I Choose

1 (b) 2

2 (d) quadratic

3 (d) 2520

4 (c) 14280

5 (d) $\frac{16}{5}\left|\frac{xz^2}{y}\right|$

6 (c) Parabola

7. (b) Two

8. EM (8,7) (3,p) (6,6) $\boxed{\text{Ans } \frac{9}{2}}$ TM (5,7) (3,p) (6,6) (a) 9

9 (c) $3x+7y=0$

10 (d) $\cot\theta$

11 (d) 60°

12 (d) 3:1:2

13 (c) 33:25

14 (a) $P(A)>1$

Common Half Yearly Exam - Dec 25

II

(15) $A \times B = \phi$ — (1), $A \times A = \{(m,m), (m,n), (n,m), (n,n)\}$ — (1)

(16) $3(2x+k) - 2 = 2(3x-2) + k$ — (1)

$6x + 3k - 2 = 6x - 4 + k$

$2k = -2$

$\boxed{k=-1}$ — (1)

(17) $2^9 \times 3^3 = 13824$ — (1)

$\boxed{a=9}$ $\boxed{b=3}$ — (1)

(18) $a = 16$, $d = -5$, $t_n = -54$

$t_n = a + (n-1)d$ — (1)

$-54 = 16 + (n-1)(-5)$

$n = \dfrac{-54-16}{-5} + 1$

$n = 14 + 1$

$\boxed{n = 15}$ — (1)

(19) $\dfrac{t}{(t-3)(t-2)}$ — (1)

Excluded values are 3, 2 — (1)

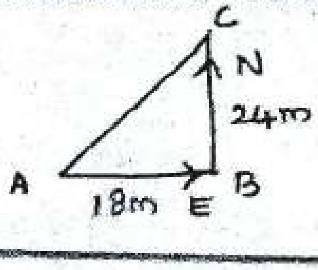
(20) $SR = -9$

$PR = 20$

$x^2 - (SR)x + PR = 0$ — (1)

$\boxed{x^2 + 9x + 20 = 0}$ — (1)

(21)



$AC = \sqrt{18^2 + 24^2}$ — (1)

$= \sqrt{324 + 576}$

$= \sqrt{900}$

$AC = 30m$ — (1)

(22) Area of the $\Delta^{le} = \dfrac{1}{2}\left|\begin{matrix} -1.5 & 6 & -3 & -1.5 \\ 3 & -2 & 4 & 3 \end{matrix}\right|$ sq.units — (1)

$= \frac{1}{2}\left|(3+24-9) - (18+6-6)\right|$

$= \frac{1}{2}\left|18 - 18\right| = 0$ — (1)

It is collinear

(23) $\frac{x}{a} + \frac{y}{b} = 1$ — (1)

$\frac{x}{2} + \frac{y}{-3} = 1$

$\boxed{a = 2}$ $\boxed{b = -3}$ — (1)

(24) $\sec\theta - \cos\theta$

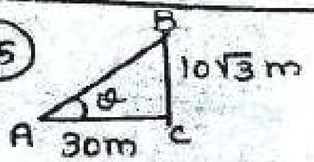
$= \frac{1}{\cos\theta} - \frac{\cos\theta}{1}$ — (1)

$= \frac{1 - \cos^2\theta}{\cos\theta}$

$= \frac{\sin\theta \times \sin\theta}{\cos\theta}$ — (1)

$= \tan\theta \sin\theta$

(25)



$\tan\theta = \frac{10\sqrt{3}}{30}$ — (1)

$\tan\theta = \frac{1}{\sqrt{3}}$

$\boxed{\theta = 30^\circ}$ — (1)

(26) $\frac{r_1}{r_2} = \frac{12}{16}$

$\frac{4\pi r_1^2}{4\pi r_2^2} = \frac{4\pi (12)^2}{4\pi (16)^2}$ — (1)

$= \frac{12 \times 12}{16 \times 16} = \frac{9}{16}$

$\boxed{9 : 16}$ — (1)

(27) $S = \{HHH, HTH, THH, TTH, HHT, HTT, THT, TTT\}$

$n(S) = 8$

A = 2 consecutive tails

$A = \{TTH, HTT, TTT\}$

$P(A) = \frac{n(A)}{n(S)} = \frac{3}{8}$ — (1)

(28) 2, 3, 5, 7, 11, 13, 17, 19, 23, 29

Range = L − S — (1)

R = 29 − 2 = 27 — (1)

III

29. $A = \{2,3\}$, $B = \{0,1\}$ $C = \{1,2\}$ — 1

$(B \cup C) = \{0,1,2\}$

$A \times (B \cup C) = \left\{ \begin{matrix} (2,0), (2,1), (2,2) \\ (3,0), (3,1), (3,2) \end{matrix} \right\}$ — (1) — 1

$(A \times B) = \left\{ \begin{matrix} (2,0), (2,1) \\ (3,0), (3,1) \end{matrix} \right\}$ — 1

$(A \times C) = \left\{ \begin{matrix} (2,1), (2,2), \\ (3,1), (3,2) \end{matrix} \right\}$ — 1

$(A \times B) \cup (A \times C) = \left\{ \begin{matrix} (2,0), (2,1), (2,2), \\ (3,0), (3,1), (3,2) \end{matrix} \right\}$ — (2) — 1

(1) = (2)

---

30. $f(2) = 0$, $f(4) = 1$, $f(6) = 2$, — 1

$f(10) = 4$, $f(12) = 5$

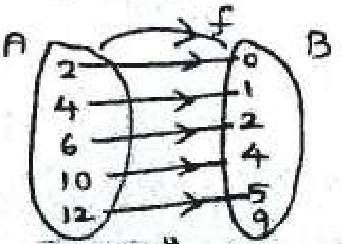
(i) $\{(2,0), (4,1), (6,2), (10,4), (12,5)\}$ — 1

(ii)

x	2	4	6	10	12
y	0	1	2	4	5

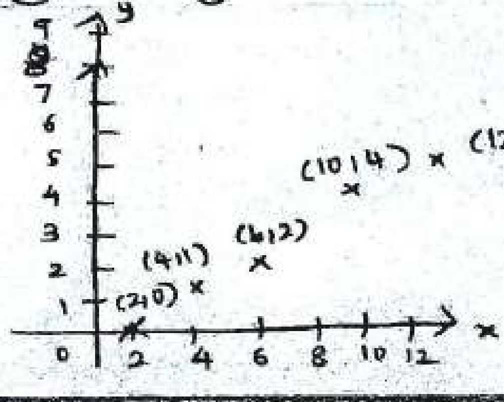
— 1

(iii)



— 1

(iv)



— 1

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31. $10^2 + 11^2 + 12^2 + \cdots + 24^2$ — 1

— 1

$\Sigma n^2 = \frac{n(n+1)(2n+1)}{6}$ — 1

$\Sigma 24^2 - \Sigma 9^2$ — 1

$= \frac{24 \times 25 \times 49}{6} - \frac{9 \times 10 \times 19}{6}$ — 1

$= 4900 - 285$

$= 4615 \text{ cm}^2$ — 1

(32) $(AB) = \begin{bmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{bmatrix} \begin{bmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{bmatrix}$

$= \begin{bmatrix} 5+2+45 & 35+4-9 \\ 1+2+40 & 7+4-8 \end{bmatrix}$

$(AB) = \begin{bmatrix} 52 & 30 \\ 43 & 3 \end{bmatrix}$ — 1

$(AB)^T = \begin{bmatrix} 52 & 43 \\ 30 & 3 \end{bmatrix}$ — 1

$B^TA^T = \begin{bmatrix} 1 & 1 & 5 \\ 7 & 2 & -1 \end{bmatrix} \begin{bmatrix} 5 & 1 \\ 2 & 2 \\ 9 & 8 \end{bmatrix}$ — 2

$= \begin{bmatrix} 5+2+45 & 1+2+40 \\ 35+4-9 & 7+4-8 \end{bmatrix}$

$B^TA^T = \begin{bmatrix} 52 & 43 \\ 30 & 3 \end{bmatrix}$ — 1

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(33) STATEMENT — 2

DIAGRAM — 1

GIVEN, TO PROVE, CONSTRUCTION, PROOF $\}$ — 2

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(34) $(-9,-2)$ $(-8,-4)$ $(1,-3)$ $(2,2)$
$x_1\ y_1$ $x_2\ y_2$ $x_3\ y_3$ $x_4\ y_4$

Area $= \frac{1}{2}\begin{vmatrix} x_1 & x_2 & x_3 & x_4 & x_1 \\ y_1 & y_2 & y_3 & y_4 & y_1 \end{vmatrix}$ sq units — 1

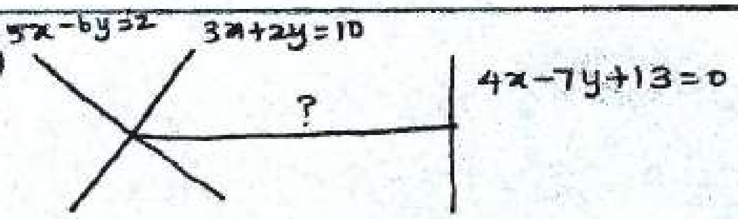
$= \frac{1}{2}\begin{vmatrix} -9 & -8 & 1 & 2 & -9 \\ -2 & -4 & -3 & 2 & -2 \end{vmatrix}$ — 1

$= \frac{1}{2}\left|(36+24+2-4)-(16-4-6-18)\right|$ — 1

$= \frac{1}{2}\left|58+12\right| = \frac{1}{2}(70) = 35$ sq units $\}$ 2

---

(35)



Solve $5x-6y=2$ & $3x+2y=10$

Pt. $\left(\frac{16}{7}, \frac{11}{7}\right)$ 1

Slope of $4x-7y+13=0$ is $m = \frac{-4}{-7}$

$\boxed{m = \frac{4}{7}}$

$\perp^r$ slope $\boxed{m_1 = -\frac{7}{4}}$ (1)

$y - y_1 = m_1 (x - x_1)$ (1)

$y - \frac{11}{7} = -\frac{7}{4}\left(x - \frac{16}{7}\right)$ (1)

$\boxed{49x + 28y - 156 = 0}$ (1)

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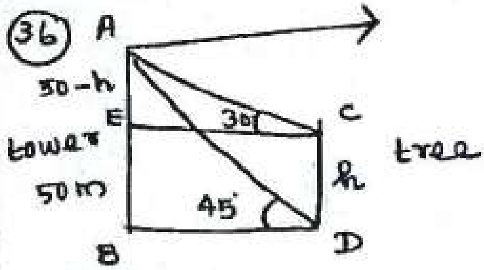
(36)



$\theta = 45°$

$BD = 50\,m = EC$ (1)

$\triangle AEC$

$\tan 30° = \frac{50 - h}{50}$ (1)

$\frac{1}{\sqrt{3}} = \frac{50 - h}{50}$ (1)

$\frac{50}{\sqrt{3}} = 50 - h$

$h = 50 - \frac{50}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ (1)

$h \approx 50 - 28.86$

$\boxed{h = 21.14\,m}$ — (1)

---

(37) $l = \sqrt{h^2 + r^2}$ (1)

$l = \sqrt{5^2 + 12^2} = \sqrt{169} = 13\,cm$ (

$n = \frac{5720}{\pi r l} = \frac{5720 \times 7}{22 \times 5 \times 13}$ (2

$\boxed{n = 28}$ (1)

---

(38) Vol. of cylinder $= \pi r^2 h = \pi \times 6^2 \times 15$

Vol. of cone $= \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \pi \times 3^2 \times 9$

Vol. of hemisphere $= \frac{2}{3}\pi r^3$

$= \frac{2}{3} \times \pi \times 3^3$

$$\text{no. of cones} = \frac{\text{Vol. of cylinder}}{\text{Vol. of cone} + \text{Vol. of hemisphere}} \quad (1)$$

$$n = \frac{\pi \times 6^2 \times 15}{\frac{1}{3}\times\pi\times 3^2\times 9 + \frac{2}{3}\times\pi\times 3^3} \quad (1)$$

$$n = \frac{6\times6\times15}{27+18} = \frac{6\times6\times15}{45}$$

$$\boxed{n = 12} \quad (1)$$

(39) $\bar{x} = \frac{\Sigma x}{n} = \frac{2700}{9} = 300$ (1)

x	$d = x - \bar{x}$	d	d^2
310	310 - 300	10	100
290	290 - 300	-10	100
320	320 - 300	20	400
280	280 - 300	-20	400
300	300 - 300	0	0
290	290 - 300	-10	100
320	320 - 300	20	400
310	310 - 300	10	100
280	280 - 300	-20	400

(2)

$\Sigma d^2 = 2000$

$$\sigma = \sqrt{\frac{\Sigma d^2}{n}} \quad (1)$$

$$\sigma = \sqrt{\frac{2000}{9}}$$

$$\sigma \approx \sqrt{222.22} = 14.91$$

$$\left.\begin{array}{l}\boxed{\sigma = 14.91}\\ \boxed{\sigma^2 = 222.22}\end{array}\right\} \quad (1)$$

(1) (40) $S = \{(1,1),(1,2)\ldots (6,6)\}$ (1)

$n(S) = 36$

(i) A = doublet = $\{(1,1),(2,2),(3,3),(4,4),(5,5),(6,6)\}$

$P(A) = \frac{n(A)}{n(S)} = \frac{6}{36} = \frac{1}{6}$ (1)

(ii) B = product as prime no

$B = \{(1,2),(1,3),(1,5),(2,1),(3,1),(5,1)\}$

$P(B) = \frac{n(B)}{n(S)} = \frac{6}{36} = 1/6$ (1)

(iii) C = sum as prime no

$C = \{(1,1),(1,2),(1,4),(1,6),(2,1),(2,3),(2,5),(3,2),(3,4),(4,1),(4,3),(5,2),(5,6),(6,1),(6,5)\}$

$P(C) = \frac{n(C)}{n(S)} = \frac{15}{36} = \frac{5}{12}$ (1)

(iv) D = sum as 1 = { }

$P(D) = 0$ (1)

(41) A : NCC

B : NSS

$n(S) = 50$, $P(A) = \frac{n(A)}{n(S)}$ (1)

$P(A) = \frac{28}{50}$, $P(B) = \frac{30}{50}$, $P(A \cap B) = \frac{18}{50}$ (1)

(i) $P(A) - P(A \cap B) = \frac{28}{50} - \frac{18}{50} = \frac{10}{50} = 1/5$ (1)

(ii) $P(B) - P(A \cap B) = \frac{30}{50} - \frac{18}{50} = \frac{12}{50} = \frac{6}{25}$ (1)

(iii) $P(A) - P(A \cap B) + P(B) - P(A \cap B)$

$= \frac{10}{50} + \frac{12}{50} = \frac{22}{50} = \frac{11}{25}$ (1)

(42) $\frac{7}{9}[9+99+999+\ldots\ldots \text{ upto } n \text{ terms}]$ (1)

$= \frac{7}{9}[10-1+100-1+1000-1+\ldots \text{ upto } n \text{ terms}]$ (1)

$= \frac{7}{9}\left[\begin{array}{l}10+100+1000+\ldots\ n \text{ terms} \\ -1\ -1\ -1\ \ldots\ldots\ n \text{ terms}\end{array}\right]$ (1)

$S_n = \frac{a(r^n - 1)}{r-1}$ (1)

$= \frac{7}{9}\left[\frac{10(10^n - 1)}{9} - n\right]$ (1)

upto n terms not mentioned in QP

IV

43 (a) Rough diagram — 1

Draw ΔPQR — 2

Draw $\angle RQX$ — 1

Draw $Q_1, Q_2, Q_3, Q_4, Q_5, Q_6, Q_7$ on QX — 1

Draw Q_3R, Q_7R', $R'P'$ — 2

$PR \parallel P'R'$ — 1

(or)

(b) Rough Diagram — 1

Draw first circle — 2

Draw second circle — 3

Draw two tgts. — 1

Length of the tgt = 8.6 cm or 8.7 cm — 1

---

44 (a) x axis, y axis — 1

Scale — 1

x	1	2	3	4	6	8	12
y	24	12	8	6	4	3	2

— 2

Plot the pts. and drawing the Rectangular hyperbola — 2

(i) $y = 8$
(ii) $x = 4$ — 2

or

(b) x axis, y axis — 1

Scale — 1

Plot the below points and drawing Parabola — 2

x	−5	−4	−3	−2	−1	0	1	2	3	4	5
x^2	25	16	9	4	1	0	1	4	9	16	25
$-8x$	40	32	24	16	8	0	−8	−16	−24	−32	−40
16	16	16	16	16	16	16	16	16	16	16	16
y	81	64	49	36	25	16	9	4	1	0	1

3

Roots are real and equal
{4, 4} — 1