SET `D` (26.08.2018)

## CLASSMATE ACADEMY

① (3) $2x - 5y = 7z - 3y$

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

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

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

② (4)

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

$t_1 + t_2 = 4.5 \, hr$

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

③ (1)  Let `C` contribute `x` thousands

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

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

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

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

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

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

④ (4)  $V = S \Rightarrow \dfrac{4}{3}\pi r^3 = 4\pi r^2 \Rightarrow r = 3$

⑤ (2)  $2k + 3k + 7k = 180° \Rightarrow 12k = 180° \Rightarrow k = 15°$

Largest angle $= 7k = 105°.$

⑥ (2)  $1995 = 3^1 \times 5^1 \times 7^1 \times 19^1$

No. of divisors $= (1+1)(1+1)(1+1)(1+1)$

$= 2^4 = 16.$

⑦ (3)

$$S \qquad D \qquad T$$

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

$$S \qquad x \qquad t$$

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

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

⑧ (2)

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

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

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

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

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

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, 90×2, 90×3, ---- }

N = { 95, 185, 275, 365, 455, 545, ---- }

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

⑩ (3)

$$A \to \frac{1}{8}, \quad B \to \frac{1}{6}, \quad C \to \frac{-1}{12}$$

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

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

16 hrs : 8(A+C) + 8(B+C) $\to$ 1.
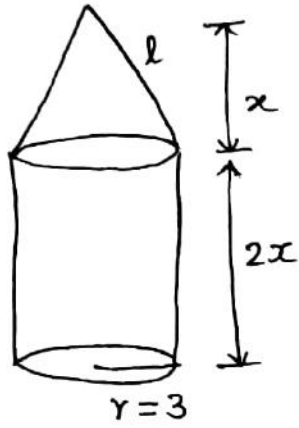
⑪ (1)

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

Monday + 1 = Tuesday

**⑫ (4)**



Curved Surface Area
$$= 2\pi rh + \pi rl = 198$$
$$\Rightarrow 12\pi x + 3\pi\sqrt{3^2+x^2} = 198$$
$$\sqrt{9+x^2} + 4x = \frac{198}{3\pi} = \frac{66}{\pi} = 21$$
$$\Rightarrow x = 4$$

Total height $= x + 2x = 3x = 12\,m$.

**⑬ (2)**

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

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

12 months : $P:Q:R = 20\times 3 + 10\times 9 : 15\times 12 : 12\times 12$
$$= 20 + 10\times 3 : 15\times 4 : 12\times 4$$
$$= 50:60:48 = 25:30:24$$

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

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

**⑭ (3)** $67^{67} + 67 = (68-1)^{67} + 67 = 68K - 1 + 67 = 68K + 66$

$68K + 66$ gives remainder $66$ when divided by $68$.
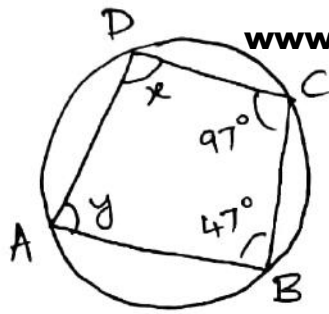
**⑮ (2)** Let $x$ passengers in the beginning

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

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

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

**⑯ (2)**



$$x + 47 = 180 \Rightarrow x = 133°$$
$$y + 97° = 180° \Rightarrow y = 83°$$
$$x - y = 133° - 83° = 50°$$

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)**

$$A \to \frac{1}{6}, \quad B \to \frac{1}{8}$$
$$A + B + C \implies \frac{1}{3}$$
$$\Rightarrow C \to \frac{1}{3} - \frac{1}{6} - \frac{1}{8} = \frac{1}{6} - \frac{1}{8} = \frac{1}{24}$$
$$A : B : C = \frac{1}{6} : \frac{1}{8} : \frac{1}{24} = 4 : 3 : 1$$
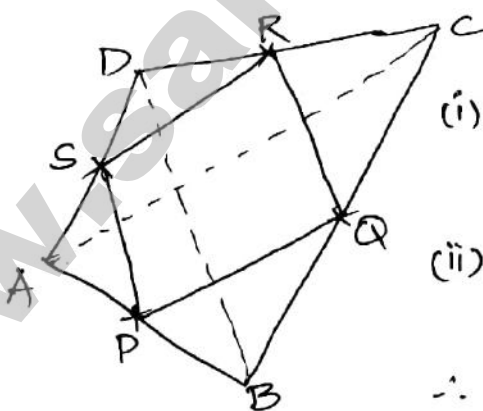$$\text{share of } B = \frac{3}{4+3+1} \times 6000 = \frac{18000}{8} = 2250.$$

**⑲ (1)**

$$\frac{A}{B} = \frac{2}{5} = \frac{14}{35} \qquad \frac{A+8}{B+8} = \frac{22}{43} \qquad \text{[By V-H method]}$$

**⑳ (4)**



By Mid-point theorem

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

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

∴ PQRS is a parallelogram.

**㉑ (3)**

Speed of min. hand, $S_m = 6°/min$
Speed of hour hand, $S_h = \frac{1°}{2}/min$
$$S_m = 6° = 12\left(\frac{1°}{2}\right) = 12\, S_h$$

**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)** $A \to \frac{1}{12}$, $B \to \frac{1}{8}$, $C \to \frac{1}{6}$

$$2(A+B+C) + t(A+B) = 1$$

$$2\left(\frac{1}{12} + \frac{1}{8} + \frac{1}{6}\right) + t\left(\frac{1}{12} + \frac{1}{8}\right) = 1$$

$$t\left(\frac{5}{24}\right) = 1 - \frac{1}{6} - \frac{1}{4} - \frac{1}{3} = \frac{12 - 2 - 3 - 4}{12} = \frac{3}{12}$$

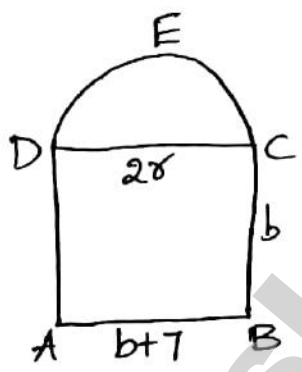$$t = \frac{24}{5} \times \frac{3}{12} = \frac{6}{5} \text{ hr} = 72 \text{ min.}$$

**㉔ (2)**

| 25% | A | 17% |
|---|---|---|
| $\frac{3}{4}$ | | $\frac{1}{4}$ |

$$A = \frac{n_1 A_1 + n_2 A_2}{n_1 + n_2}$$

$$A = \frac{\frac{3}{4}(25) + \frac{1}{4}(17)}{1} = \frac{92}{4} = 23\%$$

**㉕ (4)**



$$b(b+7) = 98 \Rightarrow b = 7$$

$$2r = 14 \Rightarrow r = 7$$

$$CDE \text{ area} = \frac{1}{2}\pi r^2 = \frac{1}{2} \times \frac{22}{7} \times 7^2$$

$$= 77.$$

**㉖ (4)**

| | | $A' = 72$ | |
|---|---|---|---|
| 2 | 10 | 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) $1000 - C = 2(C - 850)$

$\Rightarrow 1000 + 2 \times 850 = 3C$

$\Rightarrow 3C = 2700 \Rightarrow C = 900.$

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

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

**30** (1)

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

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

$\Rightarrow S \times \dfrac{7}{2} = 210 \Rightarrow S = 210 \times \dfrac{2}{7} = 60\,km/hr.$

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

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

**32** (1) $A \to \dfrac{W_1}{6}, \quad B \to \dfrac{W_2}{6}$

$A+B \to \dfrac{W_1 + W_2}{t} \Rightarrow \dfrac{W_1}{6} + \dfrac{W_2}{6} = \dfrac{W_1 + W_2}{t}$

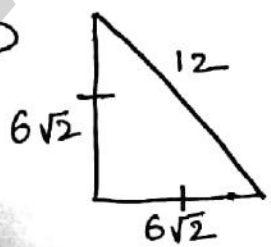$\Rightarrow \dfrac{W_1 + W_2}{6} = \dfrac{W_1 + W_2}{t} \Rightarrow t = 6\,hr.$

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

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

$= 1 : 4 : 4 : 2 : 8$

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

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

**34** (3)

$A = \dfrac{1}{2} \times \text{base} \times \text{height}$

$= \dfrac{1}{2} \times 6\sqrt{2} \times 6\sqrt{2} = 36.$

**�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)

$$P_{2013} = P_{2011} \left(\frac{105}{100}\right)^3$$
$$\text{(end)} \quad \text{(beginning)}$$

$$\Rightarrow P_{201} \text{(beginning)} = \left(\frac{100}{105}\right)^3 \times 18522$$

$$= \frac{20^3}{21^3} \times 18522 = 16000.$$

**㊳** (1)

$$(3k)^3 + (4k)^3 + (5k)^3 = a^3 = \left(\frac{d}{\sqrt{3}}\right)^3 = 24^3$$

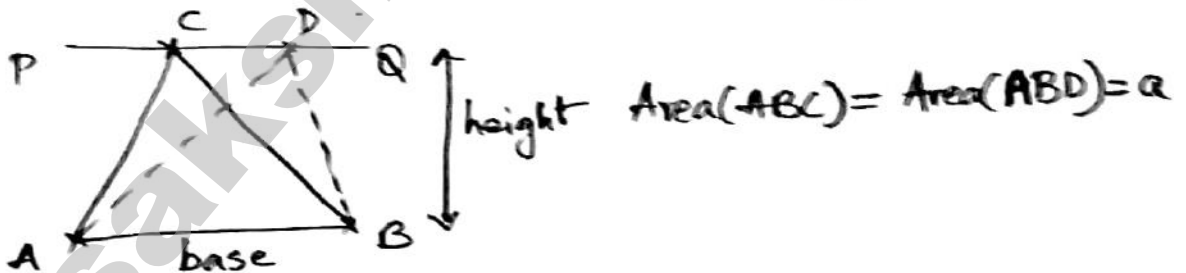$$\Rightarrow k^3(3^3 + 4^3 + 5^3) = 24^3$$

$$\Rightarrow k^3 = \frac{24^3}{27+64+125} = \frac{24^3}{216} = \left(\frac{24}{6}\right)^3 = 4^3$$
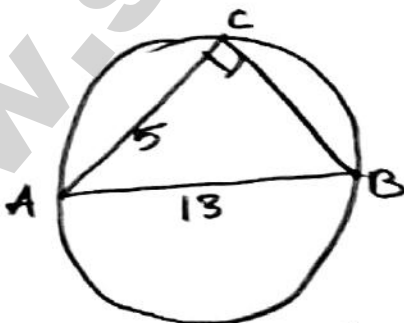
$$\Rightarrow K = 4$$

$$3k, 4k, 5k = 12, 16, 20.$$

**㊴** (1)



height  Area(ABC) = Area(ABD) = a

**㊵** (3)



$$5^2 + CB^2 = 13^2$$
$$\Rightarrow CB = 12.$$

**㊶** (3)  $A : B = 5 : 4 = 15 : 12$   $B : C = 6 : 11 = 12 : 22 \Rightarrow A : B : C = 15 : 12 : 22$

C's share $= \frac{22}{15+12+22} \times 78400 = \frac{22}{49} \times 78400 = 22 \times 1600$

$$= 35200.$$

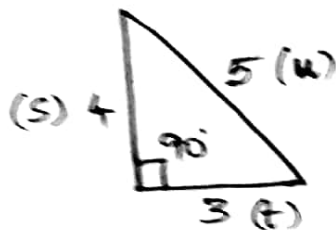**42 (1)**

$$\frac{35}{x-1} + \frac{35}{x+1} = 12$$

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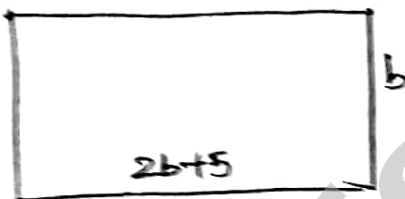
$$\Rightarrow x = 6$$

**43 (3)**

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

$$\Rightarrow \frac{A'}{A} = \frac{9}{16}$$

**44 (4)**

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



**45 (1)**



$$(2b+5)\,b = 273$$

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

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

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

**46 (2)**

| A-1 | 26 | 29 |
|-----|----|----|
| 9   | 1  | 1  |

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

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

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

**47 (4)**

$$A : B : C = 1 \times 12 : 1 \cdot 2 \times 10 : x \times 4$$

$$= 12 : 12 : 4x$$

$$\Rightarrow 4x = 12 \Rightarrow x = 3 \text{ lakh}$$

**48) (4)** Let $n$ is no. of digits.

Sum of digits $= 5 \times n = 5n$ divisible by 9

$\Rightarrow n = \{9, 18, \ldots\}$

$5 - 5 + 5 - 5 + \ldots + 5 - 5 = 0$

$\Rightarrow n$ should be even number

$\Rightarrow n = 18$

**49) (4)** $b = 200\,cm \qquad \ell = 520\,cm$

HCF of $200, 520 = 40\,cm$

No. of square tiles $= \dfrac{l \times b}{a \times a} = \dfrac{200 \times 520}{40 \times 40} = 5 \times 13 = 65.$

**50) (4)** $x = 0.\bar{3} = \dfrac{3}{9} = \dfrac{1}{3}.$

$x^2 = \dfrac{1}{9} = 0.\bar{1}$

**51) (3)** $A \to \dfrac{1}{12}, \quad B \to \dfrac{1}{16}$

$4(A+B) + x A \to 1$

$4\left(\dfrac{1}{12} + \dfrac{1}{16}\right) + \dfrac{x}{12} = 1$

$\Rightarrow \dfrac{1}{3} + \dfrac{1}{4} + \dfrac{x}{12} = 1$

$\Rightarrow \dfrac{x}{12} = 1 - \dfrac{1}{3} - \dfrac{1}{4} = \dfrac{12-4-3}{12} = \dfrac{5}{12}$

$\Rightarrow x = 5.$

**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 $\qquad$ WORLD

$+2\downarrow\ +3\downarrow\ +4\downarrow\ +5\downarrow\ \downarrow+6 \qquad +2\downarrow \qquad \downarrow+6$

CUMXK $\qquad$ YRVQJ

⑩
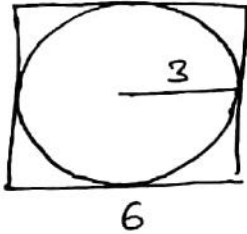
㊴ (4)  $16\% - 12\frac{1}{2}\% = 3\frac{1}{2}\%$

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

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

㊵ (4)



Area $= 6^2 = 36$
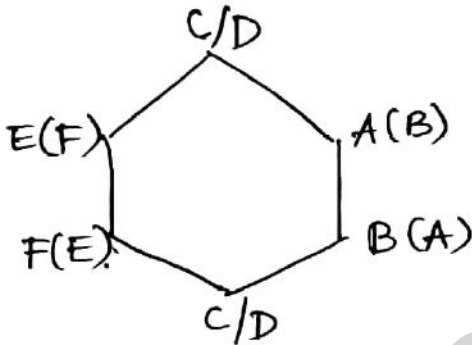
㊶ (1)  $x = 20$
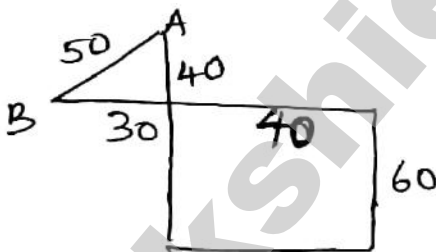
Net loss $= \frac{x^2}{100} = \frac{20 \times 20}{100} = 4\%$ loss.

㊷ (4)



A, B, EF can be arranged in 2 ways

C, D can be arranged in 2 ways

Total no. of ways $= 2 \times 2 = 4$ ways.

㊸ (4)



㊹ (2)  T R I A N G L E     S Q U A R E

+1↓   +1↓        +1↓ +1↓

U S J B O H M F     T R V B S F

㊱ (2)  $A = \frac{\sqrt{3}}{4} a^2 = \frac{\sqrt{3}}{4} \times 4^2 = 4\sqrt{3}.$

㊲ (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) (1)

65) (1)

$3, 5, 7, 11, \underline{13}$

$X \xrightarrow{-3} U \xrightarrow{-3} R \xrightarrow{-3} O \xrightarrow{-3} \underline{L}$

$5, 7, 11, 13, \underline{17}$

66) (1)

$2, 3, 5, 7, 11$

$2^2 + 1 = 5, \quad 3^2 + 1 = 10, \quad 5^2 + 1 = 26, \quad 7^2 + 1 = 50, \quad 11^2 + 1 = 122$
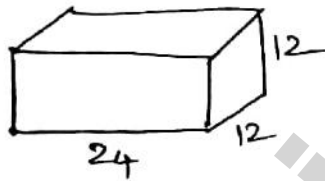
67) (3)

$D \xrightarrow{+1} E \xrightarrow{+1} F \xrightarrow{+1} G$

$F \xrightarrow{+1} G \xrightarrow{+1} H \xrightarrow{+1} I$

$I \xrightarrow{+1} J \xrightarrow{+1} K \xrightarrow{+1} L$

68) (2)

$S \cdot A = 2(24 \times 12 + 12 \times 12 + 12 \times 24)$

$= 2 \times 12 \times 12 [2 + 1 + 2] = 1440$

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

$2 \times 2 \rightarrow 16$

$3 \times 3 \rightarrow 9$

$4 \times 4 \rightarrow 4$

$5 \times 5 \rightarrow \underline{\quad 1 \quad}$

$\qquad\qquad\quad 55$

71) (4)

$\begin{array}{cccccc} G & A & L & A & X & Y \\ \downarrow{-3} & \downarrow{-3} & & & & \\ D & X & I & X & U & V \end{array}$

$\begin{array}{cccc} S & T & A & R \\ -3 & -3 & & \\ P & Q & X & O \end{array}$

72) (2)

$\begin{array}{ccccc} 1 & 4 & 9 & 16 & 25 \\ A & D & I & P & , \underline{Y} \end{array}$

�73 (4)  $a * b = a^2 + b^2 - 3ab$

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

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

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

㊄ (4)    ㊄ (1)    ㊆ (1)

㊆ (3)    ㊆ (4)    ㊆ (3)

㊇ (3)  $\dfrac{5 \times 10}{2} = 25$,  $\dfrac{10 \times 20}{2} = 100$,  $\dfrac{30 \times 15}{2} = 225.$

㊁ (2)  $4 \times 5 \times 6 - 7 \times 8 = 120 - 56 = 64$

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

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

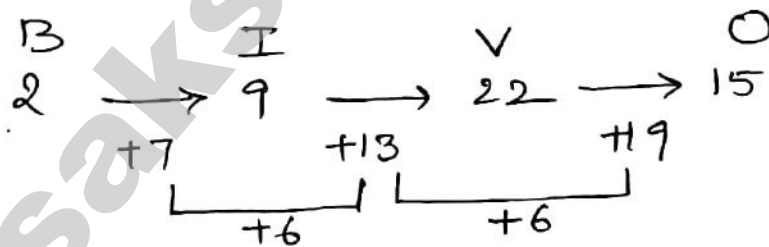㊁ (1)    ㊁ (4)  $2 \times 3 \times 4 = 24$    $x \times 5 \times 7 = 140 \Rightarrow x = 4$

$6 \times 7 \times 8 = 336$    $y \times 6 \times 10 = 120 \Rightarrow y = 2$

㊁ (3)
B    I    V    O
2 → 9 → 22 → 15
+7   +13   +19
+6    +6

㊅ (4)
B L O C K
F P U G N
↓ Vowel
↓ Next vowel
Consonant
↓+3 (skip vowel)
Consonant

㊅ (3)    ㊅ (2)    ㊅ (1)    ㊅ (2)

**90** (1)
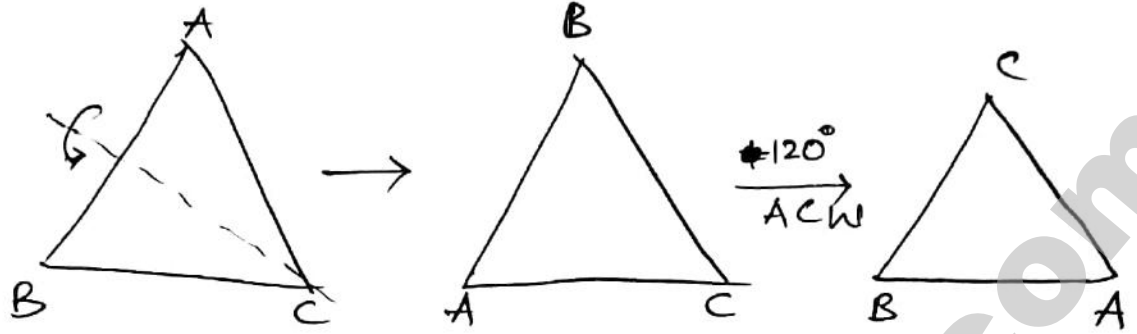


**91** (2)   (d) ⊂ (b) ⊂ (a) ⊂ (c)        ⊂ : subsets

**92** (3)   $Area = \dfrac{1}{n} \times \dfrac{1}{n+1} = \dfrac{1}{n(n+1)} = \dfrac{1}{n} - \dfrac{1}{n+1}$

$Sum = \dfrac{1}{1} - \dfrac{1}{2} + \dfrac{1}{2} - \dfrac{1}{3} + \cdots + \dfrac{1}{100} - \dfrac{1}{101}$

$= 1 - \dfrac{1}{101} = \dfrac{100}{101}$

**93** (2)   Mirror image + Water image.
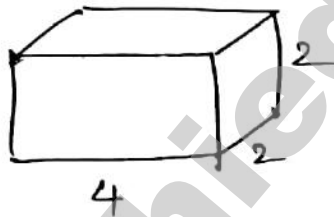
**94** (2)      $V = lbh = 4 \times 2 \times 2 = 16$

**95** (3)   $\dfrac{157 - 114}{90 - 50} = \dfrac{43}{40} = 1.075$

**96** (2)   $\dfrac{154 - 112}{100 - 90} = \dfrac{42}{10} = 4.2$

**97** (4)   Total 100 Students

**98** (3)   F → Football — 20        F + C + V = 5

**99** (2)   C → Cricket — 30        F + V = 8

**100** (4)   V → Volleyball — 25

$\underset{6}{F + C} = \underset{6}{C + V}$   (12)