

# హర్షిత్ ఇనిస్టిట్యూట్

చుట్టుగుంట, ఏలూరు రోడ్, విజయవాడ -4.

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①

Telangana-SI (prelims) Set-D

① (3)

$$2x - 5y = 7z - 3y$$

$$2x - 2y - 7z = 0$$

$$\Rightarrow (2x)^3 - (2y)^3 - (7z)^3 = 3(2x)(-2y)(-7z)$$

$$\Rightarrow \frac{8x^3 - 343z^3 - 8y^3}{xyz} = \frac{84xyz}{xyz} = 84$$

② (4)

S	D	T
75	d	$t_1$
60	d	$t_2$

$$t_1 + t_2 = 4.5 \text{ hr}$$

$$\frac{d}{75} + \frac{d}{60} = 4.5 = \frac{9}{2} \Rightarrow d = \frac{9}{2} \times \frac{75 \times 60}{135} = 5 \times 30 = 150.$$



③ (1)

Let 'C' contribute 'x' thousands

$$A : B : C = (x + 110) : (x + 60) : x$$

$$\Rightarrow x + 110 + x + 60 + x = 1070$$

$$\Rightarrow 3x + 170 = 1070 \Rightarrow 3x = 900 \Rightarrow x = 300$$

$$\therefore A : B : C = 410 : 360 : 300 = 41 : 36 : 30$$

$$\text{Share of A} = \frac{41}{41 + 36 + 30} \times 272850$$

$$= \frac{41}{107} \times 272850 = 104550.$$

④ (4)

$$V = S \Rightarrow \frac{4}{3} \pi r^3 = 4 \pi r^2 \Rightarrow r = 3$$

⑤ (2)

$$2K + 3K + 7K = 180^\circ \Rightarrow 12K = 180^\circ \Rightarrow K = 15^\circ$$

$$\text{Largest angle} = 7K = 105^\circ.$$

⑥ (2)

$$1995 = 3^1 \times 5^1 \times 7^1 \times 19^1$$

$$\text{No. of divisors} = (1+1)(1+1)(1+1)(1+1) \\ = 2^4 = 16.$$

7 (3)

S	D	T
S	$\frac{5}{7}x$	$1\frac{40}{60} = 1\frac{2}{3}$ hr
S	$x$	$t$

$$\frac{5}{7}x + x = 24 \Rightarrow \frac{12x}{7} = 24 \Rightarrow x = 14$$

$$S = \frac{\frac{5}{7}x}{1\frac{2}{3}} = \frac{\frac{5}{7} \times 14}{\frac{5}{3}} = 6 \text{ Km/hr.}$$

8 (2)

$$P\left(1 + \frac{R}{100}\right)^3 = 8575$$

$$P\left(1 + \frac{R}{100}\right)^2 = 7350$$

$$\Rightarrow 1 + \frac{R}{100} = \frac{8575}{7350} = \frac{343}{294} = \frac{49}{42} = \frac{7}{6}$$

$$P\left(1 + \frac{R}{100}\right)^2 = P\left(\frac{7}{6}\right)^2 = 7350$$

$$\Rightarrow P = \frac{7350 \times 36}{49} = 150 \times 36 = 5400.$$

9 (2)

Let  $N$  is the multiple of 7.

$N-5$  is divisible by 6, 9 and 15

$N-5$  is common multiple of 6, 9 and 15

$$N-5 = \{90, 90 \times 2, 90 \times 3, \dots\}$$

$$N = \{95, 185, 275, 365, 455, 545, \dots\}$$

$$\Rightarrow N = 455 \quad [455 \text{ is a multiple of } 7].$$

10 (3)

$$A \rightarrow \frac{1}{8}, B \rightarrow \frac{1}{6}, C \rightarrow \frac{1}{12}$$

$$A+C \rightarrow \frac{1}{8} - \frac{1}{12} = \frac{1}{24}, B+C \rightarrow \frac{1}{6} - \frac{1}{12} = \frac{1}{12} = \frac{2}{24}$$

$$2 \text{ hrs : } (A+C) + (B+C) \rightarrow \frac{1}{24} + \frac{2}{24} = \frac{3}{24} = \frac{1}{8}$$

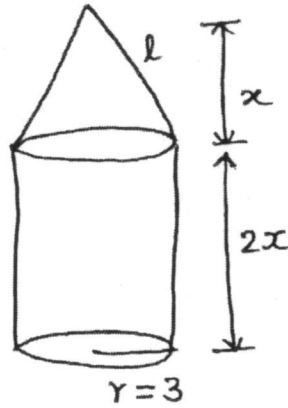
$$16 \text{ hrs : } 8(A+C) + 8(B+C) \rightarrow 1.$$

11 (1)

$$\text{No. of odd days} = \frac{365}{7} = 1 \text{ odd day.}$$

$$\text{Monday} + 1 = \text{Tuesday}$$

12 (4)



Curved Surface Area

$$= 2\pi rh + \pi r l = 198$$

$$\Rightarrow 12\pi x + 3\pi \sqrt{3^2 + x^2} = 198$$

$$\sqrt{9 + x^2} + 4x = \frac{198}{3\pi} = \frac{66}{\pi} = 21$$

$$\Rightarrow x = 4$$

$$\text{Total height} = x + 2x = 3x = 12 \text{ m.}$$

13 (2)

3 months :  $P:Q:R = \frac{1}{3} : \frac{1}{4} : \frac{1}{5} = 20:15:12$

9 months :  $P:Q:R = 10:15:12$

12 months :  $P:Q:R = 20 \times 3 + 10 \times 9 : 15 \times 12 : 12 \times 12$

$$= 20 + 10 \times 3 : 15 \times 4 : 12 \times 4$$

$$= 50:60:48 = 25:30:24$$

$$\text{Share of P} = \frac{25}{25+30+24} \times 316000$$

$$= \frac{25}{79} \times 316000 = 25 \times 4000 = 100000$$

14 (3)

$$67^{67} + 67 = (68-1)^{67} + 67 = 68K - 1 + 67 = 68K + 66$$

$68K + 66$  gives remainder 66 when divided by 68.

15 (2)

Let  $x$  passengers in the beginning

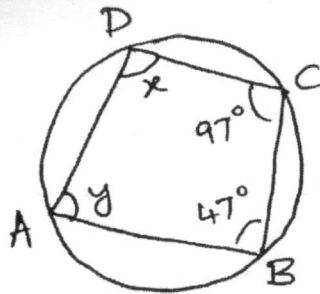
$$\frac{x - \frac{x}{3} + 280}{2} + 12 = 248$$

$$\frac{2x}{3} + 280 = (248 - 12) \times 2 = 472$$

$$\frac{2x}{3} = 192 \Rightarrow x = \frac{3}{2} \times 192 = 288.$$



(16) (2)



$$x + 47^\circ = 180^\circ \Rightarrow x = 133^\circ$$

$$y + 97^\circ = 180^\circ \Rightarrow y = 83^\circ$$

$$x - y = 133^\circ - 83^\circ = 50^\circ$$

(4)

(17) (2)

$$\frac{4}{5} = 0.8, \quad \frac{2}{3} = 0.66, \quad \frac{7}{8} = 0.875, \quad \frac{3}{4} = 0.75, \quad \frac{5}{6} = 0.833$$

Decreasing order:  $\frac{7}{8}, \frac{5}{6}, \frac{4}{5}, \frac{3}{4}, \frac{2}{3}$

$$a_1 - a_4 = \frac{7}{8} - \frac{3}{4} = \frac{1}{8}$$

$$2a_2 - a_5 = 2\left(\frac{5}{6}\right) - \frac{2}{3} = \frac{5}{3} - \frac{2}{3} = 1$$

$$5a_3 - 4a_1 = 5\left(\frac{4}{5}\right) - 4\left(\frac{7}{8}\right) = 4 - \frac{7}{2} = \frac{1}{2}$$

(18) (2)

$$A \rightarrow \frac{1}{6}, \quad B \rightarrow \frac{1}{8}$$

$$A + B + C \rightarrow \frac{1}{3}$$

$$\Rightarrow C \rightarrow \frac{1}{3} - \frac{1}{6} - \frac{1}{8} = \frac{1}{6} - \frac{1}{8} = \frac{1}{24}$$

$$A : B : C = \frac{1}{6} : \frac{1}{8} : \frac{1}{24} = 4 : 3 : 1$$

$$\text{Share of } B = \frac{3}{4+3+1} \times 6000 = \frac{18000}{8} = 2250$$



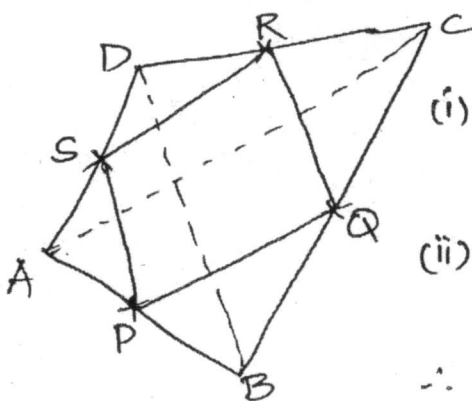
(19) (1)

$$\frac{A}{B} = \frac{2}{5} = \frac{14}{35}$$

$$\frac{A+B}{B+B} = \frac{22}{43}$$

[By V-H method]

(20) (4)



By mid-point theorem

$$(i) \quad QR = SP = \frac{1}{2} DB$$

$$\& \quad QR \parallel SP \parallel DB$$

$$(ii) \quad RS = PQ = \frac{1}{2} AC$$

$$\& \quad RS \parallel PQ \parallel AC$$

$\therefore$  PQRS is a parallelogram.

(21) (3)

$$\text{Speed of min. hand, } S_m = 6^\circ/\text{min}$$

$$\text{Speed of hour hand, } S_h = \frac{1}{2}^\circ/\text{min}$$

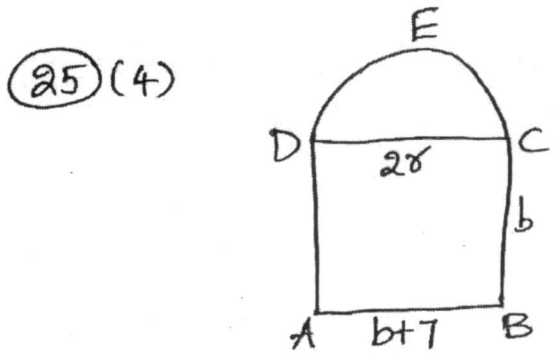
$$S_m = 6^\circ = 12\left(\frac{1}{2}\right) = 12 S_h$$

22 (1)  $a=5, l=60$   
 $\frac{n}{2}(a+l) = 195 \Rightarrow n = \frac{195 \times 2}{65} = 6$   
 $l = a + (n-1)d \Rightarrow 60 = 5 + 5d \Rightarrow d = 11$

23 (4)  $A \rightarrow \frac{1}{12}, B \rightarrow \frac{1}{8}, C \rightarrow \frac{1}{6}$   
 $2(A+B+C) + t(A+B) = 1$   
 $2\left(\frac{1}{12} + \frac{1}{8} + \frac{1}{6}\right) + t\left(\frac{1}{12} + \frac{1}{8}\right) = 1$   
 $t\left(\frac{5}{24}\right) = 1 - \frac{1}{6} - \frac{1}{4} - \frac{1}{3} = \frac{12-2-3-4}{12} = \frac{3}{12}$   
 $t = \frac{24}{5} \times \frac{3}{12} = \frac{6}{5} \text{ hr} = 72 \text{ min.}$



24 (2) 25% A 17%  
 $\frac{3}{4} \quad \frac{1}{4}$   
 $A = \frac{n_1 A_1 + n_2 A_2}{n_1 + n_2}$   
 $A = \frac{\frac{3}{4}(25) + \frac{1}{4}(17)}{1} = \frac{92}{4} = 23\%$



$b(b+7) = 98 \Rightarrow b = 7$   
 $2r = 14 \Rightarrow r = 7$   
 CDE area =  $\frac{1}{2} \pi r^2 = \frac{1}{2} \times \frac{22}{7} \times 7^2 = 77$

26 (4)

		$A' = 72$	
2	16	72	0
1	5	66	-6
3	15	80	+8

$A = A' + x$   
 $x = \frac{2(0) + 1(-6) + 3(8)}{2+1+3} = \frac{18}{6} = 3$   
 $A = 72 + 3 = 75$

27 (3)

S	D	T
40	$\frac{d}{2}$	$t_1$
60	$\frac{d}{2}$	$t_2$

$t_1 + t_2 = 7$   
 $\frac{d}{2(40)} + \frac{d}{2(60)} = 7$   
 $\Rightarrow \frac{d}{2} + \frac{d}{3} = 7 \times 2 \times 20$   
 $\Rightarrow d = 7 \times 2 \times 20 \times \frac{2 \times 3}{5} = 336$



28 (3)  $1000 - C = 2(C - 850)$   
 $\Rightarrow 1000 + 2 \times 850 = 3C$   
 $\Rightarrow 3C = 2700 \Rightarrow C = 900.$

$\frac{SP}{CP} = \frac{130}{100} = \frac{1170}{900}$

29 (4) Increase in area =  $21 + 21 + \frac{21 \times 21}{100} = 42 + 4.41 = 46.41.$

30 (1)

S	D	T
45	$d_1$	2 (10AM-12noon)
$\beta$	$d_2$	$3\frac{1}{2}$ (12noon-3:30pm)

$d_1 + d_2 = 300 \text{ km} \Rightarrow 45 \times 2 + \beta \times 3\frac{1}{2} = 300$

$\Rightarrow \beta \times \frac{7}{2} = 210 \Rightarrow \beta = 210 \times \frac{2}{7} = 60 \text{ km/hr.}$

31 (1)  $\frac{5000 \times 2 \times R}{100} + \frac{3000 \times 4 \times R}{100} = 2200$

$\Rightarrow 100R + 120R = 2200 \Rightarrow 220R = 2200 \Rightarrow R = 10\%.$

32 (1)  $A \rightarrow \frac{W_1}{6}, B \rightarrow \frac{W_2}{6}$

$A+B \rightarrow \frac{W_1+W_2}{t} \Rightarrow \frac{W_1}{6} + \frac{W_2}{6} = \frac{W_1+W_2}{t}$

$\Rightarrow \frac{W_1+W_2}{6} = \frac{W_1+W_2}{t} \Rightarrow t = 6 \text{ hr.}$

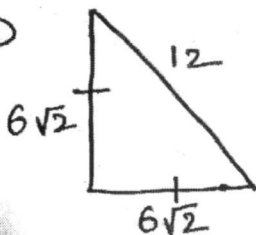
33 (3)  $I_B = I_C, I_D = \frac{1}{2}I_C = 2I_A, I_E = 2I_B$

$A : B : C : D : E = I_A : 4I_A : 4I_A : 2I_A : 8I_A$   
 $= 1 : 4 : 4 : 2 : 8$

$E's \text{ share} = \frac{8}{19} \times \text{Profit} = 2400000$

$\Rightarrow \text{Profit} = 19 \times 300000 = 57,00,000.$

34 (3)



$A = \frac{1}{2} \times \text{base} \times \text{height}$   
 $= \frac{1}{2} \times 6\sqrt{2} \times 6\sqrt{2} = 36.$

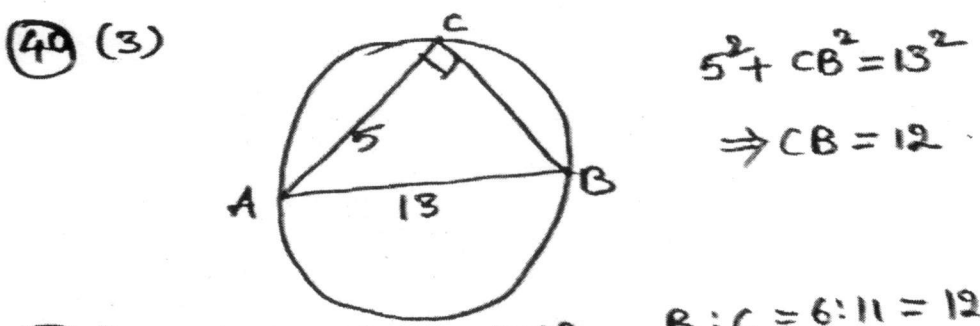
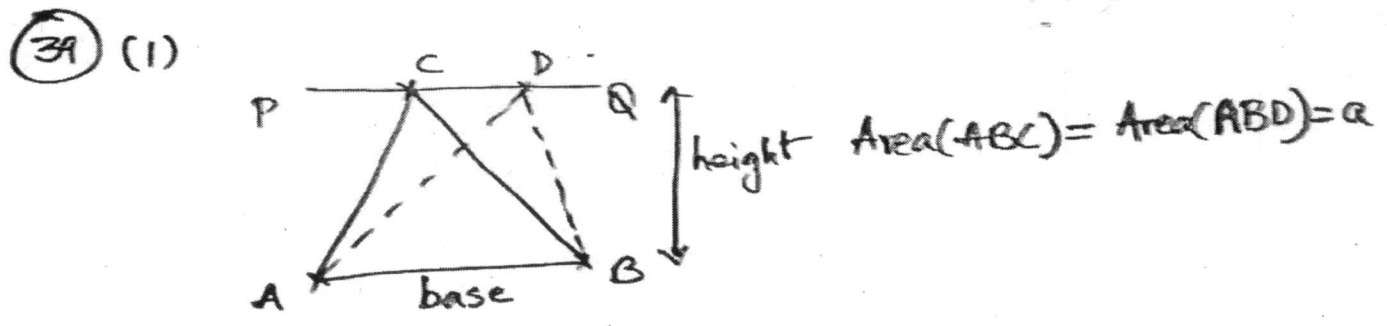


35 (2)  $x = 50\%$   
 $y = \frac{100x}{100+x} = \frac{100 \times 50}{150} = 33\frac{1}{3}\%$

36 (1)  $x = 10\%$   
 Net loss =  $\frac{x^2}{100}\% = \frac{10^2}{100} = 1\%$  Loss.

37 (4)  $P_{2013} = P_{2011} \left(\frac{105}{100}\right)^3$   
 (end) (beginning)  
 $\Rightarrow P_{2011} \text{ (beginning)} = \left(\frac{100}{105}\right)^3 \times 18522$   
 $= \frac{20^3}{21^3} \times 18522 = 16000$

38 (1)  $(3k)^3 + (4k)^3 + (5k)^3 = a^3 = \left(\frac{a}{\sqrt{3}}\right)^3 = 24^3$   
 $\Rightarrow k^3(3^3 + 4^3 + 5^3) = 24^3$   
 $\Rightarrow k^3 = \frac{24^3}{27+64+125} = \frac{24^3}{216} = \left(\frac{24}{6}\right)^3 = 4^3$   
 $\Rightarrow k = 4$   
 $3k, 4k, 5k = 12, 16, 20$

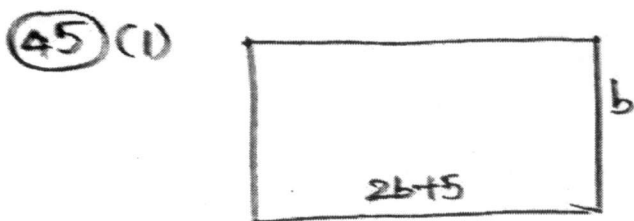
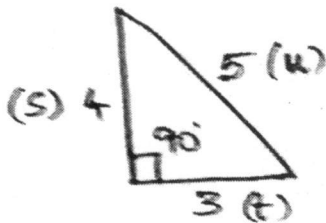


41 (3)  $A:B = 5:4 = 15:12$   $B:C = 6:11 = 12:22 \Rightarrow A:B:C = 15:12:22$   
 $C's \text{ share} = \frac{22}{15+12+22} \times 78400 = \frac{22}{49} \times 78400 = 22 \times 1600 = 35200$

(42) (1)  $\frac{35}{x-1} + \frac{35}{x+1} = 12$   
 $\frac{1}{x-1} + \frac{1}{x+1} = \frac{12}{35} = \frac{1}{5} + \frac{1}{7}$   
 $\Rightarrow x = 6$

(43) (5)  $A' = \left(\frac{3}{4}a\right)^2 = \frac{9}{16}a^2 = \frac{9}{16}A$   
 $\Rightarrow \frac{A'}{A} = \frac{9}{16}$

(44) (4)  $S = \frac{1}{6} \times 24 = 4$ ;  $t = \frac{1}{3} \times 9 = 3$ ,  $u = \frac{1}{5} \times 25 = 5$



$(2b+5)b = 273$   
 $(2b+5)2b = 2 \times 273$   
 $= 2 \times 3 \times 7 \times 13$   
 $= 26 \times 21$

$\Rightarrow 2b = 21 \Rightarrow b = \frac{21}{2} \Rightarrow r = \frac{21}{2}$

$\pi r^2 = \pi \times \left(\frac{21}{2}\right)^2 = \frac{22}{7} \times \frac{21 \times 21}{2 \times 2} = \frac{11 \times 3 \times 21}{2} = \frac{693}{2} = 346.5$

(46) (2)  $A = \frac{9(A-1) + 26 + 29}{9 + 1 + 1}$

$\Rightarrow 11A = 9A - 9 + 26 + 29 = 9A + 46$

$\Rightarrow 2A = 46 \Rightarrow A = 23$

(47) (4)  $A : B : C = 1 \times 12 : 1.2 \times 10 : x \times 4$   
 $= 12 : 12 : 4x$   
 $\Rightarrow 4x = 12 \Rightarrow x = 3 \text{ lakh}$



48 (4) Let  $n$  is no. of digits.  
 Sum of digits =  $5 \times n = 5n$  divisible by 9  
 $\Rightarrow n = \{9, 18, \dots\}$   
 $5-5+5-5+\dots+5-5=0$   
 $\Rightarrow n$  should be even number  
 $\Rightarrow n=18$

49 (4)  $b=200$  cm  $l=520$  cm  
 HCF of 200, 520 = 40 cm  
 No. of square tiles =  $\frac{l \times b}{a \times a} = \frac{200 \times 520}{40 \times 40} = 5 \times 13 = 65$ .

50 (4)  $x = 0.\bar{3} = \frac{3}{9} = \frac{1}{3}$   
 $x^2 = \frac{1}{9} = 0.\bar{1}$



51 (3)  $A \rightarrow \frac{1}{12}$ ,  $B \rightarrow \frac{1}{16}$   
 $4(A+B) + xA \rightarrow 1$   
 $4(\frac{1}{12} + \frac{1}{16}) + \frac{x}{12} = 1$   
 $\Rightarrow \frac{1}{3} + \frac{1}{4} + \frac{x}{12} = 1$   
 $\Rightarrow \frac{x}{12} = 1 - \frac{1}{3} - \frac{1}{4} = \frac{12-4-3}{12} = \frac{5}{12}$   
 $\Rightarrow x=5$ .

52 (4)  $A \xrightarrow{+6} G \xrightarrow{+6} M \xrightarrow{+6} S$   
 $C \xrightarrow{+6} I \xrightarrow{+6} O \xrightarrow{+6} U$   
 $E \xrightarrow{+6} K \xrightarrow{+6} Q \xrightarrow{+6} W$

53 (2)  $ARISE$        $WORLD$   
 $+2 \downarrow +3 \downarrow +4 \downarrow +5 \downarrow \downarrow +6$        $+2 \downarrow \downarrow +6$   
 $CUMXK$        $YRVQJ$

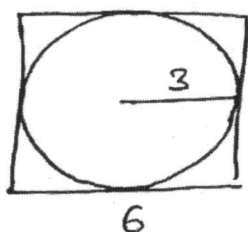
54 (4)

$$16\% - 12\frac{1}{2}\% = 3\frac{1}{2}\%$$

$$3\frac{1}{2}\% \text{ of } 240000 = \frac{7}{2}\% \text{ of } 240000$$

$$= \frac{7}{2} \times 2400 = 8400$$

55 (4)



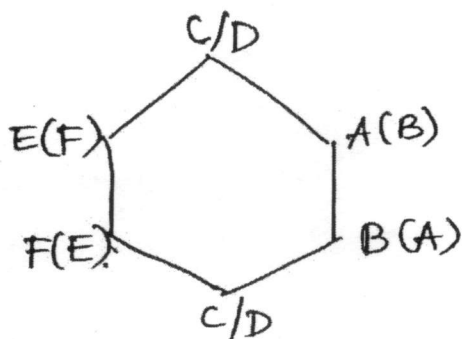
$$\text{Area} = 6^2 = 36$$

56 (1)

$$x = 20$$

$$\text{Net loss} = \frac{x^2}{100} = \frac{20 \times 20}{100} = 4\% \text{ loss.}$$

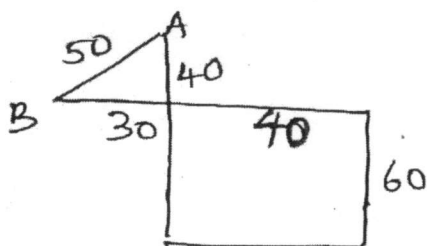
57 (4)



A, B, EF can be arranged in 2 ways  
C, D can be arranged in 2 ways

$$\text{Total no. of ways} = 2 \times 2 = 4 \text{ ways.}$$

58 (4)



59 (2)

T R I A N G L E  
+↓ +↓  
U S J B O H M F

S Q U A R E  
+↓ +↓  
T R V B S F

60 (2)

$$A = \frac{\sqrt{3}}{4} a^2 = \frac{\sqrt{3}}{4} \times 4^2 = 4\sqrt{3}$$

61 (4)

$$8\% \equiv 1.76$$

$$1\% \equiv 0.22 \Rightarrow 100\% \equiv 22$$

$$\Rightarrow 25\% \equiv \frac{22}{4} = 5.5$$

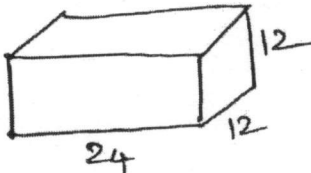
62 (3)      63 (3)      64 (4)

65 (1)      3, 5, 7, 11, 13  
 $X \xrightarrow{-3} U \xrightarrow{-3} R \xrightarrow{-3} O \xrightarrow{-3} L$   
 5, 7, 11, 13, 17

66 (1)      2, 3, 5, 7, 11  
 $2^2+1=5, 3^2+1=10, 5^2+1=26, 7^2+1=50, 11^2+1=122$



67 (3)      D  $\xrightarrow{+1}$  E  $\xrightarrow{+1}$  F  $\xrightarrow{+1}$  G  
 F  $\xrightarrow{+1}$  G  $\xrightarrow{+1}$  H  $\xrightarrow{+1}$  I  
 I  $\xrightarrow{+1}$  J  $\xrightarrow{+1}$  K  $\xrightarrow{+1}$  L

68 (2)            S.A =  $2(24 \times 12 + 12 \times 12 + 12 \times 24)$   
 $= 2 \times 12 \times 12 [2+1+2] = 1440$

69 (2)       $0.1\overline{24} = 0.1 + 0.0\overline{24} = \frac{1}{10} + \frac{24}{990} = \frac{1}{10} + \frac{8}{330}$   
 $= \frac{41}{330}$

70 (4)       $1 \times 1 \rightarrow 25$  one unit square  
 $2 \times 2 \rightarrow 16$   
 $3 \times 3 \rightarrow 9$   
 $4 \times 4 \rightarrow 4$   
 $5 \times 5 \rightarrow \frac{1}{55}$

71 (4)      G A L A X Y      STAR  
 $-3 \downarrow -3 \downarrow$       -3 -3  
 D X I X U V      P Q X O

72 (2)      1 4 9 16 25  
 A D I P Y

73 (4)  $a * b = a^2 + b^2 - 3ab$

$\{1 * (-1)\} = 1^2 + (-1)^2 - 3(1)(-1) = 1 + 1 + 3 = 5$

$\{\sqrt{2} * \sqrt{2}\} = (\sqrt{2})^2 + (\sqrt{2})^2 - 3(\sqrt{2})(\sqrt{2}) = 2 + 2 - 6 = -2$

$\{1 * (-1)\} * \{\sqrt{2} * \sqrt{2}\} = 5 * (-2) = 5^2 + (-2)^2 - 3(5)(-2) = 25 + 4 + 30 = 59$



74 (4)

75 (1)

76 (1)

77 (3)

78 (4)

79 (3)

80 (3)

$\frac{5 \times 10}{2} = 25, \frac{10 \times 20}{2} = 100, \frac{30 \times 15}{2} = 225$

81 (2)

$4 \times 5 \times 6 - 7 \times 8 = 120 - 56 = 64$

$3 \times 4 \times 5 - 6 \times 7 = 60 - 42 = 18$

$5 \times 6 \times 7 - 8 \times 9 = 210 - 72 = 138$

82 (1)

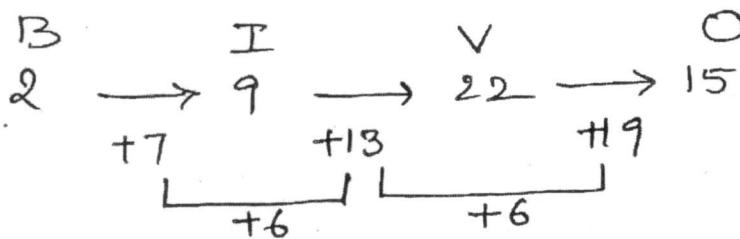
83 (4)  $2 \times 3 \times 4 = 24$

$x \times 5 \times 7 = 140 \Rightarrow x = 4$

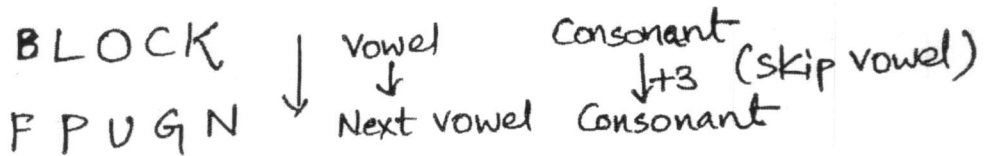
$6 \times 7 \times 8 = 336$

$y \times 6 \times 10 = 120 \Rightarrow y = 2$

84 (3)



85 (4)



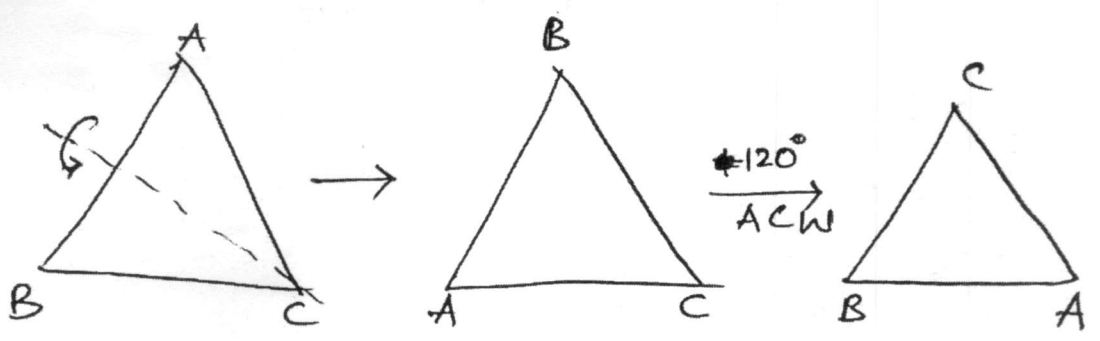
86 (3)

87 (2)

88 (1)

89 (2)

90 (1)



91 (2) (d)  $\subset$  (b)  $\subset$  (a)  $\subset$  (c)  $\subset$ : subsets

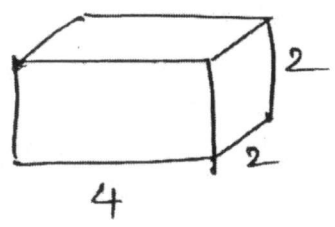
92 (3) 
$$\text{Area} = \frac{1}{n} \times \frac{1}{n+1} = \frac{1}{n(n+1)} = \frac{1}{n} - \frac{1}{n+1}$$

$$\begin{aligned} \text{Sum} &= \frac{1}{1} - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} + \dots + \frac{1}{100} - \frac{1}{101} \\ &= 1 - \frac{1}{101} = \frac{100}{101} \end{aligned}$$



93 (2) Mirror image + Water image.

94 (2)



$$V = lbh = 4 \times 2 \times 2 = 16$$

95 (3)

$$\frac{157 - 114}{90 - 50} = \frac{43}{40} = 1.075$$

96 (2)

$$\frac{154 - 112}{100 - 90} = \frac{42}{10} = 4.2$$

97 (4)

Total 100 students

98 (3)

F  $\rightarrow$  Football - 20

$$F + C + V = 5$$

99 (2)

C  $\rightarrow$  Cricket - 30

$$F + V = 8$$

100 (4)

V  $\rightarrow$  Volleyball - 25

$$\begin{matrix} F + C = C + V & (12) \\ 6 & 6 \end{matrix}$$