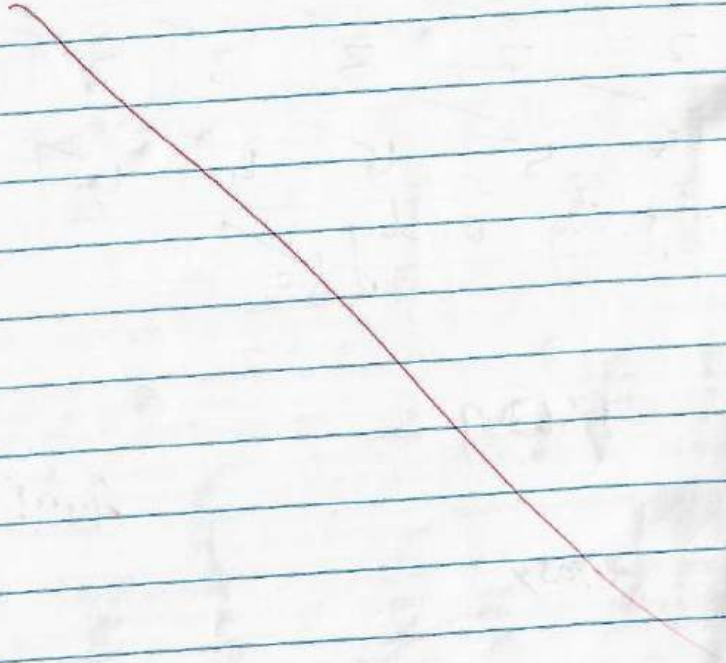


Mathematics Basic - 241

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SECTION A

Q1.

Ans 1. (C) 1:4

$$1 - \frac{1}{6} = \frac{5}{6}$$

Q2.

Ans 2. (D) Sphere

Q3.

Ans 3. (D) 62.5

Q4.

Ans 4. (B) 4000

Q5.

Ans 5. (B) $\frac{5}{6}$

Q6.

Ans 6. (B) an irrational number



Q6.

Ans 6. (D) ab

Q7.

Ans 7. (B) an irrational number

Q8.

Ans 8. (B) 49

Q9.

Ans 9. (A) 5

Q10.

Ans 10. (B) $b - a$

Q11.

Ans 11. (C) 1'1

Q12.



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Ans 12. (D) RHS

Q13.

Ans 13. (C) $LP = 40^\circ$

Q14.

Ans 14. (D) 12 cm

Q15.

Ans 15. (C) $\sin 30^\circ = \cos 30^\circ$

Q16.

Ans 16. (B) 1

Q17.

Ans 17. (C) 2

Q18.

Ans 18. (C) $l + 2r$



Q19.

Ans 19. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Q20.

Ans 20. (D) Assertion (A) is false, but Reason (R) is true.

Q21.

SECTION B

Ans 21.

Radius of circular sheet^(s) = 70 cm

$$\text{So, Area of circular sheet} = \pi r^2 = \frac{22}{7} \times 70 \times 70 \text{ cm}^2 = 15400 \text{ cm}^2$$

A quadrant is cut,

$$\text{Area of quadrant} = \frac{1}{4} \times \pi r^2 = \frac{1}{4} \times \frac{22}{7} \times 70 \times 70 \text{ cm}^2 = 3850 \text{ cm}^2$$

$$\begin{aligned} \therefore \text{Area of the remaining sheet} &= \text{Area of whole circular sheet} \\ &\quad - \text{Area of quadrant} \\ &= 15400 \text{ cm}^2 - 3850 \text{ cm}^2 \\ &= 11550 \text{ cm}^2 \end{aligned}$$

Ans.

Q22.

Ans 22.

$$3x + 5y = 8 \quad \text{--- (I)}$$

$$5x - 3y = 2 \quad \text{--- (II)}$$

From (I), $3x + 5y = 8$

$$3x = 8 - 5y$$

$$x = \frac{8 - 5y}{3} \quad \text{--- (III)}$$

Substitute x in

$$5x - 3y = 2$$

$$\Rightarrow 5\left(\frac{8 - 5y}{3}\right) - 3y = 2$$

$$\Rightarrow \frac{40 - 25y}{3} - 3y = 2$$

$$\Rightarrow \frac{40 - 25y - 9y}{3} = 2$$

$$\Rightarrow \frac{40 - 34y}{3} = 2$$

$$\Rightarrow 40 - 34y = 2 \times 3$$

$$\Rightarrow 40 - 34y = 6$$



$$\Rightarrow -34y = 6-40$$

$$\Rightarrow -34y = -34$$

$$y = 1$$

Put $y = 1$ in equation ①

$$\Rightarrow 3x + 5y = 8$$

$$\Rightarrow 3x + 5(1) = 8$$

$$\Rightarrow 3x + 5 = 8$$

$$\Rightarrow 3x = 8 - 5$$

$$\Rightarrow 3x = 3$$

$$x = 1$$

$$\text{So, } x = 1, y = 1$$

Q23.

Ans 23.

(a) Given - $PQ \parallel RS$ in the figure

To prove - $\Delta POQ \sim \Delta SOR$

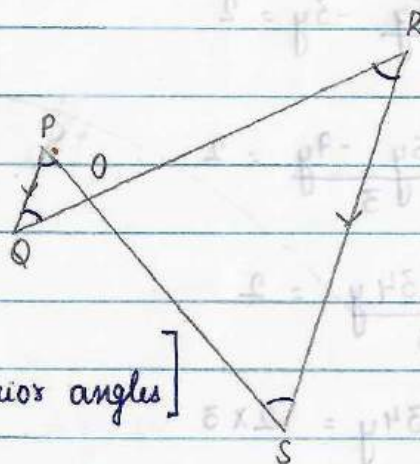
Proof - In ΔPOQ and ΔSOR

$$\angle PQO = \angle SRO$$

[Given, $PQ \parallel RS$
alternate interior angles]

$$\angle OPQ = \angle OSR$$

[Given, $PQ \parallel RS$
alternate interior angles]



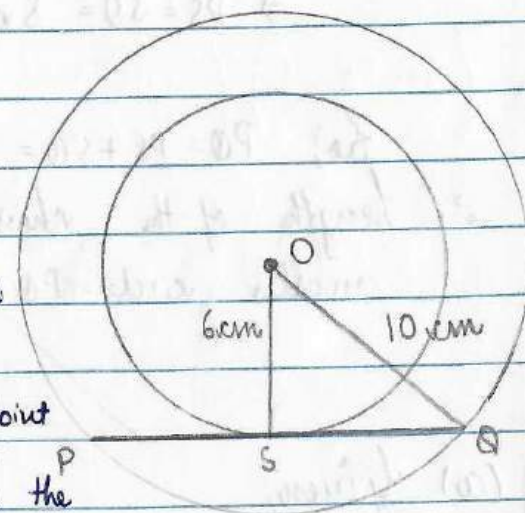


By AA similarity rule, $\Delta POQ \sim \Delta SOR$

Q 24.

Ans 24. Given - Two concentric circles are of radii 6 cm and 10 cm

To find - length of the chord of larger circle i.e. PQ



Solution - Here, $\angle OSQ = 90^\circ$ [The tangent at any point of a circle is $\perp$ to the radius through the point of contact]

So, In rt. ΔOSQ

$$H^2 = B^2 + P^2$$

$$(OQ)^2 = (SQ)^2 + (OS)^2$$

$$(10)^2 = (SQ)^2 + (6)^2$$

$$100 = (SQ)^2 + 36$$

$$(SQ)^2 = 100 - 36$$

$$(SQ)^2 = 64$$

$$SQ = \sqrt{64} = \pm 8 \text{ cm}$$

Since, length cannot be in negative

$$\text{So, } SQ = 8 \text{ cm}$$



Also, since $OS \perp PQ$ [Proved above]

$\Rightarrow PS = SQ = 8 \text{ cm}$ [Perpendicular to a chord from the centre of circle bisects the chord]

So, $PQ = PS + SQ = 8 \text{ cm} + 8 \text{ cm} = 16 \text{ cm}$

$\therefore$ Length of the chord of the larger circle which touches the smaller circle $= PQ = 16 \text{ cm}$

Q 25.

Ans 25.

(a) Given,

$$\tan(A+B) = 1$$

$$\Rightarrow \tan 45^\circ = 1$$

Comparing the angles, we get

$$A+B = 45^\circ$$

$$A = 45^\circ - B \quad \text{--- (1)}$$

Also, given,

$$\tan(A-B) = \frac{1}{\sqrt{3}}$$

$$\tan 30^\circ = \frac{1}{\sqrt{3}}$$

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Comparing the angles, we get

$$A - B = 30^\circ$$

$$\Rightarrow 45^\circ - B - B = 30^\circ \quad [\text{From ①}]$$

$$\Rightarrow 45^\circ - 2B = 30^\circ$$

$$\Rightarrow -2B = 30^\circ - 45^\circ$$

$$\Rightarrow -2B = -15^\circ$$

$$\Rightarrow B = \frac{15^\circ}{2} = 7.5^\circ$$

$$\text{So, } A = 45^\circ - 7.5^\circ \quad [\text{From ①}]$$

$$A = 37.5^\circ$$

$$\therefore \text{Value of } A = 37.5^\circ$$

$$\text{Value of } B = 7.5^\circ$$

Ans.

SECTION-C

Q 26

$$\text{Qus 26. } (\sin A - \operatorname{cosec} A)(\cos A - \sec A) = \frac{1}{\tan A + \cot A}$$

Taking L.H.S

$$\Rightarrow (\sin A - \operatorname{cosec} A)(\cos A - \sec A)$$



$$\Rightarrow \left(\sin A - \frac{1}{\sin A} \right) \left(\cos A - \frac{1}{\cos A} \right) \left[\cancel{\sin} \operatorname{cosec} A = \frac{1}{\sin A}, \sec A = \frac{1}{\cos A} \right]$$

$$\Rightarrow \left(\frac{\sin^2 A - 1}{\sin A} \right) \left(\frac{\cos^2 A - 1}{\cos A} \right)$$

$$\Rightarrow \left(\frac{-\cos^2 A}{\sin A} \right) \left(\frac{-\sin^2 A}{\cos A} \right) \left[\sin^2 A + \cos^2 A = 1 \right]$$

$$\Rightarrow \frac{-\overset{\cos A}{\cancel{\cos^2 A}}}{\sin A} \times \frac{-\overset{\sin A}{\cancel{\sin^2 A}}}{\cos A}$$

$$\Rightarrow -\cos A \times -\sin A$$

$$\Rightarrow \cos A \cdot \sin A$$

Taking R.H.s

$$\Rightarrow \frac{1}{\tan A + \cot A}$$

$$\Rightarrow \frac{1}{\frac{\sin A}{\cos A} + \frac{\cos A}{\sin A}} \left[\tan A = \frac{\sin A}{\cos A}, \cot A = \frac{\cos A}{\sin A} \right]$$

$\Rightarrow$

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$$\Rightarrow \frac{1}{\frac{\sin^2 A + \cos^2 A}{\sin A \cdot \cos A}}$$

$$\Rightarrow 1 \times \frac{\sin A \cos A}{\sin^2 A + \cos^2 A}$$

$$\Rightarrow 1 \times \frac{\sin A \cos A}{1} \quad [\sin^2 A + \cos^2 A = 1]$$

$$\Rightarrow \sin A \cos A$$

$$\Rightarrow \cos A \sin A$$

$$\text{So, L.H.S} = \text{R.H.S} = \cos A \cdot \sin A$$

Hence proved #

Q27.

Ans 27. A customer will buy a pen if it is not defective

No. of Total number of pens in the lot = 200

No. of good pens = 180

$$\begin{aligned} \text{So, no. of defective pens} &= \text{Tot. no. of pens} - \text{No. of good pens} \\ &= 200 - 180 \\ &= 20 \end{aligned}$$



Probability that the customer will not buy it = $\frac{\text{No. of defective pens}}{\text{Tot. no. of pens}}$

$$= \frac{20}{200}$$

$$= \frac{1}{10} = 0.1$$

Another lot of pens in which,

Tot. no. of pens = 100

No. of good pens in it = 80

So, no. of defective pens in it = $100 - 80$
= 20

So, in the entire lot,

Tot. no. of pens = $200 + 100 = 300$

Tot. no. of good pens = $180 + 80 = 260$

Tot. no. of defective pens = $20 + 20 = 40$

So, Probability that the customer will buy the pen

$$= \frac{\text{Tot. No. of good pens}}{\text{Tot. no. of pens}} = \frac{260}{300} = \frac{13}{15}$$

Ans.

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Q28.

Ans 28.

(a) Let us assume to the contrary that $\sqrt{3}$ is rational

$$\sqrt{3} = \frac{a}{b}, \text{ } a \text{ \& } b \text{ are co-primes, } b \neq 0$$

$$\sqrt{3}b = a$$

Squaring both sides

$$\Rightarrow (\sqrt{3}b)^2 = a^2$$

$$\Rightarrow 3b^2 = a^2$$

$$\Rightarrow \cancel{3b^2} = \cancel{a^2}$$

$$\Rightarrow b^2 = \frac{a^2}{3}$$

a^2 is divisible by 3

a is also divisible by 3

①

$$\text{So, } a = 3c$$

[c is any integer]

$$\text{Put } a = 3c \text{ in } 3b^2 = a^2$$

$$\Rightarrow 3b^2 = (3c)^2$$

$$\Rightarrow \cancel{3}b^2 = \cancel{9}c^2$$



$$\Rightarrow b^2 = 3c^2$$

$$\Rightarrow \frac{b^2}{3} = c^2$$

Since,
 b^2 is divisible by 3,

so b is also divisible by 3. ①

From ① and ②

Both a & b have common factor i.e. 3. This contradicts the fact that a & b are co-primes. This contradiction is arisen due to our incorrect assumption that $\sqrt{3}$ is rational.

So, we conclude that $\sqrt{3}$ is irrational.

Q29.

Ans 29.

Given,

Sum of zeroes = -10

Product of zeroes = 24

So, required quadratic polynomial

$$= x^2 - (\text{sum of zeroes})x + \text{Product of zeroes}$$

$$= x^2 - (-10)x + 24$$

$$\Rightarrow x^2 + 10x + 24$$

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$$\Rightarrow x^2 + 10x + 24$$

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

$$\Rightarrow x^2 + 10x + 24$$

$$\Rightarrow x^2 + 4x + 6x + 24$$

$$\Rightarrow x(x+4) + 6(x+4)$$

$$\Rightarrow (x+4)(x+6)$$

$$\text{So, } x+4=0 ; x+6=0$$

$$x=-4 \quad x=-6$$

So, the zeroes of the polynomial obtained are -4 and -6

Q30.

Ans30 (b) Given, x° and y° are complementary angles and $x:y=1:2$

$$\text{So, } x+y=90^\circ$$

$$\frac{x}{y} = \frac{1}{2} \Rightarrow 2x=y$$

$$\Rightarrow 2x-y=0$$

So, the system of linear equations in two variables :-

$$x+y=90 \quad \text{--- (i)}$$

$$2x-y=0 \quad \text{--- (ii)}$$



$$\Rightarrow \begin{array}{rcl} x + y & = & 90 \\ 2x - y & = & 0 \\ \hline 3x & = & 90 \end{array}$$

$$x = 30$$

$$\text{So, } x + y = 90 \quad [\text{From (1)}]$$

$$30 + y = 90$$

$$y = 60$$

$$\therefore x = 30^\circ, y = 60^\circ$$

Q 31.

Ans 31.

Given:- A rectangle is circumscribing a circle

To prove:- Rectangle circumscribing the circle is a square

Proof:- Here, A, B, C, D are external points from where tangents are drawn

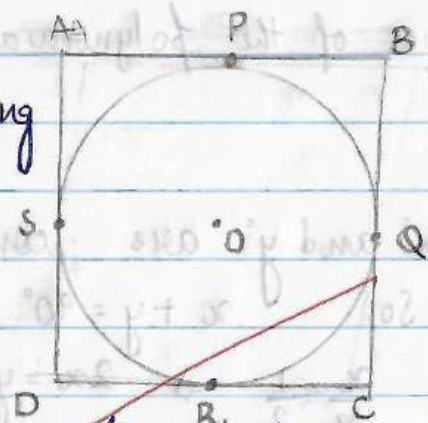
$$\Rightarrow AP = AS$$

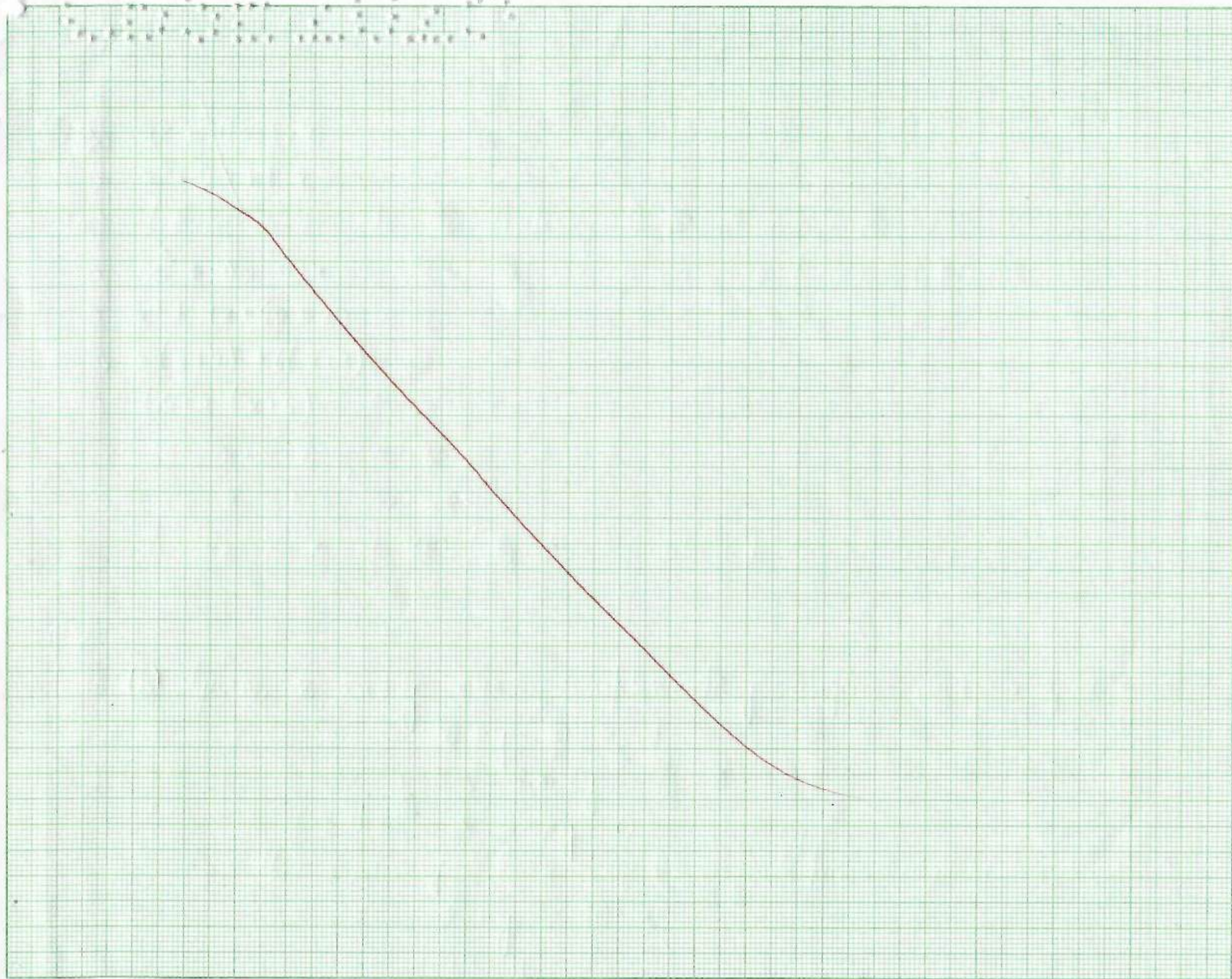
$$\Rightarrow BP = BQ$$

$$\Rightarrow CR = CQ$$

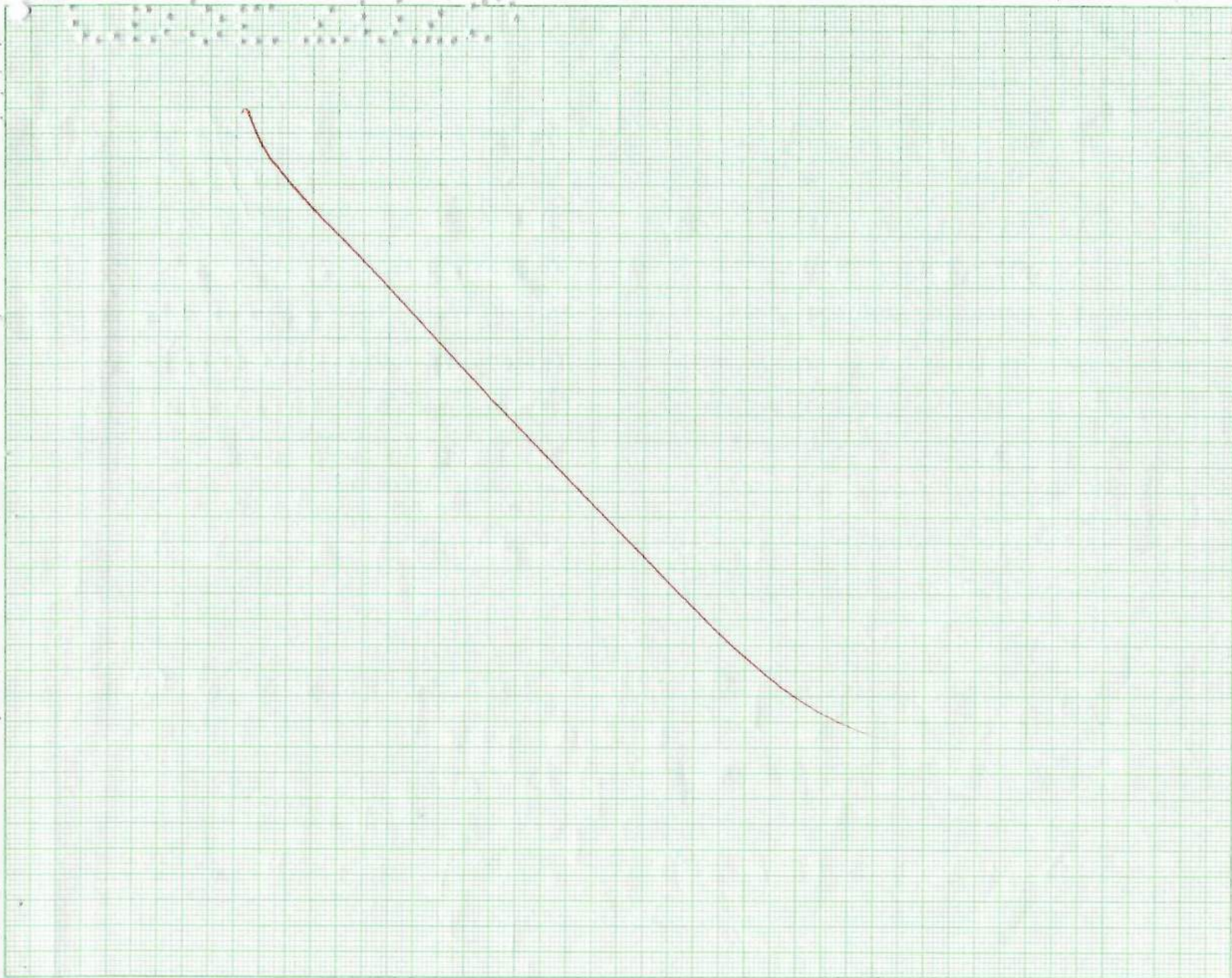
$$\Rightarrow DR = DS$$

[Length of tangents drawn from an external point to a circle are equal]





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Adding them,

$$AP + BP + CR + DR = AS + DS + BQ + CQ$$

$$\Rightarrow AB + CD = AD + BC$$

$$\Rightarrow AB + AB = AD + AD \quad \left[\begin{array}{l} \text{Opposite sides of rectangle are equal} \\ \text{So, } AB = CD, \quad AD = BC \end{array} \right.$$

$$\Rightarrow \angle AB = \angle AD$$

$$AB = AD$$

①

②

From ① and ②

$$AB = AD = CD = BC$$

Since, all the 4 sides of $\square$ are equal.

So, ABCD is a square

SECTION-D

Q32.

Ans 32.



Q-32

Age (in years)	Number of policy holders (f)	Cumulative frequency (cf)
15-20	2	2
20-25	4	2+4=6
25-30	18	6+18=24
30-35	21	24+21=45
35-40	33	45+33=78
40-45	11	78+11=89
45-50	3	89+3=92
50-55	6	92+6=98
55-60	2	98+2=100

Here, $n = 100$

$$\text{So, } \frac{n}{2} = \frac{100}{2} = 50$$

So, (35-40) is the median class

$$\text{So, } l = 35, \frac{n}{2} = 50, cf = 45, f = 33, h = U.L - L.L = 40 - 35 = 5$$

$$\therefore \text{Median age} = l + \left(\frac{\frac{n}{2} - cf}{f} \right) \times h$$

$$= 35 + \left(\frac{50 - 45}{33} \right) \times 5$$

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$$= 35 + \left(\frac{50-45}{33} \right) \times 5$$

$$= 35 + \frac{5}{33} \times 5$$

$$= 35 + \frac{25}{33}$$

$$= 35 + 0.76 \text{ (approx.)}$$

$$= 35.76 \text{ (approx.)}$$

So, median age of policy holders = 35.76 years (approx.)

Q 33

Ans 33.

(b) Given quadratic equation,

$$2x^2 + kx + 3 = 0$$

Since it has real and equal roots,

$$D = 0$$

$$\Rightarrow b^2 - 4ac = 0$$

$$\Rightarrow k^2 - 4 \times 2 \times 3 = 0$$

$$\Rightarrow k^2 - 24 = 0$$

$$\Rightarrow k^2 = 24$$

$$k = \pm\sqrt{24} = \pm 2\sqrt{6}$$

$$\begin{array}{r} 0.7575 \\ 33 \overline{) 250} \\ \underline{231} \\ 190 \\ \underline{165} \\ 250 \\ \underline{231} \\ 190 \end{array}$$

$$\begin{array}{r} 35 \\ 33 \overline{) 105} \\ \underline{105} \\ 0000 \\ 1180 \\ \underline{1180} \\ 00 \\ 35 \\ 33 \overline{) 1180} \\ \underline{99} \\ 190 \\ \underline{165} \\ 250 \end{array}$$



So, the values of k are $2\sqrt{6}$ and $-2\sqrt{6}$

So, the equations formed are

$$2x^2 + 2\sqrt{6}x + 3 = 0 \quad \text{and} \quad 2x^2 - 2\sqrt{6}x + 3 = 0$$

$$\Rightarrow 2x^2 + 2\sqrt{6}x + 3 = 0$$

$$\Rightarrow 2x^2 + \sqrt{6}x + \sqrt{6}x + 3 = 0$$

$$\Rightarrow \sqrt{2}x(\sqrt{2}x + \sqrt{3}) + \sqrt{3}(\sqrt{2}x + \sqrt{3}) = 0$$

$$\Rightarrow (\sqrt{2}x + \sqrt{3})(\sqrt{2}x + \sqrt{3}) = 0$$

$$\text{So, } \sqrt{2}x + \sqrt{3} = 0 \quad ; \quad \sqrt{2}x + \sqrt{3} = 0$$

$$\Rightarrow \sqrt{2}x = -\sqrt{3} \quad ; \quad \sqrt{2}x = -\sqrt{3}$$

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

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

So, the roots of this equation are $\frac{-\sqrt{3}}{\sqrt{2}}, \frac{-\sqrt{3}}{\sqrt{2}}$

another equation,

$$2x^2 - 2\sqrt{6}x + 3 = 0$$

$$\Rightarrow 2x^2 - \sqrt{6}x - \sqrt{6}x + 3 = 0$$

$$\Rightarrow \sqrt{2}x(\sqrt{2}x - \sqrt{3}) - \sqrt{3}(\sqrt{2}x - \sqrt{3}) = 0$$



$$\Rightarrow (\sqrt{2}x - \sqrt{3})(\sqrt{2}x - \sqrt{3}) = 0$$

$$\text{So, } \sqrt{2}x - \sqrt{3} = 0, \quad \sqrt{2}x - \sqrt{3} = 0$$

$$x = \frac{\sqrt{3}}{\sqrt{2}}$$

$$\sqrt{2}x = \sqrt{3}$$

$$x = \frac{\sqrt{3}}{\sqrt{2}}$$

So, the roots of this equation are $\frac{\sqrt{3}}{\sqrt{2}}, \frac{\sqrt{3}}{\sqrt{2}}$

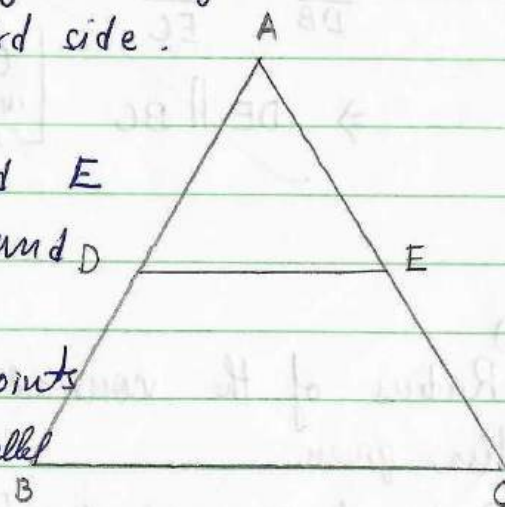
Q34.

Ans 34.

Converse of "Basic Proportionality Theorem" states that if a line is drawn to intersect ^{in distinct points} any two sides of triangle in the same ratio, then the line is parallel to third side.

Given:- ABC is a triangle and D and E are the mid-points of the sides AB and AC respectively.

To prove:- Line segment joining mid-points of any two sides of a triangle is parallel to the third side, $DE \parallel BC$



Proof:- Given, D is the mid-point of AB



$$\Rightarrow AD = DB$$

$$\Rightarrow \frac{AD}{DB} = 1 \quad \text{--- (i)}$$

Similarly it is given that E is the mid-point of AC

$$\Rightarrow AE = EC$$

$$\Rightarrow \frac{AE}{EC} = 1 \quad \text{--- (ii)}$$

From (i) and (ii)

$$\frac{AD}{DB} = \frac{AE}{EC}$$

$$\Rightarrow DE \parallel BC$$

[Converse of BPT Theorem, if a line is drawn to intersect any two sides of Δ in the same ratio, then the line is parallel to the third sides]

Hence Proved #

Q 35.

Ans 35.

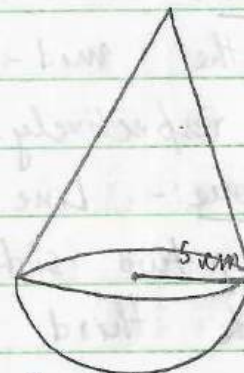
(a)

Radius of the conical part (r) = 5 cm

Also, given

Radius of conical part = Radius of hemisphere = r = 5 cm

Also, Height of the conical part (h) = Diameter of base
 $= 2 \times 5 \text{ cm} = 10 \text{ cm}$





Volume of the toy = Volume of ~~conical~~ conical part + Volume of hemisphere

$$= \frac{1}{3} \pi r^2 h + \frac{2}{3} \pi r^3 \text{ cm}^3$$

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

$$\Rightarrow \frac{1}{3} \times \frac{22}{7} \times 5 \times 5 (10 + 2 \times 5) \text{ cm}^3$$

$$\Rightarrow \frac{1}{3} \times \frac{22}{7} \times 25 \times (10 + 10) \text{ cm}^3$$

$$\Rightarrow \frac{1}{3} \times \frac{22}{7} \times 25 \times 20 \text{ cm}^3$$

$$= \frac{11000}{21} \text{ cm}^3$$

$$= 523.81 \text{ (approx.) cm}^3 \text{ (approx.)}$$

Ans.

Q36.

Ans 36. Point A (x_1, y_1) and B (x_2, y_2)

(i) Since, centre is the mid-point of a diameter

So, Coordinates of the centre C = $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$ [By mid-point formula]

$$\begin{array}{r} 35 \\ 50 \\ \hline 550 \\ 1100 \\ \hline 11000 \end{array}$$

$$\begin{array}{r} 500 \\ 22 \\ \hline 1000 \\ 10000 \\ \hline 11000 \end{array}$$

$$\begin{array}{r} 523.809 \\ 21 \overline{) 11000} \\ \underline{105} \\ 50 \\ \underline{42} \\ 80 \\ \underline{63} \\ 170 \\ \underline{168} \\ 20 \\ \underline{189} \\ 110 \end{array}$$



$$\Rightarrow \left(\frac{10+50}{2}, \frac{20+50}{2} \right)$$

$$\Rightarrow \left(\frac{60}{2}, \frac{70}{2} \right)$$

$$\Rightarrow \left(30, \frac{70}{2} \right)$$

$$\Rightarrow (30, 35)$$

So, coordinates of centre C = (30, 35)

(ii) Points of C = $(x_3, y_3) = (30, 35)$ and A = $(x_1, y_1) = (10, 20)$
 Radius of circular path = AC

$$= \sqrt{(x_3 - x_1)^2 + (y_3 - y_1)^2}$$

$$= \sqrt{(30 - 10)^2 + (35 - 20)^2}$$

$$= \sqrt{20^2 + 15^2}$$

$$= \sqrt{400 + 225}$$

$$= \sqrt{625}$$

$$= 25 \text{ units}$$

(iii) It is given that

$$AP = PQ = QB$$

So, P divides AB internally in the ratio $m_1 : m_2$
 $A(x_1, y_1)$ and $B(x_2, y_2)$

$$\begin{aligned} \text{So, coordinates of point P} &= \left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right) \\ &= \left(\frac{1 \times 50 + 2 \times 10}{1 + 2}, \frac{1 \times 50 + 2 \times 20}{1 + 2} \right) \\ &= \left(\frac{50 + 20}{3}, \frac{50 + 40}{3} \right) \\ &= \left(\frac{70}{3}, \frac{90}{3} \right) \\ &= \left(\frac{70}{3}, 30 \right) \end{aligned}$$

Q32.

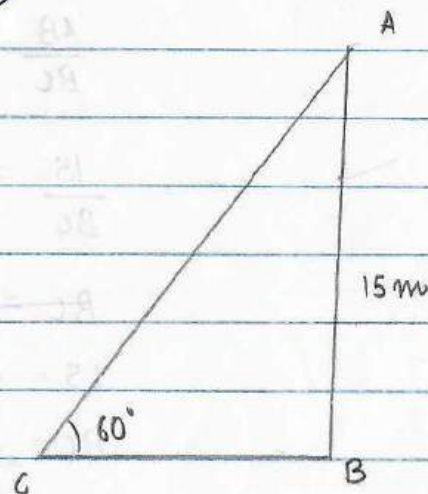
Ans 32. (i) Height of building (AB) = 15 m

Let the length of the ladder = AC

In ΔABC

$$\frac{AB}{AC} = \sin 60^\circ$$

$$\Rightarrow \frac{15}{AC} = \frac{\sqrt{3}}{2} \Rightarrow 15 \times 2 = AC \sqrt{3}$$





$$\Rightarrow 30 = AC\sqrt{3}$$

$$\Rightarrow \frac{30}{\sqrt{3}} = AC$$

$$AC = \frac{30 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} \text{ m} = \frac{30\sqrt{3}}{3} = 10\sqrt{3} \text{ m}$$

So, the length of the ladder used by the fireman to reach the roof = $10\sqrt{3} \text{ m}$

(ii) Let the distance of point on the ground at which the ladder was fixed from the bottom of the building = BC

In ΔABC

$$\frac{AB}{BC} = \tan 60^\circ$$

$$\frac{15}{BC} = \sqrt{3}$$

$$BC = \frac{15}{\sqrt{3}}$$

$$15 = BC\sqrt{3}$$

$$BC = \frac{15}{\sqrt{3}}$$

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$$BC = \frac{15 \times \sqrt{3}}{\sqrt{3}} = \frac{15\sqrt{3}}{\sqrt{3}} = 15\sqrt{3} \text{ m}$$

(iii) (b) Let the length in this case = PR

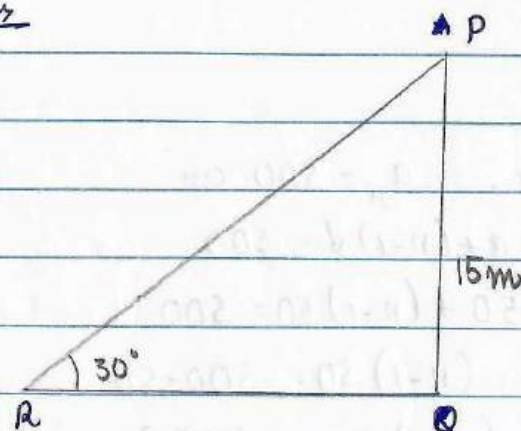
Inst. ΔPOR

$$\frac{PO}{PR} = \sin 30^\circ$$

$$\frac{15}{PR} = \frac{1}{2}$$

$$PR = 15 \times 2 = 30 \text{ m}$$

So, length of ladder in this case = 30 m



Q38.

Ans 38. Radius of 1st spiral (a_1) = 50 cm

Radius of 2nd spiral (a_2) = 100 cm

Radius of 3rd spiral (a_3) = 150 cm

So, it forms an AP with $a = 50$, $d = 100 - 50 = 50$

(i) Radius of 13th spiral (a_{13}) = $a + 12d$



$$= 50 + 12(50) \text{ cm}$$

$$= 50 + 600 \text{ cm}$$

$$= 650 \text{ cm}$$

(ii) Here, $a_n = 500 \text{ cm}$

$$\Rightarrow a + (n-1)d = 500$$

$$\Rightarrow 50 + (n-1)50 = 500$$

$$\Rightarrow (n-1)50 = 500 - 50$$

$$\Rightarrow (n-1)50 = 450$$

$$\Rightarrow n-1 = 9$$

$$n = 9 + 1$$

$$n = 10$$

$\therefore$ Value of $n = 10$

(iii) No. of ^{saplings of} ~~spirals~~ flowers in Spiral 1 = 10

" " " " Spiral 2 = 20

" " " " Spiral 3 = 30

It forms an AP with $a = 10$, $d = 20 - 10 = 10$



So, total number of saplings till the 11th spiral = S_{11}

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

$$= \frac{11}{2} [2(10) + (11-1)10]$$

$$= \frac{11}{2} [20 + 10 \times 10]$$

$$= \frac{11}{2} [20 + 100]$$

$$= \frac{11}{2} \times 120$$

$$= 660 \text{ saplings}$$

Ans

$$\frac{11(20+100)}{2}$$

$$\frac{11 \times 120}{2}$$

$$660$$