Chapter 01 Simplifications

సూక్ష్మీకరణాలు

Concept and Formulas

⇨ Conditions to be a perfect square number :-

- if a no. ends with 2, 3, 7, 8 it can't be a perfect square
- if unit digit is 5 then tens digit always 2.
- No no. can be a perfect square unless its digital root is 1, 4, 7 or 9.
- Last 2 digit of a perfect square no. = Last two digits from the squares of numbers b/w (1 to 24).

* $n \to 2K$ (even) $\longrightarrow n^2 = (2K)^2 = 4K^2 \to$ multiple of 4

$n \to 2K+1$ (odd) $\longrightarrow n^2 = (2K+1)^2 = 4K^2+4K+1 \to \underbrace{4(K^2+1)+1}_{R=1 \text{ after div by } 4}$

$\therefore n^2 \longrightarrow 4K, 4K+1$

51767 → Not a perfect square ($\frac{}{4}$, R=3)

⇨ Find squares

$\boxed{\text{Base } 100} \to 102^2 = 102+2 \,|\, \underline{2^2} = 10404$

$107^2 = 107+7 \mid 7^2 = 11449$

$113^2 = 113+13 \mid 13^2 = 126 \mid 169 \rightarrow 12769$

$121^2 = 121+21 \mid 21^2 = 142 \mid 441 \rightarrow 14641$

$97^2 = 97-3 \mid 3^2 = 9409$

$92^2 = 92-8 \mid 8^2 = 8464$

$83^2 = 83-17 \mid 17^2 = 66 \mid 289 \rightarrow 6889$

Base 50 $\rightarrow \frac{1}{2} \times 100$

$59^2 = \frac{1}{2}(59+9) \mid 9^2 \rightarrow 3481$

$54^2 = \frac{1}{2}(54+4) \mid 4^2 \rightarrow 2916$

$48^2 = \frac{1}{2}(48-2) \mid 2^2 \rightarrow 2304$

$44^2 = \frac{1}{2}(44-6) \mid 6^2 \rightarrow 1936$

$38^2 = \frac{1}{2}(38-12) \mid 12^2 \rightarrow 13 \mid 144 \rightarrow 1444$

$67^2 = \frac{1}{2}(67+17) \mid 17^2 \rightarrow 42 \mid 289 \rightarrow 4489$

Base 200 $\rightarrow 2 \times 100$

$208^2 = 2(208+8) \mid 8^2 = 43264$

$219^2 = 2(219+19) \mid 19^2 = 476 \mid 361 \rightarrow 47961$

$194^2 = 2(194-6) \mid 6^2 = 37636$

$182^2 = 2(182-18) \mid 18^2 = 328 \mid 324 \rightarrow 33124$

$\boxed{\text{Base } 150} \rightarrow \frac{3}{2} \times 100$

$152^2 = \frac{3}{2}(152+2) \mid 2^2 \rightarrow 23104$

$141^2 = \frac{3}{2}(141-9) \mid 9^2 \rightarrow 19881$

$614^2 = 6(614+14) \mid 14^2 \rightarrow 6 \times 628 \mid 196 \rightarrow 376996$

$793^2 = 8(793-7) \mid 7^2 \rightarrow 8 \times 786 \mid 49 \rightarrow 628849$

* Last 2 digits of $\rightarrow 18^2, 32^2, 68^2, 82^2, 118^2, 368^2$

$32^2 \downarrow (50-18)^2$, $82^2 \downarrow (100-18)^2$, $368^2 \downarrow (350+18)^2$

$= \boxed{24}$

$\therefore x^2, (50K \pm x)^2, (100K \pm x)^2 \rightarrow$ Last 2 digits same.

Objective Type Questions

With Solutions...

1. Find the square of these numbers?

(a) 89 (b) 114 (c) 163 (d) 197
(e) 291 (f) 374 (g) 413 (h) 837
(i) 926 (j) 1116 (k) 1493 (1) 5483

2. The students of a class donated a srinu of Rs. 2,809 to the Fund. Each student donated as many rupees as the number of students in the class. The number of students in the class is:

ఒక తరగతిలో శ్రీను 2809రూ॥లు పంచెను. ఆ తరగతిలో మొత్తం ఎంతమంది ఉన్నారో, ప్రతి విద్యార్థికి అంతే సొమ్మును పంచెను. అయిన ఆ తరగతిలో మొత్తం ఎంత మంది?

1) 49 2) 53 3) 51 4) 47

total students $= x$ & collection $= x^2$

$\therefore x^2 = 2809 \quad \therefore \boxed{x = 53}$

3. Let x be the least number which when subtracted from 10424 gives a perfect square number. What is the least number by which x should be multiplied to get a perfect square?

10424 నుండి x అనే సంఖ్యను తీసివేసిన ఖచ్చితమైన వర్గం అగును. అయిన xను ఏ సంఖ్యచే గుణించిన ఖచ్చితమైన వర్గం అగును?

1) 3 2) 6 3) 5 4) 2

$102^2 = 10404 \quad \therefore \quad 10424 - 20 = 10404$

$\therefore \quad 20 \times 5 = \text{perfect sq} \quad \therefore \quad \boxed{5}$

4. A 4-digit number of the from aabb is a perfect square. What is the value of a - b?

aabb అనేది 4 అంకెల వర్గ సంఖ్య అయిన (a-b) విలువ ఎంత?

1) 3 2) 2 3) 4 4) 1

$12^2 = 144$

$10^2 = 100$

$(100+12)^2, \ (100-12)^2, \ (50+12)^2, \ (50-12)^2$

$\downarrow$ 5digit $\quad \downarrow$

$88^2 = 7744 \quad \therefore \ 7-4 = \boxed{3}$

5. If a 5-digit number in the form xxyxx is a perfect square then find value of x+y+xxy ?

xxyxx అనేది 5 అంకెల వర్గ సంఖ్య అయిన x + y + x × y విలువ ఎంత?

1) 49 2) 51 3) 48 4) 50

$12^2 = 144 \quad \therefore \quad xxyxx = 44y44 \rightarrow (200+)^2$

$\therefore (212)^2 = 44944 \quad \therefore \quad x = 4, \ y = 9$

$\therefore \quad x + y + x \times y = 4 + 9 + 36 = \boxed{49}$

$\Rightarrow$ $x(x+a)(x+2a)(x+3a) + K$ is a perfect sq. then $K = ?$

$\rightarrow (x^2+3ax)(x^2+3ax+2a^2)$

$\rightarrow (x^2+3ax)^2 + 2 \times a^2 \times (x^2+3ax)$

$a^2 \quad + \quad 2ab \quad + b^2 = (a+b)^2$

$\therefore$ to make perfect square add $(a^2)^2 = a^4$

$\therefore (x^2+3ax+a^2)^2 \quad \& \quad \boxed{K = a^4}$

$\Rightarrow$ if I, II, III, IV are in A.P with common diff. d

Then $I \times II \times III \times IV + d^4 = (I \times IV + d^2)^2$

6. What should be added in the product of four consecutive odd numbers that it becomes a perfect square?

నాలుగు వరుస బేసి సంఖ్యలను కలిపిన అది వర్గం అగును. అయిన ఆ సంఖ్య ఏది?

1) 12 2) 14 3) 15 4) 16

Gap b/w nos = 2 ∴ 2^4 = 16

(1, 3, 5, 7)

7. What should be added in the product of four consecutive numbers that it becomes a perfect square

నాలుగు వరుస సంఖ్యలకు ఎంత కలిపిన ఖచ్చితమైన వర్గం అగును?

1) 2 2) 3 3) 4 4) 1

$1 \times 2 \times 3 \times 4 = 24 + 1$ = perfect sq ∴ 1

* What should be added (Least) in

1119 × 1126 × 1133 × 1140 to make it perfect square.

∴ Gap b/w these consecutive numbers = 7

∴ 7^4 = 2401

* To make perfect square what should subtract from:

841 × 846 × 851 × 856 + 700

∴ 841 × 846 × 851 × 856 → To make square 5^4 = 625 should be added

∴ 841 × 846 × 851 × 856 + 625 + 15 → should be subtracted.

(841 × 846 × 851 × 856 + 625 — perfect square)

* if (x+a)(x+3a)(x+5a)(x+7a) + 1296 is a perfect square. Then a = ?

$(2a)^4 = 1296$ ∴ $a^4 = 81$

$16a^4 = 1296$ $a^4 = 3^4$

a = 3

⇨ 71 × 81 ∴ (76 − 5) × (76 + 5)

Avg = $\frac{71+81}{2}$ = 76 ↳ $76^2 - 5^2$

8. If A = 8289535x8289545, B = 8289534x8289546, C = 8289533x8289547 Find smallest in A, B and C ?

1) A 2) B 3) C 4) all are same

Avg of 35245, 34246, 33247 = 40

A = ( )^2 − 25 C = ( )^2 − 49

B = ( )^2 − 36 ∴ smallest = $\boxed{C}$

9. The last positive integer that should be subtracted from 3011 x 3012 so that the difference is e perfect square is

3011 × 3012 ల నుండి ఏ సంఖ్యను తీసివేసిన ఖచ్చితమైన వర్గం అగును?

1) 3009 2) 3010 3) 3011 4) 3012

3011 × 3012 → 3011 × (3011 + 1) → 3011^2 + 3011

∴ $\boxed{3011}$ should be subtracted.

* 3011 × 3012 → what should be added to make perfect square

(3012 − 1) × 3012 → 3012^2 − 3012 ∴ $\boxed{3012}$ should be added.

* least no. subtracted from 3011 × 3018 to make perfect sq.

3011 × 3018 = 3011 × (3011 + 7) = 3011^2 + 7 × 3011

↳ 3011^2 + 6 × 3011 + 3011 → 3011^2 + 2 × 3 × 3011 + 9 − 9 + 3011

↳ 3014^2 + 3002 ∴ $\boxed{3002}$ subtracted

* 4012 × 4025 what should be added to make perfect sq.

4012 × 4025 → (4025 − 13) × 4025 → 4025^2 − 13 × 4025

↳ 4025^2 − 2 × 6 × 4025 + 36 − 36 − 4025

↳ $(4019)^2$ − 4061 ∴ $\boxed{4061}$ should be added.

10. If N = $(12345)^2$+ 12345+12346, then what is the value of $\sqrt{N}$?

1) 12346 2) 12345 3) 12344 4) 12347

U.D → 5 + 5 + 6 = 6 ∴ $\sqrt{N}$ = 12346

$\boxed{OR}$ N = $(12345)^2$ + 12345 + 12345 + 1

= $(12345)^2$ + 2 × 12345 + 1^2 = $(12346)^2$

∴ $\sqrt{N}$ = $\boxed{12346}$

11. $\dfrac{\sqrt{4916*4922+9}}{4918*4920+1}$ =?

1) $\sqrt{5329}$ 2) $\sqrt{34596}$ 3) $\sqrt{58081}$ 4) $\sqrt{2052096}$

$\dfrac{4919}{4919^2} \rightarrow \dfrac{1}{4919}$

unit digit of N	unit digit of N^2
N = 1, 9	1
N = 2, 8	4
N = 3, 7	9
N = 4, 6	6
N = 5	5

12. Find ?

1) $\sqrt{5329}$ 2) $\sqrt{34596}$ 3) $\sqrt{58081}$

A) $\sqrt{5329} \rightarrow$ U.D 3 or 7

smaller than 53, perfect square no = 49 = 7^2

$\therefore$ 73 (✓) $\rightarrow 7 \times (7+1) = 56 > 53$ $\therefore$ smaller will be ans.

77 (✗)

$\therefore \sqrt{5329} = \boxed{73}$

B) $\sqrt{34596} \rightarrow$ U.D = 4 or 6 18 4 $18 \times 19 = 342 < 345$

ignore last two digit 18 6 (✓)

$345 < 324 \rightarrow 18^2$

C) $\sqrt{58081}$ = 241 (✓) $24 \times 25 = 600 > 580$

249

13. Which of the following statement(s) is/are true

$\sqrt{64}+\sqrt{0.0064}+\sqrt{0.81}+\sqrt{0.0081}=9.07$

1) Only I 2) Only II 3) Both I and II 4) Neither I nor II

I → 8 + 0.08 + 0.9 + 0.09 = 9.07 (✓)

II → 0.101 + 9.9 + 0.5 = 10.501 (✗)

⇨ $3^2 = 09$

$33^2 = 1089$

$333^2 = 110889$

$33333^2 = 1111088889$

3 is repeated n times

I → Before 0 (n-1) times 1

II → Before 9 (n-1) times 8.

⇨ $6^2 = 36$

$66^2 = 4356$

$666^2 = 443556$

$666666^2 = 444443555556$

6 is repeated n times

I → Before 3 (n-1) times 4

II → Before 6 (n-1) times 5

⇨ $9^2 = 81$

$99^2 = 9801$

$999^2 = 998001$

$9999^2 = 99980001$

* $\sqrt{9999800001} + \sqrt{1111088889} - \sqrt{4444355556} = ?$

$99999 + 33333 - 66666 = \boxed{66666}$

⇨

n^3		U.D
1^3	1 →	1
2^3	8 →	8
3^3	27 →	7
4^3	64 →	4
5^3	125 →	5
6^3	216 →	6
7^3	343 →	3
8^3	512 →	2
9^3	729 →	9

* $\sqrt[3]{571787}$ → U.D = 3

↳ ignore last 3 digit

↳ smaller than 571 perfect cube no = $512 = 8^3$

$\therefore \sqrt[3]{571787} = \boxed{83}$

14. Find cube root?

a) $\sqrt[3]{-17576}$ (b) $\sqrt[3]{493039}$

(c) $\sqrt[3]{1171561}$ (d) $\sqrt[3]{681472}$

(e) $\sqrt[3]{1225043}$ (f) $\sqrt[3]{9663597}$

a.) unit digit = 6

cube comes before 17 is = 8 = 2^3.

∴ $\boxed{-26}$

b.) unit digit = 9

cube that comes before 493 = 343 = 7^3

$\boxed{\therefore 79}$

c.) unit digit = 1

cube that comes before 1771 = 1728 = 12^3

$\boxed{\therefore 121}$

15. The square root of which of the following in a rational number?

క్రింది వాటిలో అకరణీయంలా ఉన్న వర్గమూలం ఏది?

1) 6250.49 2) 1250.49 3) 1354.24 4) 5768.28

U.D of perfect square no can't be 8 ∴ (d) ×

digital sum of a perfect square no = 1, 4, 7, 9

∴ (a) × (b) × ∴ $\boxed{1354.24}$

⇨ Rational numbers = $\frac{p}{q}$ form where $q \neq 0$

$\frac{17}{3}$, $\frac{-5}{8}$, $\frac{22}{7}$, $\sqrt{9}$

$\sqrt{64} = 8$ (✓) $\sqrt{0.0064} = 0.08 = \frac{8}{100}$ (✓)

$\sqrt{64} = 2.26\ldots$ (×) $\sqrt{0.0000064}$ = (Not rational)

$\sqrt{\text{perfect square no}}$ = (Rational)

16. The square root of which of the following in a rational number?

క్రింది వాటిలో అకరణీయంలా ఉన్న వర్గమూలం ఏది?

1) 304704 2) 524.176 3) 344.96 4) 19.4482

(d)× → U.D can't be 2 of perfect square no. (c)× → d.s = 8

(b)× → After decimal 3 digits → irrational (a)✓ → $\boxed{304704}$

⇨ $N^2 \rightarrow$ odd no. of digits
$N \rightarrow \frac{\text{odd no. of digits}+1}{2}$

$N^2 \rightarrow$ even no. of digits
$N \rightarrow \frac{\text{even no. of digits}}{2}$

* $N^2 \rightarrow$ 17 digits
$N \rightarrow \frac{17+1}{2} = 9$ digits

$N^2 \rightarrow$ 24 digits
$N \rightarrow \frac{24}{2} = 12$ digits

17. If a perfect square of a number contains 22 digits, then how many digits will it have?
ఒక ఖచ్చితమైన వర్గంలో 22 అంకెలు కలవు. అయిన ఆ సంఖ్యలో ఎన్ని అంకెలు ఉంటాయి?

$\frac{22}{2} = \boxed{11 \text{ digits}}$

18. How many natural numbers are there between $\sqrt{261}$ and $\sqrt{455109}$?
$\sqrt{261}$ మరియు $\sqrt{455109}$ ల మధ్య మొత్తం ఎన్ని సంఖ్యలు కలవు?
(a) 144 (b) 168 (c) 196 (d) 195

$\sqrt{261}$, 17, 18, 19, ----------, 211, 212, $\sqrt{45109}$

Total $= \frac{212-17}{1} + 1 = \boxed{196}$

19. A General of an Army wants to create a formation of square from 36562 army men. After arrangement, he found some army men remained unused. Find the number of remaining soldiers.
ఆర్మీలో 36562 మంది జవాన్లు కలరు. వారిని ఖచ్చితమైన వర్గంలో ఉండేటట్లు అమర్చిన, మిగిలిన జవాన్ల సంఖ్య ఎంత?
1) 36 2) 65 3) 81 4) 97

```
     191
1   | 36562
    |  1
29  | 265
    | 261
381 |   462
    |   381
      81
```

∴ unused army men = $\boxed{81}$

OR

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36562
 -36
  26
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Last 2 digit of perfect square can't be 26

∴ check all options.

20. What least number must be added to 386822 so that it becomes a perfect square?
386822కి ఏ సంఖ్యను కలిపిన ఖచ్చితమైన వర్గం అగును?
1) 57 2) 22 3) 62 4) 60

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386822      22        22        22
  +57      +22        62        60
------     ----      ----      ----
  79(x)     44        84        82(x)
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d.s = 6 (x) (✓) ∴ $\boxed{62}$

perfect sq no. → 4K, 4K+1

21. $\frac{1}{4.263}$ =0.2346, find the value of $\frac{1}{0.0004263}$

1) 4.263 2) 2.346 3) 2346 4) 4263

$$\frac{1}{4.263} = 0.0001 \times 2346$$

$$\hookrightarrow \frac{1}{0.0004263} = \boxed{2346}$$

SQUARE MIRRORS

$14^2 + 87^2 = 78^2 + 41^2$

$15^2 + 75^2 = 57^2 + 51^2$

$17^2 + 84^2 = 48^2 + 71^2$

$26^2 + 97^2 = 79^2 + 62^2$

$27^2 + 96^2 = 69^2 + 72^2$

22. Convert these into fraction-

a) $0.\overline{7}$ b) $0.\overline{69}$ c) $0.\overline{813}$ d) $0.7\overline{4}$

(e) $0.68\overline{7}$ (f) $0.51\overline{7}$ (g) $0.67\overline{41}$ (h) $4.5\overline{78}$

(j) $13.43\overline{7}$ (k) $11.43\overline{25}$ (*l*) $7.58\overline{16}$

23. $\dfrac{\left(0.\overline{11}+0.\overline{22}\right)\times 3}{\sqrt[3]{0.\overline{037}}}$ **= ?**

1) 3 2) $\frac{1}{3}$ 3) $\frac{2}{3}$ 4) 6

$$\left(\frac{11}{99}+\frac{22}{99}\right)\times 3 = \frac{33}{99}\times 3 = 1 \qquad \therefore \frac{1}{\frac{1}{3}} = \boxed{3}$$

$$\sqrt[3]{0.\overline{037}} = \sqrt[3]{\frac{37}{999}} = \sqrt[3]{\frac{1}{27}} = \frac{1}{3}$$

24. a, b and c are three single digit numbers such that abcabcabc.... $\frac{26}{37}$ **. Find the value of a+b+c?**

1) 9 2) 11 3) 8 4) 7

D.S=9 $\therefore$ a+b+c = $\boxed{9}$

$\boxed{\text{OR}}$ $\dfrac{abc}{\cancel{999}_{27}} = \dfrac{26}{\cancel{37}}$ $\therefore$ abc = 26×27 = 702

$\therefore$ a+b+c = 7+0+2 = $\boxed{9}$

25. M and N are such integers that $0 \le N \le 9$ and $\frac{M}{810} = 0.9\overline{N5}$ then the value of M + N is equal to?

1) 752 2) 789 3) 853 4) 527

$\frac{M}{\cancel{810}\ 30} = \frac{9N5}{\cancel{999}\ 37} \rightarrow M = \frac{9N5}{37} \times 30$ $37 \times 25 = 925$

$\therefore \boxed{N=2}$

26. If A = 0.abcabc....then by what number A should be multiplied so as to get an integral value?

1) 2997 2) 1000 3)1998 4) Both 2997 and 1998

$A = \frac{abc}{999} \times (999K)$ for integer $\therefore \boxed{d}$

27. If N = 0.369369369369 and M = 0.531531531531531..... then what is the value of $\frac{1}{N} + \frac{1}{M}$?

1) $\frac{11100}{2419}$ 2) $\frac{111}{100}$ 3) $\frac{1897}{3162}$ 4) $\frac{2419}{11100}$

$\therefore \frac{1}{m} + \frac{1}{n} > 1$ $\frac{1}{\text{smaller than 1}}$ = greater than 1

$\therefore$ (c) × (d) ×

$N \approx 0.4$ $\frac{1}{N} + \frac{1}{M} \approx 2.5 + 2 \approx 4.5$ (b) ×

$M \approx 0.5$ (a) ✓

$\boxed{OR}$ $N = 0.\overline{369} = \frac{369}{999} = \frac{41}{111}$

$M = 0.\overline{531} = \frac{531}{999} = \frac{59}{111}$

$\frac{1}{N} + \frac{1}{M} = \frac{111}{41} + \frac{111}{59} = \frac{111 \times 59 + 111 \times 41}{41 \times 59} = \frac{111(59+41)}{2419} = \boxed{\frac{11100}{2419}}$

28. What is the value of $8.7\overline{4} + 6.4\overline{7}$?

1) $15\frac{2}{9}$ 2) $14\frac{7}{9}$ 3) $16\frac{1}{9}$ 4) $15\frac{1}{3}$

$14 + (0.7\overline{4} + 0.4\overline{7}) \rightarrow 14 + (\frac{67}{90} + \frac{43}{90}) \rightarrow 14 + \frac{110}{90}$

$\hookrightarrow 14 + 1\frac{2}{9} = \boxed{15\frac{2}{9}}$

29. $8.5\overline{46} + 5.\overline{927}$ = ?

1) $14.\overline{4743925}$ 2) $14.47\overline{43925}$ 3) $14.\overline{4743}$ 4) $14.\overline{4743}$

8. 5 | 4 6 4 6 4 6 | 4 6 4 6 I → After decimal digits = no. of
5. 9 | 2 7 9 2 7 9 | 2 7 9 2 max. no bar digits.

+	I	II	III
	14.4	743925	7438

II → Lcm of no. of bar digits (2, 3) = 6 digits
III → Write 2 or more digits for accuracy

∴ $\boxed{14.4\overline{743925}}$

30. $8.7\overline{4}+5.34\overline{9}$ = ?

1) $14.09\overline{4}$ 2) $14.0\overline{94}$ 3) $14.\overline{094}$ 4) $14.094\overline{5}$

8.74	4	4444
5.34	9	9999
14.09	4	4443

∴ $\boxed{14.09\overline{4}}$

31. $2.8\overline{56}+3.\overline{74}+5.857\overline{6}=?$

1) $12.461\overline{70}$ 2) $12.46\overline{170}$ 3) $12.4\overline{617}$ 4) $12.4\overline{6170}$

2.856	56	5656
3.747	47	4747
+ 5.857	66	6666
12.461	70	7069

∴ $\boxed{12.461\overline{70}}$

32. $0.00\overline{7}+17.\overline{83}+310.020\overline{2}=?$

1) $327.86\overline{38}$ 2) $327.866\overline{38}$ 3) $327.866\overline{83}$ 4) $327.866\overline{8}$

After decimal 3 digits will be of no bar ∴ (a) ×

↳ Lcm(1, 2, 1) = 2 digits bar ∴ (d) ×

310.020	22	2222
17.838	38	3838
0.007	77	7777
327.866	38	3837

∴ $\boxed{327.866\overline{38}}$

33. $22.\overline{4}+11.5\overline{67}-33.\overline{59}=?$

1) $0.\overline{32}$ 2) $0.4\overline{12}$ 3) $0.3\overline{1}$ 4) $0.\overline{412}$

(a) × (d) × → After decimal one digit of no bar

Lcm of (1, 2, 1) = 2 bar digits ∴ (c) ×.

∴ $\boxed{0.4\overline{12}}$

34. $3.5\overline{76}-1.4\overline{576}=?$

1) $2.3\overline{100191}$ 2) $2.\overline{3100191}$ 3) $2.\overline{3110091}$ 4) $2.3\overline{110091}$

3.7	676767	676
− 1.4	576576	576
2.3	100191	100

∴ $\boxed{2.3\overline{100191}}$

35. If $0.x\overline{y} + 0.y\overline{x} = \frac{5}{9}$ then x + y = ?

1) 5 2) 6 3) 9 4) 3

$\frac{xy-x}{90} + \frac{yx-y}{90} = \frac{5}{9} \rightarrow \frac{(10x+y)-x}{90} + \frac{(10y+x)-y}{90} = \frac{5}{9}$

$\frac{10x+10y}{90} = \frac{5}{9} \rightarrow \frac{10(x+y)}{90} = \frac{5}{9}$

$\therefore \boxed{x+y=5}$

* No. $\rightarrow xy = 83$
$\hookrightarrow 10x+y = 10\times8+3$

* if $0.x\overline{yz} + 0.z\overline{yx} = \frac{164}{99}$. find y_{max} ?

$\frac{xyz-x}{990} + \frac{zyx-z}{990} = \frac{164}{99}$

$\hookrightarrow \frac{(100x+10y+z)-x}{990} + \frac{(100z+10y+x)-z}{990} \Rightarrow \frac{10\cancel{0}x+10\cancel{0}z+2\cancel{0}y}{\cancel{990}\ 1\cancel{0}} = \frac{164}{\cancel{99}}$

$\therefore 5x+5z+y = 82$ $\quad \therefore y = 82-5(16) = 2 \rightarrow$ min $\quad \therefore$ only 2 value possible for y.

$y = 82-5(z+x)$ $\quad y = 82-5(15) = 7 \rightarrow$ max.

36. $0.4\overline{7} + 0.5\overline{03} - 0.3\overline{9} \times 0.\overline{8} = ?$

1) $0.6\overline{15}$ 2) $0.61\overline{5}$ 3) $0.62\overline{5}$ 4) $0.6\overline{25}$

$0.3\overline{9} \times 0.\overline{8} = \frac{\cancel{36}^{4}}{90} \times \frac{8}{\cancel{9}} = \frac{32}{90} = 0.3\overline{5}$

$\therefore$
0.4 | 77 | 7777
0.5 03 | 0303
0.3 55 5555
0.6 25 2525

$\therefore \boxed{0.6\overline{25}}$

37. $\left(2.\overline{4} \times 0.\overline{6} \times 3 \times 0.1\overline{6}\right) \times \left[0.\overline{27} \times \left(0.8\overline{3} + 0.1\overline{6}\right)\right] = ?$

1) $0.8\overline{14}$ 2) $0.1\overline{1}$ 3) $0.\overline{1}$ 4) $1.\overline{36}$

$\frac{22}{\cancel{9}} \times \frac{\cancel{6}}{\cancel{9}} \times \cancel{3} \times \frac{\cancel{15}}{\cancel{90}_{\cancel{6}}} \times \frac{\cancel{27}^{\cancel{3}}}{99} \times 5$ $\qquad \frac{\cancel{75}^{5}}{\cancel{90}} \div \frac{\cancel{15}}{\cancel{90}}$

$\hookrightarrow \frac{110}{99} = \frac{10}{9} = 1 + \frac{1}{9} = \boxed{1.\overline{1}}$

$\Rightarrow$ $1+\underline{2}+1 = 4 = 2^2$ $\qquad$ square of middle no.

$1+2+\underline{3}+2+1 = 9 = 3^2$

$1+2+3+\underline{4}+3+2+1 = 16 = 4^2$

38. 1 + 2 + 3 +.....+ 999 + 1000 + 999 +....+ 2 + 1= ?

1) 999000 2) 1000000 3) 999999 4) 990000

middle no = 1000 → $(1000)^2$ → $\boxed{1000000}$

39. Simplify: $\sqrt{1+2+3+....+78+79+78+....+2+1}=?$

1) 78 2) 6084 3) 79 4) 6241

$\sqrt{79^2} = \boxed{79}$

40. $\sqrt{1+2+3+...+(x-1)+x+(x-1)+...+2+1}$ **= 169, Find the value of x.**

1) 169 2) 13 3) 144 4) 12

$\sqrt{x^2} = 169 \quad \therefore \quad \boxed{x=169}$

41. $\sqrt{1+2+3+...+(2N-2)+(2N-1)+2N+(2N-1)+(2N-1)+...+2+1}$ **=90, Find the value of N^2.**

1) 1600 2) 2025 3) 2500 4) 8100

$2N = 90 \quad \therefore \quad N=45 \quad \therefore \quad N^2 = \boxed{2025}$

42. $\sqrt{(11111.....100times)-(22222.....50times)}$

1) (11111 ..... 100 times) 2) (11111 .... 50 times)
3) (33333... 100 times) 4) (33333.... 50 times)

$\sqrt{11-2} = 3$

$\sqrt{1111-22} = \sqrt{1089} = 33 \quad \therefore$ (3333-.....50times)

43. If $\sqrt{(11111....xtimes)-(22222...ytimes)}$ **= 3333333333, Then find** $\sqrt{3x+4y}$ **.**

1) $\sqrt{111}$ 2) 10 3) $\sqrt{91}$ 4) 9

3333333333 = 10 times

$\therefore y = 10 \quad \therefore x = 20$

$\sqrt{3x+4y} = \sqrt{60+40} = \boxed{10}$

44. If x= 111 ... 1 (20 digits), y = 333...3 (10 digits) and z= 222 ...2 (10 digits), then what is $\frac{x-y^2}{z}$ **equal to**

1) 1/2 2) 1 3) 2 4) 3

$\frac{x-y^2}{z} = \frac{11-3^2}{2} = \boxed{1}$

45. The integer closest to $\sqrt{111....1-222....2}$**, where there are 2018 one's and 1009 two's, is**

1) $\frac{10^{1009}-1}{3}$ 2) $\frac{10^{2018}-1}{9}$ 3) $\frac{10^{2010}-1}{3}$ 4) $\frac{10^{2018}-1}{3}$

33333 - - - - - - - - 1009 times

$= \frac{1}{3}[\,9999 - - - - - 1009 \text{ times}]$

$= \frac{10^{1009}-1}{3}$

46. If P = $\frac{96}{95\times97}$, Q = $\frac{97}{96\times98}$ and R= $\frac{1}{97}$, then which of the following is TRUE?

1) P < Q < R 2) R < Q < P 3) Q < P < R 4) R < P < Q

$x = 95 \quad \therefore \quad P = \frac{x+1}{x(x+2)}, \quad Q = \frac{x+2}{(x+1)(x+3)}, \quad R = \frac{1}{(x+2)}$

put $x = 1 \quad \therefore \quad P = \frac{2}{3}, \quad Q = \frac{3}{8}, \quad R = \frac{1}{3}$

0.66 0.375 0.33

$\therefore \boxed{P > Q > R}$

47. Simplify: $\frac{(2018)^2}{(2017)^2+(2019)^2-2}$

1) 1009 2) $\frac{1}{2}$ 3) $\frac{1}{3}$ 4) 23

$\frac{(2018)^2}{(2017)^2+(2019)^2-2} = ?$ let $2017 = 1 \therefore 2018 = 2$, $2019 = 3$

$\therefore \frac{4}{1+9-2} \rightarrow \frac{4}{8} \rightarrow \boxed{\frac{1}{2}}$

let $2018 = x$ $\therefore \frac{x^2}{(x-1)^2+(x+1)^2-2} \rightarrow \frac{x^2}{2x^2+\cancel{2}-\cancel{x}} \rightarrow \boxed{\frac{1}{2}}$

48. $\frac{18.43\times18.43-6.57\times6.57}{11.86} = ?$

1) 23.62 2) 25 3) 26 4) 24.12

$\frac{a^2-b^2}{a-b} = (a+b) \quad \therefore \quad 18.43+6.57 = \boxed{25}$

49. $\frac{(943+864)^2-(943-8640)^2}{(1886\times1728)} = ?$

1) 1 2) 4 3) 79 4) 1789

$$\frac{(a+b)^2-(a-b)^2}{2a\times 2b} = \frac{\cancel{4ab}}{\cancel{4ab}} = \boxed{1}$$

50. $\dfrac{(2.45)^3+7.35(1.55)^2-4.65(2.65)^2-(1.55)^3}{(2.45)^2-2\times 2.45\times 1.55+(1.55)^2}$

1) 0.8 2) 0.9 3) 0.7 4) 0.6

$$\frac{(a-b)^3}{(a-b)^2} = (a-b) \rightarrow 2.45-1.55 \rightarrow \boxed{0.9}$$

51. If a + 1= 2020² + 2021² then what is value of $\sqrt{2a+1}$?

1) 4040 2) 4042 3) 4041 4) 4054

Let 2020 = 2 $\therefore$ $a+1 = 2^2+3^2 \Rightarrow a=12$

$\therefore$ 2021 = 3 $\sqrt{2a+1} = \sqrt{24+1} = 5$ (sum of 2 & 3)

$\therefore$ Ans $\rightarrow$ 2020 + 2021 $\rightarrow \boxed{4041}$

$\boxed{\text{OR}}$ Let $x = 2020$

$\therefore (a+1) = x^2+(x+1)^2$

$a+1 = x^2+x^2+2x+1$

$a = 2x^2+2x$

$\therefore \sqrt{2a+1} = \sqrt{4x^2+4x+1}$

$= \sqrt{(2x+1)^2}$

$= 2x+1$

$= 2\times 2020+1$

$= \boxed{4041}$

52. If a = 0.4039 then $\sqrt{4a^2-4a+1}$ + 5a = ?

1) 2.2117 2) 2.4039 3) 2.8078 4) 1.8273

$\sqrt{4a^2-4a+1}$

$\sqrt{(2a-1)^2}$ $\sqrt{(1-2a)^2}$

$(2a-1)$ $(1-2a)$

Root के बाहर सिर्फ +ve value आयेगी

* $(a-b)^2 = (b-a)^2 = a^2-2ab+b^2$

$\sqrt{a^2-2ab+b^2}$ → $a-b$ $(a>b)$, $b-a$ $(b>a)$

→ for $a = 0.4039$, $(2a-1)$ will be (-ve) Hence ignore it

$\therefore \sqrt{4a^2-4a+1} + 5a = 1-2a+5a = 1+3a = 1+3\times 0.4039$

$= \boxed{2.2117}$

53. **47.2506 = 4A + $\frac{7}{B}$ + 2C + $\frac{5}{D}$ + 6E then 5A + 3GB + 6C + D + 3E = ?**

1) 53.6003 2) 53.6012 3) 153.6003 4) 213.003

$47.2506 \Rightarrow 4\times 10 + 7 + \frac{2}{10} + \frac{5}{100} + \cancel{\frac{0}{1000}} + \frac{6}{10000} = 4A + \frac{7}{B} + 2C + \frac{5}{D} + 6E$

compare

$\boxed{A=10}$ $7 = \frac{7}{B}$ $\therefore \boxed{B=1}$ $\frac{2}{10} = 2C$ $\therefore \boxed{C=\frac{1}{10}}$

$\frac{5}{100} = \frac{5}{D}$ $\therefore \boxed{D=100}$ $\frac{6}{10000} = 6E$ $\therefore \boxed{E = \frac{1}{10000}}$

$\therefore 5A+3B+6C+D+3E = 50+3+0.6+100+0.0003 = \boxed{153.6003}$

$\Rightarrow$ $7032 = 7.032\times 10^3$ $0.00961 = 9.61\times 10^{-3}$

$7032.5 = 7.0325\times 10^3$ $0.00001382 = 1.382\times 10^{-5}$

54. **The simplified value of** $\frac{0.01404}{24^2+6^2-144}$ **is:**

1) 3×10^{-5} 2) 6×10^{-5} 3) 2.4×10^{-4} 4) 3×10

$\frac{\cancel{1404}^{3}\times 10^{-5}}{\cancel{468}} \rightarrow \boxed{3\times 10^{-5}}$

55. $\frac{5.75\times 5.75\times 5.75+3.25+3.25+3.25}{57.5\times 57.5+32.5\times 32.5-57.5\times 32.5}=?$

1) 0.009 2) 0.0009 3) 0.9 4) 0.09

$\frac{a^3+b^3}{a^2+b^2-ab} = a+b$ $(575+325)\times\frac{10^{-6}}{10^{-2}} = 900\times 10^{-4}$

$= 9\times 10^{-2} = \boxed{0.09}$

56. $\frac{63.5\times 63.5\times 63.5+36.5\times 36.5\times 36.5}{6.35\times 6.35+3.65\times 3.65+6.35\times 3.65}=?$

1) 10,000 2) 1,00,000 3) 100 4) 1,000

$(635+365)\times\frac{10^{-3}}{10^{-4}} = 1000\times 10^1 = \boxed{10,000}$

57. **The value of** $\frac{\left[(68.4)^2+(31.6)^2\right]}{\left[(687+316)^2+(684-316)^2\right]}$ **is:**

1) 0.05 2) 0.005 3) 0.0005 4) 0.5

$68.4 = 684 \times 10^{-1}$ $\quad \therefore (68.4)^2 + (31.6)^2 = \dfrac{[(684)^2 + (316)^2] \times 10^{-2}}{(684+316)^2 + (684-316)^2}$

$(68.4)^2 = 684^2 \times 10^{-2}$

$\therefore \dfrac{a^2+b^2}{(a+b)^2+(a-b)^2} = \dfrac{a^2+b^2}{2(a^2+b^2)} = \dfrac{1}{2}$ $\quad \therefore \dfrac{1}{2} \times 10^{-2} = 0.5 \times 10^{-2}$

$= \boxed{0.005}$

58. $\dfrac{(0.013)^2 + (0.007)(0.000049)}{(0.007)^2 + 0.013(0.013 - 0.007)} = ?$

1) 0.06 2) 0.02 3) 0.07 4) 0.04

$\dfrac{a^3+b^3}{a^2+b^2-ab} = a+b \rightarrow 0.013 + 0.007 = \boxed{0.020}$

59. $\dfrac{27 \times (0.25)^3 + 125(0.05)^3}{(0.75)^2 - 0.25 \times 0.5} = ?$

1) 1 2) 0.25 3) 0.75 4) 0.5

$\dfrac{0.75^3 + 0.25^3}{(0.75)^2 - 0.25(0.75 - 0.25)} \Rightarrow 0.75 + 0.25 = \boxed{1}$

60. **The value of** $\dfrac{(253)^3 + (247)^3}{25.3 \times 25.3 - 624.91 + 24.7 \times 24.7}$ **is 50x10^k, where the value of k is:**

1) 4 2) 3 3) 2 4) - 3

$100 \times (253 + 247) = 50 \times 10^K$

$100 \times \cancel{500}_{10} = \cancel{50} \times 10^K \rightarrow 1000 = 10^K \rightarrow 10^3 = 10^K \therefore \boxed{K=3}$

61. $\dfrac{3.6 \times 1.62 + 0.48 \times 3.6}{1.8 \times 0.8 + 10.8 \times 0.3 - 2.16} = ?$

1) 2.4 2) 2 3) 4 4) 3

$\dfrac{3.6 \times 2.1}{1.8(0.8 + 1.8 - 1.2)} \rightarrow \dfrac{\overset{2}{\cancel{3.6}} \times 2.1}{\cancel{1.8} \times 1.4} \rightarrow \dfrac{\cancel{4.2}\ 3}{\cancel{1.4}} \Rightarrow \boxed{3}$

62. **The value of** $\dfrac{4.669 \times 4.669 - 9 \times (0.777)^2}{(4.669)^2 + (2.331)^2 + (14)(0.667)(2.331)}$ **is (1-k), where k = ?**

1) 0.467 2) 0.768 3) 0.647 4) 0.666

$3\times0.777 = 2.331 \quad \therefore \quad \frac{a^2-b^2}{a^2+b^2+2ab} = \frac{(a+b)(a-b)}{(a+b)^2} = \frac{a-b}{a+b}$

$\hookrightarrow \frac{2.338}{7} \Rightarrow 0.334 = 1-K \quad \therefore \quad \boxed{K = 0.666}$

63. The value of $\frac{0.325\times0.325+0.175\times0.175+25\times0.00455}{5\times0.0065\times3.25-7\times0.175\times0.025}+\frac{0.5}{1.5}$ **is**

1) 3 2) 2 3) 4)

$\frac{a^2+b^2+2ab}{a^2-b^2} \Rightarrow \frac{a+b}{a-b} \Rightarrow \frac{\cancel{50}^{10}}{\cancel{15}_{3}} + \frac{1}{3} \Rightarrow \boxed{\frac{11}{3}}$

64. The value of $\frac{(0.13)^2+(0.21)^2}{(0.39)^2+81(0.07)^2}\div\frac{(2.4)^4+3\times(11.52)+9}{(2.4)^6+6(2.4)^4+3(17.28)}$ **lies between :**

1) 0.4 and 0.5 2) 0.7 and 0.8 3) 0.5 and 0.6 4) 0.6 and 0.7

$\frac{0.13^2+0.21^2}{(0.13\times3)^2+(0.21\times3)^2} = \frac{\cancel{0.13^2+0.21^2}}{3^2(\cancel{0.13^2+0.21^2})} = \frac{1}{9}$

$\frac{2.4^4+6\times2.4^2+9}{2.4^6+6\times2.4^4+9\times2.4^2} = \frac{\cancel{(2.4^4+6\times2.4^2+9)}}{2.4^2\cancel{(2.4^2+6\times2.4^2+9)}} = \frac{1}{2.4^2}$

$\therefore \frac{1}{9}\div\frac{1}{2.4^2} \rightarrow \frac{1}{9}\times2.4^2 \rightarrow \frac{1}{3^2}\times2.4^2 \rightarrow 0.8^2 \rightarrow 0.64$

$\therefore$ B/w $\boxed{0.6 \text{ \& } 0.7}$

65. $\frac{0.0203\times2.92}{0.7\times0.0365\times2.9}\div\frac{(12.12)^2-(8.12)^2}{(0.25)^2+(0.24)(19.99)}=?$

1) 0.05 2) 0.5 3) 0.1 4) 0.01

$\frac{\cancel{0.0203}^{\cancel{29}}\times\cancel{2.92}\,4}{\cancel{0.7}\times\cancel{0.0365}_{5}\times\cancel{2.9}} = \frac{4}{5}$

$\frac{20.24\times4}{0.25(0.25+19.99)} = \frac{\cancel{20.24}\times4}{0.25\times\cancel{20.24}} = 16$

$\therefore \frac{4}{5}\div16 \rightarrow \frac{4}{5}\times\frac{1}{16} \rightarrow \frac{1}{20} \rightarrow \boxed{0.05}$

66. $\dfrac{(0.545)(0.081)(0.51)(5.2)}{(0.324)^3+(0.221)^3-(0.545)^3}=?$

1) -3 2) 3 3) -1 4) 1

if $a+b+c=0$ then $a^3+b^3+c^3=3abc$

$\rightarrow \dfrac{\cancel{0.545}\times\cancel{0.081}\times\cancel{0.51}^{3}\times\cancel{0.52}\cancel{+3}}{3\times\cancel{0.324}_{4}\times\cancel{0.221}_{+7}\times(-\cancel{0.545})}=\boxed{1}$

67. Evaluate the following: $\dfrac{\left((12.5)^3+(7.5)^3\right)}{(12.5)^2+(7.5)^2-12.5\times7.5}$

1)20 2) 25 3) 30 4) 15

$\dfrac{a^3+b^3}{a^2+b^2-ab}\Rightarrow\dfrac{(a+b)\cancel{(a^2+b^2-ab)}}{\cancel{(a^2+b^2-ab)}}\Rightarrow(a+b)$

$\therefore\ 12.5+7.5=\boxed{20}$

68. $\dfrac{8.(3.75)^2+1}{(7.5)^2-6.5}=?$

1) 2.75 2) $\dfrac{9}{5}$ 3) 4.75 4) 8.5

$2^3\times(3.75)^3+1\rightarrow\dfrac{7.5^3+1^3}{7.5^2-7.5+1}\rightarrow7.5+1=\boxed{8.5}$

69. The square root of $\dfrac{(0.75)^3}{1-0.75}$ **+ [0-75 + (0.75)² + 1]**

1) 1 2) 2 3) 3 4) 4

$\dfrac{\cancel{0.75^3}+(1^3-\cancel{0.75^3})}{1-0.75}\Rightarrow\sqrt{\dfrac{1}{0.25}}\Rightarrow\sqrt{4}=\boxed{2}$

70. $A=\dfrac{0.216+0.008}{0.36+0.04-0.12}$ **and** $B=\dfrac{0.729-0.027}{0.81+0.09+0.27}$ **then find the value of (A^2+B^2)?**

1) 0 - 8 2) 1 3) 2.2 4) 1.44

$$A = \frac{0.6^3 + 0.2^3}{0.6^2 + 0.2^2 - 0.6 \times 0.2} = 0.8 \qquad B = 0.6$$

$$A^2 + B^2 = 0.64 + 0.36 = \boxed{1}$$

71. The value of

$$\frac{427 \times 427 \times 427 + 325 \times 325 \times 325}{42.7 \times 42.7 + 32.5 \times 32.5 - 42.7 \times 32.5}$$

1) 75.2 2) 752 3) 75200 4) 7520

$$\frac{(427^3 + 325^3) \times 10^2}{427^2 + 325^2 - 427 \times 325} \quad \therefore \quad (427 + 325) \times 100$$

$$\boxed{75200}$$

72. The value of $\left[\frac{83.7 \times 83.7 + 16.3 \times 16.3 - 83.7 \times 16.3}{0.837 \times 0.837 \times 0.837 + 0.163 \times 0.163 \times 0.163}\right] \div 333\frac{1}{3}$ **is?**

1) 25 2) 30 3) 33 4) 0.3

$$\frac{10^{-2}(837^2 + 163^2 - 837 \times 163)}{10^{-9}(837^3 + 163^3)} \div \frac{1000}{3} \quad * \quad \frac{a^2 + b^2 - ab}{a^3 + b^3}$$

$$\hookrightarrow \frac{\cancel{a^2 + b^2 - ab}}{(a+b)(\cancel{a^2 + b^2 - ab})}$$

$$\hookrightarrow \frac{1}{a+b}$$

$$10^7 \times \frac{1}{837 + 163} \times \frac{3}{1000}$$

$$10^7 \times \frac{1}{1000} \times \frac{3}{1000} \rightarrow \frac{10^7}{10^6} \times 3 \rightarrow 10 \times 3$$

$$\rightarrow \boxed{30}$$

73. If the value of $\frac{52.5 \times 52.5 - 2493.75 \times 47.5 \times 47.5}{525^3 + 475^3} = 10^{-k}$ **Then find the value of k**

1) 3 2) 4 3) 5 4) 6

$$\frac{10^{-2}(525^2 - 249375 + 475^2)}{525^3 + 475^3} \Rightarrow \frac{1}{(525 + 475) \times 100} \Rightarrow \frac{1}{10^5}$$

$$\therefore \quad 10^{-5} = 10^{-K} \qquad \therefore \quad \boxed{K = 5}$$

74. If $a^3 = 335 + b^3$ and $a = 5 + b$, then what is the value of a + b (given that a > 0 and b > 0)

1) 7 2) 9 3) 16 4) 49

$$a^3 = 335 + b^3 \quad \& \quad a = 5 + b \qquad \therefore \quad a + b = 7 + 2 = \boxed{9}$$

$$7^3 = 335 + 2^3 \qquad 7 = 5 + 2$$

75. What is the value of $\frac{5.6\times0.36+0.42\times3.2}{0.8\times2.1}$?

1) 2 2) 1 3) 3 4) 3/2

$$\frac{10^{-3}}{10^{-2}}\left(\frac{\cancel{56}^{7}\times\cancel{36}^{12}}{\cancel{8}\times\cancel{21}_{3}}+\frac{\cancel{42}^{2}\times\cancel{32}^{4}}{\cancel{8}\times\cancel{21}}\right)\Rightarrow 10^{-1}(12+8)\Rightarrow\frac{\cancel{20}}{\cancel{10}}\Rightarrow\boxed{2}$$

76. $\sqrt{\frac{(0.03)^2+(0.21)^3+(0.065)^2}{(0.003)^2+(0.021)^2+(0.0065)^2}}$

1) 0.1 2) 10 3) 102 4) 103

$$\sqrt{\frac{10^2\,\cancel{(0.03)^2+(0.21)^2+(0.065)^2}}{\cancel{(0.03)^2+(0.21)^2+(0.065)^2}}}=\sqrt{10^2}=\boxed{10}$$

77. If N = 1 + 11 + 111 + 1111 + ... + 111111111, then what is the sum of the digit's of N?

1) 45 2) 18 3) 36 4) 5

N = 123456789

$\therefore\ 1+2+\cdots+9=\frac{9\times10}{2}=\boxed{45}$

1 + 11 = 12

1 + 11 + 111 = 123

1 + 11 + 111 + 1111 = 1234

$\Rightarrow\ 1^2=1$ $\quad 11111^2=123454321$

$11^2=121$

$111^2=12321$

$*\ 1+\sqrt{121}+\sqrt{12321}+\cdots+\sqrt{123456787654321}$

$\Rightarrow 12345678$

78. $\sqrt{121}+\sqrt{12321}+\ldots+\sqrt{1234567654321}$ = ?

1) 1234567 2) 1234566 3) 1234565 4) None

$1234567-1=\boxed{1234566}$

79. $\sqrt{121}+\sqrt{12321}+\ldots+\sqrt{N}$ = **123456789. Find the value of N.**

1) 123456787654321 2) 1234567654321

3) 12345654321 4) None

N = 1234567898765 4321

$\Rightarrow \left(1+\frac{1}{2}\right)\cdot\left(1+\frac{1}{3}\right)\left(1+\frac{1}{4}\right)\cdots\cdots\left(1+\frac{1}{80}\right) = \frac{81}{2} = 40.5$

$\left(1+\frac{1}{2}\right)\left(1+\frac{1}{3}\right)\left(1+\frac{1}{4}\right)\cdots\cdots\left(1+\frac{1}{x}\right) = \boxed{\frac{x+1}{2}}$

$\downarrow \frac{x+1}{x}$

$\left(1+\frac{1}{21}\right)\left(1+\frac{1}{22}\right)\left(1+\frac{1}{23}\right)\cdots\cdots\left(1+\frac{1}{104}\right) = \frac{105}{21} = \boxed{5}$

$\Rightarrow \left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\cdots\cdots\left(1-\frac{1}{178}\right) = \frac{1}{178}$

$\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\cdots\cdots\left(1-\frac{1}{x}\right) = \frac{1}{x}$

$\downarrow \frac{1}{2}$ $\quad \downarrow \frac{x-1}{x}$

$\left(1-\frac{1}{83}\right)\left(1-\frac{1}{84}\right)\left(1-\frac{1}{85}\right)\cdots\cdots\left(1-\frac{1}{246}\right) \Rightarrow \frac{82}{246} = \boxed{\frac{1}{3}}$

$\Rightarrow \left(1-\frac{1}{2^2}\right)\left(1-\frac{1}{3^2}\right)\left(1-\frac{1}{4^2}\right)\cdots\cdots\left(1-\frac{1}{80^2}\right)$

$\left(1+\frac{1}{2}\right)\left(1+\frac{1}{3}\right)\cdots\cdots\left(1+\frac{1}{80}\right) \times \left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\cdots\cdots\left(1-\frac{1}{80}\right)$

$\frac{81}{2} \times \frac{1}{80} = \boxed{\frac{81}{160}}$

$\therefore \left(1-\frac{1}{2^2}\right)\left(1-\frac{1}{3^2}\right)\cdots\cdots\left(1-\frac{1}{x^2}\right)$

$\hookrightarrow \left(1+\frac{1}{2}\right)\left(1+\frac{1}{3}\right)\cdots\cdots\left(1+\frac{1}{x}\right) \times \left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\cdots\cdots\left(1-\frac{1}{x}\right)$

$\hookrightarrow \frac{x+1}{2} \times \frac{1}{x} = \boxed{\frac{x+1}{2x}}$

$* \left(1-\frac{1}{30^2}\right)\left(1-\frac{1}{31^2}\right)\left(1-\frac{1}{32^2}\right)\cdots\cdots\left(1-\frac{1}{200^2}\right)$

$\frac{201}{30} \times \frac{29}{200} = \frac{5829}{6000}$

80. $\left(1-\frac{1}{2^2}\right)\left(1-\frac{1}{3^2}\right)\left(1-\frac{1}{4^2}\right)....\left(1-\frac{1}{120^2}\right)=?$

~~119~~ ~~119~~ ~~120~~ ~~121~~

1) 240 2) 120 3) 240 4) 240

$\frac{x+1}{2x} \rightarrow \frac{120+1}{2\times120} \rightarrow \boxed{\frac{121}{240}}$

81. **{(3.07)³ - (0.07)³ - 0.63 x 3.07)} + { (1.98)³ + (0.02)³ + 1.98 x 0.12)} = ?**

1) 3.6 2) 2.25 3) 3.125 4) 3.375

$a^3-b^3-3ab(a-b)=(a-b)^3$

$3.07^3-0.07^3-3\times3.07\times0.07(3)$

$3.07^3-0.07^3-0.63\times3.07 \Rightarrow (3.07-0.07)^3=3^3=27$

IIIly $(1.98)^3+(0.02)^3+1.98\times0.12=(1.98+0.02)^3=2^3=8$

$\therefore 27\div8=\boxed{3.375}$

82. **If** $\left(1-\frac{1}{2^2}\right)\left(1-\frac{1}{3^2}\right)\left(1-\frac{1}{4^2}\right)....\left(1-\frac{1}{N^2}\right)=\frac{85}{168}$ **then the value of N is:**

1) 84 2) 82 3) 81 5) 80

$\frac{N+1}{2N}=\frac{85}{168} \therefore \frac{N+1}{2N}=\frac{84+1}{2\times84} \therefore \boxed{N=84}$

83. **Simplify it** $\left(2-\frac{1}{3}\right)\left(2-\frac{3}{5}\right)\left(2-\frac{5}{7}\right)....\left(2-\frac{997}{999}\right)$

(a) $\frac{5}{999}$ (b) $\frac{5}{3}$ (c) $\frac{1001}{999}$ (d) $\frac{1001}{3}$

$\frac{5}{3}\times\frac{7}{5}\times\frac{8}{7}\times----\times\frac{1001}{999} \rightarrow \boxed{\frac{1001}{3}}$

84. **If** $\left(1+\frac{1}{2}\right)\left(1+\frac{1}{4}\right)\left(1+\frac{1}{6}\right)\left(1+\frac{1}{8}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{7}\right)=1+\frac{1}{x}$**, then what is the value of x ?**

1) 6 2) 8 3) 5 4) 7

$\frac{3}{2}\times\frac{5}{4}\times\frac{7}{6}\times\frac{9}{8}\times\frac{2}{3}\times\frac{4}{5}\times\frac{6}{7}=1+\frac{1}{x} \rightarrow 1+\frac{1}{8}=1+\frac{1}{x}$

$\therefore \boxed{8}$

85. $\frac{3}{1^2\times2^2}+\frac{5}{2^2\times3^2}+\frac{7}{4^2\times5^2}+\frac{7}{4^2\times5^2}.....+\frac{19}{9^2\times10^2}=?$ or $\frac{2^2-1^2}{2^2\times1^2}+\frac{3^2-2^2}{2^2\times3^2}.....\frac{10^2-9^2}{9^2\times10^2}$

1) 0.21 2) 1 3) 12.60 4) -1

$$\frac{1}{1^2} - \cancel{\frac{1}{2^2}} + \cancel{\frac{1}{2^2}} - \cancel{\frac{1}{3^2}} + \cancel{\frac{1}{3^2}} - \cancel{\frac{1}{4^2}} + \cdots + \cancel{\frac{1}{9^2}} - \frac{1}{10^2}$$

$$1 - \frac{1}{100} = \boxed{\frac{99}{100}}$$

86. $\dfrac{(5.4)^2 + (4.4)^2 - 47.52}{(5.4)^3 - (4.4)^3 - 71.28} = ?$

1) 0.21 2) 1 3) 12.60 4) -1

$$\frac{5.4^2 + 4.4^2 - 2 \times 5.4 \times 4.4}{5.4^3 - 4.4^3 - 3 \times 5.4 \times 4.4 \times 1} \rightarrow \frac{(a-b)^2}{(a-b)^3} \rightarrow \frac{(5.4-4.4)^2}{(5.4-4.4)^3}$$

$$\Rightarrow \frac{1^2}{1^3} \Rightarrow \boxed{1}$$

$\Rightarrow a^3+b^3+c^3-3abc = (a+b+c)\cdot(a^2+b^2+c^2-ab-bc-ca)$

$$\frac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2-ab-bc-ca} = a+b+c$$

if $a+b+c=0$
Then $a^3+b^3+c^3-3abc=0$
or $a^3+b^3+c^3=3abc$

87. The value of $\dfrac{\left[(2.5)^3 + (4.7)^3 + (2.8)^3 - 7.5 \times 4.7 \times 2.8\right]}{\left[(25)^2 + (47)^2 + (20^2 - 25 \times 47 - 47 \times 28 - 28 \times 25)\right]} = ?$

1) 0.1 2) 0.001 3) 1 4) 0.01

$$10^{-3} \times (25+47+28) = 10^{-3} \times 100 = \boxed{0.1}$$

88. $(32)^3 + (79)^3 - (111)^3 + 3 \times 32 \times 79 \times 111$ **is equal to**

1) 10000 2) 0 3) 30007 4) 1

$a+b+c=0 \rightarrow 32+79+(-111) = 0$

$\therefore a^3+b^3+(-c)^3 - 3ab(-c) = 0$

$\Rightarrow$ Ladder Fraction:

$$\frac{1}{2+\frac{1}{3+\frac{2}{5+\frac{1}{4}}}} \rightarrow \frac{21}{71} \rightarrow 2+\frac{21}{71} \rightarrow \frac{163}{71} \rightarrow \boxed{\frac{71}{163}}$$

$$5+\frac{1}{4} \rightarrow \frac{21}{4} \qquad 3+\frac{2}{21} \rightarrow \frac{71}{21}$$

* $1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\frac{3}{5}}}}}$ 5times 1

$\therefore$ 3, 5, $\underbrace{8 \quad 13 \quad 21 \quad 34 \quad 55}_{\text{5 times (+ last two terms)}}$

$\therefore \boxed{\frac{55}{34}}$

* $1-\cfrac{1}{1-\cfrac{1}{1-\cfrac{1}{1-\frac{2}{9}}}}$ 4 times 1

$\therefore$ 2, 9, $\underbrace{7, -2, -9, -7}_{\text{4 times (− last two terms)}}$

$\therefore \frac{-7}{-9} = \boxed{\frac{7}{9}}$

* $1+\cfrac{1}{1-\cfrac{1}{1+\cfrac{1}{1-\cfrac{1}{1+\frac{5}{11}}}}}$ 5 times 1 एक बार (+) एक बार (−)

5 11 $\underbrace{16 \quad 5 \quad 21 \quad 16 \quad 37}_{+\ -\ +\ -\ +}$

$= \boxed{\frac{37}{16}}$

* $2+\cfrac{1}{3+\cfrac{1}{5+\cfrac{1}{7+\frac{1}{2}}}}$ Process = 4 times

1, 2, 7×2+1 (15), 15×5+2 (77), 77×3+15 (246), 246×2+77 (569)

$\therefore \boxed{\frac{569}{246}}$

89. $4-\cfrac{5}{1+\cfrac{1}{3+\cfrac{1}{2+\frac{1}{4}}}} = ?$

1) $\frac{1}{8}$ 2) $\frac{1}{64}$ 3) $\frac{1}{16}$ 4) $\frac{1}{32}$

1, 4, 9, 9×3+4 (31), 31×1+9 (40), 40×4−31×5 (5) $\therefore \frac{5}{40} = \boxed{\frac{1}{8}}$

90. $\left[4-\cfrac{5}{1+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{4}}}}\right]$ **part of a journey takes 10 minutes, then to complete $\frac{3}{5}$th of that journey, it will take**

1) 40 minutes 2) 45 minutes 3) 48 minutes 4) 36 minutes

$\frac{1}{8} \longrightarrow 10\text{min} \therefore 1(\text{full journey}) = 80\text{min}$

$\frac{3}{5} \rightarrow 80 \times \frac{3}{5} = \boxed{48\text{ min}}$

$* \quad 3+\cfrac{2}{4-\cfrac{5}{2+\cfrac{1}{5-\frac{3}{7}}}}$ 4 times.

$-3,\ 7,\ 32,\ \underset{(71)}{32\times2+7},\ \underset{(124)}{71\times4-32\times5},\ \underset{(514)}{124\times3+71\times2}$

$\therefore \boxed{\frac{514}{124}}$

91. **If** $\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\frac{1}{x}}}}=\frac{1}{8}$ **, then what is the value of x ?**

1) 2 2) 3 3) 1 4) 4

$\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\frac{1}{x}}}} = \cfrac{1}{\frac{8}{5}}$ 3 times

$\therefore \frac{8}{5} = 1+\frac{3}{5}$

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

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

$\therefore \boxed{x=2}$

92. **If a, b, c, d are integers such that** $\cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c+\frac{1}{d}}}}=\frac{29}{154}$ **then a + b + c + d = ?**

1) 12 2) 13 3) 14 4) 15

$\cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c+\frac{1}{d}}}} = \cfrac{1}{\frac{154}{29}}$

$\therefore \frac{154}{29} = 5+\frac{9}{29}$

$\frac{29}{9} = 3+\frac{2}{9}$

$\frac{9}{2} = 4 + \frac{1}{2}$

$\therefore a+b+c+d = 5+3+4+2 = \boxed{14}$

93. $\frac{(4.53-3.07)^2}{(3.07-2.15)(2.15-4.53)} + \frac{(3.07-2.15)^2}{(2.15-4.53)(4.53-3.07)} + \frac{(2.15-4.53)^2}{(4.53-3.07)(3.07-2.15)}$ **is simplified to:**

1) 0 2) 1 3) 2 4) 3

$4.53 = x$
$3.07 = y$
$2.15 = z$

$\therefore \frac{(x-y)^2}{(y-z)(z-x)} + \frac{(y-z)^2}{(z-x)(x-y)} + \frac{(z-x)^2}{(x-y)(y-z)}$

$\Rightarrow \frac{(x-y)^3+(y-z)^3+(z-x)^3}{(x-y)(y-z)(z-x)} \Rightarrow \frac{3\times\cancel{(x-y)(y-z)(z-x)}}{\cancel{(x-y)(y-z)(z-x)}} \Rightarrow \boxed{3}$

94. What is the value of $1006-1007\times1005+1008\times1004-1009\times1003$**?**

1) 6 2) 3 3) 12 4) 24

U.D → $6-5+2-7 \rightarrow 8-2 \rightarrow \cdots 6 \therefore \boxed{6}$

$\boxed{OR}$ $\cancel{1006^2} - (\cancel{1006^2} - 1^2) + (\cancel{1006^2} - 2^2) - (\cancel{1006^2} - 3^2)$

$+1-4+9 = \boxed{6}$

$\frac{45}{53} = \frac{1}{a+\frac{1}{b+\frac{1}{c-\frac{2}{5}}}}$

95. If , **where a, b and c are positive integers, then what is the value of (4a-b+3c)?**

1) 5 2) 4 3) 6 4) 7

$\frac{53}{45} = 1 + \frac{8}{45}$

$\frac{45}{8} = 5 + \frac{5}{8}$

$\frac{8}{5} = 2 - \frac{2}{5}$

$\therefore 4a-b+3c = 4\times1-5+3\times2 = \boxed{5}$

$\frac{1}{x+\frac{1}{y+\frac{2}{z+\frac{1}{4}}}} = \frac{29}{79}$

96. If , **where x, y and z are natural numbers, then the value of (2x + 3y - z) is:**

1) 1 2) 4 3) 0 4) 2

$\frac{79}{29} = 2 + \frac{21}{29}$

$\frac{29}{21} = 1 + \frac{8}{21} \rightarrow 1 + \frac{2}{\frac{21}{4}}$

$\frac{21}{4} = 5 + \frac{1}{4}$

$\therefore\ 2x + 3y - z = 4 + 3 - 5 = \boxed{2}$

97. If (x +7957 x 7965) is a perfect square, then find the value of x?

1) 1 2) 16 3) 9 4) 25

$x + (7961)^2 - (4)^2 \Rightarrow x + (7961)^2 - 16 \quad \therefore \boxed{x = 16}$

98. $(3+1)(3^2+1)(3^4+1)(3^8+1)(3^{16}+1) = ?$

1) $\frac{(3^{32}-1)}{2}$ 2) $\frac{(3^{16}-1)}{2}$ 3) $\frac{(3^{64}-1)}{2}$ 4) $\frac{(3^{128}-1)}{2}$

$(3-1)(3+1) = 3^2 - 1$

$(3^2-1)(3^2+1) = 3^4 - 1$

$(3^4-1)(3^4+1) = 3^8 - 1$

$(3^8-1)(3^8+1) = 3^{16} - 1$

$(3^{16}-1)(3^{16}+1) = 3^{32} - 1$

$\because$ multiply and div. by $(3-1)$

$\therefore \boxed{\frac{3^{32}-1}{2}}$

99. $\sqrt{29.16} + \sqrt{0.2916} + \sqrt{0.002916} + \sqrt{0.0002916} = ?$

1) 5.9949 2) 5.9894 3) 5.9984 4) 5.9994

$5.4 + 0.54 + 0.054 + 0.0054 = \boxed{5.9994}$

100. Let $x = \left(\frac{\sqrt{1875}}{\sqrt{3888}} \div \frac{\sqrt{1200}}{\sqrt{768}}\right) \times \frac{\sqrt{175}}{\sqrt{1792}}$**. Then** $\sqrt{x}$ **is equal to:**

1) $\frac{7}{12}$ 2) $\frac{4}{9}$ 3) $\frac{5}{12}$ 4) $\frac{5}{9}$

$x = \sqrt{\frac{1875}{3888} \times \frac{768}{1200} \times \frac{175}{1792}} = \frac{25}{144} \qquad \sqrt{x} = \boxed{\frac{5}{12}}$

101. The sum of two numbers is 59 and their product is 840. Find the sum of their squares.

రెండు సంఖ్యల మొత్తం 59 మరియు లబ్ధం 840. అయిన వాటి వర్గాల మొత్తం ఎంత?

1) 2961 2) 1754 3) 1801 4) 1875

$840 \rightarrow 21 \times 40 \rightarrow 7 \times 3 \times 8 \times 5$

35×24

$a^2 + b^2 = (a+b)^2 - 2ab$

$a^2 + b^2 = (a-b)^2 + 2ab$

$\therefore 35^2 + 24^2 = \boxed{1801}$

$\boxed{OR}$ $59^2 - 2 \times 840$

102. If the difference between two numbers is 6 and the difference between their squares is 60, what is the sum of their cubes?

రెండు సంఖ్య మధ్య తేడా 6 మరియు వాటి వర్గాల మధ్య తేడా 60. అయిన వాటి ఘనాల మొత్తం ఎంత?

1) 678 2) 945 3) 894 4) 520

$a-b=6$ $a^2-b^2=60$ $\therefore a+b=10$ $\therefore a=8$, $b=2$ $\therefore 512+8=\boxed{520}$

103. If the sum of two numbers is 11 and the sum of their squares is 65, then the sum of their cubes will be:

రెండు సంఖ్య మొత్తం 11 మరియు వాటి వర్గాల మొత్తం 65. అయిన వాటి ఘనాల మొత్తం ఎంత?

1) 355 2) 576 3) 407 4) 615

$7^2+4^2=65$ $\therefore 343+64=\boxed{407}$

104. The difference between two numbers is 3 and the difference between their cubes is 999. Find the difference between their squares.

రెండు సంఖ్యల మధ్య తేడా 3 మరియు వాటి ఘనాల మొత్తం 999. అయిన వాటి వర్గాల మధ్య తేడా ఎంత?

1) 81 2) 63 3) 36 4) 18

10 7 ✗
11 8 ✗
12 9 ✓

$12^3-9^3 = 1728-729 = 999$

$\therefore 12^2-9^2 = \boxed{63}$

⇨ B O D M A S
B → Brackets → small ( ), middle { }, larger [ ]
O → of
D → Div
M → multiply
A → Add
S → subtract

105. If $\frac{10}{7}(1 - 2.54 \times 10^{-3}) = 1.417 + x$, then x is equal to:

1) 0.0417 2) 0.417 3) 0.0081 4) 0.81

$\frac{10}{7} - 3.5\times10^{-3} = 1.417+x$ $\therefore \frac{1}{7} = 0.142857$

$1.428 - 3.5\times10^{-3} = 1.417+x$

$0.011 - 3.5\times10^{-3} = x$ $(\because x < 0.011)$ $\therefore x = \boxed{0.0081}$

⇨ $4 \div 4 \div 4 \div 4 \div 4$

↳ $1 \div 4 \div 4 \div 4 \rightarrow \frac{1}{4} \div 4 \div 4 \rightarrow \frac{1}{16} \div 4 \rightarrow \frac{1}{64}$

106. If (1.25) (1-6.4) x 10^{-5}) = 1.2496 + a, then a is then a is equal to:

1) 0.0016 2) 0.00016 3) 0.0032 4) 0.00032

$1.25 - 8\times10^{-5} = 1.2496 + a$

$a = 0.0004 - 8\times10^{-5} = \boxed{0.00032}$

107. (320 + 342 + 530 + 915) ÷ (20 + 22 - x + 18) = 43, then the value of x is:

1) 11 2) 26 3) 23 4) 15

D.S ⇒ $\frac{1}{6-x} = 7 \rightarrow \frac{1}{7} = 6-x \Rightarrow 4 = 6-x \therefore x = 2$

$\therefore \boxed{x=11}$

108. $\dfrac{40-\frac{3}{4}of\,32}{37-\frac{3}{4}of\,(34-6)} = ?$

1) $\frac{1}{2}$ 2) 0 3) 1 4) $-\frac{1}{2}$

$\frac{\cancel{16}}{\cancel{16}} = \boxed{1}$

109.

1) 2) 3) 2 4) 4

$\dfrac{87.35}{58.45 - \frac{3}{7}\times\frac{7}{15} + 29.1} = \dfrac{\cancel{8735}}{\cancel{8735}} = \boxed{1}$

110. The value of (72+34) ÷ 2+ [(75 ÷ 15) + 6 x 2] is:

1) 70 2) 75 3) 86 4) 78

$53 + 17 = \boxed{70}$

111. The value of [44 ÷ 4 + {9x2-14÷7}+5x2] is:

1) 55 2) 33 3) 67 4) 44

$7 + [44 \div 4 + 16 + 5\times2] \rightarrow 7 + [11 + 16 + 10] = \boxed{44}$

112. (9+3 - 16 ÷ 4 + 10) + (3 + 5 x 2 ÷ 10) x (18 - 4 of 5) = ?

1) 15 2) 10 3) 5 4) 8

$18 + 4\times(-2) = 18 - 8 = \boxed{10}$

113. The value of : 27 + [3(50 - 20) + 168 ÷ 4 + 2-11 x 2].

1) 245 2) 139 3) 149 4) 239

$27 + [90 + 42 + 2 - 22] \rightarrow \boxed{139}$

114. Find the value of 8 - 3 ÷ **6 of 2 +** $\left[4 \div 4 of \frac{1}{4}\right] \div 8 + \left(4 \times 8 \div \frac{1}{4}\right) \times \frac{1}{8}$

1) $-\frac{7}{4}$ 2) $\frac{97}{4}$ 3) $-\frac{97}{4}$ 4) $\frac{7}{4}$

$8 - \frac{1}{4} + 4 \div 8 + 4 \times \cancel{8} \times \frac{4}{1} \times \frac{1}{\cancel{8}} \rightarrow 8 - \frac{1}{4} + \frac{1}{2} + 16 \rightarrow \boxed{\frac{97}{4}}$

115. What is the simplified value of $\left[1 - \frac{1}{\left\{4 - \frac{2}{\left[1 + \frac{1}{2 + \frac{1}{3}}\right]}\right\}}\right] \times \frac{15}{16} \div \frac{2}{3} of\, 2\frac{1}{4} - \frac{15}{16} \div \frac{3+4}{3^3 + 4^3}$

1) $\frac{6}{13}$ 2) $\frac{5}{13}$ 3) $\frac{4}{13}$ 4) $\frac{8}{13}$

116. (5 + 3 ÷ 5 x 5) ÷ (3 ÷ 3 of 6) of (4 x 4 ÷ 4 of 4 + 4 ÷ 4 x 4) = ?

1) $8\frac{1}{5}$ 2) $7\frac{1}{3}$ 3) $9\frac{3}{5}$ 4) $6\frac{2}{3}$

$8 \div \frac{1}{6}$ of 5 $\rightarrow 8 \div \frac{5}{6} \rightarrow 8 \times \frac{6}{5} \rightarrow \boxed{9\frac{3}{5}}$

117. If $A = \left[\frac{3}{7} of\, 4\frac{1}{5} \div \frac{18}{25} + \frac{17}{24}\right]$ **of** $\left[\frac{289}{16} \div \left(\frac{3}{4} + \frac{2}{3}\right)^2\right]$ **then the value of 8A is:**

1) 231 2) 321 3) 132 4) 213

$A = \frac{\cancel{3}}{7} \times \frac{\cancel{21}}{5} \times \frac{\cancel{25}^{5}}{\cancel{18}_{2}} + \frac{17}{24} = \frac{77}{24}$ of $\frac{\cancel{289}}{16} \times \frac{12^{2}}{\cancel{17}^{2}}$

$\hookrightarrow \frac{77}{\cancel{24}} \times \frac{\cancel{144}\,\cancel{6}\,3}{\cancel{16}\,8} \Rightarrow \frac{77 \times 3}{8}$

$\therefore 8A = 77 \times 3 = \boxed{231}$

118. $\frac{2}{3} \div \frac{3}{10} of \frac{4}{9} - \frac{4}{5} \times 1\frac{1}{9} \div \frac{8}{15} - \frac{3}{4} + \frac{3}{4} \div \frac{1}{2} = ?$

1) $\frac{14}{3}$ 2) $-\frac{14}{3}$ 3) $\frac{17}{9}$ 4) $\frac{49}{12}$

$$\frac{2}{3} \div \frac{2}{15} - \frac{4}{5} \times \frac{10}{9} \div \frac{8}{15} - \frac{3}{4} + \frac{3}{2}$$

$$\hookrightarrow \frac{\cancel{2}}{\cancel{3}} \times \frac{\cancel{15}^{5}}{\cancel{2}} - \frac{\cancel{4}}{\cancel{5}} \times \frac{\cancel{10}}{\cancel{9}_{3}} \times \frac{\cancel{15}^{5}}{\cancel{8}_{2}} - \frac{3}{4} + \frac{3}{2}$$

$$\hookrightarrow 5 - \frac{5}{3} - \frac{3}{4} + \frac{3}{2} \rightarrow \boxed{\frac{49}{12}}$$

119. If $A = 3\frac{1}{4} \times 4\frac{1}{4} \div 34 - \frac{47}{32} + \frac{47}{16}$ **and** $B = 2\frac{1}{2} + 5\frac{1}{2} \div 55 - \frac{11}{10}$ **then what is the value of A - B?**

1) 5/8 2) 1 3) 0 4) 3/8

$$A = \frac{13}{4} \times \frac{\cancel{17}}{4} \times \frac{1}{\cancel{34}_{2}} + \frac{47}{32} \qquad B = \frac{5}{2} + \frac{\cancel{11}}{2} \times \frac{1}{\cancel{55}_{5}} - \frac{11}{10}$$

$$\Rightarrow \frac{60}{32} \Rightarrow \frac{15}{8} \qquad \Rightarrow \frac{5}{2} + \frac{1}{10} - \frac{11}{10} \Rightarrow \frac{3}{2}$$

$$\therefore A - B = \frac{15}{8} - \frac{3}{2} = \boxed{\frac{3}{8}}$$

120. $\dfrac{7 + 8 \times 8 \div 8 of 8 + 8 \div 8 \times 4 of 4}{4 \div 4 of 4 + 4 \times 4 \div 4 - 4 \div 4 of 2}$

1) 4.6 2) 8.7 3) 7.8 4) 6.4

$$7 + \cancel{8} \times 8 \times \frac{1}{\cancel{64}} + 8 \div 8 \times 16 = 8 + 1 \times 16 = 24$$

$$\frac{4}{16} + 4 \times 4 \div 4 - \frac{4}{8} = \frac{1}{4} + 4 - \frac{1}{2} = \frac{15}{4}$$

$$\therefore \frac{24}{\frac{15}{4}} = {}^{8}\cancel{24} \times \frac{4}{\cancel{15}_{5}} = \frac{32}{5} = \boxed{6.4}$$

121. A student was asked to find the value $9\frac{4}{9} \div 11\frac{1}{3} of \frac{1}{6} + \left(1\frac{1}{3} \times 1\frac{4}{5} \div \frac{3}{5}\right) \times 2\frac{1}{6} of \frac{2}{3} \div \frac{4}{3} of \frac{2}{3}$**. His answer was** $19\frac{1}{4}$**. What is the difference between his answer and the correct answer?**

1) $7\frac{3}{4}$ 2) $7\frac{1}{2}$ 3) $6\frac{2}{3}$ 4) $6\frac{1}{3}$

$\frac{85}{9} \div \frac{17}{9} + 4 \times \frac{13}{9} \div \frac{8}{9} \Rightarrow 5 + 4 \times \frac{13}{8_2} \Rightarrow \frac{23}{2}$

$\therefore \frac{77}{4} - \frac{23}{2} = \frac{31}{4} = \boxed{7\frac{3}{4}}$

122. A student was asked to find the value of $\dfrac{\left(2\frac{1}{3}+2\frac{1}{2}-\frac{1}{6}\right)\div 2\frac{1}{2}\times 5\frac{2}{3}\div 1\frac{2}{3} of\, 4\frac{1}{4}}{3\frac{1}{5}\div 4\frac{1}{2} of\, 5\frac{1}{3}\times\frac{3}{4}\div 2\frac{2}{3}}$ **. His answer was**

1) $\frac{9}{14}$ 2) $\frac{5}{14}$ 3) $\frac{11}{49}$ 4) $\frac{6}{49}$

$\frac{7}{3} + \frac{5}{2} - \frac{1}{6} = \frac{14+15-1}{6} = \frac{28}{6} = \frac{14}{3}$

$\therefore \frac{14}{3} \div \frac{7}{3} \times \frac{17}{3} \div \frac{5}{3} of \frac{17}{4} \Rightarrow \frac{14}{3} \div \frac{7}{3} \times \frac{17}{3} \div \frac{85}{12}$

$\Rightarrow \frac{14}{3} \div \frac{7}{3} \times \frac{17}{3} \times \frac{12^4}{85_5} \Rightarrow \frac{{}^2\cancel{14}}{3} \times \frac{3}{7} \times \frac{4}{5} = \frac{8}{5}$

Now solve den :

$\hookrightarrow \frac{16}{5} \div \frac{9^3}{2} \times \frac{16^8}{3} + \frac{16}{3} \times \frac{3}{4} \div \frac{8}{3} \rightarrow \frac{16}{5} \div 24 + \frac{16}{3} \times \frac{3}{4_2} \times \frac{3}{8}$

$\hookrightarrow \frac{16^2}{5} \times \frac{1}{24_3} + \frac{3}{2} \rightarrow \frac{2}{15} + \frac{3}{2} \rightarrow \frac{4+45}{30} \rightarrow \frac{49}{30}$

$\therefore \dfrac{\frac{8}{5}}{\frac{49}{30}} \Rightarrow \frac{8}{5} \times \frac{30^6}{49} \Rightarrow \frac{48}{49}$

$\therefore$ Req. diff $= \frac{48}{49} - \frac{6}{7} \Rightarrow \frac{48}{49} - \frac{42}{49} \Rightarrow \boxed{\frac{6}{49}}$

123. The value of $\left(1\frac{1}{3}\div 2\frac{6}{7} of\, 5\frac{3}{5}\right)\div\left(6\frac{2}{5}\div 4\frac{1}{2} of\, 5\frac{1}{3}\right)\times\left(\frac{3}{4}\times 2\frac{2}{3}\div\frac{2}{3}\div\frac{5}{9} of\, 1\frac{1}{5}\right)=1+k$ **where k lies between?**

1) - 0.05 and - 0.04 2) - 0.07 and - 0.06

3) - 0.08 and - 0.07 4) - 0.06 and - 0.05

$\frac{4}{3} \div \frac{20}{7}$ of $\frac{28}{5} \Rightarrow \frac{4}{3} \div 16 \Rightarrow \frac{4}{3} \times \frac{1}{16} \Rightarrow \frac{1}{12}$

$\frac{32}{5} \div \frac{9}{2}$ of $\frac{16}{3} \Rightarrow \frac{32}{5} \times \frac{1}{24} \Rightarrow \frac{4}{15}$

$\frac{3}{4} \times \frac{8}{3} \div \frac{5}{8}$ of $\frac{5}{5} \Rightarrow \frac{3}{4} \times \frac{8}{3} \times \frac{8}{2} \Rightarrow 3$

$\therefore \frac{1}{12} \div \frac{4}{15} \times 3 = 1+K \Rightarrow \frac{1}{12} \times \frac{15}{4} \times 3 \Rightarrow \frac{15}{16} = 1+K$

$\therefore K = \frac{15}{16} - 1 = \frac{-1}{16} = -0.0625 \quad \therefore$ b/w $\boxed{-0.07 \text{ and } -0.06}$

124. The value of $\dfrac{\left(1\frac{1}{9} \times 1\frac{1}{20} \div \frac{21}{38} - \frac{1}{2}\right) \div \left(2\frac{4}{9} \div 1\frac{7}{15} of \frac{3}{5}\right)}{\frac{1}{5} of \frac{1}{5} \div \frac{1}{125} - \frac{1}{25} \div \frac{1}{5} of \frac{1}{5}}$ **lies between-**

1) 0.1 and 0.15 2) 0.2 and 0.25 3) 0.15 and 0.2 4) 0.25 and 0.3

Solve Num → $\left(\frac{10}{9} \times \frac{21}{20} \times \frac{38}{21} - \frac{1}{3}\right) \div \left(\frac{22}{9} \div \frac{22}{15}$ of $\frac{3}{5}\right)$

$\left(\frac{19}{9} - \frac{1}{3}\right) \div \left(\frac{22}{9} \times \frac{25}{22}\right) \Rightarrow \frac{16}{9} \times \frac{9}{25} \Rightarrow \frac{16}{25}$

Solve Den → $\frac{1}{25} \div \frac{1}{125} - \frac{1}{25} \div \frac{1}{25} \Rightarrow \frac{1}{25} \times 125 - 1 \Rightarrow 4$

$\therefore \frac{\frac{16}{25}}{4} \Rightarrow \frac{16}{100} \Rightarrow 0.16 \quad \therefore$ b/w $\boxed{0.15 \text{ and } 0.2}$

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