[Section - A]

(1) B) 2 (1)

(2) C) $\left(\frac{13}{7}, 0\right)$ ~~(1)~~ (1)

(3) A) 12 (1)

(4) D) Not-Real (1)

(5) A) 1650 (1)

(6) C) 8Cm (1)

(7) C) 1 (1)

(8) D) 1/12 (1)

(9) C) 3/7 (1)

(10) B) $\frac{6}{7}$ (1)

(11) D) $\triangle ADP \sim \triangle CBP$ (1)

(12) A) Increased by 2 (1)

(13) C) $1/10$ (1)

(14) B) $5\sqrt{2}$ cm (1)

(15) A) 5 units (1)

(16) B) 16^{th} (1)

(17) D) 40° (1)

(18) B) mode (1)

(19) A) Both (A) & (R) are true. (R) is the correct explanation of (A) (1)

(20) D) Assertion is not true but Reason is true. (1)

(21) $15^n = 5^n \times 3^n$ (1)

A number end with zero if it has two prime factors 2 & 5 both. Since 15^n does not have 2 as a prime factor, so it can't end with zero. (1)

(22) $A(1,0)$, $B(-5,0)$ & $C(-2,5)$

$AB = \sqrt{(-5-1)^2 + (0-0)^2} = 6$ ½

$AC = \sqrt{(-5+2)^2 + (0-5)^2} = \sqrt{34}$ ½

$CA = \sqrt{(1+2)^2 + (0-5)^2} = \sqrt{34}$ ½

$\therefore$ $BC = CA$

So, ΔABC is isosceles. ½

23 a) $2\sin^2 30^\circ \sec 60^\circ + \tan^2 60^\circ$

$= 2 \times \left(\frac{1}{2}\right)^2 \times 2 + (\sqrt{3})^2 = 4$ 2

23 b) $2\sin(A+B) = \sqrt{3}$

$\sin(A+B) = \sqrt{3}/2$

$\sin(A+B) = \sin 60^\circ$

$A+B = 60^\circ$ —— (1) 1/2

&

$\cos(A-B) = 1$

$A-B = 0^\circ$ —— (2) 1/2

Add eq. (1) & (2) :-

$2A = 60^\circ$

$\boxed{A = 30^\circ}$

Substitute the value of A in eq. (1)

$\boxed{B = 30^\circ}$ 1

ans.

(24) Join OA & OC $\frac{1}{2}$

OA = OC (radius of circle)

$\therefore \angle OAC = \angle OCA$ — ① $\frac{1}{2}$

Also, $\angle OAB = \angle OCD$ — ②

Add eq. ① & ②

$\angle OAC + \angle OAB = \angle OCA + \angle OCD$ $\frac{1}{2}$

$\therefore \boxed{\angle BAC = \angle DCA}$ $\frac{1}{2}$

(25) a) Let the required ratio be $K:1$

Coordinates of point P are $\left(\frac{-K+3}{K+1}, \frac{6K-5}{K+1}\right)$ 1

Point P lies on line $y = x$

$\therefore \quad \dfrac{-K+3}{K+1} = \dfrac{6K-5}{K+1}$ $\quad\frac{1}{2}$

$-K+3 = 6K-5$

$7K = 8$

$K = \dfrac{8}{7}$

$\therefore$ Required Ratio is $8:7$ af. $\quad\frac{1}{2}$

(25) b) We have, E is mid - Point of AC

$E = \left(\dfrac{-1+3}{2}, \dfrac{0+3}{2}\right) \Rightarrow E\left(1, \frac{3}{2}\right)$ $\quad 1$

Length of Median BE $= \sqrt{(6-1)^2 + \left(4-\frac{3}{2}\right)^2}$

$= \sqrt{25+\dfrac{25}{4}} = \sqrt{\dfrac{125}{4}} = \boxed{\dfrac{5\sqrt{5}}{2}}$ af. $\quad 1.$

[Section - C]

(26) a) A/Q. $S_m = S_n$

$$\frac{m}{2}\left[2a+(m-1)d\right] = \frac{n}{2}\left[2a+(n-1)d\right]$$

$$\frac{1}{2}\left[2am+(m-1)md\right] = \frac{1}{2}\left[2an+(n-1)nd\right]$$ 1

$$\frac{1}{2}\left[2am+m^2d-md\right]-\frac{1}{2}\left[2an+n^2d-nd\right]=0$$

$$\frac{1}{2}\left[2am-2an+m^2d-n^2d-md+nd\right]=0$$

$$\frac{1}{2}\left[2a(m-n)+d(m^2-n^2)-d(m-n)\right]=0$$ 1

$$\frac{1}{2}(m-n)\left[2a+(m+n-1)d\right]=0$$ ½

$$\cdot\ 2a = -(m+n-1)d \quad — \ (1)$$

now,

$$S_{m+n} = \frac{m+n}{2}\left[2a + (m+n-1)d\right]$$

Subtitute the value of 2a from (1)

$$S_{m+n} = \frac{m+n}{2}\left[-(m+n-1)d + (m+n-1)d\right]$$

$$S_{m+n} = \frac{m+n}{2} \times 0$$

$$\boxed{S_{m+n} = 0}$$ opf.

1/2

(26) b) let the numbers be $(a-d)$, a, $(a+d)$ 1/2

$\therefore$ $(a-d) + a + (a+d) = 24$ 1/2

$3a = 24$

$$\boxed{a = 8}$$

Now,

$$(a-d)^2 + a^2 + (a+d)^2 = 194$$

$$(8-d)^2 + 8^2 + (8+d^2) = 194$$ 1

$$(64 + d^2 - 16d) + 64 + (64 + d^2 + 16d) = 194$$

$$192 + 2d^2 = 194$$

$$2d^2 = 2$$

$$d^2 = 1$$

$$\boxed{d = \pm 1}$$ ½

∴ Numbers are 7, 8, 9 or 9, 8, 7 Ans. ½

(27) let $\sqrt{5}$ is a rational number

$\therefore \sqrt{5} = \frac{a}{b}$ [a & b are co-prime & $b \neq 0$] 1/2

$\sqrt{5}b = a$

Squaring both sides,

$5b^2 = a^2$ —— (1)

Hence 5 is a factor of a^2

So 5 is also a factor of a —— (2) 1

let $5c = a$

Substitute the value in eq. (1)

$5b^2 = (5c)^2$

$b^2 = 5c^2$

Hence 5 is also a factor of b. —— (3) 1

From eq. (2) + (3), our assumption is wrong the a & b are co-prime,

$\therefore \sqrt{5}$ is irrational. 1/2

Proved

(28) a) Join OQ,

$OQ = OA$ (radius of circle) ½

$\angle AQO = \angle QAO = 30^\circ$

Now,

$\angle OQB = 90^\circ - \angle AQO$ ½

$\angle OQB = 60^\circ$

&

$\angle BQP = 90 - \angle OQB$ (angle by tangent and radius) ½

$\angle BQP = 30^\circ$ —— (1)

$\angle BOQ = \angle AQO + \angle QAO$ (exterior $\angle$s property) ½

$\angle BOQ = 60^\circ$

Hence $\angle QPB = 90^\circ - \angle BOQ$ ½

$\angle QPB = 30^\circ$ —— (2)

From (1) & (2)

$\angle BQP = \angle QPB$

$\therefore \boxed{BP = BQ}$ ½

28) b) Join OP, OQ, OR & OS ½

$\Delta POB \cong \Delta QOB$

$\therefore \angle 1 = \angle 2$ 1

Similarly, $\angle 3 = \angle 4$ & $\angle 5 = \angle 6$ & $\angle 7 = \angle 8$

Now, $\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360°$ ½

$2(\angle 1 + \angle 8 + \angle 4 + \angle 5) = 360$

$\angle 1 + \angle 8 + \angle 4 + \angle 5 = 180°$ ½

$\boxed{\therefore \angle AOB + \angle COD = 180°}$ ½

(29) L.H.S

$$= \frac{1 + \sec\theta + \tan\theta}{1 + \sec\theta + \tan\theta} = \frac{(\sec^2\theta - \tan^2\theta) + (\sec\theta - \tan\theta)}{1 + \sec\theta + \tan\theta}$$

1

$$= \frac{(\sec\theta - \tan\theta)(\sec\theta + \tan\theta) + (\sec\theta - \tan\theta)}{1 + \sec\theta + \tan\theta}$$

$$= \frac{\sec\theta - \tan\theta\,(\sec\theta + \tan\theta \pm 1)}{(\sec\theta + \tan\theta + 1)} = \sec\theta - \tan\theta$$

1

$$= \frac{1}{\cos\theta} - \frac{\sin\theta}{\cos\theta} = \frac{1 - \sin\theta}{\cos\theta} = \underline{\text{R.H.S}}$$

1

(30)

Marks obtained	No. of Students (f_i)	x_i	$f_i x_i$
0 – 10	12	5	60
10 - 20	23	15	345
20 - 30	34	25	850
30 - 40	25	35	875
40 - 50	6	45	270
	$\Sigma f_i = 100$		$\Sigma f_i x_i = 2400$

$1\frac{1}{2}$

$$\text{Mean} = \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{2400}{100} = \boxed{24} \quad \text{Ans.} \quad 1\frac{1}{2}$$

(31)

Let the digit in ten's place be x $\frac{1}{2}$

$\therefore$ digit at unit's place $= x - 5$ $\frac{1}{2}$

A/Q, $x(x-5) = 36$

$x^2 - 5x - 36 = 0 \Rightarrow (x-9)(x+4) = 0$ 1

$x \neq -4$ & $x = 9$. $\Rightarrow \therefore$ Required Number $= \boxed{94}$ Ans. 1

[Section – D]

32 a) $3x + y + 4 = 0$

x	-2	-1
y	2	-1

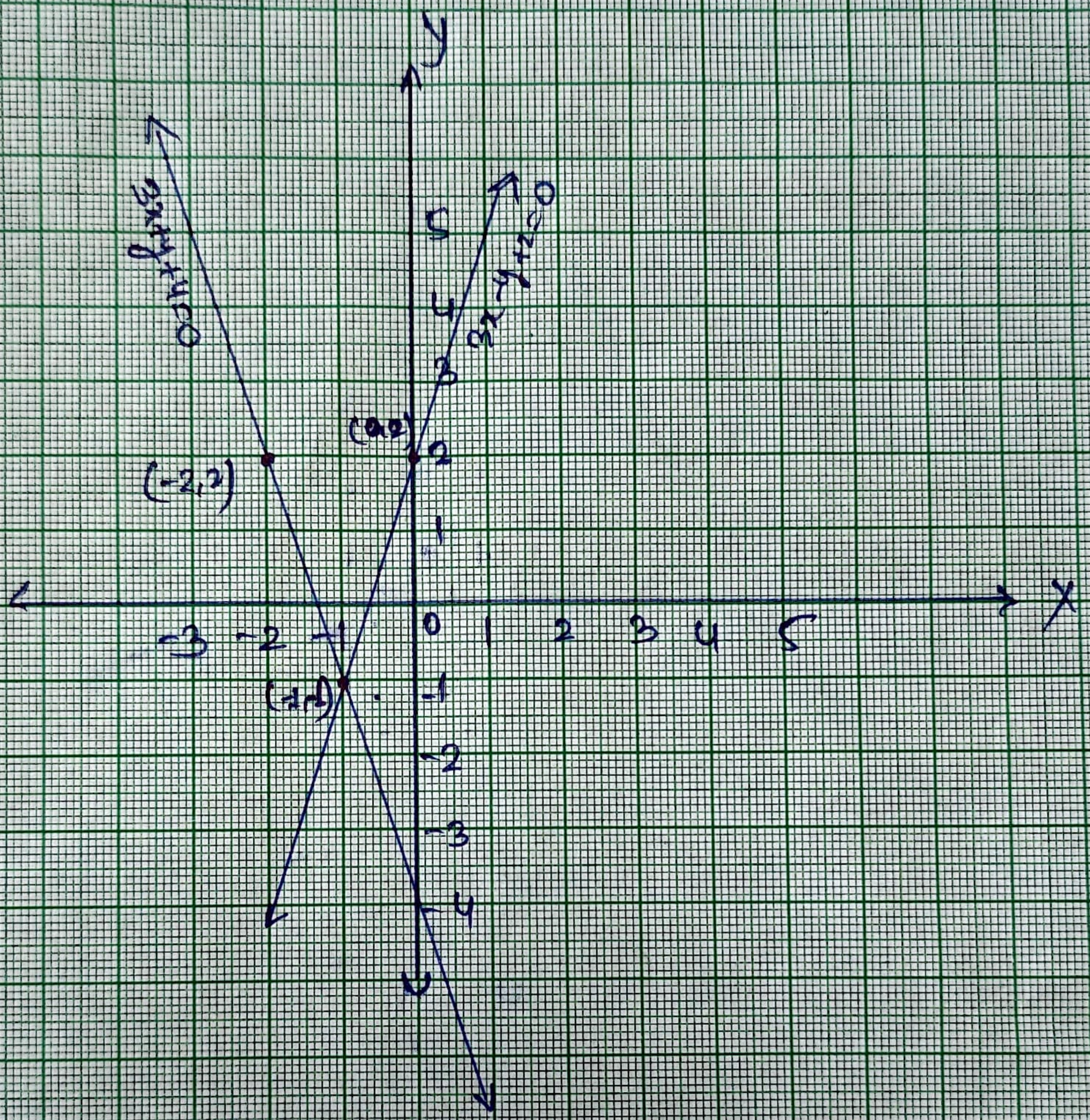
& $3x - y + 2 = 0$

x	0	-1
y	2	-1

From graph,

$x = -1$ & $y = -1$ is the solution. 1

2



32) b) Let number of Correct answers be x
& number of incorrect answers be y

A/Q,

$$3x - y = 40 \quad \text{—} ①$$ 1½

$$4x - 2y = 50 \quad \text{—} ②$$ 1½

Multiply eq. ① by 2 the subtract the equation from eq. ②

$$\begin{array}{r} 4x - 2y = 50 \\ 6x - 2y = 80 \\ - \quad + \quad\quad - \\ \hline -2x = -30 \end{array}$$

$$\boxed{x = 15}$$

Subtitute the value of x in eq. ①

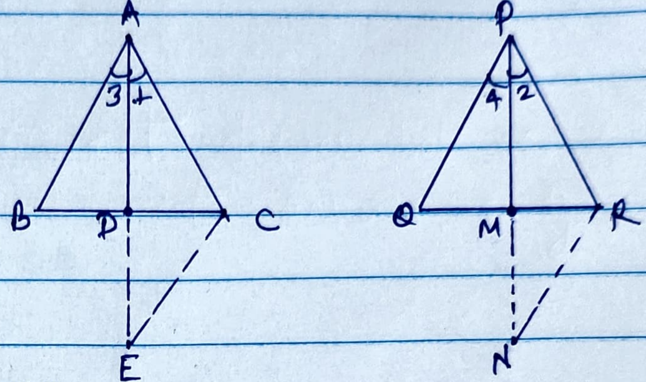
$$\boxed{y = 5}$$ 1

∴ Total number of questions $= \boxed{20}$ 1

Ans.

(33) To prove :- $\Delta ABC \sim \Delta PQR$ $\frac{1}{2}$

Construction :-



produce AD to E such that AD = DE & Join EC $\frac{1}{2}$

Similarly

Produce PM to N such that PM = MN and Join NR

Proof :- $\frac{1}{2}$

Now $\Delta ADB \cong \Delta EDC$

$\therefore$ $AB = EC$

Similarly $PQ = NR$

Since,

$$\frac{AB}{PQ} = \frac{AC}{PR} = \frac{AD}{PM}$$

$\frac{1}{2}$

$$\therefore \frac{EC}{NR} = \frac{AC}{PR} = \frac{AE/2}{PN/2}$$

So, $\Delta AEC \sim \Delta PNR$

$\therefore \angle 1 = \angle 2$

Similarly $\angle 3 = \angle 4$

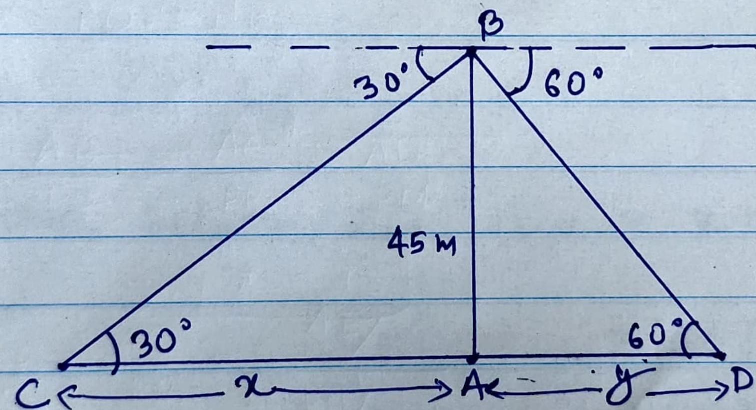
Hence, $\angle 1 + \angle 3 = \angle 2 + \angle 4$

$\angle A = \angle P$

Also $\frac{AB}{PQ} = \frac{AC}{PR}$

$\therefore \boxed{\Delta ABC \sim \Delta PQR}$ 3.

(34)



1

let AB be the light house & C and D be position of ships.

Now,

$$\tan 60^\circ = \frac{AB}{AD} = \frac{45}{y}$$ 1

$$\sqrt{3} = \frac{45}{y}$$ 1/2

$$\boxed{y = 15\sqrt{3}\ m}$$

& $$\tan 30^\circ = \frac{AB}{AC} = \frac{45}{x}$$ 1

$$\frac{1}{\sqrt{3}} = \frac{45}{x}$$

$$\boxed{x = 45\sqrt{3}\ m}$$ 1/2

Distance between two ships $= x + y = 15\sqrt{3} + 45\sqrt{3}$

$= 60\sqrt{3}$

$= 60 \times 1.73$

$= \boxed{103.8\ m}$ 1

af.

35 Perimeter $= 20m$, $r = 5.6$ m

$$2r + \frac{2\pi r}{360}\theta = 20$$ 2

$$11.2 + 2 \times \frac{22}{7} \times 5.6 \times \frac{\theta}{360} = 20$$

$$\boxed{\theta = 90^\circ}$$ 1

Area of Sector $= \frac{\theta}{360} \times \pi r^2$ 1

$$= \frac{90}{360} \times \frac{22}{7} \times 5.6 \times 5.6$$

$$= \boxed{24.64\ m^2}$$ af. 1

[Section - E]

36

i) zeroes of the polynomials are 0 & 5. 1

ii) Maximum height achived by ball

$= 25 \times \frac{5}{2} - 5 \times \left(\frac{5}{2}\right)^2 = \frac{125}{4} = 31.25$ m 1

iii) a) $30 = 25t - 5t^2$ ½

$t^2 - 5t + 6 = 0$ ½

$(t-3)(t-2) = 0$ ½

$\therefore t = 3$ or $t = 2$ of. ½

iii) b) $20 = 25t - 5t^2$ ½

$t^2 - 5t + 4 = 0$ ½

$(t-4)(t-1) = 0$ ½

$\therefore t = 4$ or $t = 1$ of ½

(37) i) Height of conical part $= 18.5 - 8 = 10.5$ m   ½

Radius $= 14$ m

Slant height $= \sqrt{(10.5)^2 + 14^2} = 17.5$ m   ½

ii) Floor Area $= \frac{22}{7} \times 14 \times 14 = 616$ m^2 1

iii) a) Area of cloth used $= 2\pi r h + \pi r l \pm 2\pi r [h + l]$ 1

$= 2 \times \frac{22}{7} \times 14 [8 + 17.5]$

$= 88 \times 25.5 = 2244$ m^2 1

iii) b) Volume of air inside the tent

$= \pi r^2 h + \frac{1}{3}\pi r^2 h = \pi r^2 \left(h + \frac{1}{3}h\right)$ 1

$= \frac{22}{7} \times 14^2 \times \left(8 + \frac{1}{3} \times 10.8\right) = 7084 \text{ cm}^3$ 1

(38) i) $P(\text{travelling by bus or ship}) = \frac{36+33}{360} = \frac{69}{360} = \frac{23}{120}$ 1

ii) Number of people used car $= \frac{177}{360} \times 120 = 59$ 1

iii) a) $P(\text{person used train}) = 1 - \frac{4}{5} = \frac{1}{5}$ 1

$\therefore$ N. of people who used train $= \frac{120}{5} = 24$ 1

b) N. of people who use aeroplane $= \frac{7}{60} \times 120 = 14$ 1

Revenue generated $= 14 \times 5000 = ₹70,000$ 1

iii) b) Volume of air inside the tent

$= \pi r^2 h + \frac{1}{3}\pi r^2 h = \pi r^2 \left(h + \frac{1}{3}h\right)$ 1

$= \frac{22}{7} \times 14^2 \times \left(8 + \frac{1}{3} \times 10.8\right) = 7084 \text{ cm}^3$ 1

38) i) P(travelling by bus or ship) $= \frac{36+33}{360} = \frac{69}{360} = \frac{23}{120}$ 1

ii) Number of people used car $= \frac{177}{360} \times 120 = 59$ 1

iii) a) P(person used train) $= 1 - \frac{4}{5} = \frac{1}{5}$ 1

$\therefore$ N. of people who used train $= \frac{120}{5} = 24$ 1

b) N. of people who use aeroplane $= \frac{7}{60} \times 120 = 14$ 1

Revenue generated $= 14 \times 5000 = ₹70{,}000$ 1

af.