd of B & C. B's share is $\frac{1}{5}$th of C & A. then, find the share of C in 1200/-.

I method.

$A = \frac{2}{3}(B+C)$ $\quad$ $B = \frac{1}{5}(C+A)$

$\frac{A}{B+C} = \frac{2}{3}$]5. $\quad$ $\frac{B}{C+A} = \frac{1}{5}$]6.

$A = \frac{2}{5} \times \overset{240}{\cancel{1200}} = 480$, $\quad$ $B = \frac{1}{\cancel{6}} \times \overset{200}{\cancel{1200}} = 200$.

$C = 480 + 200 = 680$, $1200 - 680 = \underline{520}$/-

II method

$\frac{A}{B+C} = \frac{2}{3}$]5 $\quad$ $\frac{B}{C+A} = \frac{1}{5}$]6.

$\times \frac{6}{6}$ $\quad$ $\times \frac{5}{5}$.

$\frac{A}{B+C}$. $\frac{12}{18}$]30 $\quad$ $\frac{B}{C+A} = \frac{5}{25}$]30.

A + B

12 + 5 = 17.

30 − 17 = 13.

$\overset{40}{\cancel{30}} \longrightarrow \overset{}{\cancel{1200}}$

13 → ?

C = 520/-

46. 2600/- is shared to 3 male & 4 female & 5 Boys, 1 Male, 1 female, & 1 Boy ratios 1:2:3, then find the share of 1 Boy.

3m 4f 5B
× × ×
1 : 2 : 3.

3 : 8 : 15.

$1 \text{ Boy} = \frac{15}{26} \times 2600 = \frac{1500}{5}/- = 300/-$

47. The ratios b/w Ist class, II class & III class seats in a train are 2:3:5 & the ratios of prices is 3:2:1. 1 day collection 1,80,000/- from Ist class. Then, find the total price collection from the train?

2 : 3 : 5
× × ×
3 : 2 : 1

6 : 6 : 5

(3+2+1) 6 ⟶ 1,80,000 (30000)

17 ⟶ ?

510,000/-

48. 1300/- is shared to A, B, C & D, $\frac{A \text{ share}}{B \text{ share}} = \frac{B \text{ share}}{C \text{ share}} = \frac{C \text{ share}}{D \text{ share}} = \frac{2}{3}$ find the share of A.

A : B = 2 : 3.
B : C = 2 : 3.
C : D = 2 : 3.

8 : 12 : 18 : 27.
A B C D.

$A \rightarrow \frac{8}{65} \times 1300 = 160/-$

49. The ratios b/w 2 no.'s is 3:5, the sum of the 2 no.'s is 120, then find the Largest number.

$$3x + 5x = 120.$$

$$8x = 120$$

$$x = 15.$$

$$3x : 5x.$$

$$3(15) : 5(15)$$

$$45 : 75 \checkmark$$

50. The ratio b/w 3 no.'s is 2:3:5. Least no. is 18, find the Largest no.

$$2 \rightarrow 18.$$

$$5 \rightarrow ?$$

$$45.$$

51. The ratio b/w 2 no.'s is 5:3. Their Product is 375, find the Smallest number.

$$15x^2 = 375.$$

$$x^2 = 25.$$

$$x = 5.$$

$$25 : 15.$$

52. The ratios b/w 3 no.'s is 3:4:5, their Product is 1620/-. Find the Largest no.?

$$3x \times 4x \times 5x = 1620.$$

$$60x^3 = 1620$$

$$x^3 = \frac{162}{6} = 27.$$

$$x = 3.$$

$$9 : 12 : 15.$$

54. Ratios b/w 2 no.'s is 5:3. & the difference b/w the squares of the two no.'s is 144. Find the smallest no.

$5x : 3x$.

$25x^2 - 9x^2 = 144$.

$16x^2 = 144$.

$x^2 = 9$

$x = 3$.

$15 : 9$.

55. The ratio b/w 2 no.'s is 3:4 & the sum of their squares is 625. Then find the smallest no.?.

$(3x)^2 + (4x)^2 = 625$

$9x^2 + 16x^2 = 625$.

$25x^2 = 625$

$x^2 = 25$

$x = 5$.

$15 : 20$

56. The ratios b/w 3 no.'s is 1:2:3. & the sum of cubes of the no.'s is 288. Find sum of the 3 no.'s.

$1x^3 + 8x^3 + 27x^3 = 288$.

$36x^3 = 288$

$x^3 = 8$

$x = 2$.

$2 : 4 : 6$

$2 + 4 + 6 = 12$

57. The ratios b/w boys & girls in a class is 3:5, boys decreased by 10% & girls increased by 15%. find the new ratio?.

$$\frac{30}{\cancel{90\%} \times \cancel{5}} : \frac{23}{\cancel{115} \times \cancel{5}}$$

$$30 : 23$$

58. In a College, the seats ratio of Botany, Chemistry & Maths is 3:4:5, if the seats are increased by 5%, 10% & 15%. find the new ratio?.

$$\frac{105 \times 3}{100} : \frac{110 \times 4}{100} : \frac{115 \times 5}{100}$$

$$315 : 440 : 575$$

$$63 : 88 : 115 \quad (\text{or}) \quad 6.3 : 8.8 : 11.5 \quad (\text{or}) \quad 0.63 : 0.88 : 1.15$$

58. In a class, the total no. of students is 120. find the ratio of Boys & girls.

a) 3:4 b) 5:3 c) 5:4 d) 1:13

60. A Box Contains dozen mirrors. When it falls down, find the
59. ratios of broken & Unbroken mirrors.

a) 1:4 b) 2:3 c) 4:7 d) 1:3.

If asked for not a ratio, then,

a) 2:1 b) 3:1 c) 1:2 d) 4:1

60. A farmer has some hen & cow. No. of heads is 100 & No. of legs is 280. Find the No. of hen?.

I method

$$x + y = 100 \quad \times 4$$
$$2x + 4y = 280$$

$$4x + 4y = 400$$
$$2x + 4y = 280$$
$$(-)\quad (-)\quad (-)$$
$$2x = 120$$
$$x = 60.$$

$60 + 40 = 100$. → 60 hen.
H C

II method

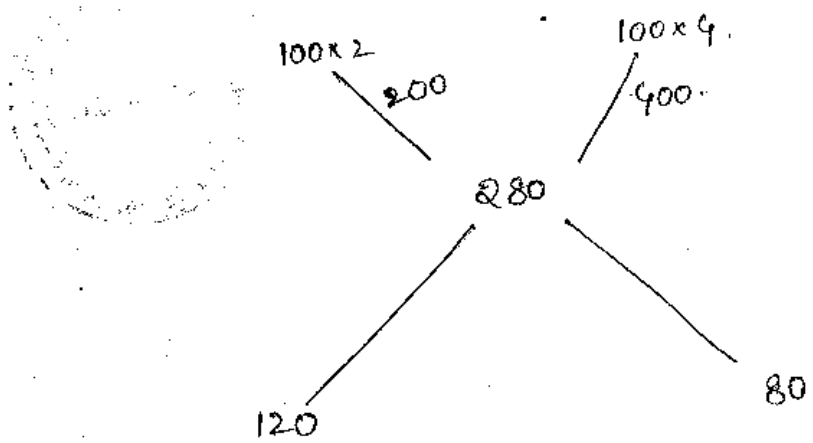
Assume, all the heads are hen, then,

$100 \times 2 = 200$.
hen legs

$280 - 200 = \frac{80}{2} = 40$ cow, $100 - 40 = 60$ hen.
$(4-2)$

III method

Assume all the 100 are hen & cow.



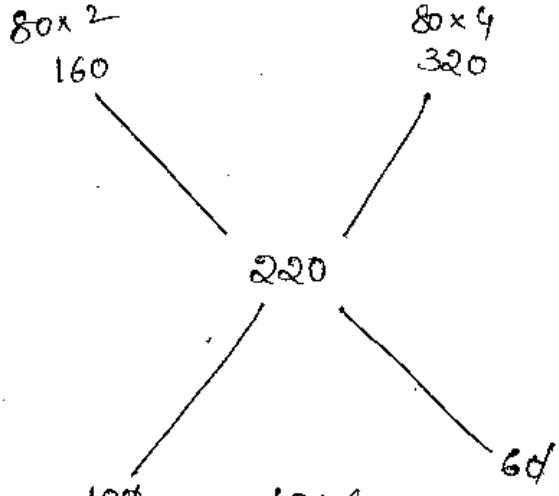
12 : 8

3 : 2.

$\frac{3}{5} \times \frac{20}{100} = 60$ — hen

$\frac{2}{5} \times \frac{20}{100} = 40$ — cow.

6$. A farmer has some hen & rabbits. No. of heads is 80 & no. of legs is 220. find the no. of rabbits?

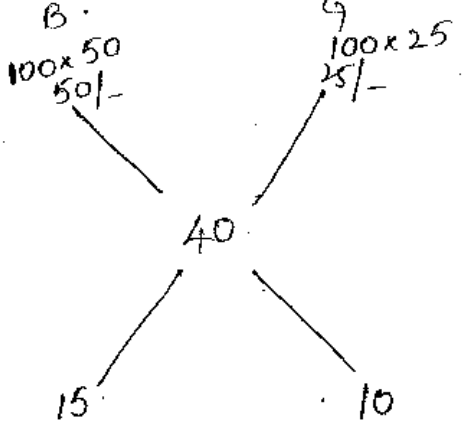


10 : 6

5 : 3.

$\frac{3}{8} \times 80^{10} = 30$ Rabbits

6% 40/- is distributed among 100 children, each boy takes 50 paise, & each girl takes 25p. find the no. of boys?

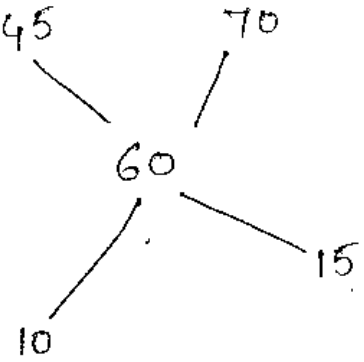


15 : 10

3 : 2.

$\frac{3}{5} \times 100^{20} = 60$ Boys $\quad \frac{2}{5} \times 100^{20} = 40$ girls.

~~64~~ 63. A mixture contains 45% of Alcohol & another contains 70% of Alcohol. In which ratio they have to be mixed to get 60% of Alcohol?



10 : 15

2 : 3.

~~65~~ 64 A bag contains 100/- . In that 1/-, 50p & 25p coins are in the ratio 5:6:8. Find the no. of 50p coins?.

	1/-	50p	25p.
	5	: 6	: 8.
Coins	500	: 300	: 200.
Value	5	: 3	: 2.

$\frac{3}{10} \times \frac{10}{100} = 30/- \rightarrow$ 60 Coins.

~~66~~ 65. A Bag contains 300/- . In that 10/-, 5/- & 2/- notes are in the ratio 3:4:5. Find the no. of 5/- notes.

	10/-	5/-	2/- .
Notes	3	: 4	: 5.
Value	30	: 20	: 10.
	3	: 2	: 1

$\frac{2}{6} \times \frac{50}{300} = \frac{100}{5} = 20$ notes.

~~68.~~ 67. 66. A Bag contains 260 coins, in that 1/-, 50p, 25p coins are in the ratio 6:4:3. Find 50p coins?.

1/- 50p 25p.

Value $6 : 4 : 3 \times 4$
$\alpha_1 \quad \alpha_2$

Coins $6 : 8 : 12$.

$3 : 4 : 6$

$\frac{4}{13} \times 260^{20} = 80$ coins.

If asked for money, then $\frac{80}{2} = 40/-$

*~~68~~ 67. Ratios b/w income of A & B is 8:9 & the ratios b/w expenditure is 6:7. Each one saves 10,000/-. Find the income of A.

A : B.

Income $\longrightarrow$ 8 : 9

Expenditure $\rightarrow$ 6 : 7.

I method

$$\frac{8x - 10,000}{9x - 10,000} = \frac{6}{7}.$$

$56x - 70,000 = 54x - 60,000.$

$2x = 10,000$

$x = 5000.$

$8x = 8 \times 5000 = 40,000/-$

II method

$a : b$
$c : d.$

$$\left| \frac{x(c-d)}{ad - bc} \right|$$

Here, $x = 10,000$.

$$\begin{array}{r} 8:9 \\ 6:7 \\ \hline 56:54 \\ \vee \\ 2 \end{array} \Rightarrow \frac{10,000 \times 1}{2} = 5000.$$

$8 \times 5000 = 40,000/-$

68. The ratio b/w incomes of A & B is 3:2. Their expenditures are in the ratio 5:3. Each one saves 5000/-. find the expenditure of B.

$$\begin{array}{r} 3:2 \\ 5:3 \\ \hline 9:10 \\ \vee \\ 1 \end{array}$$

$$\frac{5000 \times 2}{1} = 10000 \times 2 = 20,000 \rightarrow \text{Income of B.}$$

$20,000 - 5000 = 15,000 \rightarrow$ Expenditure of B.

XO. 69. The ratios b/w income of A & B is 4:7. A's income increased by 50%. & B's income decreased by 25%, the ratio changes to 8:7. find the income of A.

Can't be determined. No money is given

W. 70. The ratio b/w 2 no.'s is 2:3, Each no. increased by 15. The ratio changes into 7:9. find the smallest no.

$$\begin{array}{r} 2:3 \\ 7:9 \\ \hline 18:21 \\ \vee \\ 3 \end{array}$$

$$\frac{15 \times 2}{3} = 10 \qquad 10 \times 2 = 20.$$

~~XX~~. The ratio b/w male & female is 8:9. male increased by 10
71 & female decreased by 15. The ratio changes into 5:4.339
find the total no. of male & female.

$$\frac{8x+10}{9x-15} = \frac{5}{4}$$

$$32x + 40 = 45x - 75.$$

$$40 + 75 = 45x - 32x.$$

$$115 = 13x.$$

$$x = \frac{115}{13}.$$

~~XX~~. Which no. is to be subtracted from 17:20 to change it
72 into 5:6.

a) 1 ~~b)~~ 2 c) 3 d) 4

I method → through options.

II method $\frac{17-x}{20-x} = \frac{5}{6}$.

$$102 - 6x = 100 - 5x.$$

$$2 = x.$$

~~XX~~. Which no. is added to 11:13, to change it into 6:7.

73. ~~a)~~ 1 b) 2 c) 3 d) 4.

$$\frac{11+x}{13+x} = \frac{6}{7}.$$

$$77 + 7x = 78 + 6x.$$

$$1 = x.$$

74. x is in Proportion to y. When $x=2$, $y=3$, then find the Value of x when $y=5$?.

$x \propto y$

$x = ky$.

$\frac{2}{3} = k$.

$x = \frac{2}{3} \times 5$.

$= \frac{10}{3} = 3.33$.

75. x is inversely Proportional to y^2+1. When $y=8$, $x=6$ find the Value of x when $y=7$.

$x \propto \frac{1}{y^2+1}$

$x = \frac{K}{y^2+1}$

$6 = \frac{K}{8^2+1}$

$390 = K$.

$x = \frac{K}{y^2+1}$

$x = \frac{390}{7^2+1}$

$x = \frac{390}{50} = 7.9$.

* 76. In a Hostel, 100 members have food for 30 days, after 10 days, 80 members left. How many days the remaining food will last for the remaining?.

days 30

100×30

days 20.

80×20 → given.

$m_1 D_1 = m_2 D_2$.

$100 \times 20 = 80 \times D_2$.

Same food is served for 80 in how many days,

$25 = D_2$.

77 78. 60 Soldiers have food for 8 days. After 5 days, 15 members joined. How many days, the food will last for that people?

$$60 \times 8 = 75 \times D_2$$

$$4 = D_2$$

79 80. Some members have food for 20 days. After 8 days, 15 members left, the remaining food lasts for 15 days. Then find the no. of members?

$$M_1 \times 12 = (M_1 - 15) \times 15$$

$$12M_1 = 15M_1 - 225$$

$$225 = 3M_1$$

$$75 = M_1$$

79 80. Some members have food for x days. After 20 days, $\frac{1}{4}$th of the members left. The remaining food lasts for the remaining for x days. find x.

$$\frac{3}{4} \times (x - 20) = \frac{3}{4} \times x$$

$$4x - 80 = 3x$$

$$x = 80$$

80 The electricity bill of certain establishment is partly fixed & partly varies, as the no. of units in certain month is 540 units the bill amount is 1800/-. In another month, 2040/- for 620 units find the bill for 500 units?

fixed cost, Unit cost, Bill cost } 3 unknowns

$$620 \text{ — } 2040$$
$$540 \text{ — } 1800$$
$$80 \text{ — } 240$$

= 3/- per unit.

fixed cost,

$540 \times 3 = 1620$

$1800 - 1620 = 180/-$

Already 540 units = 1800., asked for 500 units.

$40 \times 3 = 120$

$1800 - 120 = 1680/-$

81. B's share is 10/- more than that of A. C's share is 30/- less than that of B. They got 350/-. find the share of C.

$B = A + 10$, $C = B - 30$.

$A + B + C = 350/-$.

$A + (A+10) + (A+10-30) = 350$.

$3A - 10 = 350$.

$3A = 360$

$A = 120$.

$C = B - 30$.

$\downarrow$

$C = (A+10) - 30$

$= (120+10) - 30$.

$C = 130 - 30 = 100/-$

82. In a mixture of 40 litres of milk & water, the ratio is 3:1. How many litres of water should be added to change the ratio into 1:3.

m : w.

3x : 1x.

$\frac{3}{4} \times 40^{10} = 30$.

$\frac{1}{4} \times 40^{10} = 10$.

$\frac{30}{10+x} = \frac{1}{3}$

$90 = 10 + x$.

$80 = x$.

83) 'A' Vessel contains milk & Water in the ratio 3:2, & Vessel 'B' contains milk & Water in the ratio 7:3. When they are mixed, find the new ratio of milk & Water. 343

m : w
3 : 2

$\frac{3}{5} : \frac{2}{5}$

m : w.
7 : 3.

$\frac{7}{10} : \frac{3}{10}$.

m : w.

$\frac{3}{5} + \frac{7}{10} : \frac{2}{5} + \frac{3}{10}$.

$\frac{6+7}{10} : \frac{4+3}{10}$.

$\frac{13}{10} : \frac{7}{10}$.

13 : 7 → New ratio.

84) 3 ornaments of gold, & Copper are in the ratio 3:2, 7:3, & 8:7 When 3 of them are mixed; find the new ratio of gold & Copper?.

3:2 7:3 8:7.

$\frac{3}{5} : \frac{2}{5}$ $\frac{7}{10} : \frac{3}{10}$ $\frac{8}{15} : \frac{7}{15}$.

$\frac{3}{5} + \frac{7}{10} + \frac{8}{15} : \frac{2}{5} : \frac{3}{10} : \frac{7}{15}$.

$\frac{18+21+16}{30} : \frac{12+9+14}{30}$.

$\frac{11\ 55}{30} : \frac{35}{30}\ 7$.

11 : 7

85. 3 Containers have their volumes in the ratio 2:3:4, the ratios of milk & water, are in the ratio 3:1, 2:1, 3:2. When 3 are mixed, find the new ratios of milk & water?

344

$\frac{3}{4} : \frac{1}{4}$ $\quad \frac{2}{3} : \frac{1}{3}$ $\quad \frac{3}{5} : \frac{2}{5}$.

$\frac{3}{4} + \frac{2}{3} + \frac{3}{5}$ $\quad \frac{1}{4} + \frac{1}{3} + \frac{2}{5}$.

$\frac{3}{4_2} \times 2$ $\quad \frac{1}{4_2} \times 2$ $\quad \frac{2}{3} \times 3$ $\quad \frac{1}{3} \times 3$ $\quad \frac{3}{5} \times 4$: $\frac{2}{5} \times 4$.

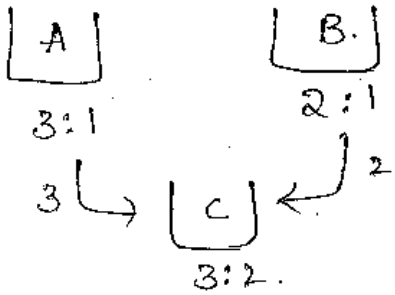
$\frac{3}{2} : \frac{1}{2}$ $\quad 2 : 1$ $\quad \frac{12}{5}$ $\quad \frac{8}{5}$.

$\frac{3}{2} + \frac{2}{1} + \frac{12}{5}$ $\quad \frac{1}{2} + \frac{1}{1} + \frac{8}{5}$.

$\frac{15 + 20 + 24}{10}$ $\quad \frac{5 + 10 + 16}{10}$.

59 : 31

86. A vessel Contains milk & water in the ratio 3:1 & vessel B Contains milk & water in the ratio 2:1. It has to be mixed into a new vessel in the ratio 3:2. find the ratios of milk & water?



A → $\frac{3}{4} \times \frac{3}{5} : \frac{1}{4} \times \frac{3}{5}$

B → $\frac{2}{3} \times \frac{2}{5} : \frac{1}{3} \times \frac{2}{5}$.

$\frac{9}{20} + \frac{4}{15}$ $\quad \frac{3}{20} + \frac{2}{15}$

$\frac{27+16}{60}$ $\frac{9+8}{60}$

$\frac{43}{60}$ $\frac{17}{60}$

$\Rightarrow 43:17$

87. $(a+b):(b+c):(c+a) = 7:8:19$, $a:b:c = ?$

$(a+b)+(b+c)+(c+a) = 24.$

$2(a+b+c) = 24.$

$a+b+c = 12.$

$7+c = 12$

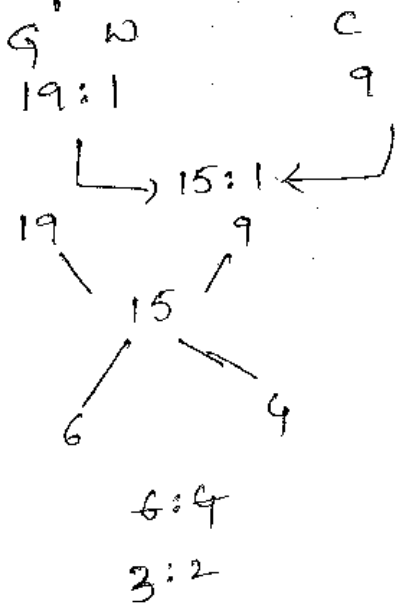
$c = 5.$

$a+8 = 12.$

$a = 4$

a	b	c
4	3	5

88. Gold is 90 times as heavy as water, copper is 9 times as heavy as water. In what ratio should these be mixed to get an alloy of 15 times as heavy as water.



$6:4$

$3:2$

89. The ratios b/w incomes of A, B & C is 3:7:4 & their expenditures are in the ratio 4:3:5. A's saving is $14\frac{2}{7}$ % of his salary. find the ratios of savings?.

A : B : C

Income (x) → 3 : 7 : 4.

Expenditure (y) → 4 : 3 : 5.

I − E = Savings.

$14\frac{2}{7}$ %.

$\frac{100}{7} \times \frac{1}{100} = \frac{1}{7}$.

Expenditure 6 $\left[\frac{1}{7}\right.$ Savings.
Salary.

$3x - 4y = 0$.

$3x = 4y$

$\frac{3x}{4y} = \frac{4}{6}$.

$18x = 28y$.

$\frac{x}{y} = \frac{28}{18}$ $\frac{14}{9}$

$x = 14, y = 9$.

$(3x - 4y) : (7x - 3y) : (4x - 5y)$

$3(14) - 4(9) : 7(14) - 3(9) : 4(14) - 5(9)$

$42 - 36 : 98 - 27 : 56 - 45$.

$6 : 71 : 11$

90. The ratios of expenditure of A, B & C is 16:12:15 and their total income is 1530/-. find the share of B's income, if they save 20%. 25% & 40% of their income.

A → 20% → [1 → Saving, 5 → Income. 4 → Expenditure.
4 → 16
5 → ? = 20.

B → 25% → [1 → Saving, 4 → Income. 3 → Expenditure.
3 → 12
4 → ? = 16.

C → 40% → [2 → Saving, 5 → Income. 3 → Expenditure.
3 → 9
5 → ? 15.

Income → 20 : 16 : 15

B's share → $\frac{16}{51} \times 1530 = 480/-$

91. A container contained 80 litres of milk, from this 8 litres of milk was taken out & is replaced with water. This process was further repeated twice. How much milk is now contained in the container?

If it is given that 10 litres of milk was taken out,

$\frac{8}{80} \times 100 = 10\%$

$80 \times \frac{90}{100} \times \frac{90}{100} \times \frac{90}{100} = \frac{729}{1000} \times 80 = 58.32$ lits of milk.

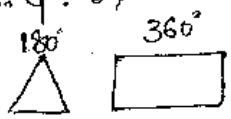
93) 2 Candles of same height are lighted at the same time. The 1st is consumed in 4hrs & 2nd is consumed in 3hrs. assuming that each candle burns at a constant rate, In How many Hours after being lighted, Was the 1st Candle 2 times (double) that the height of the 2nd Candle. 348

$$\frac{T_1 T_2 (a-b)}{T_1 a - T_2 b}$$

$a:b = 2:1$

$$\frac{4 \times 3 (2-1)}{4 \times 2 - 3(1)} = \frac{12}{8-3} = \frac{12}{5} = \underline{2.4 \text{ hrs}}.$$

94) The ratios b/w angles of a triangle is 3:4:5, then find the largest angle of the triangle?



$$3x + 4x + 5x = 180$$
$$12x = 180.$$
$$x = \frac{180}{12} = 15.$$
$$5 \times 15 = \underline{75^\circ}$$

* 95) 500/- is divided among A, B & C in such a way, that, 16/- more $\frac{2}{5}$ th of A's share, 70/- less, $\frac{3}{4}$ th of B's share & 4/- less than $\frac{3}{5}$ th of C's share are equal. Find the share of B.

6 | 2, 3, 3

$$\frac{2}{5}A + 16 = \frac{3}{4}B - 70 = \frac{3}{5}C - 4 = 6K.$$

$\frac{2}{5}A + 16 = 6K$ $\quad \frac{3}{4}B - 70 = 6K$ $\quad \frac{3}{5}C - 4 = 6K$

$A = (6K - 16)\frac{5}{2}$ $\quad B = (6K - 70)\frac{4}{3}$ $\quad C = (6K + 4)\frac{5}{3}$

$A = 15K - 90$ $\quad B = 8K - \frac{280}{3}$ $\quad C = 10K + \frac{20}{3}$

Given, $A + B + C = 500$,

$15K - 90 + 8K + \frac{280}{3} + 10K + \frac{20}{3} = 500$

$33K = 590 - 100 \quad \left\{\frac{300}{3} = 100\right\}$

$33K = 490$

$K = \frac{490}{33}\ \frac{40}{3}$ $\longrightarrow$

$B = 8\left(\frac{40}{3}\right) + \frac{280}{3}$

$= \frac{320 + 280}{3} = \frac{600}{3} = 200$

96. 600/- is divided among A, B & C so that 40/- more than $\frac{2}{5}$ th of A's share, 20/- more than $\frac{2}{7}$th of B's share & 10/- more than $\frac{9}{17}$th of C's share. May all be equal. find the share of A.

2, 2, 9 | 18

$\frac{2}{5}A + 40 = \frac{2}{7}B + 20 = \frac{9}{17}C + 10 = 18K$

$\frac{2}{5}A + 40 = 18K$ $\quad \frac{2}{7}B + 20 = 18K$ $\quad \frac{9}{17}C + 10 = 18K$

$A = (18K - 40)\frac{5}{2}$ $\quad B = (18K - 20)\frac{7}{2}$ $\quad C = (18K - 10)\frac{17}{9}$

$B = 63K - 70$ $\quad C = \frac{306K}{9} - \frac{170}{9}$

$A = 45K - 100$ $\quad C = 34K - \frac{170}{9}$

$A + B + C = 600$

$45K - 100 + 63K - 70 + \frac{306K}{9} - \frac{170}{9} = 34K$

$\frac{306K}{1} - \frac{170}{1} - \frac{170}{9}$

$306K + \frac{1800}{9} = 342K - \frac{1700}{9}$

$342K - \frac{1530 - 170}{9}$

$$45K - 100 + 63K - 70 + 34K - \frac{170}{9} = 600$$

$$142K - 170 - \frac{170}{9} = 600$$

97. The total income of A, B & C is 6060/-. A spends 80%, B spends 85% & C spends 75% the ratio of their Saving is 5:6:9. Find the income of A.

A : B : C

Saving 5 : 6 : 9

Income 25 : 40 : 36

$101 \longrightarrow 6060$

$25 \rightarrow ?$

$$\frac{25 \times 6060}{101} = 1500/-$$

$80\% \rightarrow \frac{4}{5} \rightarrow E$, $\frac{1}{5} \rightarrow I$

$1 \rightarrow 5$

$5 \rightarrow ?$

25

$85\% \rightarrow \frac{17}{20} \rightarrow E$, $\frac{3}{20} \rightarrow I$

$3 \rightarrow 6$

$20 \rightarrow ?$

40

$75\% \rightarrow \frac{3}{4} \rightarrow E$, $\frac{1}{4} \rightarrow I$

$1 \rightarrow 9$

$4 \rightarrow ?$

36

98. 2366/- is divided among 8 men, 10 women & 10 children. Each man gets 25/- more than each woman & each woman gets 25/- more than each child. Find the Amount received by each woman.

351

m : w : c

5 : 4 : 4

5 : 5 : 4

25 : 20 : 16.

×8 ×10 ×10

20ϕ 20ϕ 16ϕ

5 : 5 : 4.

14 ⟶ 2366.

5 ⟶ ?

$\frac{5 \times 2366}{14} = 845.$

Each woman,

$\frac{845}{10} = 84.5$

99. The ratios of last year income of A, B & C is 3:4:5, while the ratios of their last year income to current year income is 4:5, 2:3 & 3:4, If their total current year income is 98,500/-. Find the Present income of B & C.

Last year → 3:4:5

L C

A → 4 : 5

B → 2 : 3

C → 3 : 4

$\frac{4:5 \quad 2:3 \quad 3:4}{}$

$3_{\times 12} : 4_{\times 12} : 5_{\times 12}$

36 48 60.

×9 ×24 ×20

4:5 2:3 3:4.

×9 ×24 ×20

45 72 80

197 → 98,500. 500.

152 → ?

= 76000/-

2 | 4, 2, 3

2, 1, 3.

12

100. The Price of gold is directly Proportional to the Square of its weight. A person broke down the gold in the ratio of 3:2:1 & sold. In this Process, a loss of 4,620/-. Find the initial Price of gold?.

352.

3:2:1 $\qquad 3+2+1=6.$

$(6)^2 = 36.$

$(3)^2+(2)^2+(1)^2 = 14.$

$36-14 = 22.$

~~22~~ → ~~4620~~ (210)

36 → ?

= 7560/-

101. 1 year ago, the ratio of income of A & B is 3:5. The ratio of their last year income to Current year income is 2:3 & 4:5. If their total Current year income is 4300. Find their Present income individually?.

2 | 2, 4
1, 2
4.

A : B.

LI 3 : 5.

2:3 $\qquad$ 4:5.

$3_{\times 4} : 5_{\times 4}$

12 $\qquad$ 20.

26. 2:3 ×6 → 18 :

25 4:5 ×5 → 25

100.

43 → 4300

18 → ?

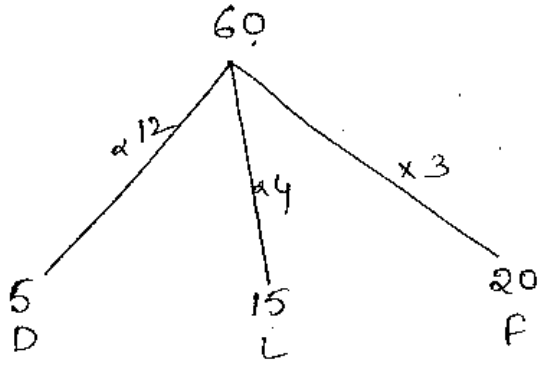
1800 : 2500

102. A dog takes 7 jumps for every 10 jumps of the lion & a fox takes 12 jumps for every 10 jumps of the lion. And the distance covered by dog in 5 jumps, & lion in 15 jumps & fox in 20 jumps is equal. find the ratio of their speeds.

353

$5 \overline{)5, 15, 20}$
$1, 3, 4.$

60.



D	L	F
7	10	12
×12	×4	×3
84	40	36

Ratio of the distance covered by two objects in same time is equal to the ratio of their speeds.

84 : 40 : 36.

103. Cost of a diamond varies directly to the square of its weight. A diamond broke into 4 pieces with their weights in the ratio 1:2:3:4. If the loss in the total value of diamond was 70,000. Find the price of the original diamond?

Initial weight = $1+2+3+4 = 10$.

Initial Price = $10^2 = 100$.

After Breaking into Pieces, $1^2+2^2+3^2+4^2 = 30$.

$100 - 30 = 70 \rightarrow 70,000$ (1000)

$100 \rightarrow ?$

10,000/-

103. A Pot Contains 81 litres of pure milk, $\frac{1}{3}$rd of the milk is replaced by the same Amount of Water, Again $\frac{1}{3}$rd of the mixture is replaced by that Amount of Water. find the ratio of milk & Water in the new mixture?

$$81 \times \frac{2}{3} \times \frac{2}{3} = 36.$$

$$81 - 36 = 45.$$

$$36 : 45$$

$$4 : 5$$

104. The ratio of no. of boys to that of no. of girls in a group becomes 2:1, when 15 girls leave. But afterwards when 45 boys also leave, the ratio becomes 1:5. Originally, the no. of girls to the number of boys in the group was?

$$\frac{2x - 45}{x} = \frac{1}{5}$$

$$10x - 225 = x.$$

$$9x = 225$$

$$x = 25.$$

$$x + 15 = 25 + 15 = 40.$$

Partnership 5/8/10

Investment x Time = Profit.

$I \times T = P$

$I_1 \times T_1 : I_2 \times T_2 : I_3 \times T_3 = P_1 : P_2 : P_3$.

A B C

$$\frac{A}{B} = \frac{I_1 \times T_1}{I_2 \times T_2} = \frac{P_1}{P_2}$$

$$I_1 : I_2 : I_3$$

$$\frac{P_1}{T_1} : \frac{P_2}{T_2} : \frac{P_3}{T_3}$$

1. A, B, & C invested 20,000/-, 50,000/- & 40,000/- respectively in a Business. Find the share of A in the Annual Profit of 12,100/-.

20 : 50 : 40.

2 : 5 : 4

11 100

11 ⟶ ~~12,100~~

2 → ?

2200/-

2. A & B started Business with 10,000/- & 15,000/- . B left that Business after 6 months, they got Profit of 35,000 Find the share of A.

356

$10 \times 12 : 15 \times 6 = 35,000$

$12\phi : 9\phi$

$4 : 3$

$7 \longrightarrow 35,000$ (5,000)

$4 \rightarrow ?$

$= 20,000/-$

3. A & B started a Business with 30,000/- & 20,000/-, after 10 months, A left the work, they got Profit of 66,000/- for $1\frac{1}{2}$ yr, then find the share of A ?

$30 \times 10 : 20 \times 18$ (10 → 5, 18 → 6)

$5 : 6$

$11 \longrightarrow 66,000$ (6000)

$5 \rightarrow ?$

$= 30,000/-$

4. A & B started a Business with 6,000/- & 8,000/-, after 6 month B left that Business. At the same time C joined with 16,000/-. They got Profit of 63,000/-. Find share of C ?

$6 \times 2 : 8 \times 6 : 16 \times 6$ (3 : 2 : 4)

$3 : 2 : 4$

$9 \longrightarrow 63,000$ (7000)

$4 \rightarrow ?$

$= 28,000/-$

5. A & B started a Business with 20,000/- & 30,000/-. After 6 months, B left that work, after 2 months C joined with 40,000/-. They got Profit 58,000/-. Find the share of A?

357

20 × 12 : 30 × 6 : 40 × 4

5 2

20 × 12 : 30 × 6 : 40 × 4

1ϕ : 3ϕ : 4ϕ.

1 : 3 : 4

8 → 58,000

7250

1 → ?

7250/-

6. 3 persons A, B & C shared profits in the ratio 4 : 5 : 6. If B received 500 more than A, find the share of C?

4 : 5 : 6

1

1 → 500

6 → ?

3,000/-

7. The ratio b/w A & B's investment is 3 : 5 & the ratios of time is 10 : 9. What is the ratio of its Profits?

3 × 10 : 5 × 9.

30 : 45

6 : 9

2 : 3.

8. A started a Business with 16,000/-, after 4 months, B joined with 15,000/-. They got Profit of 39,000/- per yr. Find B' share?

358

$$\overset{2}{16} \times \overset{4}{12} : \overset{5}{15} \times 8$$

$$8 : 5$$

$$13 \longrightarrow \overset{3000}{39,000}$$

$$5 \rightarrow ?$$

$$15,000/-$$

9. A's investment is double of B's investment, A's time is triple of B's time. They got Profit of 14,000/-. Then find share of A?

$$\frac{I}{T} = 2:1$$

$$T = 3:1$$

$$2 \times 3 : 1 \times 1$$

$$6 : 1$$

$$7 \longrightarrow \overset{2000}{14,000}$$

$$6 \rightarrow ?$$

$$12,000/-$$

10. In a Business, A invested double of B & B invested triple of C. They got Profit of 30,000 for 1yr. Find A's share?

$$A : B : C$$

$$6 : 3 : 1$$

$$10 \longrightarrow 30,000$$

$$6 \rightarrow ?$$

$$18,000/-$$

11. A & B started a Business. A invested 20,000/-. They got Profit in the ratio of 5:8. Then find investment of B?

$$20 : x = 5 : 8.$$

$$ad = bc.$$

$$160 = 5x$$

$$32 = x$$

$$32,000/-$$

12. A started a Business with 6000/-, after 4 months, B joined with some money, after 1yr, they got Profit in equal ratios. Find B's investment?

$$6000 \times 12 : B \times 8 = P_1 : P.$$

$$\frac{72000}{8} = 9000/-$$

13. A started a Business, after some time, B joined with 20,000/-. They got Profit after 1yr in the ratio 6:5. After how many months, B joined?

$$\overset{9}{18} \times 12 : \overset{10}{20} \times T_2 = 6 : 5.$$

$$108 : 10T_2 = 6 : 5$$

$$54\phi : 6\phi T_2$$

$$9 = T_2$$

After 3 months.

14. A started a Business with 14,000/- , after some time B joined with 15,000/- , after 1 yr A got $\frac{8}{5}$ IR of Share of B. After How many months, B joined that Business ? 360

$14 \times 12 : 15 \times T_2 = 8 : 5$

$56 : 5T_2 = 8 : 5$

$ad = bc$

$280 = 40 T_2$

$7 = T_2$.

7 months,

After 5 months.

15. A & B started a business with 10,000/- & 15,000/- . They are giving to charity 15% of the Profit. They got a Profit of 20,000/- . Find the share of A ?

$\frac{15}{100} \times 20,000 = 3000$.

$20,000 - 3000 = 17,000/$

10 : 15

2 : 3

5 → 17,000

2 → ?

$\frac{34000}{5} = 6800/-$

16. A & B started a Business with 15,000/- & 35,000/- . They are giving to charity 20% of the Profit. They got Profit of 30,000/- . Find A's share ?

$\frac{1}{5} \times 30,000$ (6000)

$30,000 - 6000 = 24,000/-$

15 : 35

3 : 7

10 → 24,000

3 → ?

7200/-

17. A & B started a business with 12,000/- & 8000/-. They are giving to charity 10% of the Profit. A got 8100/- as his share. Find the total Profit? 361

12 : 8

3 : 2

$3 \rightarrow 8100$ (2700)

$5 \rightarrow ?$

13,500

$9\phi \rightarrow 13500$

$10\phi \rightarrow ?$

$= 15,000/-$

18. A & B started Business with 30,000/- & 50,000/-. A is a working Partner, after 1yr, each one got 30,000 as a Share. Then find A's Salary?

$3\phi : 5\phi$

3 : 5

S + P = 30,000 P = 30,000.

$5 \rightarrow 30,000$ (6000) → Common Profit.

$3 \rightarrow ?$

18,000

30 − 18 = 12,000/- → A's Salary.

19. A & B started a Business with 10,000 & 40,000/-. B is a sleeping Partner. A takes 20% of the Profit as a Salary. They got Profit of 50,000/-. Find the Share of A?. 36

A : B

1 : 4

$\frac{1}{5} \times \overset{10,000}{\cancel{50,000}}$

50,000 − 10,000 = 40,000

$\frac{1}{5} \times \overset{8000}{\cancel{40,000}}$

10,000 + 8,000 = 18,000/-

20. A & B started a Business with 10,000 & 35,000/-. A is a working Partner, after 1yr, they got each 42,000/- as a Share. Find A's monthly Salary?.

10 : 35.

2 : 7.

S + P = 42000.

P = 42000.

7 → $\overset{6000}{\cancel{42000}}$

2 → ?

12,000

$42 - 12 = \frac{\cancel{30,000}}{\cancel{12}} = 2,500/-$

21. A, B & C started a Business with 30,000/-. A invested 4000/- more than that of B. B invested 4000/- more than that of C. Find the ratios of Profit?.

$$A + B + C = 30,000.$$

$$x + 8000 : x + 4000 : x$$

$$3x = 18000$$

$$x = 6000$$

$$14000 : 10,000 : 6000.$$

$$7 : 5 : 3.$$

22. A, B & C started a Business with 44,000/-. A invested 4000/- more than that of B & B invested 2000 more than that of C. They got Profit 66,000/-. Find the share of A?

$$A + B + C.$$

$$(x + 6000)(x + 2000) + x = 44,000.$$

$$3x + 8000 = 44,000.$$

$$3x = 36000.$$

$$x = 12000.$$

$$18000 : 14000 : 12000.$$

$$9 : 7 : 6.$$

$$22 \xrightarrow{3} 66,000.$$

$$9 \rightarrow ?.$$

$$27000/-$$

23. In a Business A invested $\frac{1}{3}$rd of the investment in $\frac{1}{3}$rd of time. B invested $\frac{1}{4}$th of the Capital in $\frac{1}{4}$th of the time. And C invested the remaining in full time, they got Profit of 34,000/-. Find Share of A?.

$$1 - \frac{1}{3} - \frac{1}{4}$$

$$\frac{12-4-3}{12} : \frac{5}{12} \text{ remaining.}$$

$$\frac{1}{9} : \frac{1}{16} : \frac{5}{12}.$$

$$\frac{\cancel{144}^{16}}{\cancel{9}} : \frac{\cancel{144}^{9}}{\cancel{16}} : \frac{\cancel{144}^{12}}{\cancel{12}} \times 5$$

$$16 : 9 : 60$$

$$\frac{16}{85} \times \cancel{34000}^{400} = 6400/-$$

24. A & B started a Business with 20,000 & 30,000 after 6 months A invested again 10,000/- & B also invested 5000/-. They got Profit 69000/- per year. Find Share of A?.

A B

2 : 3.

$$(20 \times 6 + 30 \times 6) : (30 \times 6 + 35 \times 6)$$

$$120 + 180 : 180 + 210$$

$$30\phi : 39\phi$$

$$10 : 13.$$

$$\cancel{23} \longrightarrow \cancel{69000}^{3000}$$

$$10 \rightarrow ?$$

$$30,000/-$$

25. A & B started ... 6 months, A invested again 4000/- but B withdrew 4000/-, they got profit of 32,000/- after 1yr. Find A's share?

365

$(12\times6+16\times6) : (20\times6+16\times6)$

$72+96 : 120+96$

~~168~~ : ~~216~~

~~84~~ : ~~108~~

~~42~~ : ~~54~~

~~21~~ : ~~27~~

7 : 9

$\frac{7}{16} \times \overset{2000}{\cancel{32000}} = 14000/-$

26. A & B invested in the ratio 4:5, after 6 months A invested 50% more & B withdrew $\frac{2}{5}$th of the earlier investment. They got Profit 36,000/-. Then find share of A.

$4\times6+6\times6 : 5\times6+3\times6.$

60 : 48

~~10~~ : ~~8~~

5 : 4

$\frac{5}{9} \times \overset{4000}{\cancel{36,000}} = 20,000/-$

27. A, B & C enter into a Partnership with shares in the ratio $\frac{7}{2} : \frac{4}{3} : \frac{6}{5}$ after 4 months A increases his share by 50%. If total Profit at the end of the year be 21,600/-. Then find B's share?

2, 3, 5

30.

$\frac{7}{2} : \frac{4}{3} : \frac{6}{5}$

$\frac{7}{\cancel{2}} \times \overset{15}{\cancel{30}} : \frac{4}{3} \times \overset{10}{\cancel{30}} : \frac{6}{\cancel{5}} \times \overset{6}{\cancel{30}}$

105 : 40 : 36.

$\left(105 \times 4 + \frac{15\phi}{10\phi} \times 105 \times \frac{7}{8}\right) : 40 \times 12 : 36 \times 12$.

$105 \times 4 \times 4 : 40 \times 12 : 36 \times 12$.

$35 \quad 1 \quad 1 \qquad 10 \quad 3 \qquad 9 \quad 3$.

$35 : 10 : 9$

$\frac{10}{54} \times \overset{400}{21600} = 4000/-$

28. X, Y, Z started a Business with 30,000/- 50,000/- & 70,000/- X acts as a manager is to receive 10% of the total Profit & the rest is to be divided among 3 in their capital ratios. If the total amount received by X was 28,000/-. Find the total Profit?

$3\phi : 5\phi : 7\phi$.

$\frac{1\phi}{10\phi} \times P + \frac{3}{15} \times \frac{9\phi}{10\phi} \times P = 28000$.

$\frac{1}{10}\left(P + \frac{9}{5}P\right) = 28000$

$\frac{5P + 9P}{5} = 280000$

$14P = 280000 \times 5$

$P = 1,00,000/-$

29. 3 friends take a car for 60,000/- rent. They use it for 100, 80 & 60 hrs. How much money is paid by the Ist person?

$$10\phi : 8\phi : 6\phi$$

$$5 : 4 : 3.$$

$$\frac{5}{12} \times \overset{5000}{\cancel{60,000}} = 25000/-$$

30. 3 farmers take a field for 6900/- rent. Ist persons uses 15 cows for 6 months, IInd person uses 20 cows for 3 months, IIIrd person uses 40 cows for 2 months. How much is paid to the IInd person?

$$15 \times 6 : 20 \times 3 : 40 \times 2.$$

$$9\phi : 6\phi : 8\phi$$

$$\frac{8}{\cancel{23}} \times \overset{300}{\cancel{6900}} = 2400/-$$

31. A, B & C started a Business with investments of 12,000/-, 24,000 & 9000/- respectively. After x months A withdrew his capital & after x months C withdrew his capital. If at the end of 1yr, they share the Profit in the ratio 2:12:3, then the value of x is,

Take either A:B or B:C.

$$\frac{A}{B} = \frac{\cancel{12} \times T_1}{24 \times \cancel{12}} = \frac{2}{12} \quad \frac{1}{6}$$

$$6T_1 = 24$$

$$T_1 = 4$$

$$\frac{B}{C} = \frac{\overset{8}{\cancel{24}} \times \overset{4}{\cancel{12}}}{\underset{3}{\cancel{9}} \times x} = \frac{32}{x} = 4$$

$$8 = x$$

32. A, B & C became partners in a business with respective investments in the ratios 5:7:6. Next year, they increased their investments by 26%, 20% & 15%. If their Profit by the end of 2yrs is 21,600/-. The difference b/w highest & lowest share of Profit in Rs is,

368

A : B : C

5 : 7 : 6

$5 \times \frac{126}{100} : 7 \times \frac{120}{100} : 6 \times \frac{115}{100}$

21 : 28 : 23

7

$\frac{7}{72} \times 21{,}600 = 2100/-$

1. 5 years ago Ramu age was 18 years then find his age after 4 years?

Sol:

$18+5 = 23$ present

4 after

$\underline{27}$ years

2. 5 years ago sum of the ages of A and B is 24 then find the sum of their present ages?

Sol:

$A+B = 24$

$+5 \quad +5 = 10$

$\underline{34}$ years

3. After 3 years the sum of the ages of A, B and C is 45 years then find the sum of their present ages?

Sol:

$A+B+C = 45$

$-3 \quad -3 \quad -3 = -9$

$\underline{36}$ years

4. Sum of the ages of A and B is 40 years and the ratio's of their ages 5:3 then find ~~ratio~~ the age of A?

Sol:

$A+B = 40$

$A : B$

$5 : 3$

$8 \rightarrow 40$

$5 \rightarrow ?$

$\frac{5}{8} \times 40 = \underline{25}$ years

5. The sum of the ages of A, B and C is 60 years and the ratio's of their ages 5:4:3 then find the age of C?

Sol:

$A+B+C = 60$

$A : B : C$

$5 : 4 : 3$

$12 \rightarrow 60$

$3 \rightarrow ?$

$\frac{3}{12} \times 60 = \underline{15}$ years

6. The sum of ages of A, B is 65 years and ratio's of their 8:5 then find the ratio's of 5 years ago?

Sol:

$$A + B = 65$$

$$A : B$$

$$8 : 5$$

$$A \Rightarrow \frac{8}{13} \times 65^{5} = 40 - 5 = 35$$

$$B \Rightarrow \frac{5}{13} \times 65^{5} = 25 - 5 = 20$$

} 5 years ago

$$35 : 20$$

$$\underline{7 : 4}$$

7 The sum of the ages of A and B is 72 years and the ratio's of their ages 7:5 then find the ratio's of ages after 6 years?

Sol:

$$A + B = 72$$

$$A : B$$

$$7 : 5$$

$$A \Rightarrow \frac{7}{12} \times 72^{6} = 42 + 6 = 48$$

$$B \Rightarrow \frac{5}{12} \times 72^{6} = 30 + 6 = 36$$

} after 6 years

$$48 : 36$$

$$4 : 3$$

8. The sum of ages A and B is 72 years after 6 years and their present ratio's 7:5 then find the age of A?

Sol:

$$A + B = 72$$

$$-6 \quad -6 = \underline{-12}$$

$$60$$

$$A : B$$

$$7 : 5$$

$$A \Rightarrow \frac{7}{12} \times 60^{5} = 35$$

$$35 + 6 = \underline{41} \text{ years}$$

9. Sum of the Ages of A and B 30 years and the ratio of their ages after 5 years 5:3 then find the age of A at present?

Sol:

$$A + B = 30$$
$$+5 \quad +5 = 10$$
$$40$$

$$A \Rightarrow \frac{5}{8} \times 40^{5} = 25$$

$$25 - 5 = \underline{20} \text{ years}$$

10. Sum of the ages of mother and daughter 60 years 5 years ago monther ages was 4 times of daughter age then find the present daughter age?

Sol:

$$M + D = 60$$
$$-5 \quad -5 = -10$$
$$50$$

$$M : D$$
$$4 : 1$$

$$D \Rightarrow \frac{1}{5} \times 50^{10} = 10 + 5 = \underline{15} \text{ years}$$

11. The ratio's blw ages of A and B is 2:3 and the difference blw their Ages 10 years find the differe-nce blw their ages after 5 years?

Sol:

$$A : B$$
$$2 : 3$$
$$1 \quad A - B = 10$$

$$A = 20 \qquad B = 30$$
$$\frac{+5}{25} \qquad \frac{+5}{35}$$

$$A - B = \underline{10} \text{ years}$$

12. A Father says to son when he born my age was at your present age son's present age 24 years then find the Father present age?

Sol:

$$24 + 24 = \underline{48} \text{ years}$$

13. A Father says to a son when he born may age was double of your present age son's present age 15 years then find the Father age?

Sol:

$$S + F$$

$$15 + 2(15) = 15 + 30 = \underline{45} \text{ years}$$

14. A Father says to a son when you born my age was at your present age find the sun age after 3 years Father present age 56 years?

Sol:

$$\frac{56}{2} = 28 + 3 = \underline{31} \text{ years}$$

15. A married couple at every 3 years one child totally they have 5 childern the sum of the ages of 5 childerns ages 50 years then find age of the yeilder child?

Sol:

$$x + (x+3) + (x+6) + (x+9) + (x+12) = 50$$

$$5x + 30 = 50$$

$$5x = 20$$

$$x = 4$$

$$x + 12 = 4 + 12 = \underline{16} \text{ years}$$

16. A is as much younger then B has yeilder than C if the sum of the ages of B and C 40 years then find the age of A?

Sol:

$$B - A = A - C \qquad B + C = 40$$

$$B + C = 2A$$

$$40 = 2A \Rightarrow \boxed{A = 20}$$

17. The ratio's blw ages of lakshmi and Rani 7:5 after 6 years the difference blw their ages is 8 years then find age of Rani at present?

Sol:

$$L : R$$
$$7 : 5$$
$$\underset{2}{\smile}$$
$$2 \rightarrow 8$$
$$5 \rightarrow ?$$
$$\frac{5}{2} \times 8^{4} = \underline{20} \text{ years}$$

18. The sum of the ages of A and B is 11 years more than that of sum of B and C how many years C is younger than A ?

Sol:

$$A + B = B + C + 11$$
$$A = C + 11$$
$$\Rightarrow A - C = \underline{11}$$

19. The age of sumalatha multiplied by 2 and subtracted by 10 divided by 4 it is equal to the age of 7 years less than that of karthikaih, Amurutha age is 15 years then find age of sumalatha?

Sol:

$$15 - 7 = 8$$
$$\frac{2x - 10}{4} = 8$$
$$2x - 10 = 32$$
$$x - 5 = 16 \Rightarrow x = \underline{21} \text{ years}$$

20. A person was asked to a lade age the replied bakes may age 3 years hence multiplied by 3 and then subtracted 3 times my age 3 years ago we can get may age then find the age of that lade?

Sol:

$$3(x+3) - (x-3)3 = x$$
$$3x + 9 - 3x + 9 = x$$
$$\Rightarrow x = \underline{18} \text{ years}$$

21. Rani age after 15 years is 3 times of 5 years ago age is equal what is the present age of Rani?

Sol)

$$x+15 = 3(x-5)$$

$$x+15 = 3x-15$$

$$2x = 30 \Rightarrow x = \underline{15} \text{ years}$$

(or)

ago : after

5 : 15 $\quad 5+15 = 20$

$1 : 3$ (2)

$2 \rightarrow 20$

$1 \rightarrow ?$

$\frac{1}{2} \times 20^{10} = 10+5 = \underline{15}$ years

22. Ratio's blw ages of kiran after 15 years and 10 years ago is 8:3 then find the present age of kiran?

$15+10 = 25$

$8 : 3$ (5)

$5 \rightarrow 25$

$8 \rightarrow ?$

$\frac{8}{5} \times 25^{5} = 40-15 = \underline{25}$ years

23. The ratio's blw ages of Aruna 10 years ago and 15 years ago is 6:5 then find the age of aruna at present?

Sol:

$15-10 = 5$

$6 : 5$ (1)

$1 \rightarrow 5$

$6 \rightarrow ?$

$\frac{6}{1} \times 5 = 30+10 = \underline{40}$ years

(or)

$$\frac{x-10}{x-15} = \frac{6}{5}$$

$$5x-50 = 6x-90$$

$$x = \underline{40} \text{ years}$$

24. The ratio's b/w ages of A and B is 5:7 and after 10 years the ratio changes into 7:9 then find the A present age?

Sol:

$$\frac{5x+10}{7x+10} = \frac{7}{9}$$

$$45x + 90 = 49x + 70$$

$$4x = 20$$

$$x = 105$$

$$5x = 5 \times 105 = \underline{25} \text{ years}$$

$$\frac{x(c-d)}{ad-bc}$$

$$= \left| \frac{10(2)}{45-49} \right|$$

$$= \frac{10 \times 2}{4x} = 5$$

$$= 5 \times 5 = \underline{25} \text{ years}$$

25. The ratio's b/w age's of A and B is 8:9 and 5 years ago 7:8 then find the B present age?

Sol:

$$\frac{x(c-d)}{ad-bc}$$

$$= \frac{5 \times 1}{64-63} = \frac{5 \times 1}{1} = 5$$

$$B = 9 \times 5 = \underline{45} \text{ years}$$

26. The ratio's b/w ages of A and B 4:5, 6 years after A ages and also 5 years ago B ages ratio 6:5 then find the ratio's of A age 10 years ago and B age after 5 years?

Sol:

$$\frac{4x+6}{5x-5} = \frac{6}{5}$$

$$20x + 30 = 30x - 30$$

$$10x = 60$$

$$x = 6$$

$$A = 4 \times 6 = 24 - 10 = 14$$

$$B = 5 \times 6 = 30 + 5 = 35$$

$$14 : 35$$

$$2 : 5$$

27. At present son age is $\frac{2}{5}$ of mother age and after 10 years half of the mother age then find the mother age?

Sol:

M : S

1 : $\frac{2}{5}$

5 : 2

M : S

1 : $\frac{1}{2}$

2 : 1

$$\frac{5x+10}{2x+10} = \frac{2}{1}$$

$$5x + 10 = 4x + 20$$

$$x = 10$$

$$5x = 5 \times 10 = \underline{50} \text{ years}$$

28. Father age is 3 times of sum of the ages of his two son's after 5 years sum of the son's ages is $\frac{4}{7}$ of father age then find the father age?

Sol:

F : 2S

3 : 1

$$\frac{3x+5}{x+10} = \frac{7}{4}$$

F : 2S

1 : $\frac{4}{7}$

7 : 4

$$12x + 20 = 7x + 70$$

$$5x = 50$$

$$x = 10$$

$$F = 3x = 3 \times 10 = \underline{30} \text{ years}$$

29. Father age is 3 years more than 3 times of his son and after 10 years 3 years more than double of his son then find the in father age at present?

Sol:

S : F

x : 3x + 3

$$2(x+10) = (3x+13) - 3$$

$$2x + 20 = 3x + 10$$

$$x = 10$$

$$F = 3x + 3 = 30 + 3 = \underline{33} \text{ years}$$

30. At present ratio's of ages wife and husband 4:5 after 15 years their ages ratios 11:13 at the time of marriage their ages ratio's 3:4 how many years ago they got marriages?

Sol:

$$A : B$$
$$4 : 5$$

$$\frac{4x+15}{5x+15} = \frac{11}{13}$$

$$52x + 195 = 55x + 165$$

$$3x = 30 \Rightarrow x = 10$$

$$A = 40 \text{ , } B = 50$$

$$\frac{40-x}{50-x} = \frac{3}{4}$$

$$160 - 4x = 150 - 3x$$

$$x = \underline{10} \text{ years}$$

31. The avg ages of A and B is 20 years and the ratio's of their ages 5:3 then find the age of A?

Sol:

$$\frac{A+B}{2} = 20 \qquad A : B$$
$$5 : 3$$

$$A + B = 40$$

$$8 \rightarrow 40$$

$$5 \rightarrow ?$$

$$\frac{5}{8} \times 40^{5} = \underline{25} \text{ years}$$

32. 5 years age the avg age's of A, B and c,d is 45 years at present e joined the Avg age is 49 years then find the e present age?

Sol:

$$\frac{A+B+C+D}{4} = 45$$

$$\Rightarrow A + B + C + D = 180$$

$$\Rightarrow \frac{A+B+C+D+E}{5} = 49$$

$\Rightarrow A+B+C+D+E=245$

$180+E=245$

$E=245-200$

$E=\underline{45}$ years

33. The ratio's b/w Ages of Father and son is 5:2 and product of their age's 640 then find the Father age?

Sol:

$F:S$

$5:2$

$5x \times 2x = 640$

$10x^2 = 640$

$x=8$

$F=5x = 5\times 8 = \underline{40}$ years

34. The ratio's b/w ages of Father and son is 5:2 and product of their ages 640 then find the Father age?

34. The Ratio's b/w ages of A and B is 3:2 and the sum of the squares of their ages 117 then find the age of A?

Sol:

$A:B$

$3:2$

$9x^2+4x^2=117$

$13x^2=117$

$x^2=9$

$x=3$

$A = 3x = 3\times 3 = \underline{9}$ years

35. 5 years ago father age was 3 times of son's age and after 5 years father age will be double of son's age than find the father age at present?

Sol:

F : S

5 ago 3 : 1

5 after 2 : 1

$1 \rightarrow 10$

$1 \rightarrow ?$

$1 \times 10 = 10$

$3 \times 10 = 30 + 5 = \underline{35}$ years

36. The difference blw ages of Ramu and mohan is 16 years and 6 years ago the ratio's blw their ages 1 : 3 then find the mohan present age?

Sol:

R : M

$\underbrace{1 : 3}_{2}$

$2 \rightarrow 16$

$3 \rightarrow ?$

$\overset{8}{}$

$\frac{3}{2} \times 16 = 24 + 6 = \underline{30}$ years


HARSHITH INSTITUTE
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Formulas:

$$\text{Average} = \frac{\text{sum of observations}}{\text{number of observations}}$$

$$\text{no. of observations} = \frac{\text{sum of observations}}{\text{Average}}$$

Sum of observations = Average x no. of observations

problems:

1. A student got 580 marks in 5 subjects then find the average marks?

Sol:

$$\text{Avg} = \frac{\text{Sum of observations}}{\text{number of observations}} = \frac{580}{5} = \underline{116}$$

2. In a class 25 students average is 15 years then find the sum of there ages?

Sol:

Sum of observations = Average x no. of observations

$$= 25 \times 15 = \underline{375}$$

3. Sum of the student total marks 1320 and Average marks 22 then find the no. of students?

Sol:

$$\text{no. of students} = \frac{\text{Sum of observations}}{\text{Average}} = \frac{1320}{22} = \underline{60}$$

4. Find the average of 18, 25, 33, 40, 54

Sol:

$$\text{Avg} = \frac{18+25+33+40+54}{5} = \frac{170}{5} = 34$$

5. Find the average of 10, 15, 20, 25, 30, 35

Sol:

$$\text{Avg} = \frac{10+15+20+25+30+35}{6}$$

$$= \frac{135}{6} = \underline{22.5}$$

6. Find the average of 50, 40, 30, 20, 10

Sol:

$$\text{Avg} = \frac{50+40+30+10}{4} = \frac{130}{4} = \underline{32.5}$$

50, 40, 30, 20, 10

$$\text{Avg} = \frac{50+10}{2} = \frac{60}{2} = \underline{30}$$

7. Find the avg of odd numbers from 1 to 255?

Sol:

$$\text{Avg} = \frac{1+255}{2} = \frac{256}{2} = \underline{128}$$

8. Find the Avg of odd numbers from 111 to 333?

Sol:

$$\text{Avg} = \frac{113+331}{2} = \frac{444}{2} = \underline{222}$$

9. Find the Avg of odd numbers blw 111 to 360?

Sol:

$$\text{Avg} = \frac{111+359}{2} = \frac{470}{2} = \underline{235}$$

10. Find the avg of even numbers from 1 to 200?

Sol:

$$\text{Avg} = \frac{2+200}{2} = \frac{202}{2} = \underline{101}$$

11. Find the avg of even numbers from 225 to 600?

Sol:

$$\text{Avg} = \frac{226+600}{2} = \frac{826}{2} = \underline{413}$$

12. Find the Avg of even numbers blw 400 and 675?

Sol:

$$\text{Avg} = \frac{402+674}{2} = \frac{1076}{2} = \underline{538}$$

Formulas:

Avg of first n odd numbers is n
Avg of first n even numbers is n+1

13. Find the avg of first 60 odd numbers?

Sol:

$$n = \underline{60}$$

14. Find the Avg of odd numbers From 1 to 60?

Sol:

$$Avg = \frac{60}{2} = \underline{30}$$

15. Find the Avg of first 75 even numbers?

Sol:

$$n+1 = 75+1 = \underline{76}$$

16. Find the avg of even numbers From 1 to 75?

Sol:

$$n+1 = 76, \quad \frac{76}{2} = 38$$

17. Find the avg of first 20 multiple of 3?

Sol:

$3 \times 1 = 3$

$3 \times 20 = 60$

(or) $\frac{k(n+1)}{2} = \frac{3(20+1)}{2} = \frac{63}{2} = \underline{31.5}$

$\frac{63}{2} = \underline{31.5}$

18. Find the avg of first 15 multiple of 8?

Sol:

$$\frac{k(n+1)}{2} = \frac{8 \times \overset{9}{16}}{2} = \underline{64}$$

19. Find the avg of divisible by 5 From 1 to 200?

Sol:

5, 10, - - - - - - 200

$$Avg = \frac{5+200}{2} = \frac{205}{2} = \underline{102.5}$$

20. Find the avg of divisibles by 2, 3 From 1 to 250?

Sol:

$\underline{2,3} = 6$ 1 to 250

$$Avg = \frac{6+246}{2} = \frac{252}{2} = \underline{126}$$

21. Find the avg of the number divisible by 7 From 100 to 300?

Sol:

$$\frac{105+294}{2} = \frac{399}{2} = \underline{199.5}$$

Formulas:

The avg of first n natural numbers $\frac{n+1}{2}$

The avg of squares of n natural numbers

$$1^2+2^2+\text{----}+n^2=\frac{(n+1)(2n+1)}{6}$$

The avg of cubes of n natural numbers

$$1^3+2^3+3^3+\text{----}+n^3=\frac{n(n+1)^2}{4}$$

22. Find the avg of first 150 natural numbers?

Sol:

$$\text{avg}=\frac{n+1}{2}=\frac{150+1}{2}=\frac{151}{2}=\underline{75.5}$$

23. Find the avg of squares of first 23 natural numbers?

Sol:

$$\text{avg}=\frac{(n+1)(2n+1)}{6}=\frac{24\times 47}{6}=\underline{188}$$

24. Find the avg of cubes of first 20 natural numbers?

Sol:

$$\text{avg}=\frac{n(n+1)^2}{4}=\frac{20\times 441}{4}=\underline{2205}$$

25. The avg of 5 consecutive even numbers is 40 Find the ~~smallest~~ largest number?

Sol:

$$\frac{x+(x+1)+(x+2)+(x+3)+(x+4)}{5}=43$$

$$\frac{5x+10}{5}=43$$

$$\frac{5}{5}(x+2)=43$$

$$x=43-2$$

$$x=41$$

$x+4=41+4=\underline{45}$ large number

(or)

41 42 <u>43</u> 44 45 (large)

26. The avg of 13 conjecutive even numbers is 40 find the smallest number?

Sol: 28 30 32 34 36 38 40

↓

Smallest number

27. The avg of 7 conjecutive odd numbers is 49 find the largest number?

Sol: 43 45 47 49 51 53 55

↓

largest number

28. The avg of 6 conjecutive odd numbers is 48 then find the smallest number?

Sol: 43 45 47 48 49 51 53

↓

smallest number

29. The avg of 8 conjecutive even numbers is 51 then find the smallest number?

Sol: 44 46 48 50 51 52 54 56 58

↓

Smallest number

30. The avg of 9 conjecutive natural numbers is 56 then find the difference b/w largest and smallest?

Sol: 52 53 54 55 56 57 58 59 60

$60-52 = 8$ (or) $9-1 = 8\times1 = 8$

31. The avg of 7 conjecutive odd numbers is 63 then find the difference b/w largest and smallest

Sol: 57 59 61 63 65 67 69

$69-57 = 12$ (or) $7-1 = 6\times2 = 12$

32. The avg of 13 conjecative even numbers is 40 then find the difference blw largest and smallest?

Sol:

$$13-1 = 12\times 2 = \underline{24}$$

33. The sum of the 7 conjecative natural numbers is 91 then find the largest numbers?

Sol:

$$x+(x+1)+(x+2)+(x+3)+(x+4)+(x+5)+(x+6)=91$$

$$7x+21=91$$

$$7(x+3)=91^{13}$$

$$x=13-3$$

$$x=10$$

$$x+6=10+6=\underline{16} \text{ largest number}$$

34. The sum of the 5 conjecative odd numbers is 125 then find the smallest number?

Sol:

$$\text{Avg} = \frac{125}{25} = 25$$

21 23 25 27 29

↓

Smallest number

35. The sum of the 12 conjecative even number is 156 then find the largest number?

Sol:

$$\text{Avg} = \frac{156}{12} = 13$$

2 4 6 8 10 12 13 14 16 18 20 22 24

↓

largest number

36. In a class the avg weight of 30 boys 35 kgs and the avg of 20 girls is 30 kgs then find the avg weight of the total class?

Sol:

$$\text{avg} = \frac{30\times 35+20\times 30}{50} = \frac{1050+600}{50} = \frac{1650}{50} = \underline{33 \text{ kgs}}$$

37. The avg of first 7 members is 22 and another 8 members is 15 and last 5 members avg 30 then find the avg of the total members?

Sol:

$$\text{avg} = \frac{7\times22 + 8\times15 + 5\times30}{20} = \frac{154+120+150}{20}$$

$$= \frac{424}{20} = \underline{21.2\ \text{kg}}$$

38. The avg temperature for a week 25°c and first 4 days temperature 22°c then find the avg temperature for last 3 days?

Sol:

$$\text{avg} = \frac{7\times25 - 4\times22}{3} = \frac{175-88}{3} = \frac{87}{3} = \underline{29^\circ c}$$

39. The Avg weight of 30 students is 18 years in that 8 students avg age 14 years and another 12 members avg is 15 years then find the remaing students avg age?

Sol:

$$\text{Avg} = \frac{30\times18 - 8\times14 - 12\times15}{10} = \frac{2(15\times18 - 4\times14 - 6\times15)}{10}$$

$$= \frac{370-56-90}{5} = \frac{248}{5} = \underline{24.8}$$

40. The avg of 13 members is 28 in that first 6 members avg 22 and last 6 members avg 25 then find the 7th member?

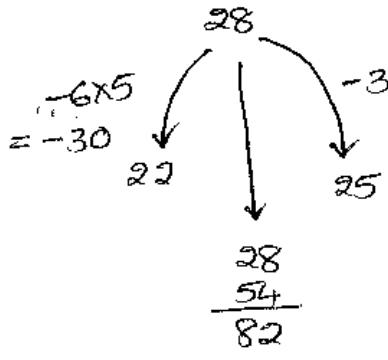
Sol:

$13\times28 = 364$

$6\times22 = 132$
$6\times25 = 150$] 282

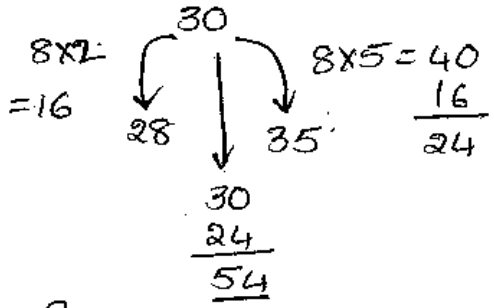
$364 - 282 = \underline{82}$

(or)



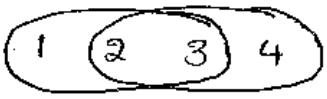
41. The avg of 15 members is 30 in that first 8 members avg 28 and last 8 members avg 35 then find the 8th member?

Sol:



42. The avg of first 3 numbers is 22 out of 4 members and last 3 members avg is 25 and first member is 30 then find the last number?

Sol:



F $3 \times 22 = 66$

L $3 \times 25 = 75$

$75 + 30 = 105 - 66 = \underline{39}$

43. The avg of first 3 numbers is 40 out of 4 and last 3 number avg is 28 and last number is 50 then find the first number?

Sol:

$3 \times 40 = 120$

$3 \times 28 = 84$

$120 + 50 = 170 - 84 = \underline{86}$

44. The ratio's blw 2 numbers is 4:5 and the avg of 2 ~~me~~numbers is 36 then find the smallest number?

Sol:

4:5

$9 \rightarrow 72$

$4 \rightarrow 9$

$\frac{4}{9} \times 72^{8} = \underline{32}$

(or)

$\frac{A+B}{2} = 36$

$A+B = 72$

45. The ratio's b/w cost price of T.V and Radio is 5:3 the avg price 4,200/- then find the cost price of the radio.

Sol:

$$\frac{TV+R}{2} = 4,200$$

$$\Rightarrow TV+R = 8,400$$

TV : R

5 : 3

$8 \longrightarrow 8,400$

$3 \longrightarrow ?$

$$\text{Radio} = \frac{3}{8} \times 8,400 = 3150$$

46. The avg of 3 numbers is 44 in that 2 number is trible of first and double of third then find the first number?

Sol:

$$\frac{A+B+C}{3} = 44 \Rightarrow A+B+C = 132$$

A : B : C

2 : 6 : 3

$11 \longrightarrow 132$

$2 \longrightarrow ?$

$$\frac{2}{11} \times 132 = 24$$

(or)

$A : B = 1 : 3$

$B : C = 2 : 1$

$A : B : C = 2 : 6 : 3$

47. The avg of 3 numbers is 36 in that first number sum of the $\frac{2}{7}$ of the second and third number then find the first number?

Sol:

$$\frac{A+B+C}{3} = 36 \Rightarrow A+B+C = 108$$

A : B : C

$9 \longrightarrow 108$

$2 \longrightarrow ?$

$$\frac{2}{9} \times 108 = 24$$

$$A = \frac{2}{7}(B+C)$$

$$7A = 2(B+C)$$

$$\frac{A}{B+C} = \frac{2}{7}$$

48. In a class the avg of 19 students weight is 30 kgs when we added a new person 40 kgs of weight then find the avg weight of total?

Sol:

$$19 \times 30 = 570 + 40 = \frac{610}{20} = \underline{30.5}$$

(or)

$$\frac{20}{240} = 0.5 \quad \text{total} = 30 + 0.5 = \underline{30.5}$$

49. The avg age of 23 students is 18 years when two students 15 years, 20 years ages added then find the new avg?

Sol:

$$23 \times 18 = 414 + 15 + 20$$

$$= \frac{449}{25} \times \frac{4}{4}$$

$$= \frac{1796}{100} = \underline{17.96}$$

50. The avg weight of 33 students is 40 kgs 3 students 25, 35, 40 kgs weights. left that group then find the avg weight of the remaing?

Sol:

$$33 \times 40 = 1320 - 25 - 35 - 40$$

$$= \frac{1220}{30} = \underline{40.66}$$

51. The avg of 40 students marks is 30 when we recheck the marks it is noticed that 50 is wrongly taken as 60 then find the correct average?

Sol:

student	marks
40	30
50	60

$$\frac{10}{40} = 0.25$$

$$30 - 0.25 = \underline{29.75}$$

52. The avg age of 50 students is 22 years in that one of the student is taken 25 years insted of 30 years then find the currect avg?

Sol:

student	age
50	22
30	25

$\frac{5}{50} = 0.1$

$22 + 0.1 = 22.1$

53. The avg of 20 members is 34 it was wrongly entered 50 and 20 insted of 25 and 35 then find the currect avg?

Sol:

$25 \quad 50$

$35 \quad 20$

$60 \quad 70$

10

$\frac{10}{20} = 0.5$

$34 - 0.5 = \underline{33.5}$

54. The avg marks of 30 student is 25 and each student increased 3 marks then find the currect avg?

Sol:

$30 \rightarrow 25 + 3 = \underline{28}$

55. The avg of 40 members is 50 and each number decreased 5 then find new avg?

Sol:

$40 \rightarrow 50 - 5 = \underline{45}$

56. The avg of some members is 18 each number is multiplied by 2 and subtracted by 3 then find the currect avg?

Sol:

$18 \times 2 = 36 - 3 = \underline{33}$

57. The avg of 30 students weight 20 kg when teacher weight increased the avg weight increased 2 kg then find the weight of the teacher?

Sol:

$30 \times 20 = 600$

$31 \times 22 = \underline{682}$

$\underline{82}$ kg

(or)

$30 \rightarrow 20$

$31 \rightarrow 1$) 2

$31 \times 2 + 20 = 62 + 20 = \underline{82}$ kg

58. The avg age of 39 students is 15 years when teacher age inculded the avg included 2.5 years then find the age of the teacher?

Sol:

$39 \rightarrow 15$

$40 \rightarrow$) $2.5 \times \frac{10}{10} = \frac{5}{2}$

$40^{20} \times \frac{5}{2} + 15 = 100 + 15 = \underline{115}$ years

59. The avg weight of 25 students is 30 kg when teacher weight increased 600 gm then find the weight of the teachers?

Sol:

25 30

26) 3/5

$1 \rightarrow 1000$ gm

600gm

$\frac{6}{10} = \frac{3}{5}$

$26 \times \frac{3}{5} + 30 = 15.6 + 30 = \underline{45.6}$

$\frac{250}{1000} = \frac{1}{4}$

$\frac{500}{1000} = \frac{1}{2}$

3 months $= \frac{3}{12} = \frac{1}{4}$

9 months $= \frac{9}{12} = \frac{3}{4}$

6 months $= \frac{6}{12} = \frac{1}{2}$

60. The avg age of 59 students is 18 years when teacher age included the avg increased 8 months then find the age of the teacher?

Sol:

59 18

60) 2/3

$\frac{8}{12} = \frac{2}{3}$

$60^{20} \times \frac{2}{3} + 18 = 40 + 18 = \underline{58}$

61. The avg age of 24 students is 19 years when one of the student age included the avg decreased by one then find the age of the new person?

Sol:

$$\begin{matrix} 24 & -19 \\ 25 & -18 \end{matrix} \Big) 1$$

$25 \times 1 - 18 = 25 - 19 = \underline{6}$ years

62. In a commite of 10 members one of the weight 40 kgs replaced by new person the avg increased by 2 kgs then find the weight of the new person?

Sol:

$10 \times 2 = 20$

$\underline{40}$

$\underline{60}$ kgs

63. In a 15 members commite 70 years person replaced by a new person the avg decreased by 3 years then find the avg of the new person?

Sol:

$$15 \times 3 = \begin{matrix} 70 \\ 45 \\ \hline \underline{25} \end{matrix}$$

64. The avg age of 8 members of a commite is the same as it was 2 years ago because another member has been replaced by a new member find the difference of there ages?

Sol:

$8 \times 2 = \underline{16}$ years

65. In a commite of 20 members in that 2 members weight 30 kgs, 20 kgs replaced by a new person the avg increased 3 kgs then find the avg weight of the two members?

Sol:

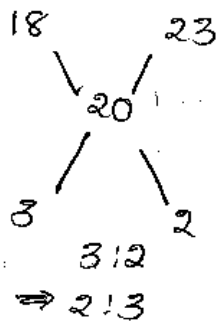
$20 \times 3 = 60$

$\underline{50}$

$\frac{110}{2} = \underline{55}$

66. In a class the avg age of girls 18 years and the avg age of boys 23 and the avg age of the entire class room 20 years then find the ratio's of number of boys and girls?

Sol:



(or)

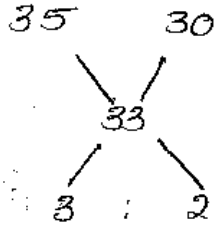
$$\frac{B\times 23 + G\times 18}{B+G} = 20$$

$$23B + 18G = 20B + 20G$$

$$B:G = 2:3$$

67. The avg weight of boys age is 35 kgs and girls age is 30 kgs the entire class is 33 kgs the total number students 120 then find the number of boys?

Sol:



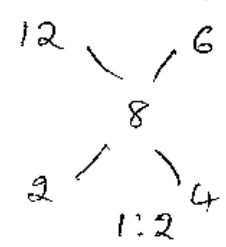
$5 \rightarrow 120$

$3 \rightarrow ?$

$\frac{3}{5} \times 120^{24} = \underline{72}$

68. In a factory the avg salary of 7 technics 12,000 Rs/- and the avg salary of remaing employees 6,000 Rs/- and the avg salary of entire family is 8,000 Rs/- then find the total no. of empolyees in a factory?

Sol:

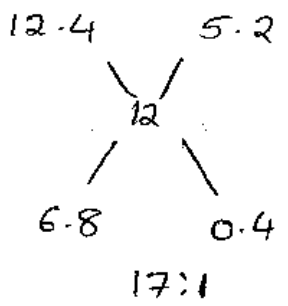


$1 \rightarrow 7$

$3 \rightarrow ?$ $\quad \frac{3}{1} \times 7 = \underline{21}$

69. A cricket player avg bolling 12.4 runs per wecate next wining he takes 5 wecat-es per 26 runs his avg decreased 0.4 how many wecat-es he take before last wining?

Sol:



$\frac{26}{5} = 5.2$

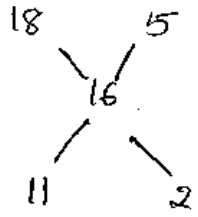
$1 \rightarrow 5$

$17 \rightarrow ?$

$17 \times 5 = \underline{85}$

70. A bollar gives 18 runs for wecate and next winings he takes 6 wekat-es for 30 runs the avg decreased to 2 then find the no. of wekat-es before last- wining?

Sol:



$\frac{30}{6} = 5$

$2 \rightarrow 6$

$11 \rightarrow ?$

$\frac{11}{2} \times 6^{3} = \underline{33}$

71. The avg age of wife and husband was 23 years 5 years ago at present they have one year child then find the avg age of the entire family?

Sol:

$23 \times 2 = 46$

$+10 \quad +1 = \underline{10}$

$56 + 1 = \frac{57}{3} = \underline{19}$

72. The avg age of 4 members 24 years 10 years ago two give members born in that family with 2 years difference but there is no changes in avg at present find the age of the younger child?

Sol:

$24 \times 4 = 96$

$\underline{40}$

136

$6 \times 24 = 144$

$144 - 136 = 8$ years

$3x + (2x+2) = 8$

$5x = 6 \Rightarrow x = 3$

$x + 2 = 3 + 2 = \underline{5}$ years

73. The avg age of A and B is 22 years 10 years ago the avg age is increased when C is added at present then find the age of C?

Sol:

$A + B = 2 \times 22 = 44$

$\frac{20}{64}$

$A + B + C = 3 \times 28 = 84$

$84 - 64 = \underline{20}$ years

75. 9 members went to a hostel in that 8 members paid 12 Rl- each one but 9th one pay 8 Rl- more then that of avg Expenditure find the total Expenditure in that hotel?

Sol:

$8 \rightarrow 12$ $\quad \frac{8}{8} = 1$

$9 \rightarrow 8$ $\quad 9 \times 13 = \underline{117}$

a. 115
b. 116
c. ✓ 117
d. 118

(or)

$$\frac{8 \times 12 + (x+8)}{9} = x$$

$96 + x + 8 = 9x \Rightarrow 8x = 104 \Rightarrow x = 13$

$9 \times 13 = 117$

75 10 members went to a hotel in that 9 members paid 15 Rl- each one but 10th one paid 18 Rl- more then that of avg a Expenditure how much money paid by 10th one?

Sol:

$\frac{15}{9} = 2$ $\quad 10 \times 17 = 170$

$9 \times 2 = 18$ Rl-

$17 + 18 = \underline{35}$ Rl-

76. In a hostel 35 members are their when 7 members are joined 42 Rs/- increased per day avg Expenditure decreased 1 Rs/- per each student then find the total Expenditure one day first?

Sol:

$$\frac{35x+42}{42} = (x-1)$$

$$35x + 42 = 42x - 42$$

$$7x = 84$$

$$\Rightarrow x = 12$$

$$35x = 35 \times 12 = \underline{420}$$

(or) 7 (42 | -42 / 35 | +42) avg

$$\frac{84}{7} = 12$$

$$35 \times 12 = \underline{420}$$

77. Some members went to a picknick their avg ages 20 years went 10 members joined in that group their avg ages 15 years and the avg all the students 19 years then find the number of students first went to picknick?

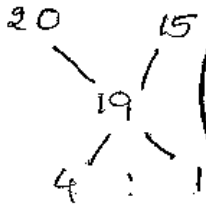
Sol:

$$\frac{x \times 20 + 10 \times 15}{x + 10} = 19$$

$$20x + 150 = 19x + 190$$

$$x = \underline{40} \text{ members}$$

(or)



$1 \rightarrow 10$

$4 \rightarrow ?$

$\frac{4}{1} \times 10 = \underline{40}$ members

78. A cricket player score 60 runs in 12th wining the avg increased two then find the avg score before 12th wining?

Sol:

$$11x + 60 = 12 \times (x+2)$$

$$11x + 60 = 12x + 24$$

before 12th $x = 36$

after 12th $x = 36 + 2 = \underline{38}$

(or)

$$12 \times 2 = \overset{60}{\underline{24}}$$

$$\underline{36}$$

29. A cricket player score 30 runs in 9th ending avg score decreased 1 then find the avg score after 9th wining?

Sol:

$9 \times 1 = 9 + 30 = 39 - 1 = \underline{38}$

30. The avg temprature from sunday to wendesday 25°c and avg temprature from monday to thursday 22°c and the temprature on thursday 20°c then find the temprature on sunday?

Sol:

$S + M + T + W = 100$

$M + T + W + Th = 88$

$S - Th = 12°C$

$S - 20°C = 12°C$

$Sunday = \underline{32°C}$

(or)

$\begin{matrix} 25 \\ 22 \end{matrix} \Big) 3 \times 4$

$= 12 + 20$

$= \underline{32°C}$

31. The avg temprature from sunday to thursday 24°c and monday to friday 22°c the ratios blw temprat-ure of sunday and friday is 5:3 then find the temprature on friday?

Sol:

$\begin{matrix} 24 \\ 22 \end{matrix} \Big) 2 \times 5 = 10$

$2 \rightarrow 10$

$3 \rightarrow ?$

$\frac{3}{2} \times \overset{5}{10} = \underline{15}$

32. The avg temprature monday to wendsday 40°c the avg tempratore from thusday to thrusday is 41°c if the thrusday temprature 42°c then find the tempr-ature on monday?

Sol:

$\begin{matrix} 40 \\ 41 \end{matrix} \Big) 1 \times 3 = 3$

$monday = 42 - 3 = \underline{39°C}$

33- The avg of a, b, c is m when $ab+bc+ca=0$ then find the avg of $a^2+b^2+c^2$ = ?

Sol:

$$\frac{a+b+c}{3} = m \Rightarrow a+b+c = 3m$$

$$(a+b+c)^2 = (3m)^2$$

$$a^2+b^2+c^2+2(ab+bc+ca) = 9m^2$$

$$a^2+b^2+c^2+2(0) = 9m^2$$

$$a^2+b^2+c^2 = 9m^2$$

$$\Rightarrow \frac{a^2+b^2+c^2}{3} = \frac{9m^2}{3} = \underline{3m^2}$$

34- The avg Salary value of a and b is 6,000 Rl- b and c is 5,800 Rl- c and a is 4,800 Rl- then find the avg Salary of a, b and c.

Sol:

$a:b = 6000$

$b:c = 5800$

$c:a = 4800$

$\frac{16600}{3} = \underline{5533.33}$

(or)

$a+b = 12000$

$b+c = 11600$

$c+a = 9600$

$33,200$

$2(a+b+c) = 33,200$

$a+b+c = 16,600$

$\frac{a+b+c}{3} = \underline{5533.33}$

35- The avg weight of p and q 54 kg q and r 52 kg, r and p 45 kg then find the weight of the p?

Sol:

$p+q+r = 54+52+45 = 151$

$\frac{q+r}{2} = 52 \Rightarrow q+r = 104$

$(P+Q+R) - Q+R = 151 - 104 = \underline{47}$

36. The avg of x and $\frac{1}{x}$ is m then find the avg of x^2 and $\frac{1}{x^2}$?

Sol:

$$\frac{x+\frac{1}{x}}{2} = m$$

$$\Rightarrow x+\frac{1}{x} = 2m$$

$$x^2+\frac{1}{x^2}+2 = 4m^2$$

$$x^2+\frac{1}{x^2} = 4m^2-2$$

$$\Rightarrow x^2+\frac{1}{x^2} = 2(2m^2-1)$$

$$\Rightarrow \frac{x^2+\frac{1}{x^2}}{2} = 2m^2-1$$

37. The avg daily income of p,q,r is 80 Rl- p earn's 80Rl- less than r, r earns 60Rl- more then q what is the daily income of q?

Sol:

$$\frac{p+q+r}{3} = 80$$

$$\Rightarrow p+q+r = 240$$

$$p = x$$

$$q = x+60$$

$$r = x+30$$

$$x+30+x+x+60 = 240$$

$$3x+90 = 240$$

$$3x = 150 \Rightarrow \boxed{x=50}$$

$$p : q : r$$

$$80 : 50 : 110$$

$$\underline{8:5:11}$$

what is the avg of different propable weights of aruna?

30)

60 65 66 67 68 70 72

$$= \frac{66+67+68}{3}$$

$$= \frac{201}{3}$$

$$= 67$$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Natural Numbers:

→ Counting Numbers are called Natural Numbers.
→ They are denoted by 'N'.

$$N = \{1, 2, 3, \ldots \infty\}.$$

Whole Numbers:

→ All the Natural Numbers including '0' are called Whole Numbers.
→ denoted by 'W'

$$W = \{0, 1, 2, 3, \ldots \infty\}$$

'0 is a Whole Number'.

Integers:

→ +ve & -ve Natural Numbers are called Integers.
→ denoted by 'I'.

$$I = \{-\infty, \ldots -2, -1, 0, 1, 2, 3, \ldots \infty\}$$

Rational Numbers:

→ If any Numbers can be written in the form $\frac{P}{q}$, those Numbers are called Rational Numbers.
→ denoted by 'R'.

$$R = \frac{P}{q} \quad (q \neq 0)$$

$$R = \left\{\frac{2}{3}, \frac{3}{4}, \frac{4}{5}\right\}$$

Irrational Numbers:

→ If any Number cannot be expressed in the form $\frac{P}{q}$, then those Numbers are Irrational Numbers.
→ (If exact value cannot be found), π is also an irrational Number $\pi = \frac{22}{7}$)

$$\{\sqrt{2}, \sqrt{3}, \sqrt{6}, \ldots\}$$

Even Numbers:

→ If any Number is divisible by 2, then those Numbers are even numbers.

$\{4, 6, 22, 28, 200, 234, \ldots\}$

Odd Numbers:

→ The Numbers which are not divisible by 2 are Odd Numbers.

$\{1, 3, 5, 7, 9, 11 \ldots\}$.

Prime Numbers:

→ The Numbers which are only divisible by 1 & itself are Prime Numbers.

$\{2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 57, 61, 67, 71, 73, 79, 83, 89, 97, \ldots\}$

* Smallest Prime Number → 2.
* Smallest Even Prime Number → 2.

How many Prime Numbers are there from 1 to 50 → 15.

51 to 100 Prime Numbers → 10

Prime Numbers from 1 to 1000 → 168

The Smallest 3 digit Prime Number → 101

Biggest 3 digit Prime Number → 997.

Twin Prime Numbers:

If the difference b/w 2 Consecutive Prime numbers is 2, then those No.'s are Twin Prime no.'s.

eg: $(3,5), (5,7) \ldots (11, 13)$

Co-Prime Numbers:

If there is no any common factors, then those no.'s are Called Co-primes.

$(4, 19)$ — Co-primes.

1. → Which is a Prime no: from the below:

a) 413 b) 271 c) 329 d) 119.

(In this process, take the square no: earlier to the no: given here, & take the prime no.'s upto the given square. Check whether the given no. in the options is divisible by these primes.)

413 → ✗

400 → 20^2 →

2, 3, 5, 7, 11, 13, 17, 19.

413/2 ✗, 413/3 ✗, 413/5 ✗,

413/7 ✓

✓271 →

256 – 14^2 →

2, 3, 5, 7, 11

271/2 ✗, 271/3 ✗, 271/5 ✗,

271/7 ✗, 271/11 ✗

2. → Which is a Prime no: from the below:

a) 187 b) 173 c) 811 d) 437.

187 –

169 – 13^2

2, 3, 5, 7, 11.

187/2 ✗ 187/3 ✗ 187/5 ✗

187/7 ✗ 187/11 ✓

173 – ✓

169 – 13^2

2, 3, 5, 7, 11

173/2 ✗ 173/3 ✗ 173/5 ✗ 173/7 ✗

173/11 ✗

3. find the Prime factors of

→ $2^5 \times 3^4 \times 5$

5+4+1 = 10.

→ $6^4 \times 10^2 \times 7^2$

2×3 2×5

$2^4 \times 3^4 \times 2^2 \times 5^2 \times 7^2$

4+4+2+2+2 = 14

4 → find the factors of

$2^4 \times 5^2 \times 6^2$

(If asked for factors, then add 1 to each Power & multiply)

$(4+1)(2+1)(2+1)$

$5 \times 3 \times 3 = 45$.

$2^3 \times 5^2 \times 3^1$

$(3+1)(2+1)(1+1)$

$4 \times 3 \times 2 = 24$.

5 → find the sum of the factors. $2^3 \times 5^2 \times 3^1$.

$(2^0+2^1+2^2+2^3)(5^0+5^1+5^2)(3^0+3^1)$

$(1+2+4+8)(1+5+25)(1+3)$

$15 \times 31 \times 4 = 1860$.

(or)

$$\frac{2^4-1}{2-1} \times \frac{5^3-1}{5-1} \times \frac{3^2-1}{3-1}$$

$$\frac{15}{1} \times \frac{\overset{31}{\cancel{124}}}{\cancel{4}} \times \frac{\cancel{8}^{4}}{\cancel{2}} = 15 \times 31 \times 4 = 1860.$$

6 → Sum of the factors of $5^2 \times 3^1 \times 2^1$.

$$\frac{5^3-1}{5-1} \times \frac{3^2-1}{3-1} \times \frac{2^2-1}{2-1}$$

$$\frac{\overset{62}{\cancel{124}}}{\cancel{4}} \times \frac{\cancel{8}^{2}}{\cancel{2}} \times \frac{3}{1}$$

$62 \times 2 \times 3 = 372$.

7. find the no. of factors & Sum of the factors of 300.

$$\begin{array}{r|l} 2 & 300 \\ 2 & 150 \\ 5 & 75 \\ 5 & 15 \\ & 3 \end{array}$$

$2^2 \times 5^2 \times 3^1$

$(2+1)(2+1)(1+1)$

$3 \times 3 \times 2 = 18$ → no. of factors

$$\frac{2^3-1}{2-1} \times \frac{5^3-1}{5-1} \times \frac{3^2-1}{3-1}$$

$$= \frac{7}{1} \times \frac{\overset{62}{124}}{4} \times \frac{8^2}{2} = 868 - \text{Sum of factors.}$$

8. Find the no. of factors & Sum of the factors of 200.

$$\begin{array}{r|l} 2 & 200 \\ 2 & 100 \\ 5 & 50 \\ 5 & 10 \\ & 2 \end{array}$$

$2^3 \times 5^2$

$(3+1)(2+1)$

$4 \times 3 = 12$ → no. of factors.

$$\frac{2^4-1}{2-1} \times \frac{5^3-1}{5-1}$$

$$\frac{15}{1} \times \frac{\overset{31}{124}}{4} = 465 \rightarrow \text{Sum of factors.}$$

9. Find the no. of factors for 1200 except 1 & itself?.

$$\begin{array}{r|l} 2 & 1200 \\ 2 & 600 \\ 3 & 300 \\ 5 & 100 \\ 2 & 20 \\ 5 & 10 \\ & 2 \end{array}$$

$2^4 \times 5^2 \times 3^1$

$(4+1)(2+1)(1+1)$

$5 \times 3 \times 2 = 30 - 2 = 28$

(except 1 & 1200)

10. How many no.'s are divisible by 5 from 1 to 100.

$$\frac{100}{5} = 20$$

11. How many no.'s are divisible by 7 from 1 to 615.

$$\frac{615}{7} = 87$$

12. How many no.'s are divisible by 2 & 3 from 1 to 800.

$$\frac{800}{6} = 133.$$

6 | 2,3

13. How many no.'s are divisible by 15 from 350 to 700.

$$\frac{700}{15} - \frac{349}{15} = \frac{351}{15} = 23$$

14. How many no.'s are divisible by 9 from 45 to 350.

$$\frac{350}{9} - \frac{44}{9} = \frac{306}{9} = 34.$$

15. How many no.'s are divisible by 12 from 500 to 960.

$$\frac{960}{12} - \frac{499}{12} = \frac{461}{12} = 38$$

16. find the sum of the Numbers divisible by 5 from 1 to 700.

5, 10, 15, 20, 25, ... 700.

$$\frac{n}{2}(a+l)$$

$$n = \frac{700}{5} = 140.$$

70

$$\frac{140}{2}(5+700)$$

$$70(705) \rightarrow 49350$$

17. Sum of the no.s divisible by 9 from 100 to 300.

18. Sum of 3 digit no.'s divisible by 3 & 4

19. What is the last digit in the form, $23 \times 42 \times 67 \times 89 = 8$.
$3 \times 2 \times 7 \times 9 = 8$

What is the last digit

→ $68 \times 73 \times 87 \times 92 = 6$
$8 \times 3 \times 7 \times 2 = 6$

→ $73 \times 47 \times 82 \times 64 = 8$
$3 \times 7 \times 2 \times 4 = 8$

→ $437 + 67 + 143 = 7$
$7 + 7 + 3 = 17$

20. Last digit of the form n^n.

$21340^{673} \rightarrow 0$ $\quad$ $0^{\text{Anything}} \rightarrow 0$.

$721^{834} \rightarrow 1$ $\quad$ $1^{\text{Anything}} \rightarrow 1$

$725^{872} \rightarrow 5$ $\quad$ $5^{\text{Anything}} \rightarrow 5$

$686^{439} \rightarrow 6$ $\quad$ $6^{\text{Anything}} \rightarrow 6$.

$674^{836} \rightarrow 6$

$729^{87} \rightarrow 4$

$69^{361} \rightarrow 9$

$729^{724} \rightarrow 1$

	Odd	Even
4	4	6
9	9	1

$4^1 = 4$ $\quad$ $9^1 = 9$

$4^2 = 16$ $\quad$ $9^2 = 81$

***

2, 3, 7, 8.

$2^1 = 2$ $\quad$ $3^1 = 3$ $\quad$ $7^1 = 7$ $\quad$ $8^1 = 8$

$2^2 = 4$ $\quad$ $3^2 = 9$ $\quad$ $7^2 = 49$ $\quad$ $8^2 = 64$

$2^3 = 8$ $\quad$ $3^3 = 27$ $\quad$ $7^3 = 343$ $\quad$ $8^3 = 512$

$2^4 = 16$ $\quad$ $3^4 = 81$ $\quad$ $7^4 = 2401 = 7^0$ $\quad$ $8^4 = 8^0 = 6$.

$472^{823} = 2^3 = 8$

$4)823(205$
-8
023
-20
(3)

$843^{842} = 3^2 = 9$

$4)842(21$
$-8\downarrow$
4
-4
(02)

$472^{928} = 2^8 = 6$

$4)928(232$
-92
8
-8
(0)

$67^{929} = 7^3 = 3$

$4)67(16$
-4
27
-24
(3)

$773^{814} = 3^2 = 9$

$7)814(116$
-77
44
-42
(2)

$768^{1742} = 8^2 = 4$

$4)1742(435$
-16
14
-12
22
-20
2

$813^{914} = 3^2 = 9$

$4)914(228$
-8
11
-8
34
-32
(2)

$817^{64} = 7^0 = 1$

$4)64(16$
-64
(0)

How many 0's can we get.

Inorder to get 0, there should be compulsorily one even no. & one 5. So forget about all the no.s, Consider only even no. & 5 & Convert each even no. into the form of 2^1's. The then obtained form, in which the no. has least power, that is the Answer.

→ $2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9$.

$2 \times \cancel{3} \times 4 \times \overset{5}{\cancel{5}} \times 6 \times \cancel{7} \times 8 \times \cancel{9}$.

2×2 2×3 $2\times2\times2$

$2^2 \times 5^1 \rightarrow 1 \rightarrow$ zero.

→ $5^7 \times 2^{10} \times \cancel{3^4} \times \cancel{7^{20}}$

$5^7 \times 2^{10} \rightarrow 7 \rightarrow$ zeros.

→ $20^6 \times 15^4 \times 12^8$.

$(2\times2\times5)^6 \quad (3\times5)^4 \quad (2\times2\times3)^8$

$2^6 \times 2^6 \times 5^6 \times \cancel{3^4} \times 5^4 \times 2^8 \times 2^8 \times \cancel{3^8}$.

$2^{28} \times 5^{10}$ → 10 → zeros

→ $24 \times 32 \times 17 \times 23 \times 19$ → No zeros.

→ $1 \times 3 \times 5 \times 7 \times \ldots 99$ → No zeros.

Sum of the Ist 'n' Consecutive Natural no.'s → $\frac{n(n+1)}{2}$

$1+2+3+\ldots n$.

Sum of the Squares of Ist 'n' Natural no.'s (Consecutive) → $1^2+2^2+3^2+\ldots n^2$

$\frac{n(n+1)(2n+1)}{6}$

Sum of the Cubes of Ist 'n' Natural no.'s (Consecutive) → $1^3+2^3+3^3+\ldots n^3$

$\left(\frac{n(n+1)}{2}\right)^2$ (or) $\frac{n^2(n+1)^2}{4}$

Sum of the Ist 'n' Consecutive even no.'s → $2+4+6+8, \ldots n. \rightarrow n(n+1)$

Sum of the Ist 'n' Consecutive Odd no.'s → $1+3+5+7+\ldots n \rightarrow n^2$.

1. First 150 Natural no.'s Sum → $\frac{n(n+1)}{2} \rightarrow \frac{150(150+1)}{2} \rightarrow (75\times151) \rightarrow 11325$

2. Sum of the Squares of first 30 Natural no.'s → $\frac{n(n+1)(2n+1)}{6}$

$\frac{\overset{5}{30}(30+1)(2\times30+1)}{\underset{1}{6}} \rightarrow 9455$

$5 \times 31 \times 61 \rightarrow 9455$

3. Sum of the cubes of 1st 20 Consecutive Natural no.'s

$$\left(\frac{n(n+1)}{2}\right)^2 \rightarrow \left(\frac{\overset{10}{\cancel{20}}(21)}{\cancel{2}}\right)^2 \rightarrow (210)^2 \rightarrow 44100$$

4. Sum of the Natural no.'s from 51 to 120.

1 to 50

$$\frac{\overset{25}{\cancel{50}} \times 51}{\cancel{2}} = 1275$$

1 to 120.

$$\frac{\overset{60}{\cancel{120}}(121)}{\cancel{2}} = 7260$$

$$7260 - 1275 = 5985$$

5. $11^2 + 12^2 + 13^2 + \ldots 20^2$

1 to 10.

$$\frac{\overset{5}{\cancel{10}}(10+1)(20+1)}{\cancel{6}\ 3}$$

$$\frac{5 \times 11 \times \overset{7}{\cancel{21}}}{\cancel{3}} = 385$$

1 to 20

$$\frac{\overset{10}{\cancel{20}}(20+1)(40+1)}{\cancel{6}\ 3}$$

$$\frac{\overset{7}{10} \times \cancel{21} \times 41}{\cancel{3}} = 2485$$

$$2485 - 385 = 2100$$

6. Sum of the first 25 Natural no.'s which are multiples of 8.

for 1st 'n' natural no.'s Sum $\rightarrow \frac{n(n+1)}{2}$

Here $n = 25$

$$\frac{25 \times \overset{13}{\cancel{26}}}{\cancel{2}} = 325 \times 8 = 2600$$

7. Sum of the first 30 Natural no.'s, multiples of 12.

$$\frac{\overset{15}{\cancel{30}} \times 31}{\cancel{2}} = 465 \times 12 = 5580$$

$$\begin{array}{r} 31 \\ \times\ 15 \\ \hline 155 \\ 31\,\text{q} \\ \hline 465 \end{array}$$

8. One Porter saves 1/- on I day, 2/- on II day, 3/- on III day, in the same way he saves for 1 year. find, How much he can save in one ordinary year. L112

$\rightarrow n(n+1)/2$.

$$\frac{365 \times 366}{2} = 66,795/-$$

9. find the no. of even no.'s & odd no.'s from 1 to 327.

$$\frac{327}{2} = 163 \rightarrow \text{even.}$$

$$\frac{327+1}{2} = \frac{328}{2} = 164 \rightarrow \text{odd no.'s}$$

10. find the no. of odd & even no.'s from 300 to 400.

50 → odd.

51 → even.

11. find the sum of the 1st 60 odd no.'s. — 1, 3, 5, 7, ...

$n^2 = (60)^2 = 3600$

12. Sum of odds from 1 to 60 — 1, 2, 3, 4, 5, ... 60.

$$\frac{60}{2} = (30)^2 = 900$$

13. 1 to 105 odd no.'s sum.

$$\frac{105}{2} = 53 = (53)^2 = 2809$$

14. Sum of first 40 even no.'s

$n(n+1)$

$40 \times 41 = 1640$

15. Sum of the even no.'s from 1 to 40.

$\frac{40}{2} = 20 \quad 20 \times 21 = 420.$

16. What Smallest no. should be added to 4000, that it is divisible by 13.

```
13) 4000 (307
   -39
   ----
    100
    -91
    ---
      9
```

13 − 9 = 4 should be Added.

17. Which no. should be subtracted from 4000, that it is definitely divisible by 13.

Reminder 9 should be subtracted from 4000.

18. Which Smallest no. should be added to 3000, that it is divisible by 11 & Which no. should be subtracted that it is exactly divisible by 11.

```
11) 3000 (272
   -22
   ----
     80
    -77
    ---
      30
     -22
     ---
       8
```

11 − 8 = 3 should be added.

Reminder 8 should be subtracted from 3000.

19. Largest 5 digit no. that is divisible by 12.

```
12) 99999 (8333
   -96
   ----
     39
    -36
    ---
     39
    -36
    ---
     39
    -36
    ---
      3
```

```
99999
   -3
-------
99996
```

20. The Smallest 5 digit no. divisible by 12.

$$12\overline{)10000}\,(833$$
$$-96$$
$$\overline{40}$$
$$-36$$
$$\overline{40}$$
$$-36$$
$$\overline{4}$$

$$12-4=8.$$

$$10000+8=10008$$

21. The Largest 5 digit no. divisible by 13.

$$13\overline{)99999}\,(7692$$
$$-91$$
$$\overline{89}$$
$$-78$$
$$\overline{119}$$
$$-117$$
$$\overline{29}$$
$$-26$$
$$\overline{3}$$

$$99999-3=99996$$

22. If a no. is divided by 45, the reminder is 20, & if the same no. is divided by 15, the reminder is ?.

$$45)\_\_(\_$$
$$\_$$

$$15\overline{)20}\,(1$$
$$-15$$
$$\overline{5}$$

23. If a no. is divided by 60, the reminder is 25, if the same no. is divided by 20, the reminder is,

$$60)\_\_(\_$$
$$\_$$

$$20\overline{)25}\,(1$$
$$-20$$
$$\overline{5}$$

24. If a no. is divided by 81, reminder is 15, if the same no. is divided by 27, the reminder is,

81) — (

27) 15 (

15

* if the divisor is more than the given reminder, then the reminder itself is the Answer.

25. If a no. is divisible by 7, reminder is 4, if the same no. is squared & divided by 7, the reminder is,

7) — (

) 4 (

$\frac{4^2}{7} = \frac{16}{7} = 2.$

26. If a no. is divided by 4, reminder is 3, if the same no. is doubled & divided by 4, the reminder is,

4) — (

$\frac{3 \times 2}{4} = \frac{6}{4} = 2.$

27. If 25 × 26 is divided by 24, the reminder is,

$\frac{25 \times 26}{24}$

$1 < \frac{25}{24} \times \frac{26}{24} > 2$

$\frac{1 \times 2}{24} = \frac{2}{24} = 2.$

28) If 153×799 is divided by 5, the reminder is,

$$\frac{153}{5} \times \frac{799}{5}$$

$5)153(3$
-15
3

$5)799(159$
-5
29
-25
49
-45
4

$$\frac{3 \times 4}{5} = \frac{12}{5} = 2.$$

29) $17 \times 27 \times 95 \times 36$ by 8.

$$\frac{17}{8} = 1 \quad \frac{27}{8} = 3 \quad \frac{95}{8} = 7 \quad \frac{36}{8} = 4$$

$$\frac{1 \times 3 \times 7 \times 4}{8} = \frac{84}{8} = 4$$

30) $76^2 \times 49^3 \div 24.$

$$\frac{76}{24} \times \frac{76}{24} \times \frac{49}{24} \times \frac{49}{24} \times \frac{49}{24}$$

$$\frac{4 \times 4 \times 1 \times 1 \times 1}{24} = \frac{16}{24} = 16.$$

Dividend = (divisor x Quotient) + Reminder.

31. The divisor is 13, Quotient is 22, Reminder – 3, find the dividend.

$(13 \times 22) + 3.$

$286 + 3 = 289$

divisible by 18:

If a no. is divisible by 2 & 9, that no. is definitely divisible by 18.

divisible by 24:

If the sum of all the digits in a no. is divisible by 24, then that no. is definitely divisible by 27.

divisible by 6:

If any no. is divisible by 2 & 3, that no. is definitely divisible by 6.

divisible by 12:

If any no. is divisible by 3 & 4, that no. is definitely divisible by 12.

divisible by 5:

If in any no., the last digit is 0 or 5, then that no. is definitely divisible by 5.

divisible by 15:

If any no. is divisible by 3 & 5, that no. is definitely divisible by 15.

divisible by 7:

If the digits in any no. justifies the + − + rule, then that value is divisible by 7.

eg: i) $\overline{6}\,\overline{5}\,\overline{4}\,\overline{3}\,\overline{2}\,\overline{5}\,\overline{7}$
$+ \quad - \quad + \quad - \quad + \quad - \quad +$

$547 + 65 = 612$

$642 - 432 = 210$

$\frac{210}{7} = 30$ ✓

(or) ii) $34\underline{3} \rightarrow 3 \times 2 = 6$.

$34 - 6 = \frac{28}{7} = 4$ ✓

iii) $65432\underline{57} \rightarrow 7 \times 2 = 14$.

$6543257 - 14$

$7 \overline{)6543243} (934749$

63

24

-21

33

-28

52

-49

34

-28

63.

32. Reminder = 40, $\frac{1}{5}$ Reminder = Quotient, 7 Quotient = divisor, find the dividend.

$\frac{1}{5} \times 40 = 8$ = Quotient.

$7 \times 8 = 56$ = divisor.

(divisor x Quotient) + Reminder = dividend.

$(56 \times 8) + 40 = 448 + 40 = 488$

Divisibility Rules:

Divisible by 2:

If in any no., the last digit is 0, or an even no., it is definitely divisible by 2.

Divisible by 4:

If in any no., the last 2 digits are 00's or divisible by 4, then its definitely divisible by 4.

Divisible by 8:

If in any no., the last 3 digits are 0's or divisible by 8, those no.'s are definitely divisible by 8.

Divisible by 16:

If in any no., the last 4 digits are 0's or divisible by 16, that no. is definitely divisible by 16.

Divisible by 3:

If the sum of all the digits in a no. is divisible by 3, then that no. is definitely divisible by 3.

Divisible by 9:

If the sum of all the digits in a no. is divisible by 9, then that no. is definitely divisible by 9.

divisible by 11:

If the sum of the digits in the even places of a given no. is equal to the odd places sum of the digits

(or)

the difference b/w them is divisible by 11, then that no. is definitely divisible by 11.

eg: 4537225 ✓

4+3+2+5 = 14

5+7+2 = 14

91817 ✓

9+8+7 = 24

1+1 = 2

$\frac{22}{4} = 2$

divisible by 88:

If any no. is divisible by 11 & 8, then that no. is exactly divisible by 88.

divisible by 72:

If any no. is divisible by 8 & 9, then that no. is exactly divisible by 72.

1. from the following, which no. is divisible by 2?

a) 492 b) 321 c) 654 d) 295

492 → Even no.

2. from the following, which no. is divisible by 3?

a) 421 b) 352 c) 690 d) 281

690 → 6+9+0 = $\frac{15}{3} = 5$

3. from the following, which no. is divisible by 4 ?
a) 821 b) 300 c) 471 d) 315

300 — last 2 digits are 00's.

4. from the following, which no. is divisible by 6 ?
a) 735426 b) 83145 c) 1600759 d) 843.

$7+3+5+4+2+6 = \frac{27}{3} = 9.$

5. from the following, which no. is divisible by 8 ?.
a) 15376 b) 50839 c) 91300 d) 6392.

$15376 \rightarrow \frac{376}{8} = 47$

6. from the following, which no. is divisible by 11 ?.
a) 53259 b) 3476 c) 5384 d) 931436.

$3+7 = 10$
$4+6 = 10$

7. from the following, which no. is divisible by 45?.
a) 632745 b) 9310469 c) 3248632 d) none.

$6+3 = 9$
$2+7 = 9$
$4+5 = 9.$

8. Find the least no. of x if 537x42 is exactly divisible by 9.

$537x42 \rightarrow 3+6=9$

9

$x = 6$

9. If 34 is added to a no., the result is equal to the double of that no. & 30 less. Find that no. ?

$$34 + x = 2x - 30$$

$$64 = x$$

$$64 + 34 = 2 \times 64 - 30$$

$$98 = 128 - 30$$

$$98 = 98$$

10. Find a no., which is as much greater than 486, is that much less than 720.

$$x - 486 = 720 - x$$

$$2x = 1206$$

$$x = 603$$

11. If a no. is tripled, its value is reduced by 18, that value is equal to the double of that no. & added to 12. Find that no. ?

$$3x - 18 = 2x + 12$$

$$x = 12 + 18$$

$$x = 30$$

$$3 \times 30 - 18 = 2 \times 30 + 12$$

$$72 = 72$$

12. A no. is increased by 4 times & 10 is reduced, & that is divided by 5, obtains a result 20. Find that no.

$$\frac{4x - 10}{5} = 20$$

$$4x - 10 = 100$$

$$4x = 110$$

$$x = \frac{110}{4} = 27.5$$

13. If a no. is multiplied by 15, its value increases by 196. find that no. ?

$$15x = x + 196$$
$$14x = 196$$
$$x = \frac{196}{14} = 14.$$

14. If a no. is divided by 4, then that no. decreased by 12. find that no. ?

$$\frac{x}{4} = x - 12.$$
$$x = 4x - 48$$
$$3x = 48$$
$$x = 16.$$

15. If 10 is decreased from $\frac{2}{3}$rd of a no., then the value thus obtained is equal to $\frac{3}{5}$ th of the same no.. find that no. ?

$$\frac{2}{3}x - 10 = \frac{3}{5}x$$
$$\frac{2}{3}x - \frac{3}{5}x = 10$$
$$\frac{10x - 9x}{15} = 10$$
$$x = 150.$$

16. If 44 is added to $\frac{4}{7}$ th of a no., then the value thus obtained is equal to $\frac{5}{6}$ th of the same no.. find that no. ?

$$\frac{4}{7}x + 44 = \frac{5}{6}x$$
$$44 = \frac{5}{6}x - \frac{4}{7}x$$
$$44 = \frac{35x - 24x}{42}$$
$$44 \times 42 = 11x$$
$$168 = x$$

17. $\frac{3}{4}$ th of $\frac{2}{3}$rd of $2\frac{1}{2}$ times of a no. is equal to 40. Find the no. ?

$2\frac{1}{2} = \frac{5}{2}$

$$\frac{3}{4} \times \frac{2}{3} \times \frac{5}{2} x = 40$$

$$\frac{5}{4} x = 40$$

$$5x = 160$$

$$x = \frac{160}{5} = 32.$$

18. The value of 10% of 20% of $\frac{4}{7}$th part of a no. is 40. Find that no. ?

$$\frac{10}{100} \times \frac{20}{100} \times \frac{4}{7} x = 40.$$

$$\frac{4}{350} x = 40$$

$$x = \frac{40 \times 350}{4}$$

$$x = 3500.$$

* 19. The sum of the digits of a 2 digit no. is 8. If the digits of the no. are interchanged, then its value increases by 18. Find that no. ?

a) 53 b) 35 c) 26 d) 62.

$$\begin{array}{r} 35 \\ -53 \\ \hline 18 \end{array} \checkmark$$

20. The Sum of the digits of a 2 digit no. is 9. If the digits are interchanged, then its value decreases by 27. Find that no.?

a) 54 b) 63 c) 72 d) 81

$$\begin{array}{r} 63 \\ -36 \\ \hline 27 \end{array}$$

21. When the places of a 2 digit no. are interchanged, its value is increased by 45. Find the difference of the 2 digits?

$$\frac{45}{9} = 5.$$

22. When the digits of a 2 digit no. are interchanged, its value increased by 27. Find the difference b/w the 2 digits.

23. The Product of 2 no.'s is 385, Sum is 40, Find the no.'s

$$x+y = 40$$
$$xy = 385.$$
$$\frac{1}{x} + \frac{1}{y} = \frac{y+x}{xy} = \frac{40}{385} = \frac{8}{77}$$

24. Product of 2 no.'s is 20, Sum of their Squares is 41, find the Sum of the 2 no.'s?

$$(x+y)^2 = x^2+y^2+2xy, \quad x^2+y^2 = 41.$$
$$= 41 + 2 \times 20$$
$$x+y = \sqrt{81}$$
$$x+y = 9$$

25. Sum of 2 no.'s is 42, their Product is 437. find the difference b/w the 2 no.'s ?.

$x+y = 42$ ...

$xy = 437$.

$(x+y)^2 - (x-y)^2 = 4xy$

$42 - (x-y)^2 = 4(437)$

$1764 - 1748 = (x-y)^2$

$16 = (x-y)^2$

$\sqrt{16} = x-y$

$4 = x-y$

26. The sum of a no. & its square is 182. Find that no.

a) 12 b) 15 c) 13 d) 14

$x+x^2 = 182$.

$13+169 = 182$

27. Sum of 2 no.'s is 48 & difference b/w 2 no.'s is 14, then find the difference b/w the squares of the 2 no.'s ?

$(a^2-b^2) = (a+b)(a-b)$

$a^2-b^2 = (48)(14)$

$a^2-b^2 = 672$

28. Difference b/w 2 no.'s is 22 & the difference b/w the Squares of the 2 no.'s is 1320. Then find the Sum of the 2 no.'s?

426

$$a^2 - b^2 = (a+b)(a-b)$$

$$1320 = (a+b)\,22$$

$$\frac{1320}{22} = a+b$$

$$60 = a+b$$

29. Sum of 2 no.'s is 60, difference is 20, find the Product?

$$(a+b)^2 - (a-b)^2 = 4ab$$

$$(60)^2 - (20)^2 = 4ab$$

$$3600 - 400 = 4ab$$

$$\frac{3200}{4} = ab$$

$$800 = ab$$

30. Sum of 2 digits is 48, difference is 12, find the Largest no.?

$$x + y = 48$$
$$x - y = 12$$
$$\overline{2x = 60}$$
$$x = 30$$

31. 20% of a no. = 25% of another no., Sum of the two no. is 72. Find the Largest no. ?

$$\frac{20}{100}x = \frac{25}{100}y$$

$$\frac{1}{5}x = \frac{1}{4}y$$

$$4x = 5y$$

$$\frac{x}{y} = \frac{5}{4}$$

$$\frac{5}{9} \times \overset{8}{72} = 40$$

32. A student instead of multiplying a no. with $\frac{2}{3}$, he multiplied it with $\frac{4}{5}$, so that no. increased by 24, find that no. ?

$$\frac{2}{3}x + 24 = \frac{4}{5}x$$

$$\frac{4}{5}x - \frac{2}{3}x = 24$$

$$\frac{12x - 10x}{15} = 24$$

$$2x = 24 \times 15$$

$$x = 180$$

33. A person gave $\frac{1}{3}$rd of his income to his wife, $\frac{1}{4}$th to his son, & $\frac{1}{5}$th to his daughter. He saved 65000/-. Find the share of his wife.

$$\frac{1}{3} + \frac{1}{4} + \frac{1}{5}$$

$$\frac{20+15+14}{60} = \frac{47}{60} > \frac{13}{60}$$

$$13 \longrightarrow \overset{5000}{65000}$$

$$60 \longrightarrow ?$$

$$= 300,000/- \longrightarrow \frac{1}{3} \times \overset{1,00,000}{3,00,000} = 1,00,000/-$$

34. A person gave $\frac{1}{5}$rd of his income to his son, $\frac{1}{3}$rd to his daughter & the remaining he distributed equally among his 4 grand daughters. He gave 2,10,000/- to each granddaughter. Find his income?

$\frac{1}{5}+\frac{1}{3}=\frac{3+5}{15}=\frac{8}{15}>\frac{7}{15}$

$2,10,000 \times 4 = 8,40,000$

$7 \longrightarrow 8,40,000$

$1 \longrightarrow 1,20,000$

$15 \longrightarrow ?$

18,00,000/-

35. In the total length of a flag pole, $\frac{2}{3}$rd is coloured green, In the remaining, $\frac{3}{5}$th is coloured red, In the remaining, $\frac{1}{3}$rd is coloured black, the remaining 8cms is coloured orange, find the length of the Pole?

$x \times \frac{1}{3} \times \frac{2}{3} \times \frac{3}{5} = 8\text{cm}$

$\frac{x}{15} = 4\text{ cm}.$

$x = 90\text{cm}$

36 If the value of a Numerator of a fraction is increased by 1, its value changes to $\frac{4}{5}$, & if the value of a denominator is decreased by 1, its value changes to $\frac{3}{4}$. Find that fraction? 429

a) $\frac{4}{7}$ b) $\frac{2}{3}$ c) $\frac{3}{5}$ d) $\frac{5}{7}$

$\frac{3}{5}$ $\begin{cases} +1 \rightarrow 4/5 \\ -1 \rightarrow 3/4 \end{cases}$

→ If 'n' is an odd number, in a^n+b^n, then a^n+b^n is divisible by a+b.

→ If 'n' is an odd number, in a^n-b^n, then a^n-b^n is divisible by a-b.

→ If 'n' is an even number, then its divisible by (a+b) & (a-b).

1. $2^{10} - 1024$

$2^{10} - 2^{10}$

$(2^3+2)(2^3-2)$

25 21

5 x 5 3 x 7

2. $49^{10} - 1$

$(49-1)(49+1)$

48 50

6 x 8 5 x 10

2 x 3 2x2x2 2 x 5

3. $10^{11} - 10 = 11$ → Bases are equal, so powers are equal.

→ If 4^{20} is divided by 3, find the reminder — 1

→ If 90^{120} is divided by 89, find the reminder — 1

→ If 7^{53} is divided by 6, find the reminder — 1

Note: If asked to divide a no. by its earlier no., then the reminder is always 1.

→ If 2^{40} is divided by 3, then the reminder is — 1

→ If 2^{25} is divided by 3, then the reminder is — 2.

→ If 5^6 is divided by 6, then the reminder is — 1

→ If 7^{29} is divided by 8, then the reminder is — 4.

Note: If the power of the given no., is an even no., then the answer is always 1. & If the power of the given no., is an Odd no., then the answer is the base itself.

a) $\sqrt{7\sqrt{7\sqrt{7\sqrt{7}}}}\ldots\alpha$

b) $\sqrt{5\sqrt{5\sqrt{5\sqrt{5}}}}\ldots\alpha$

c) $\sqrt{30\sqrt{30\sqrt{30}}}\ldots\alpha$

1) 7 2) 5 3) 30 → Answers.

a) $\sqrt{7\sqrt{7\sqrt{7}}}\ldots\ 2^3$

b) $\sqrt{5\sqrt{5\sqrt{5\sqrt{5}}}}\ldots\ 2^4$

c) $\sqrt{30\sqrt{30\sqrt{30\sqrt{30\sqrt{30}}}}}\ldots\ 2^5$

1) $7^{4/8}$ 2) $5^{15/16}$ 3) $30^{31/32}$ → Answers.

a) $\sqrt{12+\sqrt{12+\sqrt{12+\ldots}}}$ — 4×3.

b) $\sqrt{12-\sqrt{12-\sqrt{12\ldots}}}$ — 4×3.

c) $\sqrt{30-\sqrt{30-\sqrt{30\ldots}}}$ — 5×6

d) $\sqrt{20+\sqrt{20+\sqrt{20\ldots}}}$ — 4×5

Answers: a) 4 b) 3 c) 5 d) 5.

Note:

We have to take side by side no.'s, if + then take big no., if - then take small no.

* Find the difference b/w the place value & face value of 4 in the number 563992.

400 — place value.
- 4 — face value.
396

* Convert 89 into Binary form?

2 | 89
2 | 44 — 1
2 | 22 — 0
2 | 11 — 0
2 | 5 — 1
2 | 2 — 1
1 — 0 ↑
↳ 1

1011001 — is the Binary form of 89.

* Convert 1011001 into Numeric form?

1011001 →

$1 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$.

$64 + 0 + 16 + 8 + 0 + 0 + 1 = 89$.


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L.C.M - H.C.F:

1. LCM - Least of all common multiples

2. HCF - Highest common factor (or) G.C.D

- L.C.m. of certain numbers is exactly divisible by each of the numbers [2, 3, 4] = 12

- H.C.F of certain numbers divides L.C.m. of same numbers.
[12, 18, 24] = 6

H = 6
L = 72

$$\begin{array}{r|l} 6 & 12, 18, 24 \\ \hline 2 & 2, \ 3, 4 \\ \hline & 1, 3, 2. \end{array}$$

- L.C.m of prime numbers is equal to product of them [3, 5, 7] = 3 × 5 × 7 = 105.

- H.C.F of prime numbers is equal to 1 (or) relative prime numbers.

- H.C.F. of co-prime numbers is 1.

- product of two numbers = Their L.C.m. × H.C.F.

$$ab = [a,b]\,(a,b)$$

$$L \times H = ab$$

- L.C.m of fractions = $\frac{\text{L.C.m. of Numerators}}{\text{H.C.F. of Denominators}}$

- H.C.F of fractions = $\frac{\text{H.C.F of Numerators}}{\text{L.C.m. of Denominators}}$

- L.C.m. ← all primes & Highest powers.

- H.C.F. —— Common primes & Least powers.

Find the LCm and H.C.F of 18, 24, 36 & 48.

Sol:-

6	18, 24, 36, 48
3	3, 4, 6, 8
2	1, 4, 2, 8
2	1, 2, 1, 4
	1, 1, 1, 2

H.C.F = 6

L.C.m = 144

Find the LCm and HCF of 90, 36, 108, 162.

Sol:-

6	90, 36, 108, 162
3	15, 6, 18, 27
2	5, 2, 6, 9
2	5, 2, 3, 3
	5, 1, 1, 3

H.C.F = 18

L.C.m = 1620.

1. Find the HCF of 720, 180, 1440, 960.

Sol:-

10	720, 180, 1440, 960
6	72, 18, 144, 96
3	12, 3, 24, 16
4	4, 1, 8, 16
2	1, 1, 2, 4
	1, 1, 1, 2

H.C.F = 10×6 = 60

L.C.m = 2880.

2. Find the L.C.M. and H.C.F of $2^4 \times 3^2 \times 5$, $2^3 \times 3^3 \times 5 \times 7^2$, $2^5 \times 3^2 \times 5^2 \times 7$.

Sol:- L.C.m. $= 2^5 \times 3^3 \times 5^2 \times 7^2$

H.C.F $= 2^3 \times 3^2 \times 5^1 = 8 \times 9 \times 5 = 360$.

3. Find the L.C.m and H.C.F of $2^5 \times 3^2 \times 7^2$, $2^3 \times 3 \times 5^2$, $3^2 \times 5^2 \times 7^2$, $2 \times 3^3 \times 5^3 \times 7^1$

Sol:- L.C.m $= 2^5 \times 3^3 \times 5^3 \times 7^2$

H.C.F $= 3^1$

4. Find L.C.m. & H.C.F. of 60^5, 75^3, 45^2

Sol:- 60^5 75^3 45^2

$(2 \times 3 \times 2 \times 5)^5$ $(3 \times 5 \times 5)^3$ $(3 \times 3 \times 5)^2$

$(2^2 \times 3 \times 5)^5$ $(3 \times 5^2)^3$ $(3^2 \times 5)^2$

$(2^{10} \times 3^5 \times 5^5)$, $3^3 \times 5^6$, $3^4 \times 5^2$

L.C.m $= 2^{10} \times 3^5 \times 5^6$, H.C.F $= 3^3 \times 5^2 = 9 \times 25 = 225$.

5. Find L.C.m & H.C.F of $(36)^3$, $(48)^2$, $(15)^4$

Sol:- $(36)^3$ $(48)^2$ $(15)^4$

$(2 \times 2 \times 3 \times 3)^3$ $(2 \times 2 \times 2 \times 2 \times 3)^2$ $(3 \times 5)^4$

$(2^2 \times 3^2)^3$ $(2^4 \times 3)^2 = 2^8 \times 3^2$

$2^6 \times 3^6$, $= 2^8 \times 3^2$ $= 3^4 \times 5^4$

L.C.m $= 2^8 \times 3^6 \times 5^4$, H.C.F $= 3^2 = 9$

6. Find LCM of $\frac{18}{55}, \frac{9}{143}, \frac{15}{121}$

Sol:

$$\begin{array}{r|l} 3 & 18, 9, 15 \\ \hline 3 & 6, 3, 5 \\ \hline & 2, 1, 5 \end{array}$$

LCM = 90

$$\begin{array}{r|l} 11 & 55, 143, 121 \\ \hline & 5, 13, 11 \end{array}$$

H.C.F = 11

$$\frac{\text{L.C.M of Numerator}}{\text{H.C.F of Dinominator}} = \frac{90}{11}$$

7. Find H.C.F of $\frac{18}{25}, \frac{72}{125}, \frac{54}{25}$

Sol:

$$\text{H.C.F} = \frac{\text{HCF of Numerator}}{\text{Lcm of Dinominator}}$$

$$\begin{array}{r|l} 18 & 18, 72, 54 \\ \hline & 1, 4, 3 \end{array}$$

H.C.F = 18

$$\begin{array}{r|l} 5 & 25, 125, 25 \\ \hline 5 & 5, 25, 5 \\ \hline & 1, 5, 1 \end{array}$$

L.C.M = 125

$$\frac{18}{25}$$

8. Find L.C.M of 0.18, 0.36, 0.72, 1.2

Sol: $0.18 \times 100, 0.36 \times 100, 0.72 \times 100, 1.2 \times 100$

$$\begin{array}{r|l} 3 & 18, 36, 72, 120 \\ \hline 2 & 6, 12, 24, 40 \\ \hline 3 & 3, 6, 12, 20 \\ \hline 2 & 1, 2, 4, 20 \\ \hline 2 & 1, 1, 2, 10 \\ \hline & 1, 1, 1, 5 \end{array}$$

$3 \times 2 \times 3 \times 2 \times 2 \times 5 = \frac{360}{100} = 3.60$ (or) 3.6

=

9. Find the Lcm of 2.4, 0.18, 1.2, 3.6.

Sol: $2.4\times100,\ 0.18\times100,\ 1.2\times100,\ 3.6\times100$

$6 \mid 240, 18, 120, 360$

$3 \mid 40, 3, 20, 60$

$20 \mid 40, 1, 20, 20$

$2, 1, 1, 1$

$\therefore 6\times3\times20\times2 = \frac{720}{100} = 7.2$

10. Find HCF of 0.12, 0.18, 0.15, 1

Sol: $0.12\times100,\ 0.18\times100,\ 0.15\times100,\ 1\times100$

$1 \mid 12, 18, 15, 100$

1

$\frac{1}{100} = 0.01$

11. L.C.M and H.C.F of two numbers are 270 & 18. If one number is 54 then find the second number?

Sol:

$L = 270,\ H.C.F = 18,\ a = 54,\ b = ?$

$L.C.m \times H.C.F = a\,b$

$\frac{270}{90} \times 18 = 54 \times b$

$b = 90 \Rightarrow 2^{nd}$ number.

12. The LCM & HCF of two numbers are 693 & 11 respectively. If one number is 77 find the second number?

Sol:

$LCm \times HCF = a \times b$

$\frac{693}{99} \times 11 = 77 \times b$

$b = 99.$

13. The product of LCM & HCF of two numbers is 216. If one number is 18. Find the second number?

Sol:

$LCm \times HCF = a\,b$

$216 = 18 \times b$

12

$b = 12$

14. The Lcm of two numbers is 15 times of their HCF. The sum of their Lcm & HCF is 80. If one number is 25, then find the 2nd number.

Sol:- Lcm = 15 H, L+H = 80, a=25, b=?

15H+H=80

Lcm = 15(5)

16H=80

Lcm = 75

H = 5

L × H = a × b

75 × 5 = 25 × b

b = 15

15. The sum of two numbers is 100. The Lcm & HCF of them are 495 & 5 respectively. Find the difference of two numbers?

Sol:- a+b = 100, Lcm = 495, HCF = 5.

ab = L × H

= 495 × 5

= 5 × 99 × 5

= 5 × 9 × 11 × 5

= 45 × 55   45+55=100 ✓ sum

a−b = 55 − 45

= 10 ✓ difference

16. The difference between two numbers is 2, product of their Lcm & HCF is 24. (a) 6,4 (b) 4,8 (c) 3,2 (d) 5,4

Sol:- a−b = 2   L×H = 24

a·b = L×H

ab = 24 — a=6, b=4

a−b = 2

17. The ratio of two numbers is 3:2 respectively. The product of their Lcm and HCF is 864. Find the greatest number?

Sol:- a=3x, b=2x, Lcm × HCF = 864

ab = L × H

3x × 2x = 864

$6x^2 = 864$, $x^2 = 144$

x = 12

Greatest number = 3x

= 3 × 12

= 36.

18. Two numbers are in the ratio 3:2 respectively their H.C.F is 5. How many pairs of such numbers are possible & Find two numbers?

Sol:- Numbers = Ratio × HCF

$(3:2) \times 5 \Rightarrow 15:10.$

19. Three numbers are in the ratio 3:2:5 their H.C.F is 20. Find greatest of them?

Sol:- number

$(3:2:5) \times 20$

$\rightarrow 60:40:100$ (greatest)

20. Three numbers are in the ratio 2:3:6 their H.C.F is 12. Find the sum of the three numbers?

Sol:- $(2+3+6) \times 12 \Rightarrow 11 \times 12$

$= 132.$

21. Three numbers are in the ratio 3:4:6 their H.C.F is 5, then find their L.C.M?

Sol:-

$3 \mid 3, 4, 6$

$2 \mid 1, 4, 2$

$1, 2, 1$

H.C.F = 5

$12 \times 5 = 60.$

$3 \times 2 \times 2 = 12,$

another

$(3:4:6) \times 5$

$5 \mid 15, 20, 30$

$3 \mid 3, 4, 6$

$2 \mid 1, 4, 2$

$1, 2, 1$

$5 \times 3 \times 2 \times 2 = 60.$

22. Four numbers are in the ratio 3:2:6:4 their H.C.F is 20. Find their LCM?

Sol:-

$3 \mid 3, 2, 6, 4$

$2 \mid 1, 2, 2, 4$

$1, 1, 1, 2$

$3 \times 2 \times 2 = 12 \times 20 = 240$

23. Four numbers are in the ratio 3:2:4:6, their H.C.F. is 12. Find the LCM of smallest and greatest of them?

Sol:-

$2 \mid 2, 6$

$1, 3$

$2 \times 3 = 6 \times 12$

$= 72$

24. Three numbers are in the ratio 3:2:4 respectively, their LCM is Find HCF of them?

Sol:

$$2 \mid 3, 2, 4$$
$$3, 1, 2$$

$2 \times 3 \times 2 = 12 \Rightarrow \frac{48}{12} = 4$

25. Three numbers are in the ratio 5:4:6 and their is 3600. Find their H.C.F?

Sol:

$$2 \mid 5, 4, 6$$
$$5, 2, 3$$

$2 \times 5 \times 2 \times 3 = 60 \Rightarrow \frac{3600}{60} = 60 = H.C.F$

Another

$$2 \mid 5x, 4x, 6x$$
$$2 \mid 5, 4, 6$$
$$5, 2, 3$$

$60x = 3600$

$x = 60 = H.C.F.$

26. Four numbers are in the ratio 3:5:6:10. Their L.C.M. is 4800. Find their H.C.F?

Sol:

$$3 \mid 3, 5, 6, 10$$
$$2 \mid 1, 5, 2, 10$$
$$5 \mid 1, 5, 1, 5$$
$$1, 1, 1, 1$$

$3 \times 2 \times 5 = 30 \Rightarrow \frac{4800}{30} = 160 = H.C.F$

27. Three numbers are in the ratio 6:4:3 respectively. The L.C.M. is 1440. Find the greatest number of them?

Sol:

$$3 \mid 6, 4, 3$$
$$2 \mid 2, 4, 1$$
$$1, 2, 1$$

$3 \times 2 \times 2 = 12 \Rightarrow \frac{1440}{12} = 120 \times 6$

$= 720.$

28. Three numbers are in the ratio 3:4:8. Their L.C.M. is 96. Find Smallest number?

If number asked H.C.F is Compulsory.

Sol:

$$2 \mid 3, 4, 8$$
$$2 \mid 3, 2, 4$$
$$3, 1, 2$$

$2 \times 2 \times 3 \times 2 = 24 = \frac{96}{24} = 4 = H.C.F.$

Smallest number $= 4 \times 3$

$= 12.$

29. product of two numbers is 150. Their H.C.F is 5. How many pairs of such numbers can be possible?

Sol:

$(a:b)\times 5$

$5a \cdot 5b = 150$

$25ab = 150$

$ab = 6$ — (3:2), (1:6) — 2 pairs

Another method:-

$\frac{150}{5\times 5} = 6$ — 2:3, 1:6

2 pairs.

30. The product of two numbers is 270. Their H.C.F is 3. Find the number of pairs of the numbers satisfying these two numbers.

Sol:

$\frac{270}{3\times 3} = 30$ — 2:15, 3:10, 1:30, 5:6 — 4 pairs

31. The product of two numbers is 3125. Their HCF is 25. Find two numbers?

Sol:

$\frac{3125}{25\times 25} = \frac{125}{5} = 5$ — (1:5)

Numbers = $(1:5)\times 25$

$= 25:125$.

32. The sum of two numbers is 216 and their H.C.F is 27. How many pairs of such numbers can be possible?

Sol:

$(a:b)\times 27$

$27a + 27b = 216$

$27(a+b) = 216$

$a+b = 8$ — (1,7), (2,6) x, (3,5), (4,4) x — co-primes don't take

(1,7), (3,5) — 2 pairs

33. Sum of two numbers is 192. Their H.C.F. is 16. Find the number of pairs such numbers satisfying the given conditions?

Sol:

$\frac{192}{16} = 12$ — (1,11) ✓, (2,10), (3,9), (4,8), (5,7) ✓, (6,6) — pairs.

34. The LCM of certain numbers is 120. which of the following can be their HCF. (a) 18 (b) 9 (c) 15 (d) 36

Sol:

$$\frac{120}{15} = 8$$

3 | 15, 12, 18
2 | 5, 4, 6
5, 2, 3

$= 180$

35. The HCF of certain numbers is 12. which of the following can be their LCM. (a) 288 (b) 86 (c) 98 (d) 278

Sol:

$$\frac{288}{12} = 24$$

36. Find the Least number which is exactly divisible by 15, 24, 12, 18

Sol:

3 | 15, 24, 12, 18
3 | 5, 8, 4, 6
2 | 5, 8, 4, 2
2 | 5, 4, 2, 1
5, 2, 1, 1

$3 \times 3 \times 2 \times 2 \times 2 \times 5 = 360.$

37. Find the Least number which when divided by 36, 18, 24, 12 leaving the remainder 2 in each case?

Sol:

LCM + Remainder

3 | 36, 18, 24, 12
2 | 12, 6, 8, 4
3 | 6, 3, 4, 2
2 | 2, 1, 4, 2
1, 1, 2, 1

$3 \times 2 \times 3 \times 2 \times 2 = 72$

$= 72 + 2$

$= 74.$

38. Find the smallest number which when divided by 15, 18, 45, 36 leaving the remainder 3 in each case?

Sol:

LCM + Remainder

3 | 15, 18, 45, 36
3 | 5, 6, 15, 12
2 | 5, 2, 5, 4
5 | 5, 1, 5, 2
1, 1, 1, 2

$15 = 3 \times 5$
$18 = 2 \times 3^2$
$45 = 3^2 \times 5$
$36 = 2^2 \times 3^2$

$2^2 \times 3^2 \times 5 = 4 \times 9 \times 5$

$= 180 + 3$

$= 183.$

$3 \times 3 \times 2 \times 5 \times 2 = 180 + 3$

$= 183$

39. Find the least number which when divided by 16, 24, 48 and 15. Leaving the remainder 13, 21, 45 & 12 respectively.

Sol: : LCM – Common Difference.

16	24	48	15
13	21	45	12
3	3	3	3

2	16, 24, 48, 15
2	8, 12, 24, 15
2	4, 6, 12, 15
3	2, 3, 6, 15
2	2, 1, 2, 5
	1, 1, 1, 5

$2\times2\times2\times3\times2\times5 = 240 - 3$

$= 237$

40. Find the smallest number which when divisible by 12, 15, 18, 20 leaving the remainders 8, 11, 14 & 16 respectively.

Sol: LCM – Common Difference

12	15	18	20
8	11	14	16
4	4	4	4

3	12, 15, 18, 20
2	4, 5, 6, 20
2	2, 5, 3, 10
5	1, 5, 3, 5
	1, 1, 3, 1

$3\times2\times2\times5\times3 = 180 - 4$

$= 176$

41. Find the least square which is exactly divisible by 24, 18, 27, 15.

Sol:

3	24, 18, 27, 15
3	8, 6, 9, 5
2	8, 2, 3, 5
2	4, 1, 3, 5
	2, 1, 3, 5

$[3\times3\times2\times2\times2\times3\times5]\times2\times3\times5$

$= [3\times2\times2\times3\times5]^2$

$= [180]^2$

$= 32400.$

42. Find the least square which is exactly divisible by 25, 30, 15, 36

Sol:

5	25, 30, 15, 36
3	5, 6, 3, 36
2	5, 2, 1, 12
2	5, 1, 1, 6
3	5, 1, 1, 3
	5, 1, 1, 1

$\Rightarrow 5\times5\times3\times3\times2\times2$

$= [5\times3\times2]^2$

$\Rightarrow [30]^2$

$\Rightarrow 900.$

43. Find the least number which when added by 4 is exactly divisible by 15, 8, 6, 9.

Sol:

3	15, 8, 6, 9
2	5, 8, 2, 3
2	5, 4, 1, 3
	5, 2, 1, 3

Lcm

+ → −
− → +
× → $\frac{a}{b}$
$\frac{a}{b}$ → ×

$3 \times 2 \times 2 \times 2 \times 5 = 360 - 4$

$= 356$

44. Find the least number which when decreased by 3, divisible by 36, 45, 25 & 12.

Sol:

5	36, 45, 25, 12
3	36, 9, 5, 12
3	12, 3, 5, 4
4	4, 1, 5, 4
	1, 1, 5, 1

$5 \times 3 \times 3 \times 5 \times 4 = 900 + 3$

$= 903$

45. Find the smallest number which when multiplied by 5, is exactly divisible by 30, 45, 25 and 15.

Sol:

5	30, 45, 25, 15
3	6, 9, 5, 3
2	2, 3, 5, 1
	1, 3, 5

$5 \times 3 \times 2 \times 3 \times 5 = \frac{450}{5} = 90.$

46. Find the least number which when divided by 4, 6, 8, 12 leave the remainder 1, but when divided by 7 leaves no remainder.

(or)

Find the least number of 7 multiple, which when divided by 4, 6, 8, 12 leave the remainder 1 in each case?

Sol:

2	4, 6, 8, 12
2	2, 3, 4, 6
3	1, 3, 2, 3
	1, 1, 2, 1

$2 \times 2 \times 3 \times 2 = 24$

$24K + 1$ – original number

$\frac{24K+1}{7} = 3K + 1$

$K = 1 \Rightarrow 3(1) + 1 = 4$

$K = 2 \Rightarrow 3(2) + 1 = \frac{7}{\uparrow} = 1(0)$ remainder

$\Rightarrow K = 1 \Rightarrow 24(1) + 1 = 25$

$K = 2 \Rightarrow 24(2) + 1 = 49$ ✓ (least number)

42. Find the least number, which when divided by 5, 6, 7, 8 leave the remainder 3 in each case but when divided by 9 leaves no remainder.

Sol:

$2 \mid 5, 6, 7, 8$

$5, 3, 7, 4$

$2 \times 5 \times 3 \times 7 \times 4 = 840$

$840K + 3$

$\frac{840K+3}{9} = 3K + 3$

$K=1 \Rightarrow 3(1)+3=6$

$K=2 \Rightarrow 3(2)+3=9$ ✓

$\Rightarrow K=1$

$= 840(2)+3$

$= 1680 + 3$ ✓

$= 1683$ ✓

43. Find the least number of 4 digits which is divisible by 12, 15, 18 and 24.

Sol:

$3 \mid 12, 15, 18, 24$

$2 \mid 4, 5, 6, 8$

$2 \mid 2, 5, 3, 4$

$1, 5, 3, 2$

$3 \times 2 \times 2 \times 5 \times 3 \times 2 = 360$

Least 4 digit number.

$360 \mid 1000 \mid 2$

720

280

Divisor − Remainder

$360 - 280 = 80$

$1000 + 80 = 1080$

44. Find the smallest number of 5 digits which is divisible by 15, 12, 9 and 20 exactly.

Sol:

$3 \mid 15, 12, 9, 20$

$5 \mid 5, 4, 3, 20$

$3 \mid 1, 4, 3, 4$

$4 \mid 1, 4, 1, 4$

$1, 1, 1, 1$

$3 \times 5 \times 3 \times 4 = 180$

Least 5 digits number

$180 \mid 10000 \mid 55$

900

1000

900

100

Divisor − Remainder

$180 - 100 = 80$

$10,000 + 80 = 10,080$

is the least number of 5 digits which is exactly divisible

45. Find the greatest of 4 digits which is divisible by 20, 15, 12 and 18 exactly!

Sol:

$3 \mid 20, 15, 12, 18$

$5 \mid 20, 5, 4, 6$

$4 \mid 4, 1, 4, 6$

$2 \mid 2, 1, 2, 3$

$1, 1, 1, 3$

$3 \times 5 \times 2 \times 2 \times 3 = 180$

Greatest 4 digit number

$180 \mid 9999 \mid 55$

900

999

900

99

$\Rightarrow 9999 - 99 = 9900$

46. 5 Bells commence to toll at intervals of 2 sec, 4 sec, 6 sec, 8 sec and 10 sec respectively. How many times will they all together toll in 30 minutes?

Sol:-

2	2, 4, 6, 8, 10
2	1, 2, 3, 4, 5
2	1, 1, 3, 2, 5
	1, 1, 3, 1, 5

$2 \times 2 \times 2 \times 3 \times 5 = 120$ sec

$\frac{120 \text{ sec}}{60 \text{ sec}} = 2$ minutes

$\frac{30}{2} = 15 + 1 = 16$ times

1 → First toll

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47. 5 Bells toll at intervals of 5 sec, 6 sec, 7 sec, 10 sec and 12 sec respectively. If they started simultaneously. How many times will they all together toll in one hour excluding the ring at the first?

Sol:-

2	5, 6, 7, 10, 12
3	5, 3, 7, 5, 6
5	5, 1, 7, 5, 2
	1, 1, 7, 1, 2

$2 \times 3 \times 5 \times 7 \times 2 = \frac{420 \text{ sec}}{60 \text{ sec}} = 7$ minutes

$\frac{60}{7} = 8$ (R)

$= 8$ times

48. At a cross road four traffic signals change at intervals of 48 sec, 60 sec, 72 sec and 40 sec respectively. If the 4 signals all together are changed at 8:30 Am when will they all together changed again?

Sol:- Firstly take prime to easily solving.

3	48, 60, 72, 40
2	16, 20, 24, 40
2	8, 10, 12, 20
2	4, 5, 6, 10
5	2, 5, 3, 5
	2, 1, 3, 1

$3 \times 2 \times 2 \times 2 \times 5 \times 2 \times 3 = \frac{720 \text{ sec}}{60 \text{ sec}}$ (12)

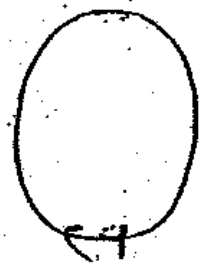
$= 12$ min

8:30 Am + 12 min = 8:42 Am

49. 4 mens A, B, C, D are running around a circular track. A can complete one revolution around the circular track in 12 minutes. B in 15 min, C in 10 min, D in 20 min. They started at same time with the same direction from the same place, after how much time will they together meet again at the starting point?

Sol:-

3	12, 15, 10, 20
2	4, 5, 10, 20
2	2, 5, 5, 10
5	1, 5, 5, 5
	1, 1, 1, 1



H.C.F Applications: $3\times2\times2\times5 = 60$ min = 1 hour, after 1 hour they meet all togt

50. Find the greatest number which divides 286 & 230 & 110 exactly

Sol:-

2	286, 230, 110
	143, 115, 55

HCF = 2

51. Find the greatest number which divides 1540, 990, 1650.

Sol:-

10	1540, 990, 1650
11	154, 99, 165
	14, 9, 15

HCF = 10×11 = 110.

52. Find the greatest possible length of a stick which can measure 240 meters, 150 meters, 180 meters and 300 meters exactly?

Sol:-

30	240, 150, 180, 300
	8, 5, 6, 10

HCF = 30 meters

10	240, 150, 180, 300
3	24, 15, 18, 30
	8, 5, 6, 10

10×3 = 30 meters

53. Find the greatest quantity of a vessel which can measure 3 containers of 270 litres, 450 litres, 180 litres and 630 litres exactly.

Sol:-

10	270, 450, 180, 630
9	27, 45, 18, 63
	3, 5, 3, 7

HCF = 10×9 = 90 meters

54. Find the greatest number which when divide 487, 546, 801 leaving the remainders 3, 2, 1 respectively

Sol:-

```
      487    546    801
      -3     -2     -1
   ----------------------
   4 | 484 , 544 , 800
     --------------------
       121 , 136 , 200
```

= 4 is the answer.

55. Find the greatest number which when divide 630, 755, 1005, 1130 leaving the remainder 5 in each case?

greatest number [illegible] H.C.F [illegible] Lcm [illegible] only. 4 digits (or) 5 digits [illegible] greatest number [illegible]

Sol:-

```
        630    755    1005    1130
        -5     -5     -5      -5
      ------------------------------
  125 | 625 ,  750 ,  1000 ,  1125
      ------------------------------
        5   ,  6   ,  8    ,  9
```

greatest num = 125.

56. Find the greatest number which when divide 484, 1200, 840 and leaving the same remainder in each case?

Sol:-

```
      1200     840     1200
     -840     -484    -484
   ----------------------------
   4 | 360 ,  356 ,   716
     --------------------------
       90 ,   89 ,    179
```

greatest number which is divisible, is 4.

45. The diagonal of a quadrilateral is 40 cm. 10 cm & 15 cm are drawn to the diagonal. Then find its Area?

Sol:

$$\text{Area} = \frac{1}{2} d(h_1 + h_2)$$

$$= \frac{1}{2} \times 40 (10+15)$$

$$= \frac{1}{\cancel{2}} \times \overset{20}{\cancel{40}} \times 25 = 500 \text{ Sq.cm.}$$

(13)

46. If the radius of a circle is 7 cm then find its diameter circumference and area.

Sol:

$r = 7$.

① $d = 2r$

$= 2 \times 7 = 14 \text{ cm}$

② $2\pi r = 2 \times \frac{22}{7} \times 7 = 44 \text{ cm}$

③ Area $= \pi r^2$

$= \frac{22}{\cancel{7}} \times \cancel{7} \times 7$

$= 154 \text{ Sq.cm}$

For lengthy values go with back Substitution, when divisible by 11, 99x - Blogic. When π involve don't convert answer into points until answer come.

47. Find the area of the circle having the diameter 35 cm.

Sol:

$d = 35$

$$\text{Area} = \frac{\pi d^2}{4} = \frac{1}{\cancel{4}_2} \times \frac{\overset{11}{\cancel{22}}}{\cancel{7}} \times \overset{5}{\cancel{35}} \times 35$$

$$= \frac{55 \times 35}{2} = \frac{1925}{2} = 962.5$$

962.5

$9+2=11$
$6+5=11$
$11-11=0$.

48. Find the circumference of the circle having the diameter 21 cm.

Sol:

$d = 21 \text{ cm}$

Circumference of circle, $\pi d = \frac{22}{\cancel{7}} \times \overset{3}{\cancel{21}}$

$= 66 \text{ cm}$.

(or)

$2r = 21$

$r = \frac{21}{2}$

$2\pi r = 2 \times \frac{\overset{11}{\cancel{22}}}{\cancel{7}} \times \frac{\overset{3}{\cancel{21}}}{\cancel{2}}$

$= 22 \times 3 = 66 \text{ cm}$.

49. If the area of the circle is 616 Sq.cm. Then find its circumference?

Sol:

$\pi r^2 = 616$

$\frac{\overset{2}{\cancel{22}}}{\cancel{7}} r^2 = \frac{\overset{28}{\cancel{616}}}{\cancel{7}}$

$r^2 = 28 \times 7$

$r^2 = 196 \Rightarrow r = 14 \text{ cm}$.

(b) $2\pi r = 2 \times \frac{22}{\cancel{7}} \times \frac{\overset{2}{\cancel{14}}}{1}$

$= 88 \text{ cm}$.

(it is also divisible by 4 because π is involved)

@ (a) 55 (b) 88 (c) 67 (d) 143

remaining one not divisible by both 2 & 11. → 2 and 4 both are divisible because last number is odd even. 143 bcoz of divisible of 11.

50. If the circumference of circle is 132 cm then find its area?

Sol:

$2\pi r = 132$

$2 \times \frac{22}{\cancel{7}} \times r = \frac{\overset{3}{\cancel{21}}}{\cancel{132}}$

$r = 21 \text{ cm}$.

$\text{Area} = \pi r^2 = \frac{22}{\cancel{7}} \times \overset{3}{\cancel{21}} \times 21$

$= 66 \times 21$

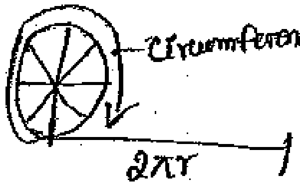
$= 1386 \text{ Sq.cm}$.

(↓ even)

first decide odd numbs turn divisible by 11

51. Find the distance covered by a circular wheel of radius 14cm in 50 rotations. ~~find the area~~?

Sol:



Distance $= n \times 2\pi r$

$= 50 \times 2 \times \frac{22}{7} \times 14$

$= 100 \times 44$

$= 4400$ rotations

It is also divisible by both 2 and 4.

52. A circular wheel covered 88 km of distance in 1000 revolutions. Find the radius of wheel?

Sol:

$D = n \times 2\pi r$

$88\,km = 1000 \times 2 \times \frac{22}{7} \times r$

$88 \times 1000\,m = 1000 \times \frac{44}{7} \times r$

$r = 14\,m.$

53. If the radius of the semi circle is 28 cm then find its Area and perimeter?

Sol:

$r = 28\,cm$

(a) Area $= \frac{\pi r^2}{2} = \frac{1}{2} \times \frac{22}{7} \times 28 \times 28$

$= 44 \times 28 = 1232$ sq.cm

(b) perimeter $= \frac{36}{7} r$

$= \frac{36}{7} \times 28$

$= 144$ cm.

54. If the perimeter of a semi circle is 180 cm and find its area?

Sol:

perimeter $\frac{36}{7} r = 180$

$r = 35\,cm$

Area $\frac{\pi r^2}{2} = \frac{22}{7} \times 35 \times 35$

$= \frac{22 \times 175}{2}$

$= \frac{3850}{2}$ sq.cm.

$= 1925$ sq.cm

$175 \times 22 = 350 + 3500 = 3850$

55. The area of a semi circle is 308 cm Then find its perimeter?

~~perimeter~~

Area $\frac{\pi r^2}{2} = 308$

$\frac{1}{2} \times \frac{22}{7} \times r^2 = 308$

$r^2 = 28 \times 7$

$r^2 = 196$

$r = 14$

$\frac{36}{7} \times 14$

$= 72\,cm.$

13. AREAS PERIMETERS

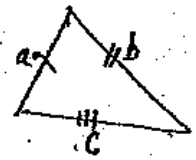
1. Triangle :-

Area $= \frac{1}{2} bh$

h – height / corresponding Altitude
b – base

2. Scalene Triangle :-

(a) perimeter $= a+b+c$



(b) $S = \frac{a+b+c}{2}$

Half of the perimeter.

(c) Area $= \sqrt{S(S-a)(S-b)(S-c)}$

3. Isosceles Triangle :-

(a) $p = 2a+b$

(b) Area $= \frac{b}{4}\sqrt{4a^2-b^2}$

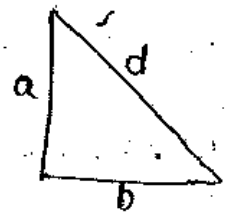
a – Equal side
b – Non-equal side

4. Right Angled Triangle :-

(a) $d^2 = a^2+b^2$

(or)

$d = \sqrt{a^2+b^2}$



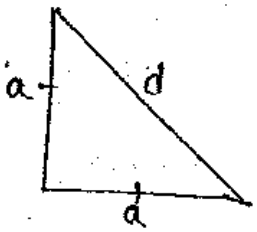
(b) perimeter $= a+b+d$

(c) Area $= \frac{1}{2} ab$

d – Hypotenuse
a – opposite
b – Base.

5. Isosceles Right Angle Triangle :-

(a) Hypotenuse $\Rightarrow d = \sqrt{2}a$



(b) perimeter $= 2a+d$

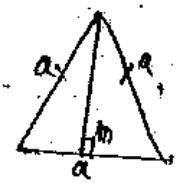
$= 2a+\sqrt{2}a$

$= (2+\sqrt{2})a$

(c) Area $= \frac{1}{2}a^2$

6. Equilateral Triangle :-

(a) perimeter $= 3a$



(b) height $= \frac{\sqrt{3}}{2}a$

(c) Area $= \frac{\sqrt{3}}{4}a^2$ (or) $\frac{h^2}{\sqrt{3}}$

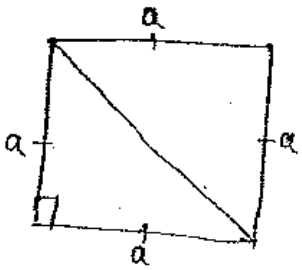
Quadrilaterals :-

1. Square :-

(a) Diagonal $(d) = \sqrt{2}a$

(b) perimeter $= 4a$

(c) Area $= a^2$ (or) $\frac{d^2}{2}$



⑧ Rectangle :-

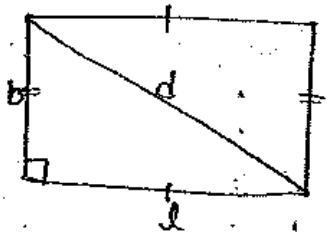
ⓐ Diagonal $d^2 = l^2 + b^2$

(or)

$d = \sqrt{l^2 + b^2}$

ⓑ perimeter $= 2(l+b)$

ⓒ Area $= lb$



l - length
b - breadth.

9. Rhombus :-

ⓐ $4a^2 = d_1^2 + d_2^2$

(or)

$a = \frac{\sqrt{d_1^2 + d_2^2}}{2}$

$d_1 d_2$ - diagonals

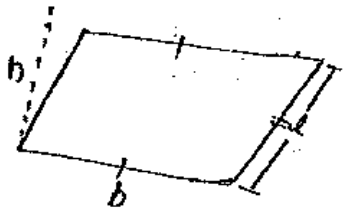
ⓑ perimeter $= 4a$

ⓒ Area $= \frac{1}{2} d_1 d_2$

10. parallelogram :-

ⓐ perimeter $= 2(l+b)$

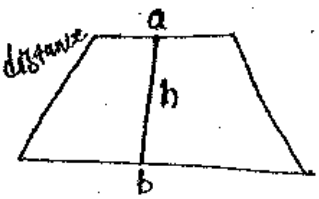
ⓑ Area $= bh$



11. Trapizium :-

a, b — parallel sides

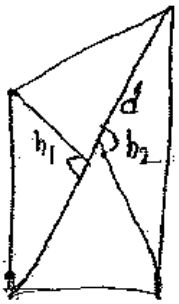
h — perpendicular distance / shortest distance between two parallel sides



Area $= \frac{1}{2} h(a+b)$

12. General Quadrilateral :-

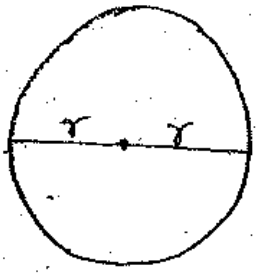
Area $= \frac{1}{2} d(h_1 + h_2)$.



d - diagonal

h_1, h_2 - $\perp^{er}$ to diagonal d

13. Circle :-



① Diameter(d) = $2r$

② Circumference (perimeter) :- (C) = $2\pi r$ (or) πd

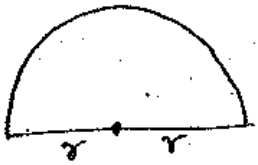
③ Area = πr^2 (or) $\frac{\pi d^2}{4}$

$\pi = \frac{22}{7}$

14. Semi-Circle :-

① perimeter = $\pi r + 2r$
$= (\pi + 2)r$
$= \frac{36}{7} r$

② Area = $\frac{\pi r^2}{2}$



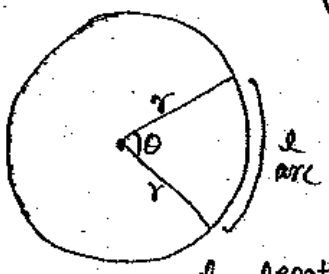
15. Sector :-

(A) perimetre = $l + 2r$

(B) length of arc

$l = \frac{\theta}{360} \times 2\pi r$

(C) Area = $\frac{\theta}{360} \times \pi r^2$ (or) $\frac{1}{2} lr$



l - length of arc
θ = Angle of sector

1. The base of a triangle is 20 cm and its height is 15 cm. Find its area

Sol:- $b = 20$ cm

$h = 15$ cm

$\text{Area} = \frac{1}{2}bh \Rightarrow \frac{1}{2} \times 20 \times 15$

Area = 150 Sq.cm.

2. The area of the triangle is 180 Sq.cm and its base is 9cm. Then find its corresponding Altitude/height?

Sol:-

$\frac{1}{2}bh = 180$, base = 9

$\frac{1}{2} \times 9 \times h = 180$

height = 40 cm.

A.P

3. In a triangle the Base and height are in the ratio 3:4 and the area of the triangle is 150 Sq.cm? Find its base?

Sol:- $b = 3x$, $h = 4x$, $\frac{1}{2}bh =$

$\frac{1}{2}bh = 150$

$\frac{1}{2} \times 3x \times 4x = 150$

$x^2 = 25 \Rightarrow x = 5$

Base $= 3x$

$= 3 \times 5$

$= 15$ cm.

4. Find the Area of the triangle whose sides are 13cm, 14cm a 15 cm.

13 cm, 14 cm, 15 cm

Sol:-

$S = \frac{a+b+c}{2} = \frac{13+14+15}{2} = \frac{42}{2} = 21.$

$\text{Area} = \sqrt{S(S-a)(S-b)(S-c)} = \sqrt{21(21-13)(21-14)(21-15)}$

$= \sqrt{21(8)(7)(6)} =$

$= \sqrt{3 \times 7 \times 4 \times 2 \times 7 \times 2 \times 3}$

$= 3 \times 7 \times 4 = 84$ Sq.cm.

5. Find the Area of the triangle whose sides are ⓐ 7cm, 8cm, 9c ⓑ 4 cm, 5 cm, $\sqrt{41}$ cm. ⓒ 3 cm, 4 cm, 5 cm

Sol:-

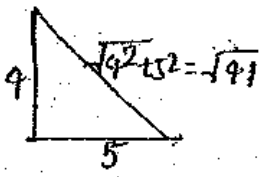
$S = \frac{a+b+c}{2} = \frac{7+8+9}{2} = \frac{24}{2} = 12$ cm

$\text{Area} = \sqrt{S(S-a)(S-b)(S-c)} = \sqrt{12(12-7)(12-8)(12-9)}$

$= \sqrt{12 \times 5 \times 4 \times 3} = \sqrt{4 \times 3 \times 5 \times 4}$

$= 12\sqrt{5}$ Sq.cm

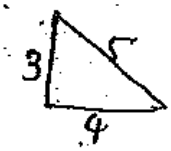
⑤ a=4cm, b=5cm, c=$\sqrt{41}$ cm.



Area = $\frac{1}{2}bh$

$= \frac{1}{2} \times 4 \times 5 \Rightarrow 10$ Sq.cm.

⑥ a=3 cm, b=4 cm, c=5 cm



$\sqrt{3^2+4^2} = \sqrt{9+16} = \sqrt{25}$

$= 5$cm

Area = $\frac{1}{2}bh$

$= \frac{1}{2} \times 3 \times 4 = 6$ Sq.cm.

Phythogoran Triplets:-

① 3, 4, 5 → ×2 → 6, 8, 10; ×3 → 9, 12, 15; ×4 → 12, 16, 20

② 5, 12, 13 → ×2 → 10, 24, 26; ×3 → 15, 36, 39

③ 8, 15, 17

④ 7, 24, 25

⑤ 9, 40, 41

⑥ 11, 60, 61

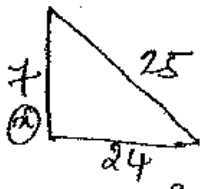
6. In a right angle triangle its Base is 24 cm, its hypotenuse is 25 cm. Then find its Area?

Sol:-

Area = $\frac{1}{2}ab$

$= \frac{1}{2} \times 7 \times 24$

$= 84$ Sq.cm



$x^2 + 24^2 = 25^2$

$x^2 = 25^2 - 24^2$

$x^2 = 625 - 576$

$x^2 = 49 = 7$

$x = 7$

7. The sides of a triangle are in the 3:4:5 respectively and its area is 150 sq.cm. Find the smallest side of the triangle.

Sol:

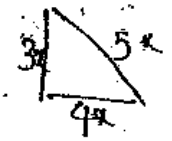
Area of right angle triangle $= \frac{1}{2}ab = 150$

$\Rightarrow \frac{1}{2} \times 3x \times 4x = 150$

$6x^2 = 150$

$x^2 = 25$

$x = 5$



Smallest side $= 3x = 3 \times 5 = 15$ cm.

When triplets given need not understand it is right angle triangle.

(5)

8. Find the diagonal and area of a right-angled isosceles triangle whose sides is 24 cm.

Sol:

$a = 24$ cm

diagonal $= \sqrt{2}a$

$\Rightarrow \sqrt{2}24 \Rightarrow 24\sqrt{2}$ cm.

(8) Area $= \frac{1}{2}a^2$

$= \frac{1}{2} \times 24 \times 24$

$= 288$ sq.cm

9. Find the area of isosceles right angle triangle if its diagonal is 36 cm.

Sol:

diagonal $= \sqrt{2}a = 36$

$a = \frac{36}{\sqrt{2}}$

Area $= \frac{1}{2}a^2$

$= \frac{1}{2} \times \frac{18}{36} \times \frac{36}{\sqrt{2}} \times \frac{36}{\sqrt{2}}$

$= \frac{18 \times 36}{2} = 324$ sq cm.

10. If the Area of isosceles right angle triangle is 800 sq.cm then find its perimeter?

Sol:

Area of a isosceles right angle triangle

$= \frac{1}{2}a^2 = 800$

$a^2 = 1600$

$a = 40$

perimeter $= (2+\sqrt{2})a$

$= (2+\sqrt{2})40$ cms

diagonal $= \sqrt{2}a$

$= 40\sqrt{2}$ cms.

11. Find the ratio of the sides of an isosceles right angled triangle?

Sol: The sides of Isosceles triangle

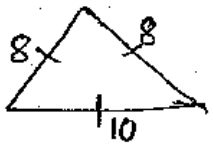
$a : a : \sqrt{2}a$

$1 : 1 : \sqrt{2}$

12. Find the Area of Isoceles triangle if its equal sides 8cm and Non-equal sides 10 cm?

Sol:

$$S = \frac{8+8+10}{2} = \frac{26}{2} = 13 \text{ cm}$$



$$\text{Area} = A = \sqrt{13 \times (13-8) \times (13-8) \times (13-10)}$$

$$= \sqrt{13 \times 5 \times 5 \times 3} \Rightarrow 5\sqrt{39} \text{ Sq.cms}$$

$\frac{b}{4}\sqrt{4a^2-b^2}$

$\frac{10}{4}\sqrt{4\times8^2-10^2}$

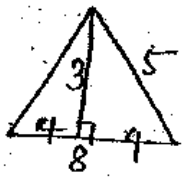
$= \frac{5}{2} \times 2\times$

13. Find the height of an Isoceles triangle if its base is 8cm and its another side is 5cm.

Sol:

height = 3 cm.

(or)



$$\frac{\sqrt{4a^2-b^2}}{2} = \frac{\sqrt{4(5)^2-8^2}}{2}$$

$$= \frac{\sqrt{4\times25-64}}{2} = \frac{\sqrt{100-64}}{2} = \frac{6}{2} = 3\text{cm}$$

14. If the side of an equilateral triangle is 8cm then find its perimeter height and area?

Sol:

Side, $a = 8\text{cm}$

(i) perimeter $= 3a = 3\times8 = 24$ cm

(ii) $h = \frac{\sqrt{3}}{2}a = \frac{\sqrt{3}}{2}\times8^4 = 4\sqrt{3}$ cm

(iii) Area $= \frac{\sqrt{3}}{4}a^2 = \frac{\sqrt{3}}{4}\times8\times8 \Rightarrow 16\sqrt{3}$ Sq cm.

15. If the perimeter of Equilateral triange is 48cm then find its Area

Sol:

perimeter, $3a = 48$

$$a = 16$$

$$\text{Area} = \frac{\sqrt{3}}{4}a^2 \Rightarrow \frac{\sqrt{3}}{4}\times16\times16 \Rightarrow 64\sqrt{3}\ \text{cm}^2$$

16. If the height of an equilateral triangle is 12 cm. then find its Area?

Sol:

$h = 12$

$$\text{height} = \frac{h^2}{\sqrt{3}} = \frac{12\times12}{\sqrt{3}} = \frac{12\times4\times\sqrt{3}\times\sqrt{3}}{\sqrt{3}}$$

$$= 48\sqrt{3} \text{ Sq.cm}$$

17. The Area of an Equilateral Triangle is $49\sqrt{3}$ Sq.cm. Find its height.

Sol:-

$\frac{h^2}{\sqrt{3}} = 49\sqrt{3}$

$h^2 = 49 \times 3$

$h = 7\sqrt{3}$ cm.

Area $= \frac{\sqrt{3}}{4}a^2 = 49\sqrt{3}$

$a^2 = 49 \times 4 = \sqrt{49 \times 4}$

$a = 7 \times 2 = 14$ cm.

height $= \frac{\sqrt{3}}{2}a \Rightarrow \frac{\sqrt{3}}{2} \times 14 = 7\sqrt{3}$ cm.

18. If the Area of an Equilateral Triangle is $121\sqrt{3}$ Sq.cm, find its perimeter

Sol:-

Area $= \frac{\sqrt{3}}{4}a^2 = 121\sqrt{3}$

$\frac{\sqrt{3}}{4}a^2 = 121\sqrt{3}$

$a^2 = 121 \times 4$

$a = 11 \times 2 = 22$ cm

perimeter $= 3a$

$= 3 \times 22$

$= 66$ cm.

19. If the perimeter and area of an equilateral triangle are numerically equal. Find its side upto 2 decimals.

Sol:-

$3a = \frac{\sqrt{3}}{4}a^2$

$\sqrt{3} \times \sqrt{3} = \frac{\sqrt{3}}{4}a$

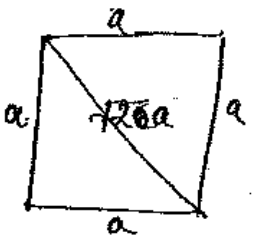
$a = 4\sqrt{3} \Rightarrow 4(1.732)$

$= 6.928$ cm

20. If the side of a square is 25 cm then find its diagonal perimeter and area?

Sol:-

$a = 25$ cm



(a) Diagonal $= \sqrt{2}a = \sqrt{2} \times 25$

$= 25\sqrt{2}$ cm

(b) Perimeter $4a = 4 \times 25 = 100$ cm

(c) Area $= a^2 = 25 \times 25 = 625$ Sq.cm

21. The perimeter of a square is 64 cm then find its Area.

Sol:-

perimeter $4a = 64$

$a = 16$ cm

Area $a^2 = (16)^2$

$= 256$ Sq.cm

17. The diagonal of a square is 18cm then find its Area?

Sol:- Diagonal $\sqrt{2}a = 18$

$a = \frac{18}{\sqrt{2}} = \frac{\sqrt{2}\times\sqrt{2}\times 9}{\sqrt{2}} = 9\sqrt{2}$ cm.

Area $= a^2 = (9\sqrt{2})^2$

$= 81\times 2 = 162$ Sq.cm

$\frac{d^2}{2} = \frac{18\times 18}{2}$

$= 162$ Sq.cm

18. If the area of a square feet is 1 Hectre. find its perimeter?

Sol:- Area $a^2 = 1,00,000$ Sq.m

$a^2 = (100)^2$

$a = 100$

perimeter $4a = 4\times 100$

$= 400$ meters

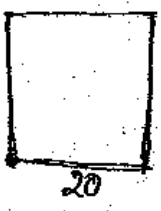
19. In what time can a man ~~who~~ with speed 18 kmph complete one revolution along with a square feet of each 20 metres?

Sol:- (perimeter) Distance $4a = 4\times 20$

$= 80$ m.

Speed $= \frac{18\times 5}{18} = 5$ m/sec

Time $= \frac{D}{S} = \frac{80}{5} = 16$ sec.



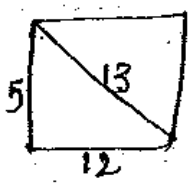
20. The length and breadth of a rectangle are 12 cm and 5 cm respectively. Then find its perimeter, diagonal and area.

Sol:- $l = 12$, $b = 5$

(a) diagonal $= \sqrt{l^2+b^2} = \sqrt{(12)^2+(5)^2} = \sqrt{169} = 13$ cm

(b) perimeter $= 2(l+b) = 2(12+5) = 2\times 17 = 34$ cm.

(c) Area $= lb = 12\times 5 = 60$ Sq.cm.



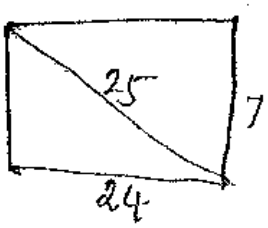
21. Find the highest possible length of a pencil which can be inscribed in a Geometry Box of 24 cm long and 7 cm wide.

Sol:-

$\sqrt{7^2+24^2} = \sqrt{49+576}$

$= \sqrt{625}$

$= 25$ cm.



22. If the length of a rectangle is 15 cm and its perimeter is 50cm. Then find its Area.

Sol:- $l = 15$,

perimeter, $2(l+b) = 50$

$l+b = 25$

$15+b = 25$

$b = 10$ cm

$lb = 15 \times 10$

$= 150$ Sq.cm

23. If the area of a rectangle is 180 Sq.m and its length is 8 m more than breadth. Find its length and breadth. (a) 15,12 (b) 18,12 (c) 18,10

Sol:- $\text{Area} = lb = 180 \longrightarrow 18 \times 10$

$l = b+8$

$l-b = 8$

product of options & see difference

product = 180

difference = 8.

24. If the perimeter of a rectangle is 140 m. and its length is 10 m more than its breadth. Find the length of the rectangle?

Sol:- perimeter $2(l+b) = 140$

$l+b = 70$

$l-b = 10$

$2l = 80$

$l = 40$ m.

25. If the perimeter of a rectangle is 82 cm and its area is 400 Sq.cm Find its length and Breadth? (a) 21cm, 20cm (b) 25cm, 20cm (c) 25cm, 16cm

Sol:- perimeter $2(l+b) = 82$

$l+b = 41$

Area $lb = 400$

$25+16 = 41$ (sum or add)

$25 \times 16 = 400$.

length = 25, breadth = 16.

26. If the diagonal of a Rectangle is 10 cm and its Area is 48 cm^2 then find its perimeter?

Sol:- Rectangle diagonal $= \sqrt{l^2+b^2} = 10$

$l^2+b^2 = 100$, Area $lb = 48$

$(l+b)^2 = l^2+b^2+2lb$

$= 100+2\times48$

$(l+b)^2 = 196$

$l+b = 14$

perimeter $2(l+b)$

$= 2 \times 14$

$= 28$ cm.

27. If the perimeter of a rectangle is 40 cm and its diagonal is 10 cm. Find its area?

Sol:- perimeter $2(l+b)=40$

$l+b=20$

Diagonal $\sqrt{l^2+b^2}=10$

$l^2+b^2=100$

$(l+b)^2 = l^2+b^2+2lb$

$(20)^2 = 100+2lb$

$400 = 100+2lb$

$2lb = 300$

$lb = 150$ Sq.cm.

28. The length of a rectangle is twice of its breadth and its perimeter is 48 cm. Find its area?

Sol:- $l:b = 2:1 \Rightarrow \frac{l}{2x}, \frac{b}{x}$

perimeter $2(l+b)=48$

$l+b=24$

$2x+x=24$

$3x=24$

$(x=8)$

Area $\Rightarrow lb = 2x \times x$

$= 2\times 8\times 8$

$= 128$ Sq.cm.

29. If length and breadth of a rectangle are in the ratio 3:2 respectively. If its area is 726 Sq.cm then find its perimeter?

Sol:- $l:b = 3:2$

$l = 3x, b = 2x.$

Area $\Rightarrow lb = 726$

$3x\times 2x = 726$

$6x^2 = 726$

$x^2 = 121$

$x = 11$

perimeter $2(l+b) =$

$2(3x+2x)$

$2(3\times 11 + 2\times 11)$

$2(33+22)$

$= 110$ cm.

30. If the length and width of a rectangle are in the ratio 4:3 respectively. And its diagonal is 25 cm then find its area?

Sol:- $l:b = 4:3$

$l = 4x, b = 3x.$

Diagonal $= \sqrt{l^2+b^2} = 25$

$\sqrt{(4x)^2+(3x)^2} = 25$

$\sqrt{25x^2} = 25$

$25x^2 = 25\times 25$

$x = 5$

Area $= lb$

$= 4x\times 3x$

$= 12x^2$

$= 12\times 25$

$= 300$ Sq.cm.

31. If one side of a square is increased by 5 cm and its another side is decreased by 5 cm then it becomes a Rectangle of Area 75 Sq.cm then find the perimeter of the original Square?

Sol:-

$(a+5)(a-5) = 75$

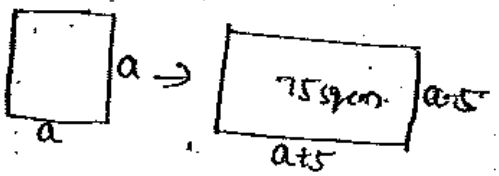
$a^2 - 5^2 = 75$

$a^2 = 75+25$

$a^2 = 100$

$a = 10$

Side of a original Square



perimeter of original square $= 4a$

$= 4 \times 10$

$= 40$ cm.

32. The area of a Rectangle is 60 Sq.cm and its length and breadth are decreased by 6 cm and 2 cm respectively then it becomes a square. Find the perimeter of original rectangle?

Sol:-

$60 = 12 \times 5$

20×3

15×4

10×6

[because all sides of square are equal]

$l - b = 4$

$l b = 60$ ← $10 \times 6 = 60$

$l - b = 4$ ← $10 - 6 = 4$

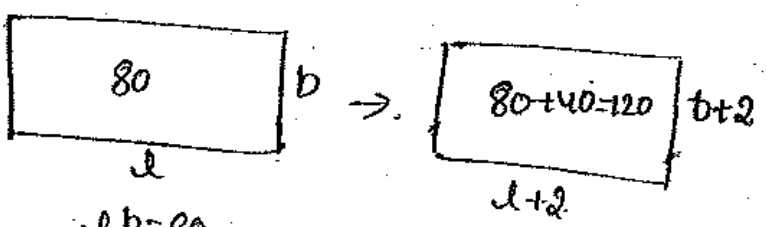
$l = 10, b = 6$

perimeter of rectangle $= 2(l+b)$

$= 2(10+6) \Rightarrow 2(16) = 32$ cm.

33. If the area of a rectangle is 80 Sq.cm if its length and width are increased by 2 cm each then its area will increase by 40 Sq.cm. what is the perimeter of the original Rectangle.

Sol:-



$l b = 80$

$(l+2)(b+2) = 120$

$lb + 2l + 2b + 4 = 120$

$80 + 2(l+b) + 4 = 120$

$2(l+b) = 120 - 84$

$2(l+b) = 36$ cm.

∴ The perimeter of a rectangle

34. Find the area of a rhombus whose diagonals 12 cm and 18 cm.

Sol:

$$\text{Area} = \frac{1}{2} d_1 d_2$$

$$= \frac{1}{2} \times 12 \times 18$$

$$= 108 \text{ Sq.cm.}$$

35. If the area of the Rhombus is 160 Sq.cm. its one of the diagonal is 12 cm then find another diagonal?

Sol:

$$\text{Area} = 160 \text{ Sq.cm}$$

$$d_1 = 12, \; d_2 = ?$$

$$\text{Area} = \frac{1}{2} d_1 d_2 = 160$$

$$\frac{1}{2} \times 12 \times d_2 = 160$$

$$d_2 = \frac{160}{6}$$

$$d_2 = \frac{80}{3} = 26.66 \text{ cm.}$$

Another diagonal = 26.66 cm.

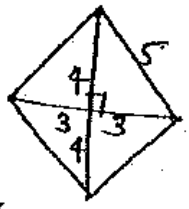
36. Diagonals of a Rhombus are 8 cm and 6 cm respectively. Find its perimeter?

Sol:

$$a = \frac{\sqrt{d_1^2 + d_2^2}}{2} = \frac{\sqrt{8^2 + 6^2}}{2} = \frac{\sqrt{100}}{2}$$

$$a = \frac{10}{2} = 5 \Rightarrow a = 5$$

perimeter $4a = 4 \times 5 = 20$ cm.



37. The perimeter of a Rhombus is 100 cm, its one diagonal is 48 cm then find its area?

Sol:

perimeter $4a = 100$

$a = 25$ cm.

$d_1 = 48, \; d_2 = 14.$

(or) $\frac{1}{2} d_1 d_2 \Rightarrow \frac{1}{2} \times 48 \times 14 \Rightarrow 336$ Sq.cm.

7, 24, 25.

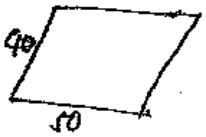
38. In a parallelogram the length of adjacent sides are 40 cm & 50 cm respectively then find its perimeter?

Sol:

$$\text{perimeter} = 2(a+b)$$

$$= 2(40+50)$$

$$= 2(90) = 180 \text{ cm}$$



39. The Base of a parallelogram is 18 cm and its corresponding Altitude is 15 cm. Then find its Area?

Sol:

$$\text{Area} = bh$$

$$= 18 \times 15$$

$$= 270 \text{ cm}^2$$

Altitude = Corresponding height

40. The adjacent sides of a parallelogram are 9cm and 8 cm. Its one of the diagonal is 11 cm. Then find its Area?

Sol:-

$S = \frac{11+9+8}{2} = \frac{28}{2}$

$S = 14cm$

According to Scalar triangle.

$Area_{parallel} = 2\sqrt{s(s-a)(s-b)(s-c)}$

$= 2\sqrt{14(14-11)(14-9)(14-8)} = 2\sqrt{14\times3\times5\times6}$

$= 2\sqrt{2\times7\times3\times5\times2\times3}$

$= 2\times2\times3\sqrt{7\times5}$

$= 12\sqrt{35}\ cm^2$

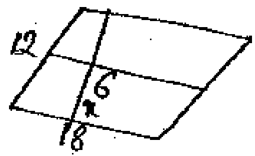
41. The adjacent sides of a parallelogram are 12cm and 18cm respectively. The distance between the shortest side is 6cm. Find the distance between the longest side of parallelogram?

Sol:-

$bh_1 = lh_2$

$18 \times x = 12 \times 6$

$x = 4$ cm.



(11 Ist model)

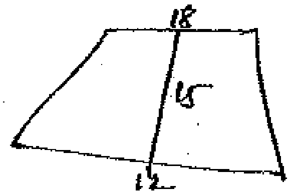
42. The parallel sides of a Trapezium are 18 cm and 12 cm respectively and the distance between them is 15 cm. Then find its Area?

Sol:-

$Area = \frac{1}{2}h(a+b)$

$= \frac{1}{2}\times15(18+12)$

$= \frac{1}{2}\times15\times30 = 225\ Sq\,cm^2$



43. The parallel sides of a Trapezium are $x+y$ and $x-y$, the distance between is x units. Find its area.

Sol:-

$Area = \frac{1}{2}h(a+b)$

$= \frac{1}{2}\times x(x+y+x-y)$

$= \frac{1}{2}\times x \times 2x = x^2$ Sq. units

44. If the area of a Trapezium is 180 sq.cm and the distance between two parallel sides is 10 cm. If one of its parallel side is 9cm then find another parallel side?

Sol:-

$Area = \frac{1}{2}h(a+b) = 180$

$\frac{1}{2}\times10(9+b) = 180$

$45 + 5b = 180$

$5b = 135$, $b = 27$ cm.

55. The length of arc of a circle is 10 cm and the radius of the circle is 8 cm. Then find its perimeter and Area.

Sol:- $l = 10\text{cm}$, $r = 8$.

(A) $l + 2r = 10 + 2\times 8 = 26\text{cm}$.

(B) $\frac{1}{2} lr = \frac{1}{2} \times 10 \times 8 = 40\ \text{cm}^2$.

56. The area of a sector is 150 Sq.cm and radius of a circle is 5 cm. Then find length of Arc of a sector?

Sol:- $\frac{1}{2} lr = 150$, $r = 5\text{cm}$

$\frac{1}{2} \times l \times 5 = 150$

$l = 60$ cm.

57. The Angle of a sector of circle is 60° and the radius of the circle is 21 cm. Then find its Area?

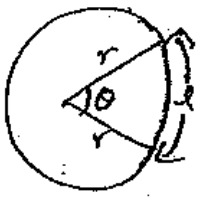
Sol:- $\theta = 60°$, $r = 21$ cm

$\text{Area} = \frac{\theta}{360} \times \pi r^2$

$= \frac{60}{360} \times \frac{22}{7} \times 21 \times 21$

$= 11 \times 21 = 231\ \text{cm}^2/\text{Sq.cm}$

58. The Angle of a sector of a circle is 72° and the radius of a circle is 35 cm. what is the length of Arc of sector?



Sol:- $\theta = 72°$, $r = 35\text{cm}$

$l = \frac{\theta}{360} \times 2\pi r \Rightarrow \frac{72}{360} \times 2 \times \frac{22}{7} \times 35$

Length of an arc is = 44 cm.

59. In a circle, length of Arc of a sector is 22 cm. The radius of the circle is 21 cm. Find the angle of sector?

Sol:- $l = 22\text{cm}$, $r = 21\text{cm}$, $\theta = ?$

$l = \frac{\theta}{360} \times 2\pi r$

$22 = \frac{\theta}{360} \times 2 \times \frac{22}{7} \times 21 \Rightarrow \theta = 60°$

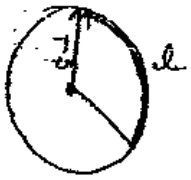
60. In a clock the length of minute hand is 7cm, How much distance will the minute hand travel in 20 minutes.

1 min = 6°

Sol:-

$r = 7cm, \theta = 20 \text{ min}$

$= 20 \times 6 = 120°$



$l = \frac{\theta}{360} \times 2\pi r$

$l = \frac{\cancel{120}^{1}}{\cancel{360}_{3}} \times 2 \times \frac{22}{\cancel{7}} \times \cancel{7}$

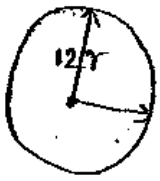
$l = \frac{44}{3} cm = 14.33 cm$

61. In a clock, the length of a minute hand is 12cm. Find the area of a region covered by minute hand in 15 min.

Sol:-

$r = 12 cm, \theta = 15 \text{ min}$

$= 15 \times 6° = 90°$



$\frac{1}{\cancel{4}_{2}} \times \frac{\cancel{22}^{11}}{\cancel{7}_{1}} \times \frac{\cancel{12}^{3}}{\cancel{7}_{1}} \times \cancel{12}^{3}$

$\cancel{12}^{3} \times \cancel{12}^{3}$

$\cancel{144}^{72}$

$Area = \frac{\theta}{360} \times \pi r^2$

$Area = \frac{\cancel{90}^{1}}{\cancel{360}_{4}} \times \frac{22}{7} \times \cancel{12}^{3} \times 12 \Rightarrow \frac{36 \times 22}{7} \Rightarrow \frac{\cancel{792}^{113}}{\cancel{7}_{1}} = 113\frac{1}{7} cm^2$

62. The area of a sector is $\frac{1}{6}$ th of the area of its circle. Find the Angle of sector?

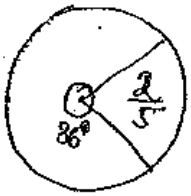
Sol:-

$\frac{1}{\cancel{6}} \times \cancel{360}^{60} = 60°$

63. The area of a sector is $\frac{2}{5}$ th of the area of its circle. Find the Angle of sector?

Sol:-

$\frac{2}{\cancel{5}} \times \cancel{360}^{72} = 144°$



Applications:-

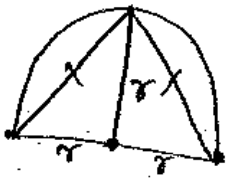
64. Find the area of the largest triangle which is inscribed in a semi circle of radius r.

Sol:-

$b = 2r, h = r$

$\frac{1}{2} bh = \frac{1}{2} \times 2r \times r$

$= r^2$ sq.units



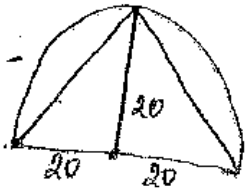
radius: the distance between from one point to any point of the circle.

65. Find the area of the largest triangle which can be inscribed in a semi circle of radius 20 cm.

Sol:-

$\frac{1}{2} bh = \frac{1}{\cancel{2}} \times \cancel{40}^{20} \times 20$

$= 400$ Sq.cms.

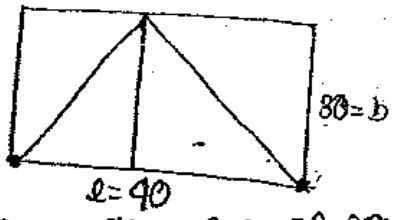


66. Find the area of the largest triangle which can be inscribed in a triangle rectangle of dimensions 40 cm and 30cm.

Sol:- $b=40$, $h=30$

$\frac{1}{2}bh = \frac{1}{2}\times 40 \times 30$

$= 600$ Sq.cm

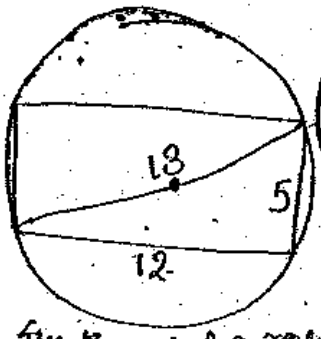


67. A largest rectangle is inscribed in a circle the dimensions of rectangle are 12 cm x 5 cm. Find the radius of the circle?

Sol:-

diagonal = 13 = $\frac{13}{2}$

then radius = 6.5 cm



the diagonal of a rectangle is equal to the diameter of a circle

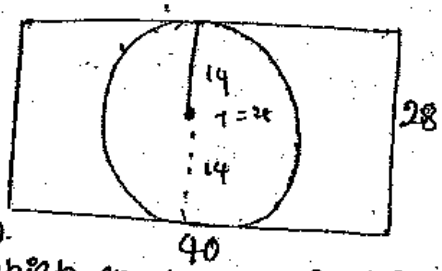
68. Find the area of the largest circle inscribed in a rectangle of dimensions 40cm x 28 cm.

Sol:- width of □ is diameter of ○

radius = $\frac{28}{2}$ = 14cm.

Area = $\pi r^2 = \frac{22}{7}\times 14 \times 14$

$= 22 \times 28 \Rightarrow 616$ Sq.cm.



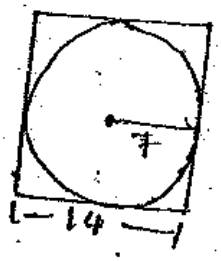
69. Find the area of the largest circle which can be inscribed in a square of each side 14 cm.

Sol:- Side of □ = diameter of ○

$r = \frac{14}{2} = 7$ cm

Area $\pi r^2 = \frac{22}{7}\times 7 \times 7$

$= 154$ Sq.cm.

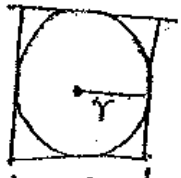


Inside square, circle is called Incircle, and radius Inradius.

Outside square, circle is called Circum circle.

70. Find the ratio of the Inradius and Circum radius of a square.

Sol:-



Diagonal of a square is equal to diameter of a circle

$\sqrt{2}a = 2R$

$\therefore R = \frac{a}{\sqrt{2}}$

$r = \frac{a}{2}$

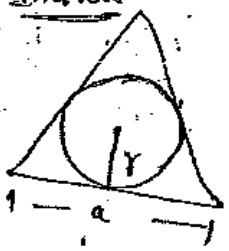
Ratio of their Areas = $(1:\sqrt{2})^2 = 1:2$

$r : R = \frac{a}{2} : \frac{a}{\sqrt{2}} = \sqrt{2} : 2 = 1:\sqrt{2}$ $\therefore r:R = 1:\sqrt{2}$

71. Find the ratio of inradius & circum radius of an Equilateral triangle?

Sol:- Inradius $r = \frac{a}{2\sqrt{3}}$

Incircle



Circumcircle

Circum radius, $R = \frac{a}{\sqrt{3}}$

Ratio of their radii

$r : R = \frac{a}{2\sqrt{3}} : \frac{a}{\sqrt{3}}$

$= \frac{1}{2} : 1$

$r : R = 1 : 2$

(b) The ratio of Areas $= (1:2)^2 = 1:4$

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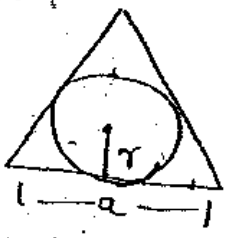
72. A circle of radius $6\sqrt{3}$ cm, is inscribed in an equilateral triangle. find the area of an equilateral triangle?

Sol:- Square-Rectangle



$r = \frac{a}{2\sqrt{3}}$

$6\sqrt{3} = \frac{a}{2\sqrt{3}}$

$a = 2\sqrt{3} \times 6\sqrt{3}$

$a = 12 \times 3$

$a = 36$ cm.

Area of equilateral triangle $= \frac{\sqrt{3}}{4} a^2$

$= \frac{\sqrt{3}}{4} \times 36 \times 36$

$= 324\sqrt{3}$ Sq.cm.

73. The side of a square is equal to the radius of a circle then find the ratio of their areas?

Sol:-

$a = r$

Area of Square = Area of circle

$a^2 = \pi r^2$

$r^2 : \pi r^2$

$1 : \pi$

$1 : \frac{22}{7}$

$7 : 22$

74. If the side of a square and the radius of a circle are same. Find the ratio of perimeter of a square and the circumference of a circle?

Sol:-

$a = r$

$4a : 2\pi r$

$4r : 2\pi r$

$2 : \pi$

$2 : \frac{22}{7}$

$= 1 : \frac{11}{7}$

$= 7 : 11$

15. If the perimeter of a square and circumference of a circle are equal. Find the ratio of their Areas?

Sol:- $4a = 2\pi r$

$2a = \pi r$

$a = \frac{\pi r}{2}$

Areas: $a^2 : \pi r^2$

$\left(\frac{\pi r}{2}\right)^2 : \pi r^2$

$\frac{\pi^2 r^2}{4} : \pi r^2 \Rightarrow \frac{\pi}{4} : 1$

$= \pi : 4$

$= \frac{22}{7} : 4^2$

$= 11 : 14$

*FBD models

16. A metal wire is bent in the form of a square encloses the area of 1089 Sq.cm. Find the area of the region covered by the same metal wire. If it is bent into the form of a circle?

Sol:-

1089

$a^2 = 1089$

$a^2 = (33)^2$

$a = 33$

?

perimeter of square P_S = P_C Circumference of circle

$4a = 2\pi r$

$\frac{4 \times 33}{2} = 2 \times \frac{22}{7} \times r$

$r = 21$ cm

Area of circle $= \pi r^2$

$= \frac{22}{7} \times 21 \times 21$

$= 66 \times 21$

$= 1386$ Sq.cm.

17. A metal wire is bent in the form of an equilateral triangle encloses 121$\sqrt{3}$ Sq.cm. what is the area if it is bent in the form of a circle?

Sol:-

121$\sqrt{3}$

$\frac{\sqrt{3}}{4} a^2 = 121\sqrt{3}$

$a^2 = 484$

$a^2 = (22)^2$

$a = 22$

!

perimeter of Equilateral = Circumference of circle

$3a = 2\pi r$

$3 \times 22 = 2 \times \frac{22}{7} \times r$

$r = \frac{21}{2}$

Area of circle $= \pi r^2$

$= \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2}$

$= \frac{33 \times 21}{2}$

$= \frac{693}{2} = 346.5$ Sq.cm.

18. If length of a rectangle is increased by 20% and its breadth is increased by 25%. what is the growth percentage of Area?

Sol:-

$100\% \times \frac{120}{100} \times \frac{125}{100}$

$= 150\% - 100\%$

$= 50\%$ growth

79. If each side/diagonal/perimeter of a square is raised by 50%. what is the growth percentage of its area?

Sol:

$100\% \times \frac{150}{100} \times \frac{150}{100}$ because a^2 is the side.

$= 225\%$

$= 225\% - 100\%$

$= 125\%$ growth

80. If the length of a rectangle is doubled and its width is tripled. How many times of its area will increased?

Sol:

$100\% \times \frac{200}{100} \times \frac{300}{100}$ (if becomes gives 6 times, including 1) (increase means -100%).

$= 600\% - 100\%$

$= 500\% = 5$ times

F.B.O Asked

81. If the radius of the circle is doubled. How many times will its Area increased.

Sol: Area $= \pi r^2$

$100\% \times \frac{200}{100} \times \frac{200}{100}$

$= 400\% - 100\% \Rightarrow 300\% = 3$ times.

82. If the Base of a triangle is raised by 50% and its height is decreased by 20%. what is the change percentage of its area?

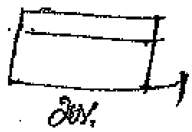
Sol:

$\frac{150}{100} \times \frac{80}{100} \times 100\%$

$= 120\% - 100\%$

$= 20\%$ growth

83. If the length of a rectangle is increased by 20%. By how much percentage should its breadth be decreased in order to maintain the same Area?



Sol:

$\frac{120}{100} \times \frac{x}{100} \times 100\% = 100\%$

$x = \frac{500}{6} = \frac{250}{3}$

$= 83.33\%$

$100 - 83.33 = 16.66\% \downarrow$

84. If the length of a rectangle is increased by 20%. By how much percent should its breadth be decreased to increase 8% of its Area.

Sol:- $\frac{120}{100} \times \frac{x}{100} \times 100\% = 108$

$x = 90\%$

$100\% - 90\% = 10\%$ decrease

85. The area of a Square is increased by 44%. what is the growth percentage of its side / diagonal / perimeter?

Sol:- "a^2"

$\frac{x}{100} \times \frac{x}{100} \times 100\% = 144$

Question from this model. $x^2 = 144 \times 100$

$x = 12 \times 10$

$x = 120\%$

$120\% - 100\% = 20\%$ growth.

86. If the area of a circle is reduced by 19%. what is the reduction percentage of its radius?

Sol:- "πr^2"

$\frac{x}{100} \times \frac{x}{100} \times 100\% = 81$

$x^2 = 81 \times 100$

$x = 9 \times 10 = 90\%$.

$100\% - 90\% = 10\%$ decrease

NOTE:-

- The ratio of sides / radii / of two equilateral / Square / circles / semi circles is $x:y$
- ⓐ The ratio of their heights / diagonals / Diameters $= x:y$
- ⓑ The ratio of their perimeters / circumferences $= x:y$
- ⓒ The ratio of their Areas $= x^2:y^2$.

87. The ratio of sides of two squares is 3:4 respectively. Then find ⓐ The ratio of their diagonals

ⓑ The ratio of their perimeters

ⓒ The ratio of their Areas.

Sol:- ⓐ 3:4

ⓑ 3:4

ⓒ 9:16

88. The ratio of radii of two circles is 5:6 then find the ratio of their areas.

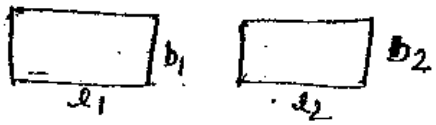
Sol: $x^2 : y^2 = 5^2 : 6^2 = 25:36$

89. If the ratio of areas of two equilateral triangles is 81:64 respectively. Find the ratio of their perimeters?

Sol: $x^2 : y^2 \rightarrow x : y = 9:8$

90. The lengths of two rectangles are in the ratio 3:5 respectively and their widths are in the ratio 5:2 respectively. What is the ratio their Areas?

Sol: $\frac{l_1}{l_2} = \frac{3}{5}$, $\frac{b_1}{b_2} = \frac{5}{2}$.



$$\frac{A_1}{A_2} = \frac{l_1 b_1}{l_2 b_2} = \frac{3}{5} \times \frac{5}{2} = \frac{3}{2}$$

$= 3:2$

91. The Bases of two triangles are in the ratio $x:y$ respectively and their Areas are in the ratio $a:b$ respectively. Find the ratio of their heights?

Sol: $\frac{b_1}{b_2} = \frac{x}{y}$ $\therefore \frac{A_1}{A_2} = \frac{a}{b}$

$$\frac{A_1}{A_2} = \frac{\frac{1}{2} b_1 h_1}{\frac{1}{2} b_2 h_2}$$

$$\frac{a}{b} = \frac{x}{y} \times \frac{h_1}{h_2}$$

$\frac{h_1}{h_2} = \frac{ay}{bx}$

$h_1 : h_2 = ay : bx$

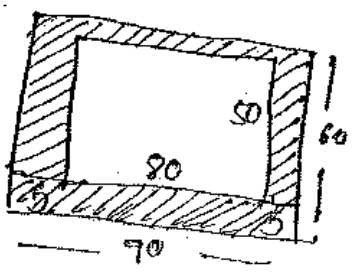
Area of path = outer Area − Inner Area

92. A path of width 5 metres is constructed around a rectangular plot of dimensions 80 m × 50 m. Find the Area of path.?

Sol: $90 \times 60 - 80 \times 50$

$= 5400 - 4000$

$= 1400$ Sq. m

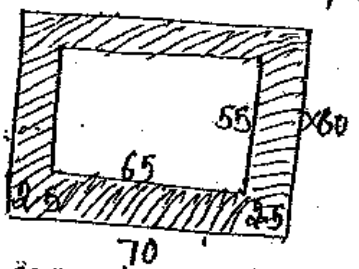


93. A path of ~~width~~ width 2.5 m is constructed around a rectangular field of dimensions 70 m × 60 m inside. Find the Area of the path?

Another method

Sol:
$70 \times 60 - 65 \times 55$
$\Rightarrow 4200 - 3575$
$\Rightarrow 625$ Sq.m

$(l+b-2w) \times 2w$
$(70+60-5) \times 5$
$= 125 \times 5$
$= 625$ Sq.m

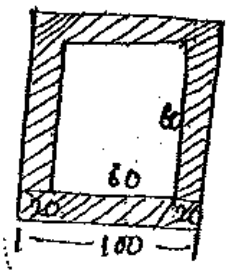


94. A path of 20 m width is constructed around a square feet of each side 60 metre. Find the Area of the path?

Sol: "jar"

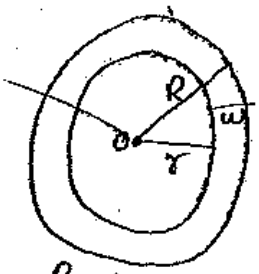
$100^2 - 60^2 \Rightarrow 10,000 - 3,600$
$= 6400$ Sq.m

Another method based on formula:
$(a+w)4w$
$(60+20)\times 4 \times 20$
$80 \times 80 = 6400$ Sq.m



NOTE:

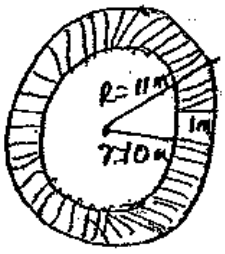
$\pi R^2 - \pi r^2$
$= \pi(R^2 - r^2)$
$= \pi(R+r)(R-r)$
$= \pi(R+r)w$



$R = r + w$
$w = R - r$

95. A circular path of width 1 m is constructed around a circular field of radius 10 m outside. what is the price to construct the path at 5/- per a square metre.

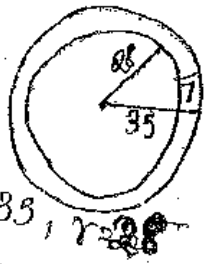
Sol:
$\pi(11^2 - 10^2)$
$= \frac{22}{7}(121-100) \Rightarrow \frac{22}{7} \times 21^3$
$= 66$ Sq.m $\times 5/-$
$= 330/-$



R = outer Radius
r = Inner circle

96. A path of width 7 m is constructed around a circular field of radius 35 m inside. what is the Area of the circular path?

Sol:
$\pi(35^2 - 28^2)$
$\frac{22}{7}(35+28)(35-28)$
$\frac{22}{7} \times 63 \times 7$
$= 1386$ Sq.m



R=35, r=28

97. There is a rectangular field dimensions 60m x 50m. Two parts of each with 5m are constructed inside of the rectangular field parallel to the length and breadth of it. What is the Area of two paths.

Sol:

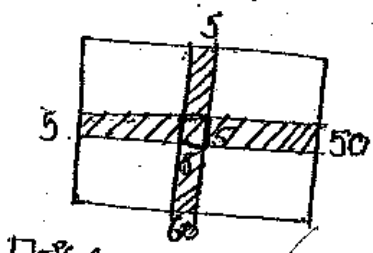
$60 \times 5 = 300$

$50 \times 5 = 250$

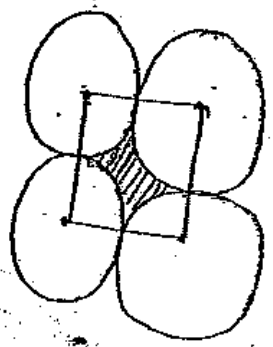
550

$5 \times 5 = 25$

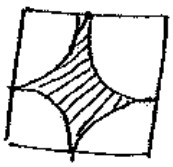
525



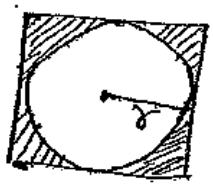
□ of 5 Square $a^2 = 5 \times 5 = 25$ Coming 2 times so, need to ~ one time.



$\frac{6}{7}r^2$



$\frac{6}{7}a^2$



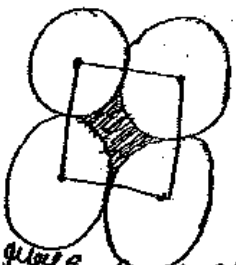
$\frac{6}{7}r^2$

98. 4 coins of each radius 7 cm are placed on a table so that the rim of each coin touches the rims of other two coins. Find the area of the region bounded by 4 coins.

Sol:

$\frac{6}{7}r^2 \Rightarrow \frac{6}{7} \times 7 \times 7$

$= 42$ Sq cm.



99. 4 cows are tied at 4 corners of a square field of each side 28 m. So that every cow is just touches the other cows. Find the area of the region ungrazed?

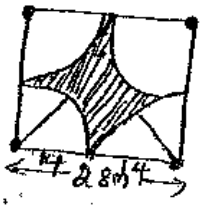
Sol:

$r = 14$

$\frac{6}{7}r^2 = \frac{6}{7} \times 14 \times 14$

$= 12 \times 14$

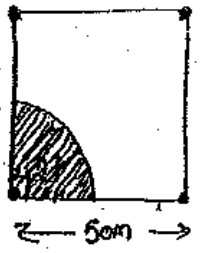
$= 168$ Sq.m



100. A cow is tied at a corner of square field of each side 50m by a rope of length 21 m. find the area of the region, which can be grazed by the cow.

Sol:

$\theta = 90°, r = 21$ m



Area of the sector $= \frac{\theta}{360} \times \pi r^2$

$= \frac{90}{360} \times \pi \times 21 \times 21$

$= \frac{1}{4} \times \frac{22}{7} \times 21 \times 21 \Rightarrow \frac{33 \times 21}{2} = \frac{693}{2} = 346.5$ Sq.m

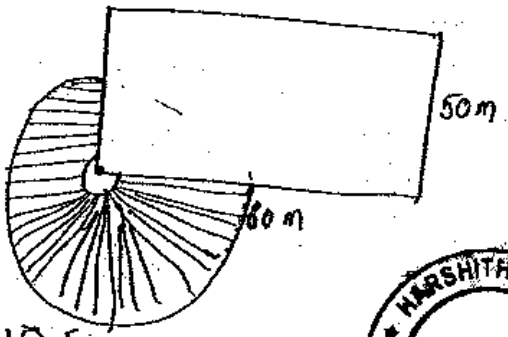
101. An ox is tied at a corner of rectangular field of dimensions 60 m × 50m with a rope of length 7m. Find the area of the region which can be grazed outside of the field:

Sol: $\theta = 270°, r = 7$m

$\frac{\theta}{360} \times \pi r^2$

$\frac{270}{360} \times \frac{22}{7} \times 7 \times 7 \Rightarrow \frac{33 \times 7}{2}$

$\Rightarrow \frac{231}{2} = 115.5$ Sq.m



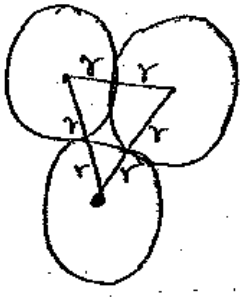
a=2r

$\frac{\sqrt{3}}{4}(2r)^2 - 3 \times \frac{\theta}{360} \pi r^2$

$\frac{\sqrt{3}}{4} \times 4r^2 - 3 \times \frac{60}{360} \times \pi r^2$

$\left(\sqrt{3} - \frac{\pi}{2}\right) r^2$

$\left(\sqrt{3} - \frac{11}{7}\right) r^2$



102. If 3 coins of each radius 14 cm are placed so that the rim of each point touches the rims of other two coins. Find the area of the region bounded by 3 coins?

Sol:

$\left(\sqrt{3} - \frac{11}{7}\right) r^2$

$= \left(\sqrt{3} - \frac{11}{7}\right) \times 14 \times 14$

$= (\sqrt{3} - 11) \times 2 \times 14$

$= (\sqrt{3} - 11)\, 28$ Sq.m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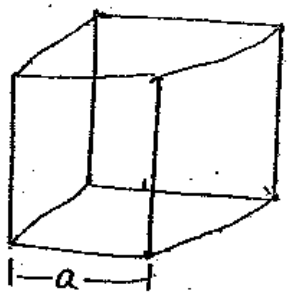
VOLUMES SURFACE AREAS

1. Cube :-



a = side of edge

Lateral Surface = Base perimeter x height
$4a \times a = 4a^2$

Total surface area = Base Area x height
Volume
$a^2 \times a = a^3$

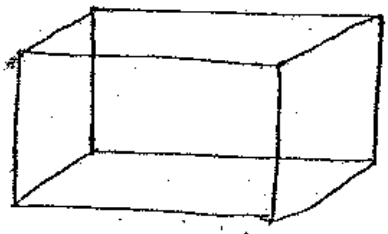
ⓐ Diagonal of a cube (d) = $\sqrt{3}\,a$.

ⓑ Lateral Surface Area (L.S.A) = $4a^2$

ⓒ Total Surface Area (T.S.A) = $6a^2$

ⓓ Volume (V) = a^3

2. Cuboid :-



l - length
b - breadth
h - height

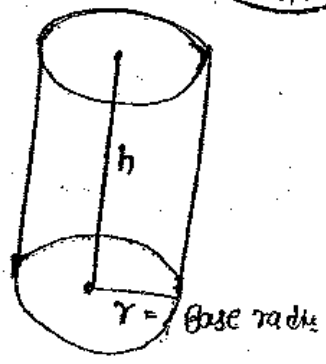
ⓐ Diagonal of cuboid (d) = $\sqrt{l^2+b^2+h^2}$

ⓑ Lateral Surface Area (L.S.A) = $2h(l+b)$

ⓒ Total Surface Area (T.S.A) = $2(lb+bh+hl)$

ⓓ Volume = lbh.

3. *** Cylinder :-

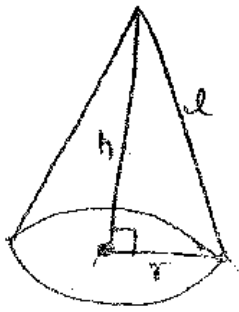


ⓐ Curved Surface Area C.S.A = $2\pi rh$
(or)
Lateral Surface Area

ⓑ Total Surface Area T.S.A = $2\pi r(h+r)$

ⓒ Volume (V) = $\pi r^2 h$

4. *** Cone :-



r - Base radius
h - height
l - Slant height

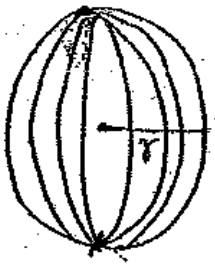
ⓐ $l^2 = h^2 + r^2$ (or) $l = \sqrt{h^2+r^2}$

ⓑ Curved Surface Area = πrl

ⓒ Total Surface Area = $\pi r(l+r)$

ⓓ Volume (V) = $\frac{1}{3}\pi r^2 h$

5. Sphere :-

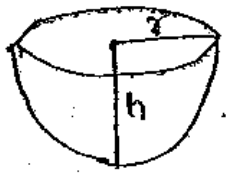


① Diameter (d) = $2r$

② Surface Area = $4\pi r^2$

③ $V = \frac{4}{3}\pi r^3$

6. Hemi Sphere :-



① Curved surface Area (C.S.A) = $2\pi r^2$
(or)
(L.S.A)

② Total surface Area = (T.S.A) = $3\pi r^2$

③ Volume (v) = $\frac{2}{3}\pi r^3$

1. The edge of a cube is 12 cm then find its diagonal, L.S.A, T.S.A and volume?

Sol: $a = 12\text{cm}$

(a) Diagonal $\sqrt{3}a = \sqrt{3} \times 12$
$= 12\sqrt{3}$ cm.

(b) L.S.A $= 4a^2 = 4 \times 12 \times 12$
$= 576$ Sq.cm

(c) T.S.A $= 6a^2 = 6 \times 12 \times 12$
$= 864$ Sq.cm

(d) Volume $= a^3$
$= (12)^3$
$= 1728$ cu.cm/cm^3

2. If the diagonal of a cube is 15 cm then find its T.S.A?

Sol: Diagonal $\sqrt{3}a = 15$

$a = \frac{15}{\sqrt{3}}$

T.S.A $= 6a^2 = \cancel{6}^{2} \times \frac{15}{\cancel{\sqrt{3}}} \times \frac{15}{\cancel{\sqrt{3}}}$

$= 450$ cm^2 (or) Sq.cm.

3. If the diagonal of a cube is 6 cm then find its volume?

Sol: Diagonal $\sqrt{3}a = 6$

$a = \frac{6}{\sqrt{3}}$

Volume $(V) = a^3 = \left(\frac{6}{\sqrt{3}}\right)^3$

$= \frac{6}{\sqrt{3}} \times \frac{6}{\sqrt{3}} \times \frac{6}{\sqrt{3}} \Rightarrow \frac{\overset{12}{\cancel{36}}}{\cancel{3}} \times \frac{2 \times \sqrt{3} \times \cancel{3}}{\cancel{\sqrt{3}}} \Rightarrow 24\sqrt{3}$ cu.cm

4. The curved surface Area of a cube is 400 Sq.cm. Then find its volume?

Sol: L.S.A $= \cancel{4}a^2 = \cancel{400}$

$a^2 = 100$

$a = 10$.

Volume $V = a^3$
$= 10 \times 10 \times 10$
$= 1000$ cm^3.

5. The total surface Area of a cube is 15,000 Sq.cm, then find its volume?

Sol: T.S.A $\cancel{6}a^2 = \overset{2500}{\cancel{15000}}$

$a^2 = 2500$

$a = 50$

Volume $a^3 = (50)^3$

$= 125,000$ cm^3

6. The volume of a cube is 9261 cm^3. Then find its T.S.A?

Sol:

Volume $V = a^3$

$a^3 = 9261$

$a^3 = 21^3$

$a = 21$

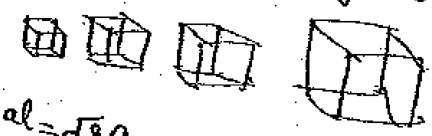
T.S.A $6a^2 = 6 \times 21 \times 21$

$= 2646$.

$1^3 = 1$, $2^3 = 8$, $3^3 = 27$, $4^3 = 64$, $5^3 = 125$, $6^3 = 216$, $7^3 = 343$, $8^3 = 512$, $9^3 = 729$, $10^3 = 1000$

(46)656 → 36 (10)648 → 22 (9)261 → 21

7. The edges of 3 cubes are 3 cm, 4 cm, 5 cm respectively. They are melted and reformed into a new Big cube. Find the diagonal of Big cube?



Sol:

Volume $= 3^3 + 4^3 + 5^3$

$= 27 + 64 + 125$

$= 216$

$= 6^3$

$a = 6cm$

Diagonal $= \sqrt{3}a$

$= \sqrt{3} \times 6$

$= 6\sqrt{3}$ cm.

A.P.
8. 5 Iron cubical blocks edges 9 cm, 6 cm, 3 cm, 3 cm, 1 cm are melted and reformed into a new cube. Find the edge of the new cube?

Sol:

Volume $= 9^3 + 6^3 + 3^3 + 3^3 + 1^3$

$= 726 + 216 + 27 + 27 + 1$

$= 1000$

$a^3 = 10^3$

$a = 10$ cm

9. The edges of 3 cubical blocks are in the ratio 3 : 4 : 5 respectively. These 3 are melted and moulded into a new cube of diagonal $12\sqrt{3}$ cm. Then find the edge of the smallest cube.

Sol:

3 : 4 : 5

3x 4x 5x

Volume $= (3x)^3 + (4x)^3 + (5x)^3$

$= 27x^3 + 64x^3 + 125x^3$

$= 216x^3$

$a^3 = (6x)^3$

$a = 6x$

Diagonal $\sqrt{3}a = 12\sqrt{3}$

$a = 12$

$6x = 12$

$x = 2$.

∴ Smallest $3x = 3 \times 2$

$= 6cm$.

10. Length, Breadth & Height of a cuboid are 12cm, 9 cm, 8cm respectively. Then find its Diagonal, L.S.A, T.S.A and volume?

Sol:- $l=12,\ b=9,\ h=8$

① Diagonal $\sqrt{l^2+b^2+h^2} = \sqrt{(12)^2+(9)^2+(8)^2} = \sqrt{144+81+64}$

$= \sqrt{289} = 17\text{cm}.$

② L.S.A $= 2h(l+b) \Rightarrow 2\times8(12+9)$

$= 16(21)$

$= 336\ \text{Sq.cm}$

③ T.S.A $= 2(lb+bh+hl) \Rightarrow 2(108+72+96)$

$= 2(276)$

$= 552\ \text{Sq.cm}.$

④ Volume $= 12\times9\times8$

$= 108\times8 \Rightarrow 864\ \text{cm}^3.$

11. Find the length of a stick which can be inscribed/fitted in a greatest possible rectangular cube of dimensions 16m×15m×12m.

Sol:- Diagonal $= \sqrt{(16)^2+(15)^2+(12)^2}$

$= \sqrt{256+225+144} = \sqrt{625}$

$= 25\text{cm}.$

12. Find the Area of 4 walls of a rectangular cube of dimensions 40m×30m×25m?

Sol:- L.S.A (or) 4 walls Area $= 2h(l+b)$

$= 2\times25(40+30)$

$= 50\times70 \Rightarrow 3500\ \text{Sq.m}.$

13. Find the total surface Area of a cuboid of dimensions 20cm×15cm×10cm

Sol:- T.S.A $= 2(lb+bh+hl)$

$= 2(20\times15+15\times10+10\times20)$

$= 2(300+150+200) \Rightarrow 2\times650$

$= 1300\ \text{Sq.cm}.$

14. How many litres of water that can be fitted/filled in a rectangular water tank of dimensions 6m×4m×2m

$1\text{m}^3 = 1000\ \text{litres}$

$1\text{l} = 1000\ \text{cm}^3$

Sol:- Volume $= lbh$

Volume $= 6\times4\times2$

$= 48\ \text{m}^3$

$= 48\times1000 = 48{,}000\ \text{litres of water}.$

15. In a cobical Block the area of 3 adjacent plains are 48 cm^2, 36 cm^2 75 cm^2. Then find its volume?

Sol:- $lb=48,\ bh=36,\ hl=75$

$V=lbh$

$lb\times bh\times hl = 48\times36\times75$

$(lbh)^2 = \sqrt{48\times36\times75}$

$V = 6\sqrt{48\times3\times25}$

$= 6\times5\sqrt{144} \Rightarrow 30\times12$

$= 360$ cu.cm/cm^3

16. The Base radius of a cylinder is 7 cm and its height is 14 cm. Then find its C.S.A, T.S.A and volume.

Sol:- (a) $C.S.A = 2\pi rh = 2\times\frac{22}{7}\times7\times4$

$= 44\times4 = 616$ sq.cm.

(b) $T.S.A = 2\pi r(h+r) = 2\times\frac{22}{7}\times7(14+7)$

$= 2\times22\times21$

$= 44\times21$

$= 924$ sq.cm

(c) volume $= \pi r^2 h$

$\pi r^2 h = \frac{22}{7}\times7\times7\times14$

$= 22\times7\times14$

$= 2156\ cm^3$

154×14

616
154
2156

17. The height of a cylinder is 21 cm. Its height is twice of its Base radius. Then find the volume of the cylinder.

Sol:- $h = 21$ cm

$h = 2r$

$r = \frac{h}{2} = \frac{21}{2}$

volume $\pi r^2 h = \frac{22}{7}\times\frac{21}{2}\times\frac{21}{2}\times21$

$= \frac{33\times441}{2}$

when π in the problem, check it options are divisible by 11 or not

$= \frac{14553}{2} = 7276.5$

1323
1323
14553

18. The height of the cylinder is 14 cm and its Base perimeter is 88 cm. Then find its total surface area?

Sol:- $h = 14$ cm, $2\pi r = 88$

$\pi r = 44$

$\frac{22}{7}\times r = 44$

$r = 14$ cm

$T.S.A = 2\pi r(h+r)$

$= 2\times\frac{22}{7}\times14(14+14)$

$= 2\times\frac{22}{7}\times14\times28$

$= 44\times56$

$= 2464$ sq.cm

264
220
2464

19. The curved surface area and the total surface area cylinder are in the ratio 2:3 respectively. Then find the ~~radius~~ ratio of height and its Base radius?

Sol:

$$\frac{2\pi rh}{2\pi r(h+r)} = \frac{2}{3}$$

$$3h = 2h+2r$$

$$h = 2r$$

$$\frac{h}{r} = \frac{2}{1} \Rightarrow \boxed{h:r = 2:1}$$

20. The base radius of a cone is 7cm and its Salent height is 10 cm then find its curved surface Area and total surface Area?

Sol:

$r = 7$ cm, $l = 10$ cm

(a) πrl (C.S.A) $= \frac{22}{7} \times 7 \times 10$

$= 220$ Sq.cm

(b) T.S.A $\pi r(l+r) = \frac{22}{7} \times 7(10+7)$

$= 22 \times 17 = 374$ Sq.cm

22×17

154
22
374

21. The height of a cone is 20 cm and its base radius is 7cm then find its volume?

Sol:

$h = 20$ cm, $r = 7$cm

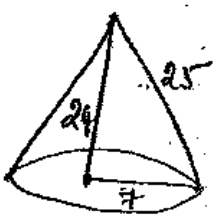
$$\text{Volume} = \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 20$$

$$= \frac{22 \times 20 \times 7}{3} \Rightarrow \frac{22 \times 140}{3} = \frac{3080}{3} \Rightarrow 1026.66 \text{cm}^3$$

22. Find the volume of the right circular cone of its Salent height 25 cm and its Base radius 7 cm?

Sol:

$l = 25$ cm, $r = 7 \Rightarrow h = 24$cm.



$$\text{Volume} = \frac{1}{3}\pi r^2 h$$

$$= \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 24^8$$

$$= 22 \times 56$$

$$= 1232 \text{ cm}^3.$$

132
110
1232

23 The curved surface Area and Total surface Area of a cone are in the ratio 3:4 respectively. Then find its Salent height and Base radius ratio?

Sol:

$$\frac{\pi rl}{\pi r(l+r)} = \frac{3}{4}$$

$$4l = 3l + 3r$$

$$l = 3r$$

$$\frac{l}{r} = \frac{3}{1}$$

$$\boxed{l:r = 3:1}$$

24. The heights of two cylinders are in the ratio 3:4 and their Base radii are in the ratio 2:3 respectively. Then find the ratio of their volume?

Sol:- $\frac{h}{H} = \frac{3}{4}$, $\frac{r}{R} = \frac{2}{3}$

$$\frac{\text{Volume}_1}{\text{Volume}_2} = \frac{\pi r^2 h}{\pi R^2 H} \Rightarrow \left(\frac{2}{3}\right)^2 \times \frac{3}{4}$$

$$\Rightarrow \frac{4}{9_3} \times \frac{3}{4}$$

$$\frac{V_1}{V_2} \Rightarrow \frac{1}{3} \Rightarrow \therefore \boxed{V_1 : V_2 = 1:3}$$

25. The volumes of two cones are in the ratio 4:9 respectively. Their radii are equal. Find the ratio of their heights?

Sol:-

$$\frac{V_1}{V_2} = \frac{4}{9}, \quad \frac{r}{R} = \frac{1}{1} \text{ (equal)}.$$

$$\frac{V_1}{V_2} = \frac{\frac{1}{3}\pi r^2 h}{\frac{1}{3}\pi R^2 H} \Rightarrow$$

$$\frac{4}{9} = 1 \times \frac{h}{H} \Rightarrow \therefore \boxed{h:H = 4:9}$$

26. If the radius of a sphere is 7cm then find its volume?

Sol:- $r = 7$ cm.

Volume $= \frac{4}{3}\pi r^3$

$= \frac{4}{3} \times \frac{22}{7} \times 7 \times 7$

$= \frac{88 \times 49}{3} = \frac{4312}{3} = 1437.33 \text{ cm}^3/\text{cu.cm}$

$d = 2r$

Surface Area $= 4\pi r^2$

Volume $= \frac{4}{3}\pi r^3$

27. Find the surface Area of a sphere of radius 21cm.

Sol:- Surface Area $= 4\pi r^2$ $\quad r = 21\text{cm}$

$= 4 \times \frac{22}{7} \times 3 \times 21$

$= 63 \times 88 \Rightarrow 5544 \text{ cm}^2$

28. If the diameter of a Hemisphere is 42 cm. Then find its curved surface Area, Total surface Area and volume?

Sol:- radius $= \frac{\text{Diameter}}{2}$

radius $= \frac{42}{2} = 21\text{cm}$

① $2\pi r^2 = 2 \times \frac{22}{7} \times 3 \times 21$

② $3\pi r^2 = 3 \times \frac{22}{7} \times 3 \times 21$

$= 66 \times 63$

$= 4158 \text{ cm}^2$

③ $\frac{2}{3}\pi r^3 = \frac{2}{3} \times \frac{22}{7} \times 3 \times 21 \times 21$

29. The total Surface Area and the volume of a cube are numerically equal then find length of its edge?

Sol:- $a^3 = 6a^2$

$a = 6$ units

30. The curved Surface and the volume of cylinder are numerically equal then find its Base Area?

Sol: $2\pi r h = \pi r^2 h$

$r = 2$

31. The Surface Area and the volume of a sphere are numerically equal its surface is π is ______.

Sol: $4\pi r^2 = \frac{4}{3}\pi r^3$

$r = 3$

$4\pi r^2 = 4\pi \times 3^2$

$= 4\pi \times 9$

$= 36\pi$ Sq.cm

NOTE:-

- If the Edges / Diagonals of two cubes (or) the radii / Diameters of two Spheres / Hemi-spheres are in the ratio $x:y$ respectively, Then,

ⓐ The ratio of their surface Area = $x^2:y^2$.

ⓑ The ratio of their volumes = $x^3:y^3$.

32. The edges of two cubes are in the ratio 7:8. Then find the ratio of their lateral surface Area and the ratio of their volumes?

Sol: L.S.A = 49:64

Volume = 343:512

33. The ratio of volumes of two Spheres are in the ratio 1:27. Then find the ratio of their radii?

Sol: = 1:27 — volumes

= 1:3 — radius

34. The ratio of total surface Areas of cubes is 36:25. Then find the ratios of their volume?

Sol: $x^2:y^2 = 36:25$

Edge ratio = $x:y = 6:5$

Volumes ratio = $x^3:y^3 = 216:125$

35. The length of a cuboid is raised by 60%, its width is raised by 25% and its height is decreased by 20%. what is the change percentage of its volume?

Sol:- Volume of cuboid = lbh

$\frac{160}{100} \times \frac{125}{100} \times \frac{80}{100} \times 100\% = 160\% - 100\%$

= 60% increase

Asked
36. The each edge of a cube is raised by 10%. what is the growth percentage of its volume? & find the growth% of its surface area?

Sol:- Volume of cube $= a^3$

$\frac{110}{100} \times \frac{110}{100} \times \frac{110}{100} \times 100\% = \frac{133\%}{10}$

$= 133.1\% - 100\%$

$= 33.1\%$ increase

Area $= a^2$

$\frac{110}{100} \times \frac{110}{100} \times 100\%$

$= 121\% - 100\% = 21\%$ (growth)

F.B.O.
37. The radius of a sphere is doubled, by how many times will it volume increase?

Sol:- $\frac{4}{3}\pi r^3 \Rightarrow$ doubled

$2^3 - 1 = 8 - 1 = 7$ times

$\frac{200}{100} \times \frac{200}{100} \times \frac{200}{100} \times 100\%$

F.B.O.
$= 800\% - 100\% = 700\%$ (7 times)

38. The radius of a cone is doubled and its slant height is increased by 20%. what is the change percentage of its curved surface area?

Sol:- $L.S.A = \pi r l$ — double, height ↑ 20%

$\frac{200}{100} \times \frac{120}{100} \times 100\% \Rightarrow 240\% - 100\%$

$= 140\%$ (increased)

39. The radius of a cylinder is doubled and its height is tripled, by how many times will its volume increased?

Sol:- Volume of a cylinder $= \pi r^2 h$

$2^2 \times 3 = 12 - 1$

$= 11$ times

$\frac{200}{100} \times \frac{200}{100} \times \frac{300}{100} \times 100\%$

$= 1200\% - 100\% = 1100\%$ (11 times increased)

40. If the radius of a Iron cylinder is 35 cm and its height is 42 cm. It is melted and reformed into a certain number of conical Iron Block of radius 7cm & height 14 cm. Then find the number of conical Blocks!

Sol:- $R = 35cm$, $H = 42cm$

$r = 7cm$, $h = 14cm$

$$\frac{\text{Big volume}}{\text{Small volume}} = \frac{\pi R^2 H}{\frac{1}{3}\pi r^2 h} \Rightarrow \frac{\pi \times 35 \times 35 \times 42}{\frac{1}{3}\pi \times 7 \times 7 \times 14}$$

$$= 9 \times 5 \times 5 \times 3$$

$$= 225 \text{ Blocks.}$$

41. An Iron Spherical Ball of radius 21 cm. is melted and recast to a certain number of cubes of each edge 7cm. Find the number of Cubical Blocks.

Sol:-

$$\frac{\text{Big volume}}{\text{Small volume}} \quad \frac{\frac{4}{3}\pi r^3}{a^3} = \frac{\frac{4}{3} \times \frac{22}{7} \times 21 \times 21 \times 21}{7 \times 7 \times 7}$$

7

$$= \frac{88 \times 9}{7} \Rightarrow \frac{792}{7}$$

$$= 113.14$$

$= 113$ cubical blocks.

42. Find the number of Bricks of dimensions $4m \times 3m \times 2m$ to construct a wall of dimensions $50m \times 30m \times 24m$

Sol:-

$$\frac{\text{Big}}{\text{Small}} = \frac{\text{volume of the way}}{\text{Volume of the Brick}} = \frac{50 \times 30 \times 24}{4 \times 3 \times 2} = 1500 \text{ Bricks are required.}$$

43. Find the number of Bricks of dimensions $10m \times 8m \times 4m$ that required to build a wall to Contruct a cubical wall of each side 40m.

Sol:-

$$\frac{\text{V. Way}}{\text{V. Brick}} = \frac{40 \times 40 \times 40}{10 \times 8 \times 4} = 200 \text{ Bricks.}$$

44. A Spherical copper ball of radius 3 cm. is melted and recast into a wire of radius 0.2 cm. Find the length of the wire?

Sol:-

3cm

Volume of the Sphere = Volume of the cylinder

$$\frac{4}{3}\pi r^3 = \pi r^2 h$$

$$\frac{4}{3} \times \pi \times 3 \times 3 \times 3 = \pi \times 0.2 \times 0.2 \times h$$

$$4 \times 3 \times 3 = \frac{2}{10} \times \frac{2}{10} \times h \Rightarrow h = 900cm \Rightarrow 9m$$ ans

45. An Iron Spherical Ball of radius 3m is droped into cylindrical water tank of base radius 6m. Find the height of the rise of the water?

Sol:-

$$\frac{4}{3}\pi r^3 = \pi r^2 h$$

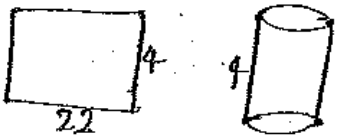
$$\frac{4}{3} \times 3 \times 3 \times 3 \times 2 = 6 \times 6 \times h$$

$$h = \frac{8}{27}$$

$$h = 0.29 \text{ mts}$$

F.B.O

46. A rectangular paper sheet of dimensions 22 cm x 4 cm is rolled into a cylindrical form of height 4 cm. then find the volume of the cylinder.



Sol:-

$h = 4$ cm, $2\pi r = 22$

$$2 \times \frac{22}{7} \times r = 22$$

$$r = \frac{7}{2}$$

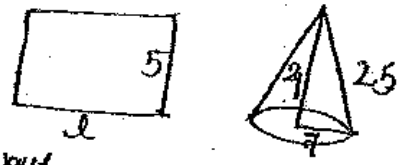
Volume $= \pi r^2 h$

$$= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 4 \Rightarrow 11 \times 2 \times 7$$

$$= 154 \text{ cm}^3$$

*** 47. How many metres of cloth of 5 metres width required to construct a conical tent of base radius 7 m and height 24 meters.

Sol:-



Area of the Rectangle = Curved surface of the cone

$$lb = \pi r l$$

$$l \times 5 = \frac{22}{7} \times 7 \times 25$$ - Slant height

$$l = 110 \text{ mts}$$ Cloth required

48. An Iron Spherical Ball of radius 10 cm is moulded into 8 Spherical Balls of same radius then find the radius of each Ball?

Sol:-

Volume of Sphere = 8 x Volume of Small Sphere

Big

$$\frac{4}{3}\pi R^3 = 8 \times \frac{4}{3}\pi r^3$$

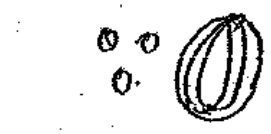
$$\frac{10 \times 10 \times 10}{5 \times 5 \times 5} = \frac{8 \times r^3}{1}$$

$$r^3 = 125$$

49. 3 Iron Spheres of Radii 6cm, 8cm and 10cm are melted and recast into a Big Sphere. The diameter of the big Sphere is ? = ____ ?

Sol:

$$V = \frac{4}{3}\pi r_1^3 + \frac{4}{3}\pi r_2^3 + \frac{4}{3}\pi r_3^3$$



$$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi[r_1^3 + r_2^3 + r_3^3]$$

$$= \frac{4}{3}\pi[6^3 + 8^3 + 10^3] \Rightarrow \frac{4}{3}\pi[216 + 512 + 1000]$$

$$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi[1728]^3$$

$$= \frac{4}{3}\pi[12]^3$$

radius = 12

diameter = 24 cm.

AP. Mains

50. A Cone, A Hemi Sphere, A cylinder have the same Base, same height. Find the ratio of their volumes? (16 - From mathematics in F.B.O.)

Sol:-

Volume of Cone : Volume of H.S : Volume of Cylinder

$$\frac{1}{3}\pi r^2 h : \frac{2}{3}\pi r^3 : \pi r^2 h$$

Standard Questions School Books problems

$$\frac{1}{3}h : \frac{2}{3}r : h \quad \because \{r = h\}$$

$$\frac{1}{3}h : \frac{2}{3}h : h \Rightarrow 1 : 2 : 3$$

F.B.O

$[h = r]$

Curved surface Areas of 3.

$$\pi r l : 2\pi r^2 : 2\pi r h$$

$$l : 2r : 2h$$

$$\sqrt{2}r : 2r : 2r$$

$$1 : \sqrt{2} : \sqrt{2}$$

$h = r$

$l = \sqrt{h^2 + r^2}$

$= \sqrt{r^2 + r^2}$

$= \sqrt{2}r$

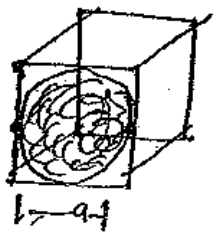
51. A Sphere is exactly fitted inside of a cube. Find the ratio of the volumes of Sphere and cube?

Sol:-

$$V_S : V_C \Rightarrow \frac{4}{3}\pi r^3 : a^3$$

$$= \frac{4}{3}\pi \frac{a}{2}\times\frac{a}{2}\times\frac{a}{2} : a^3 \qquad r = \frac{a}{2}$$

$$= \pi : 6$$

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సూక్ష్మీకరణ (Simplification)

* $(a+b)^2 = a^2+2ab+b^2$
* $(a-b)^2 = a^2-2ab+b^2$
* $a^2-b^2 = (a+b)(a-b)$
* $(a+b)^2-(a-b)^2 = 4ab$
* $(a+b)^2+(a-b) = 2(a^2+b^2)$
* $(a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$
* $(a+b)^3 = a^3-b^3-3ab(a-b)$
* $\dfrac{a^3+b^3}{a^2-ab+b^2} = a+b$
* $(a+b)^3 = a^3+b^3+3ab(a+b)$
* $\dfrac{a^3-b^3}{a^2+ab+b^2} = a-b$
* $\dfrac{a^2-ab+b^2}{a^3+b^3} = \dfrac{1}{a+b}$
* $\dfrac{a^2+ab+b^2}{a^3-b^3} = \dfrac{1}{a-b}$
* $a+b+c=0$ అయితే $a^3+b^3+c^3 = 3ab$
* $\dfrac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2-ab-bc-ca} = a+b+c$
* $a \times a \times a \times a \ldots\ldots$ "m" సార్లు $= a^m$
  $a \rightarrow$ భూమి
  $m \rightarrow$ ఘాతాంకం
* $a^m \times a^n = a^{m+n}$

* $a^m \div a^n = a^{m-n}$
* $(a^m)^n = a^{mn}$
* $(ab)^m = a^m b^m$
* $(ab)^m = a^m \times b^m$
* $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$
* $a = 1$
* $\left(\frac{a}{b}\right)^{-m/n} = \left(\frac{b}{a}\right)^{m/n}$
* $a^{-1} = \frac{1}{a}$
* $a^{-m} = \frac{1}{a^m}$

1) $57 \times 57 + 2 \times 57 \times 43 + 43 \times 43 = ?$

$(a+b)^2 = (57+43)^2 = (100)^2 = 10,000$ ✓

2) $86^2 - 2 \times 86 \times 44 + 44^2 = ?$

$(a-b)^2 = (86-44)^2 = (42)^2 = 1764$ ✓

3) $117 \times 117 - 113 \times 113 = ?$

$a^2 - b^2 = (117)^2 - (113)^2$

$= (117+113)(117-113)$

$= 230 \times 4 \Rightarrow 920$ ✓

4) $60^2 - 40^2 = 20x = ?$

$(a^2 - b^2) = (a+b)(a-b)$

$60^2 - 40^2 = 20x$

$100 \times 20 = 20x$

$x = 100$ ✓

5) $\dfrac{79\times79\times79+63\times63\times63}{79^2-79\times63+63^2}=?$

$\boxed{(a+b)} = 79+63 = \underline{142}$ ✓

6) $\dfrac{85^3-47^3}{85^2+85\times47+47^2}=?$

$\boxed{a-b} = 85-47 = \underline{38}$ ✓

(7) $\dfrac{478^2-478\times331+331\times331}{478^3+331^3}=?$

$\dfrac{1}{a+b} = \dfrac{1}{478+331} = \underline{\dfrac{1}{809}}$ ✓

(8) $\dfrac{(187+125)^2-(187-125)^2}{187\times125}=?$

$\dfrac{(a+b)^2-(a-b)^2}{a\times b} = 4ab$

∵ ab ఇవ్వనందున 4 వచ్చింది ఇచ్చినదే Ans

Ans $= \underline{4}$ ✓

(9) $\dfrac{(221+105)^2-(221-105)^2}{4}=?$

$ab = 221\times105 = 23205$ ✓

(10) $\dfrac{(463+337)^2+(463-337)^2}{463\times463+337\times337}=?$

Ans $= 2$

(11) $2x+3y+4z=0$ అయిన $8x^3+27y^3+64z^3=?$

$a=2x$
$b=3y$
$c=4z$

$3abc$

$= 3 \times 2x \times 3y \times 4z$

$= 72xyz$ ✓

(12) $\dfrac{(x-y)^3+(y-z)^3+(z-x)^3}{9(x-y)(y-z)(z-x)} = ?$

$a = x-y$
$b = y-z$
$c = z-x$

$= \dfrac{3(x-y)(y-z)(z-x)}{9(x-y)(y-z)(z-x)} = \dfrac{1}{3}$ ✓

(13) $\dfrac{25^3+20^3+15^3-3\times25\times20\times15}{25^2+20^2+15^2-25\times20-20\times15-15\times25} = ?$

$= a+b+c = 25+20+15 = 60$ ✓

(14) $\dfrac{\frac{1}{5}\cdot\frac{1}{5}\cdot\frac{1}{5}+\frac{1}{4}\cdot\frac{1}{4}\cdot\frac{1}{4}+\frac{1}{3}\cdot\frac{1}{3}\cdot\frac{1}{3}\times3\times\frac{1}{5}\times\frac{1}{4}\times\frac{1}{3}}{\frac{1}{25}+\frac{1}{16}+\frac{1}{9}-\left(\frac{1}{20}+\frac{1}{12}+\frac{1}{15}\right)}$

$= a+b+c = \frac{1}{5}+\frac{1}{4}+\frac{1}{3} = \frac{12+15+20}{60} = \frac{47}{60}$ ✓

(15) $a+b+c=34$. $ab+bc+ca=340$ అయిన $a^2+b^2+c^2=?$

Formula $(a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$

$(34)^2 = a^2+b^2+c^2+2(340)$

$= 1156 - 680 = x$

$x = 476$ ✓

(16) $a+\frac{1}{a}=5$ అయితే $a^2+\frac{1}{a^2}=?$

$a+\frac{1}{a}=5$, $a^2+\frac{1}{a^2}$

$5^2-2=\underline{23}$ ✓

(17) $x-\frac{1}{x}=4$ అయితే $x^2+\frac{1}{x^2}=?$

$x^2+\frac{1}{x}=4^2+2=\underline{18}$ ✓

(18) $a+\frac{1}{a}=3$ అయితే $a4+\frac{1}{a4}=?$

$a^2+\frac{1}{a^2}=3^2-2=7$

$a4+\frac{1}{a4}=7^2-2=\underline{47}$

(19) $y-\frac{1}{y}=2$ అయితే $y^2+\frac{1}{y^2}$ ఎంత?

$y^2+\frac{1}{y^2}=2^2+2=6$

$y4+\frac{1}{y4}=6^2-2=34$

$y4+\frac{1}{y8}=(34)^2-2$

$=1156-2=\underline{1154}$

(20) $x+\frac{1}{x}=4$ అయితే $x^3+\frac{1}{x^3}?$

$x^3+\frac{1}{x^3}=4$

$x^3+\frac{1}{x^3}=4^3-3\times4$

$=64-12=52$

(21) $a-\frac{1}{a}=7$ అయితే $a^3-\frac{1}{a^3}=?$

$a^3-\frac{1}{a^3}=7^3+3\times7$

$=343+21=\underline{364}$ ✓

(22) $x+\frac{1}{x}=2$ అయితే $x^{125}+\frac{1}{x^{125}}?$

$\boxed{x=1}$

$1^{125}+\frac{1}{125}=1+1=2$

(23) $2^0(3^0-4^0)=?$

$1(1-1)=1\times0\Rightarrow0$

(24) $5^x=625$ అయితే x^3 ఎంత?

$5^x=5^4$

$x=4$

$=x^3=4^3=\underline{64}$ ✓

(25) $5^x=1000$ అయితే 5^{x-2} ఎంత?

$5^{x-2}=\frac{5^x}{5^2}=\frac{1000}{25}=\underline{40}$ ✓

(26) $4^x=300$ అయితే 4^{x+3} ఎంత?

$4^{x+3}=4^x+4^3=300\times64=\underline{19200}$

(27) $3^x=243$ అయితే '4x' ఎంత?

$3^x=3^5$

$\underline{x=5}$

$4x=4\times5=\underline{20}$ ✓

(28) $4^n=128$ అయితే n ఎంత?

$(2^2)^n=128$

$2^{2n}=2^7$

$n=\underline{7/2}$

(5) 2913 కి ది కనిష్ట సంఖ్యను కలిపితే అది ఖచ్చిత వర్గం అవుతుంది.

*) కలపండి ఎక్కువ

*) ఇక్కడకు కూడా ఎక్కువ రాకుండా తీసుకోవాలి.

5	2913	5
	25	
104	413	
x4	416	
	(3)	

Ans = 3 ✓

(6) 12990 కి ది కనిష్ట సంఖ్యను కలిపితే అది ఖచ్చిత వర్గం అవ్వాలంటే.

1	12 90	11
21	29	
x1	-21	
224	690	
x4	-896	
	(6)	

Ans = 6 ✓

(7) 15,130 నుంచి ది కనిష్ట సంఖ్యను "తీసివేస్తే" అది ఖచ్చిత వర్గం అవ్వాలంటే

*) తీసివేస్తే అంటే తక్కువ అయ్యేటు సున్న తీసుకోవాలి, 729, 728

1	15 130	12
	1	
22	51	
x2	44	
243	730	
x3	729	
	(1)	

Ans = 1 ✓

(8) 1850 నుంచి ది కనిష్ట సంఖ్యను తీసివేస్తే అది ఖచ్చితవర్గం అవ్వాలంటే

4	18 50	4
	16 ↓	
83	250	
x3	249	
	(1)	

Ans = 1 ✓

(9) 1806 ని ది కనిష్ట సంఖ్యతో గుణిస్తే అది ఖచ్చిత వర్గం అవ్వాలంటే

5	1860
2	372
2	186
3	93
31	31

$(2 \times 2 \times 5 \times 3 \times 31) \times 5 \times 3 \times 31$

$5 \times 3 \times 31 = 465$ ✓

41) $999\frac{1}{7}+999\frac{2}{7}+999\frac{3}{7}+999\frac{4}{7}+999\frac{5}{7}+999\frac{6}{7}=?$ 494

$999\frac{1}{7}+999\frac{2}{7}+999\frac{3}{7}+999\frac{4}{7}+999\frac{5}{7}+999\frac{6}{7}$

$6\times 999+\frac{1}{7}+\frac{2}{7}+\frac{3}{7}+\frac{4}{7}+\frac{5}{7}+\frac{6}{7}$ ∴ 999 లు 6 సార్లు [illegible]

$5994+3=5997$ ✓

(42) $111\frac{4}{5}+444\frac{2}{3}-222\frac{1}{6}$

$1+444-222+\frac{4}{5}+\frac{2}{3}-\frac{1}{6}$

$333+\left(\frac{24+20-5}{30}\right)$

$333+\frac{9}{30}=334\,\frac{9}{30}=334\frac{3}{10}$

(43) ~~777~~ $\frac{2}{5}-44\frac{3}{4}=?$

~~777~~ $-444+\frac{2}{5}-\frac{3}{4}$ $333+\left(-\frac{7}{20}\right)$

$333+\left(\frac{8-15}{20}\right)$ $333-\frac{7}{20}=332\frac{13}{20}$ ✓

(44) $\frac{1}{1\times 2}+\frac{1}{2\times 3}+\cdots+\frac{1}{50\times 51}=?$

$=\frac{1}{1}-\frac{1}{51}$

$=\frac{51-1}{51}=\frac{50}{51}$

*) ఇలాంటి Q.n వచ్చినప్పుడు ప్రతి పదం నుండి 2nd పదం తీసివేయాలి

*) different – 1

(45) $\frac{1}{3\times 5}+\frac{1}{5\times 7}+\cdots\frac{1}{13\times 15}=?$

$\frac{1}{2}\left[\frac{1}{3}-\frac{1}{5}\right]=\frac{1}{2}\left[\frac{5-1}{15}\right]$

$=\frac{1}{2}\times\frac{4}{15}=\frac{2}{15}$ ✓

different – 2

*) 1st & Last

(48) $\frac{1}{1\times4} + \frac{1}{4\times7} + \cdots + \frac{1}{10\times13} = ?$ difference 3 words

$\frac{1}{3}\left[\frac{1}{1} - \frac{1}{13}\right] = \frac{1}{3}\left[\frac{1}{1} - \frac{1}{13}\right] = \frac{1}{3} \times \left[\frac{12}{13} \times \frac{4}{3}\right] = \frac{4}{13}$ ✓

(49) $\frac{3}{1^2 2^2} + \frac{5}{2^2 3^2} + \frac{7}{3^2 4^2} + \frac{9}{4^2 5^2} + \frac{11}{5^2 6^2} + \cdots + \frac{21}{10^2 + 11^2} = ?$

$\frac{1}{12} = \frac{1}{112} = \frac{1}{1} = \frac{1}{121} = \frac{120}{121}$

P, Q 48) Imp $1 + \frac{1}{4\times3} + \frac{1}{4+3^2} + \frac{1}{4\times3^3} = ?$

$1 + \frac{1}{4\times3}\left[\frac{1}{1} + \frac{1}{3} + \frac{1}{9}\right]$

$1 + \frac{1}{12}\left[\frac{9+3+1}{9}\right]$

$= 1 + \frac{1}{12} + \frac{13}{9}, \quad \frac{1+13}{108} = \frac{121}{108}$ ✓

VBODMAS

V – Vinculars, ( ) { } [ ]

B – Bracket

O – Of

D – Division

M – Multipication

A – Addition

S – Subtraction

(1) $\frac{400 \div 25 \times 5}{80} = ?$

$\frac{400}{25} \times 5 = 80$ ✓

(2) $\frac{3}{11}$ of $132 \div 12 \times 4 - 30 = ?$

$\frac{3}{11} \times 132 = 36$

$36 \div 12 \times 4 - 30$

$3 \times 4 - 30$

$12 - 30 = -18$ ✓

(3) $1200 \div 40 \div 10 = ?$

$1200 \times \frac{1}{40} \times \frac{1}{10} = 3$

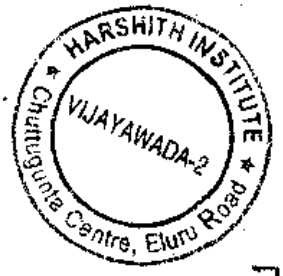
(4) $120 \div (4/5 \text{ of } 80 \div 12 \times 2) = ?$

$120 \div (64 - 12 + 20)$

$120 \div (16/3 + 20) = 120 \div 76/3$

$120 \times 3/76 = 180/19$

(4) 5 of $120 \div 10) \div 40$



(5) $300 + [400 + \{150 + (60 \div 20 \times 3 - 40)\}] = ?$

$300 + [400 + \{150 + (3 \times 3 - 40)\}]$

819 ✓

(6) $150 - [120 + \{30 - \overline{50 + 30 - 20}\}] = ?$

* పై గీతకి ముందు - ఉంటే
లోపల value
మారుతుంది.

$150 - [120 + \{30 - 50 - 30 + 20\}]$

$150 + 120 + \{-30\}$

$90 - 60$

(7) $\dfrac{\frac{1}{3} \div \frac{1}{3} - \frac{1}{3}}{\frac{1}{3} \div \left(\frac{1}{3} \text{ of } \frac{1}{3}\right)} - \frac{1}{9} = ?$

$\dfrac{1 - \frac{1}{3}}{\frac{1}{3} \times \frac{9}{1}} - \frac{1}{9}$

$\dfrac{2/3}{3/1} - \frac{1}{9}$, $\frac{2}{9} - \frac{1}{9} = \frac{1}{9}$ ✓

(8) $\dfrac{\frac{1}{2} \div \left(\frac{1}{2} \text{ of } \frac{1}{2}\right)}{\frac{1}{2} + \left(\frac{1}{2} \text{ of } \frac{1}{2}\right)} = ?$ $\frac{1}{2} \times \frac{4}{1}$

$\frac{1}{2} + \left(\frac{1}{2} \text{ of } \frac{1}{2}\right)$

$\dfrac{2/1}{6/8} = \frac{2}{1} \times \frac{8}{6} = \frac{8}{3}$ ✓

(9) $9 - 1\frac{2}{9} \text{ of } 3\frac{3}{11} \div 5\frac{1}{7} \text{ of } \frac{7}{9}$

$9 - \frac{11}{9} \text{ of } \frac{36}{11} \div \frac{36}{7} \text{ of } \frac{7}{9}$

$9 - 4 \div 4$

$9 - 1 = 8$

(10) $\left(\frac{5}{7} \text{ of } 1\,6/13\right) \div \left(2\frac{5}{7} \div 3\frac{1}{4}\right) = ?$

$\left(\frac{5}{7} \text{ of } \frac{19}{13}\right) \div \left(\frac{19}{7} \times \frac{4}{13}\right)$

$\frac{95}{91} \times \frac{91}{76} = 5/4$

(11) $2 + \frac{3}{4} \div 2 + \frac{2}{3} \div 1\frac{1}{12} = ?$

$\frac{11}{4} \div \frac{8}{3} \div \frac{13}{12}$

$\frac{11}{4} \times \frac{3}{8} \times \frac{12}{13} = \frac{99}{104}$

(12) $\frac{(3/5)^3 - (2/5)^3}{(\frac{3}{5})^2 - (\frac{2}{5})^2} = ?$

$\frac{\frac{27}{125} - \frac{8}{125}}{\frac{9}{25} - \frac{4}{25}} = \frac{19/125}{5/25}$

$\frac{19}{125} \times \frac{25}{5}$

$= \frac{19}{25}$ ✓

(13) $\frac{(6+6+6+6+6) \div 6}{4+4+4+4+4 \div 4} = ?$

$\frac{30 \div 6}{16+1} = \frac{5}{17}$ ✓

(14) $\frac{p}{q} = 7$ అయిన $\frac{p+q}{p-q}$ ఎంత?

$p = 7$

$q = 1$

$\frac{7+1}{7-1} = \frac{8}{6} = 4/3$

(15) $\frac{a}{b} = 5/6$ అయిన $\frac{3a+2b}{4a-b}$ తెలుపు?

$a = 5$

$b = 6$ $\quad \frac{3 \times 5 + 2 \times 6}{4 \times 5 - 6}$

$= \frac{15+12}{20-6} = \frac{27}{14}$ ✓

(16) $\frac{2x}{3y} = \frac{1}{5}$ అయిన $\frac{x+y}{x-y}$ తెలుపు?

498

$\frac{x}{y} = \frac{1}{5} \times \frac{3}{2} = \frac{3}{10}$

$\frac{3+10}{3-10} = \frac{13}{7}$ ✓

(17) $\frac{x}{y} = \frac{2}{3}$ అయిన $\frac{1}{3} - \left(\frac{x-y}{x+y}\right)$ తెలుపు ఎంత?

$\frac{x}{y} = \frac{2}{3} \times \frac{4}{1} = \frac{8}{3}$

$\frac{1}{3} - \left(\frac{8-3}{8+3}\right)$

$\frac{1}{3} - \frac{5}{11}$

$-4/33$

(18) $\frac{a}{b} = \frac{5}{3}$, $\frac{b}{c} = \frac{4}{5}$ అయిన

$\frac{c^2 - a^2}{c^2 + a^2}$ తెలుపు ఎంత?

$\frac{a}{b} \times \frac{b}{c} = \frac{5-4}{3-5}$

$a = 4$

$c = 3$

$\frac{3^2 - 4^2}{3^2 + 4^2} = \frac{7}{25}$

(19) $a * b = \frac{a^2+b^2}{a^2-b^2}$ అయిన

$4 * 2$ తెలుపు ఎంత?

$a = 4$

$b = 2$

$\frac{4^2+2^2}{4^2-2^2} = \frac{20}{12} = \frac{5}{3} = 5/3$

(20) $x @ y = \frac{xy}{x-y}$ అయినా $(5@4) @ (3@2)$ అయితే ఎంత? 499

$$\left(\frac{5\times4}{5-4}\right) @ \frac{3\times2}{3-2}$$

$$\frac{120}{14} = \frac{@}{7} \qquad 20@6 = \frac{20\times6}{20-6}$$

(i) ఈ క్రింది వాటిని భిన్నాంకాలలో తెలపండి

1) $\frac{3.7}{10} = 3.7$

2) $\frac{1349}{100} = 1.349$

3) $27\frac{3}{100} = 27.03$

4) $123\frac{1}{1000} = 123.001$

(ii) ఈ క్రింది వాటిని భిన్నాంకాలలో కాకుండా దశాంశాలలో వ్యక్తపరచండి

1) $2.71 = \frac{271}{100}$

2) $0.113 = \frac{113}{1000}$

3) $0.\overline{7} = 7/9$

4) $0.\overline{31} = 31/99$

5) $2.\overline{731} = 2\frac{731}{999}$

6) $11.\overline{43} = 11\frac{43}{99}$

7) $0.\overline{73} = \frac{73-7}{90} = \frac{66}{90} = \frac{11}{5}$

*) point తర్వాత . వున్న digits ఉంటే ఉన్న '0' ల పెట్టాలి

*) ఉంటే Digit తేకపోతే

8) $4.8\overline{31} = 4\frac{831-8}{990} = 4\frac{823}{990}$ ✓

(9) $0.\overline{23}$ యొక్క ఉపరి పూరకాలను కనుగొనుము

ఉపరి = 2 , ఇచ్చిన letter లో ఎంత ఉంటే

ఉపరి = 23, అంత ఉపరి $\overline{23} = 2$

(10) $7.31,\overline{11}$ యొక్క ఉపరి పూరకాలను కనుగొనుము

ఉపరి = 2

పూర్ణరి = $\overline{71}$

(11) $\frac{7}{9} + \frac{2}{99}$

$\frac{77+23}{99} = \frac{100}{99}$ ✓

(12) $2.\overline{3} + 4.\overline{1} + 5.\overline{6} = ?$

$2\frac{3}{9} + 4\frac{1}{9} + 5\frac{6}{9}$

$11 + \left(\frac{3}{9} + \frac{1}{9} + \frac{6}{9}\right)$

$11 + \frac{10}{9}$

$11 + 1\frac{1}{9} = 12\frac{1}{9}$ ✓

(13) $0.\overline{36} \times 1.\overline{2} = ?$

$\frac{36}{99} \times 1\frac{2}{9} = \frac{36}{99} \times \frac{11}{9} = 0.\overline{4}$ ✓

(14) $0.3 \times 2.1 \times 0.45 = ?$

$3 \times 21 \times 45 = 2835$

0.2835

(15) $2.5 \times 0.007 = ?$

$25 \times 7 = 175$

$.0175$

(16). $0.25 \div 0.05 = ?$

$\frac{0.25}{0.105} = \frac{25}{5} = 5$

(17) $\frac{0.256}{1.6} = ?$

$\frac{0.256}{0.600} = \frac{256}{1600}$ (16, 100)

(18) $5.14 \times 10^k = 0.0514$ అయినా 'k' ఎంత?

$2-4 = (-2)$

*) $10^x \times 135 = 71,35$ అయినా x ఎంత?

$3-2 = 1$