Class-X

Mathematics Basic (241)

Section A

1. b) $2^4 \times 7^3$

2. d) Mode = 3 Median − 2 Mean

3. a) 60°

4. c) 5.5

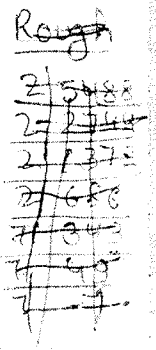
5. d) $\frac{3}{2}, -1$

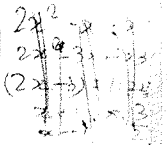
6. a) 4

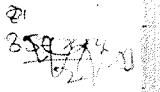
7. b) 5

8. b) $x + y = 19$

Rough







9. a) 0

10. c) $\frac{77}{2}$ cm^2

11. c) 115°

12. a) $\frac{1}{26}$

13. d) 4

14. d) −2

15. d) $\frac{1}{3}$

16. a) $K = \frac{3}{2}$

17. d) −1

Rough

18. c) 360

19. c) Assertion (A) is true, but Reason (R) is false.

20. b) Both (A) and (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

Section - B

21. a) divisible by 6.

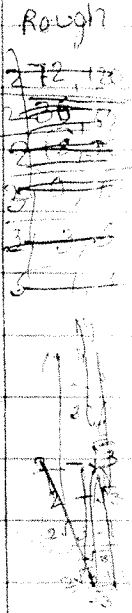
Favourable outcomes = 5, Total outcomes = 30

⇒ No. divisible by 6 are : 6, 12, 18, 24, 30

$P(E) \Rightarrow \frac{5}{30} \Rightarrow \frac{1}{6}$

$P(E) \Rightarrow \frac{1}{6}$ ans

Rough



21. b) greater than 25

Total outcomes ⇒ 30

favourable outcomes ⇒ 26, 27, 28, 29, 30 ⇒

$$P(E) \Rightarrow \frac{5}{30} \Rightarrow \frac{1}{6}$$

ans ⇒ $\frac{1}{6}$

22. a) $5x^2 - 10x + K = 0$

For real and equal roots

$D = 0$

$D = b^2 - 4ac$

$b \Rightarrow -10$, $a \Rightarrow 5$, $c = K$

$0 \Rightarrow (-10)^2 - 4 \times 5 \times K$

$0 \Rightarrow 100 - 20K$

$100 \Rightarrow 20K$

P.T.O.

$$K = \frac{100}{20}$$

$$[K = 5] \text{ ans}$$

23. $5\,\text{cosec}^2 45° - 3\sin^2 90° + 5\cos 0°$

$\text{cosec}\ 45° \Rightarrow \sqrt{2}$, $\sin 90° \Rightarrow 1$

$\cos 0° \Rightarrow 1$

$5(\sqrt{2})^2 - 3 \times (1)^2 + 5 \times (1)$

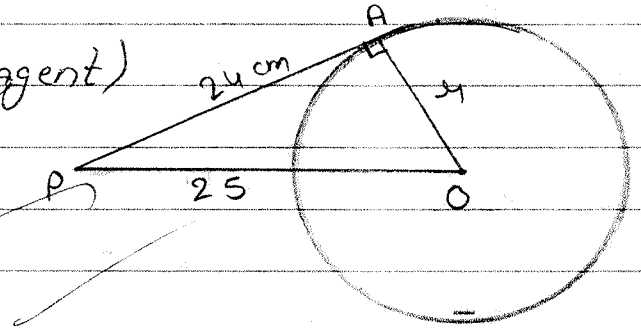
$\Rightarrow 5 \times 2 - 3 + 5$

$\Rightarrow 10 - 3 + 5$

$\Rightarrow 12$ ans

24. Given : $C(O, r)$, $PA = 24$ (Tangent)

$PO = 25$ cm , OA = radius



To find : OA -

P.T.O.

Solution :- $\angle OAP = 90^\circ$ [radius is alway ⊥ to point of contact on tangent]

ΔAOP is a right angled triangle

$OP^2 = PA^2 + OA^2$ [Pythagoras theorem]

$\Rightarrow (25)^2 \Rightarrow (24)^2 + OA^2$

$625 \Rightarrow 576 + r^2$

$625 - 576 \Rightarrow r^2$

$49 \Rightarrow r^2$

$r = 7$ cm

Ans. Radius $\Rightarrow$ 7 cm

Qs. b) $x^2 + 4x - 12$

$\Rightarrow x^2 + 6x - 2x - 12$

$\Rightarrow x(x+6) - 2(x+6)$

$(x-2)(x+6)$

$x - 2 = 0, \quad x + 6 = 0$

$x = 2, \quad x = -6$

Zeroes $\Rightarrow$ 2, −6 Ans

Section - C

26 Let, $7+4\sqrt{5}$ be a rational number.

$7+4\sqrt{5} = \frac{a}{b}$, $b \neq 0$, a & b are integers (co-prime)

$\therefore \quad 7+4\sqrt{5} = \frac{a}{b}$

$4\sqrt{5} = \frac{a}{b} - 7$

$4\sqrt{5} = \frac{a-7b}{b}$

$\sqrt{5} = \frac{a-7b}{4b}$

Since, a and b are integers. $\frac{a-7b}{4b}$ is rational but we know that $\sqrt{5}$ is an irrational number.

So, Contradicts by facts, Hence, $7+4\sqrt{5}$ is an irrational number.

27. $\frac{1}{x} - \frac{1}{x-2} = 3$

$\frac{x-2-x}{x(x-2)} = 3$

$\frac{-2}{x^2-2x} = 3$

$-2 = 3x^2 - 6x$

$3x^2 - 6x + 2 = 0$

$D = b^2 - 4ac$

$= (-6)^2 - 4 \times 3 \times 2$

$= 36 - 4 \times 6$

$= 36 - 24$

$= 12$

roots $= \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{6 \pm \sqrt{12}}{2 \times 3} = \frac{6 \pm 2\sqrt{3}}{6}$

$= \frac{2\sqrt{3}(1+\sqrt{3})}{3} = \frac{3+\sqrt{3}}{3}$

roots $= \frac{-(-6) - \sqrt{12}}{2 \times 3}$

$= \frac{6 - 2\sqrt{3}}{6}$

$= \frac{2(3-\sqrt{3})}{3}$

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

Ans $\Rightarrow$ roots $\Rightarrow$ $\frac{3+\sqrt{3}}{3}, \frac{3-\sqrt{3}}{3}$

28. a) $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\cos^2 A}{(1 + \sin A)^2}$

LHS $\Rightarrow$ $\frac{\cot A - \cos A}{\cot A + \cos A} \times \cot$

$\Rightarrow$ $\frac{\frac{\cos A}{\sin A} - \cos A}{}$

28 b) $(\sec\theta + \tan\theta)(1 - \sin\theta) = \cos\theta$

LS $\Rightarrow$ $(\sec\theta + \tan\theta)(1 - \sin\theta)$

$\Rightarrow$ $\left(\frac{1}{\cos\theta} + \frac{\sin\theta}{\cos\theta}\right)(1 - \sin\theta)$

$\Rightarrow$ $\frac{(1 + \sin\theta) \times (1 - \sin\theta)}{\cos\theta}$

PTO

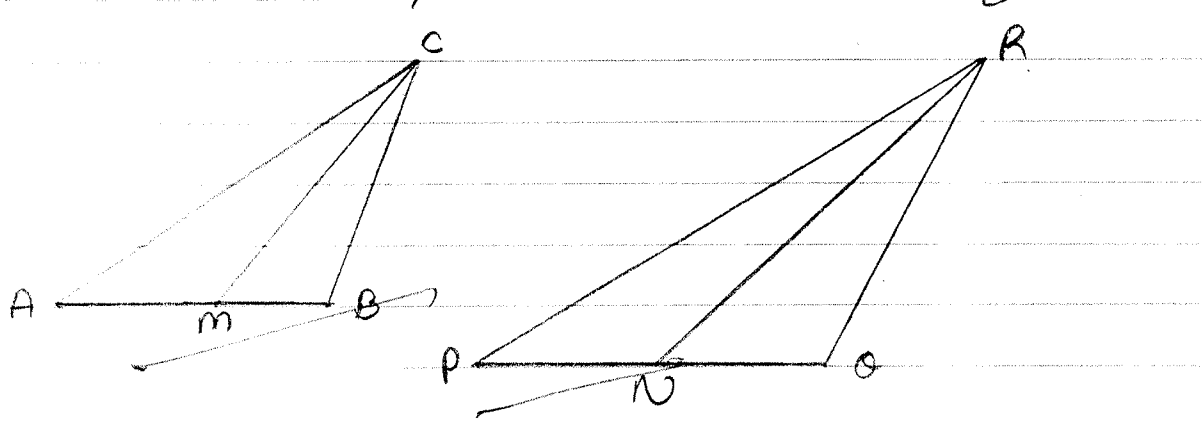
» $\frac{1 - \sin^2\theta}{\cos\theta}$

» $\frac{\cos^2\theta}{\cos\theta}$ $\left[\sin^2\theta + \cos^2\theta = 1\right]$

» $\cos\theta$

LHS = RHS , $\cos\theta = \cos\theta$

29. b)



Given :- CM and RN are medians respectively of $\triangle ABC$ and $\triangle PQR$. $\triangle ABC \sim \triangle PQR$

To prove : $\Delta AMC \sim \Delta PNR$

proof : $\Delta ABC \sim \Delta PQR$ (given)

$$\frac{AB}{PQ} = \frac{AC}{PR} = \frac{BC}{QR}$$

$\angle A = \angle P$, $\angle B = \angle Q$, $\angle C = \angle R$

$$\therefore \quad \frac{AB}{PQ} = \frac{2AM}{2PN}$$ [CM and RN are medians]

$\therefore$ In ΔAMC and ΔPNR

$$\frac{AC}{PR} = \frac{AM}{PN}$$ [each equal to $\frac{AB}{PQ}$]

$\angle A = \angle P$ (given)

$\Delta AMC \sim \Delta PNR$ (By SAS similarity)

~~Hy~~

~~30~~.

30.

Family size	No. of families	C.F.	
1 - 3	7	7	
3 - 5	8	15	median class
5 - 7	2	17	
7 - 9	2	19	
9 - 11	1	20	

$\frac{N}{2} \Rightarrow \frac{20}{2} \Rightarrow 10$

$\text{median} \Rightarrow l + \left(\frac{N/2 - cf}{f}\right) \times h$

$\Rightarrow 3 + \left(\frac{10 - 7}{8}\right) \times 2$

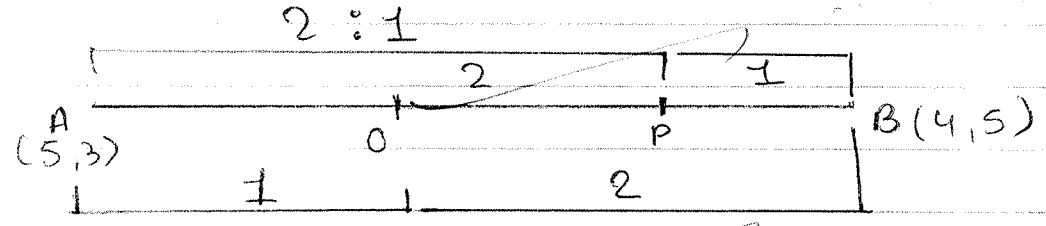
$3 + \frac{3}{8} \times 2$

$3 + \frac{3}{4}$

$\Rightarrow \frac{15}{4}$

$\Rightarrow 3.75$

31.



A → 5, 3 , B → 4, 5

- At O ratio → 1 : 2

∴ O(x, y)

$$x = \frac{m x_2 + n x_1}{m + n}$$

$$\Rightarrow \quad x \Rightarrow \frac{1 \times 4 + 2 \times 5}{1 + 2}$$

$$x \Rightarrow \frac{4 + 10}{3} \Rightarrow \frac{14}{3}$$

$$y \Rightarrow \frac{1 \times 5 + 2 \times 3}{3} \Rightarrow \frac{5 + 6}{3} \Rightarrow \frac{11}{3}$$

$$\therefore \quad O(x, y) \Rightarrow O\left(\frac{14}{3}, \frac{11}{3}\right)$$

- At P ratio: → 2 : 1

P(x, y) →

P TO

$$x = \frac{2 \times 4 + 1 \times 5}{2+1}$$

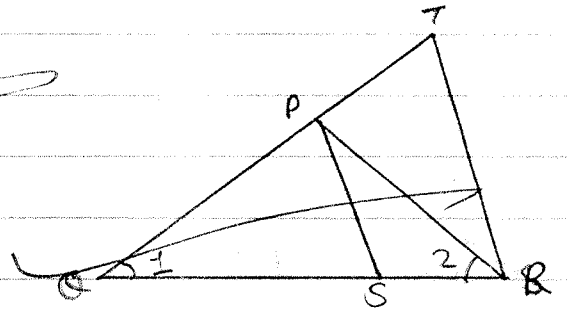
$$x = \frac{8+5}{3} \Rightarrow \frac{13}{3}$$

$$y = \frac{2 \times 5 + 1 \times 3}{3} = \frac{13}{3}$$

$$\therefore P(x, y) \Rightarrow P\left(\frac{13}{3}, \frac{13}{3}\right) \text{ Ans}$$

Section - D

32. b) given: $\frac{QR}{QS} = \frac{QT}{PR}$, $\angle 1 = \angle 2$



To prove: $\Delta PQS \sim \Delta TQR$

proof: In ΔPQR

$\angle 1 = \angle 2$

$PQ = PR$ [sides opposite to equal angles are equal]

PTO

In ΔPQS and ΔTQR

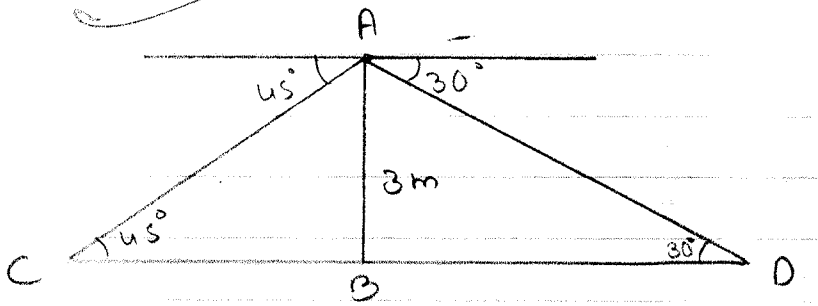
$\angle Q = \angle Q$ [common]

$\frac{QR}{QS} = \frac{QT}{PR}$ (given)

$\Rightarrow \frac{QR}{QS} = \frac{QT}{PQ}$ [$PR = PQ$]

$\therefore \Delta PQS \sim \Delta TQR$ [By SAS similarity] Hp

32. a)



Given, AB = height of bridge = 3m

$\therefore$ In ΔABC

$\tan 45° = \frac{AB}{BC}$

PTO

$$1 = \frac{3}{BC}$$

$$BC = 3\,m$$

In ΔABD,

$$\tan 30^\circ \Rightarrow \frac{AB}{BD}$$

$$\frac{1}{\sqrt{3}} \Rightarrow \frac{3}{BD}$$

$$BD = 3\sqrt{3}\ m$$

$\therefore$ width of river $\Rightarrow BC + BD \Rightarrow CD$

$$3 + 3\sqrt{3}$$

$$\Rightarrow 3(1 + \sqrt{3})$$

$$= 3 \times 2.73$$

$$\Rightarrow 8.19\ m$$

34. First term = a , common difference = d

$a_4 + a_8 = 24$

$a_6 + a_{10} = 44$

$a + 3d + a + 7d = 24$

$2a + 10d = 24$

$a + 5d = 12$ ①

$a + 5d + a + 9d = 44$

$2a + 14d = 44$

$a + 7d = 22$ ②

From ① and ②

$a + 5d = 12$

$a + 7d = 22$

$2d = 10$

$[d = 5]$

put (d) in eq (1)

$$a + 5d = 12$$
$$a + 5 \times 5 = 12$$
$$a + 25 = 12$$
$$[a = -13]$$

AP is $\Rightarrow$ $-13, -8, -3, 2 \ldots$

$S_{25} \Rightarrow \frac{n}{2}(2a + (n-1)d)$

$S_{25} \Rightarrow \frac{25}{2}(2 \times -13 + (24) \times 5)$

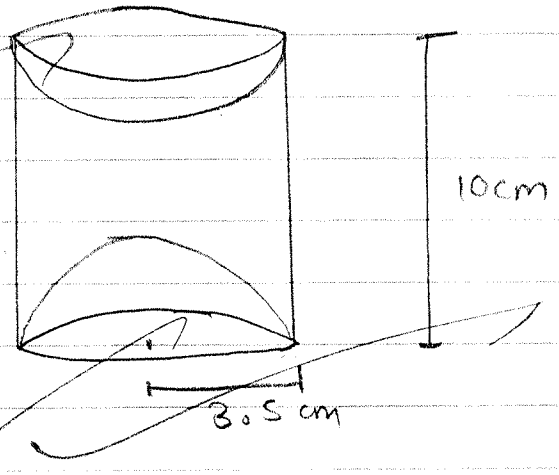
$\frac{25}{2} \times (-26 + 120)$

$\frac{25}{2} \times 94^{47}$

$\Rightarrow 1175$

35. height of cylinder = 10 cm

radius = 3.5 cm = $\frac{7}{2}$ cm



TSA of article =

CSA of cylinder +

2 × CSA of hemisphere

$= 2\pi rh + 2 \times 2\pi r^2$

$= 2\pi r[h + 2r]$

$= 2 \times \frac{22}{7} \times \frac{7}{2}\left(10 + 2 \times \frac{7}{2}\right)$

22×17

$= 374 \text{ cm}^2$

Section - E

36. i) B is midpoint of AC

$\therefore$ AB = BC

AC = 2AB

AC = 2 × 20

$\Rightarrow$ AC = 40 m

ii) Shortest distance of road from the village = radius.

$OA^2 = AB^2 + OB^2$

$\Rightarrow (25)^2 = (20)^2 + OB^2$

$625 - 400 = OB^2$

$225 = OB^2$

$[OB = 15\ m]$

$\therefore$ Shortest distance = 15 m

iii) a) Circumference → $2\pi r$

→ $2 \times \frac{22}{7} \times 15$

→ $\frac{44 \times 15}{7}$

$\frac{660}{7}$ cm

→ $94\frac{2}{7}$ cm or 94.183 cm

37. i) area of square → side^2

→ 8×8 → 64 cm^2

ii) length of diagonal → $\sqrt{2}a$

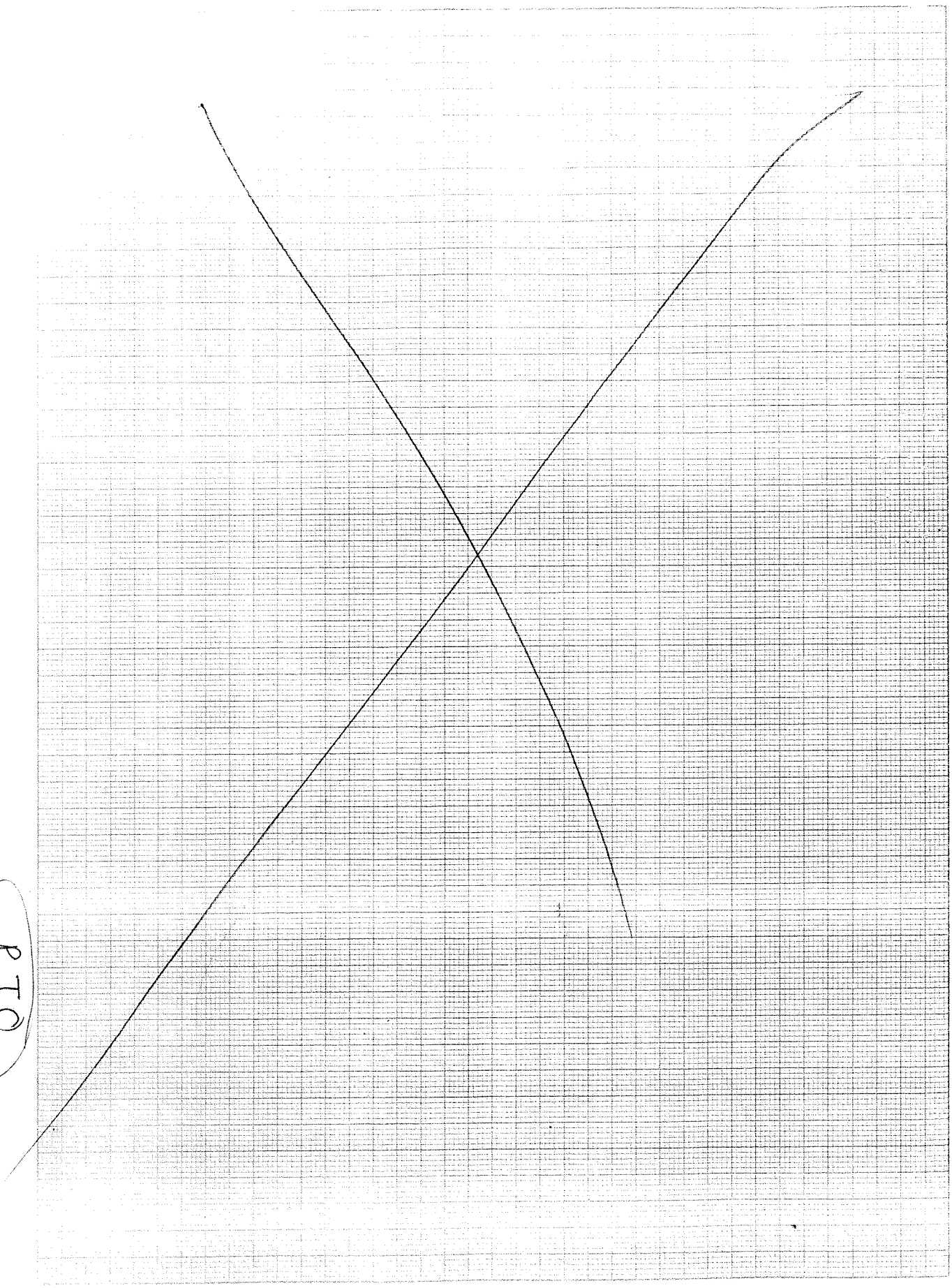
→ $8 \times \sqrt{2}$ → $8\sqrt{2}$ cm

iii) side → diameter → diameter → 8cm

radius → 4cm

area of sector → $\frac{\pi r^2 \theta}{360^\circ}$ → $\frac{22}{7} \times 4 \times 4 \times \frac{90}{360}$ → $\frac{88}{7}$ cm^2

→ $\frac{88}{7}$ cm^2 or 12.57 cm^2



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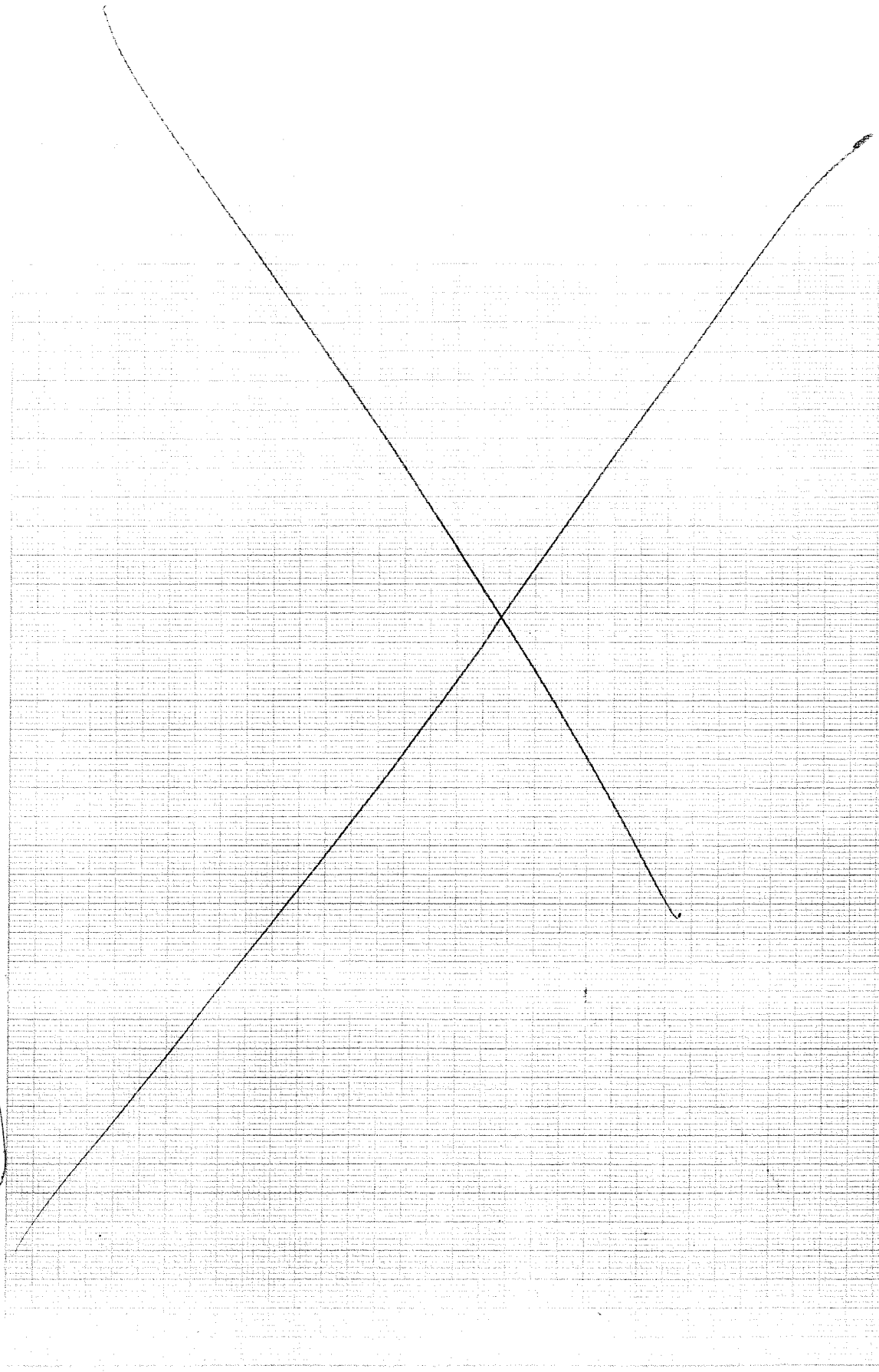

P.T.O.

38.

Let, the fixed charge be ₹ x

Let, the charges per km be ₹ y

$\therefore$ $x + 10y = 105$ — (1)

$x + 15y = 155$ — (2)

$5y = 50$

$[y = 10]$

$\therefore$ $x + 10 \times 10 = 105$

$x = 105 - 100$

$[x = 5]$

i) Fixed charges = ₹ 5

ii) Charges per km = ₹ 10

iii) fixed charge = ₹ 20, charges per km = ₹ 10

$\therefore$ pay for 10 km = $20 + 10 \times 10$

$= 20 + 100 = ₹ 120$ Hp