CLASS : X

SUBJECT – MATHEMATICS

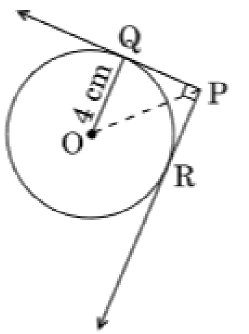
SOLUTIONS

1. $a = p^3q^4$ and $b = p^2q^3$
HCF (a, b) = p^2q^3 ……(i)
and LCM (a, b) = p^3q^4 ……(ii)
But given : HCF (a, b)= p^mq^n and LCM (a, b) = p^rq^s
From eq. (i), $p^mq^n = p^2q^3$
So, m = 2 and n = 3
From eq. (iii), $p^rq^s = p^3q^4$
So, r = 3 and s = 4
$\therefore$ (m + n) (r + s) = (2 + 3) (3 + 4) = 35

2. Distance of point from x-axis is |y|
= |- 4| = 4 units.

3. 3x + y = 1 ………(i)
and (2k – 1) x + (k – 1) y = 2k + 1 ………(ii)
Comparing eq. (i) with $a_1x + b_1y + c_1 = 0$ and eq. (ii)
with $a_2x + b_2y + c_2 = 0$, we get
$a_1 = 3$
$a_2 = 2k – 1$
$b_1 = 1$
$b_2 = k – 1$,
$c_1 = - 1$ and $c_2 = - (2k + 1)$
Since, system is inconsistent, then
$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$
$$\Rightarrow \frac{3}{2k-1} = \frac{1}{k-1} \neq \frac{-1}{-(2k+1)}$$
Either $\frac{3}{2k-1} = \frac{1}{k-1}$ & $\frac{1}{k-1} \neq \frac{1}{2k+1}$
$$\Rightarrow 3k-3 = 2k-1 \text{ \& } 2k+1 \neq k-1$$
$$\Rightarrow k = 2 \text{ \& } k \neq -2$$
Hence, the value of k is 2.

4. OQ = 4 cm, OQ ⊥ PQ & OR⊥ RP



$\therefore$ OQPR is a square
Hence PQ = 4 cm.

5. $(\tan x + \cot x)^2 = 4$
$\tan^2x + \cot^2x + 2 = 4$
$\tan^2x + \cot^2x = 2$

6. Factors of P = P × 1
$\therefore$ roots are P and 1
The quadratic equation is
$x^2 – (P + 1) x + P = 0$

7. $2\pi r = 4a$
$$a = \frac{\pi r}{2}$$
$$\frac{\text{Area of circle}}{\text{Area of square}} = \frac{\pi r^2}{\left(\frac{\pi r}{2}\right)^2} = \frac{4}{\pi} = \frac{4 \times 7}{22}$$
$$= \frac{14}{11}$$

8. 0.08 × 6000 = 480

9. $(a \cos \theta + b \sin \theta)^2 = 12^2$
$+ (a \sin \theta - b \cos \theta)^2 = 5^2$
$a^2(\cos^2 + \sin^2 \theta) + b^2 (\sin^2 \theta + \cos^2 \theta) + 2ab \sin \theta \cos \theta – 2 ab\sin\theta \cos\theta$
= 144 + 25
$a^2 + b^2 = 169$

10. We know that 5^n always ends in 5
& 6^n always ends in 6 for any natural number n.
$\therefore$ 2(5 + 6) $\Rightarrow$ 2 × 11 = 22
i.e. it will always ends with 2.

11. The total surface area of sphere = $4\pi r^2$
The surface area of 1 hemisphere = $3\pi r^2$
$\therefore$ Required ratio $= \frac{4\pi r^2}{6\pi r^2}$
= 2 : 3

12. $\alpha + \beta = \frac{-b}{a}$
$$3\beta + \beta = \frac{-b}{a}$$
$$\beta = \frac{-b}{4a} \quad \text{……..(i)}$$
$$\alpha\beta = \frac{c}{a}$$
$$3\beta \times \beta = \frac{c}{a}$$

$$\beta^2 = \frac{c}{3a} \qquad \text{.......(ii)}$$

By (i) & (ii) we get

$$\frac{b^2}{16a^2} = \frac{c}{3a} \Rightarrow b^2 = \frac{16ac}{3}$$

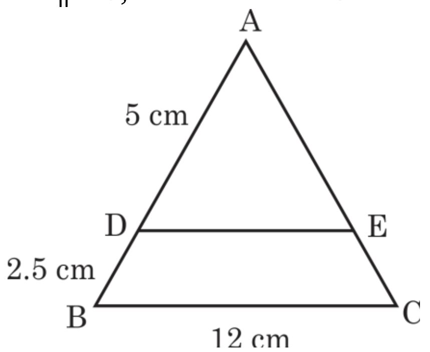
or $\frac{b^2}{ac} = \frac{16}{3}$

13. $A = \frac{120}{360} \times \frac{22}{7} \times 10.5 \times 10.5$

$A = \frac{1}{3} \times \frac{22}{7} \times 110.25$

A = 115.5 cm^2

14. DE || BC, $\Delta ADE \sim \Delta ABC$



$\frac{AD}{AB} = \frac{DE}{BC}$

$\frac{5}{7.5} = \frac{DE}{12} \Rightarrow DE =$ 8 cm.

15. Perfect square $\rightarrow$ 9, 16, 25, 36, 49

Total = 5

$P(\text{perfect square}) = \frac{5}{50} = \frac{1}{10}$

16. $\frac{2a+(-2)}{2} = 1; \ \frac{4+3b}{2} = 2a+1$

2a – 2 = 2; $\frac{4+3b}{2} = 4+1$

2a = 4;

a = 2, 4 + 3b = 10

3b = 6

b = 2

17. Mode = 3 median – 2 mean

Mean = 9 k Median = 8k

Z = 3 (8k) – 2(9k)

= 24k – 18k

Z = 6k

$\frac{M}{Z} = \frac{8k}{6k} = \frac{4}{3}$

18. $\angle$OAC = 90 – 40 = 50º

$\angle$C = 90º (Angle in a semicircle)

Now, in ΔABC, $\angle$B = 180-(90+50) = 40º

19. (d)

20. (a)

21. The number which ends with 0 is divisible by 2 and 5 both.

$\therefore$ Such numbers between 102 and 998 are :

110, 120, 130,…., 990.

Last term, a_n = 990

a + (n – 1) d = 990

110 + (n – 1) × 10 = 990

110 + 10n – 10 = 990

10n + 100 = 990

10n = 990 – 100

10n = 890

$n = \frac{890}{10} = 89$

OR

Given A.P. is 3, 15, 27, 39

Here, first term, a = 3 and common difference d = 12

Now, 21st term of A.P. is

t_{21} = a + (21 – 1) d [t_n = a + (n – 1) d]

$\therefore$ t_{21} = 3 + 20 × 12 = 243

Therefore, 21st term is 243

We need to calculate term which is 120 more than 21st term.

i.e., it should be 243 + 120 = 363

Therefore, t_n = 363

363 = 3 + (n – 1) 12

360 = 12 (n – 1)

n – 1 = 30

n = 31

22. In right angle triangle,

Opposite side = 3, adjacent side = 4

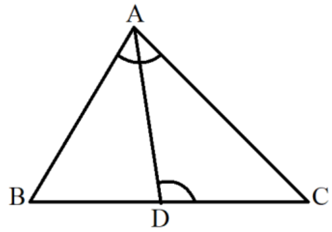
$\Rightarrow$ hypotenuse = 5

sin A = $\frac{3}{5}$, cos A = $\frac{4}{5}$

Now, $\frac{2\sin A.\cos A}{\sin^2 A - \cos^2 A} = \frac{2\times\frac{3}{5}\times\frac{4}{5}}{\frac{9}{25}-\frac{16}{25}}$

$= \frac{\frac{24}{25}}{-\frac{7}{25}} = -\frac{24}{7}$

23. In ΔABC and ΔDAC, we have



$\angle BAC = \angle ADC$ [given]

$\angle C = \angle C$ [common]

$\therefore \Delta ABC \sim \Delta DAC$ [By AA]

$$\frac{BC}{AC} = \frac{AC}{DC}$$

$AC^2 = CB \times CD$

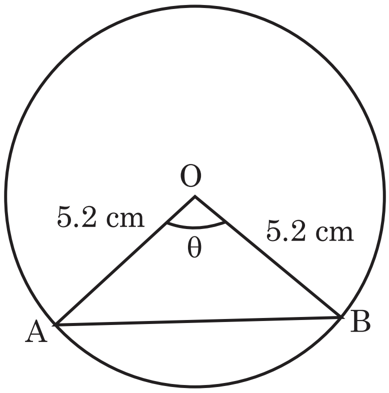
24. Radius of circle (r) = 5.2 cm

OA = OB = r = 5.2 cm

and the perimeter of a sector = 16.4 cm

As we know that perimeter of sector

$$= 2r + \frac{\theta}{360} \times 2\pi r = 16.4\,cm$$



$$16.4 = 2 \times 5.2 + \frac{2\pi \times 5.2 \times \theta}{360}$$

$$\frac{2\pi \times 5.2 \times \theta}{360} = 6 \qquad \Rightarrow \theta = \frac{6 \times 360}{2\pi \times 5.2}$$

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

$$= \frac{6 \times 360}{2\pi \times 5.2 \times 360} \times \pi \times (5.2)^2 = 3 \times 5.2$$

= 15.6 sq. units

OR

Since, in 60 minutes, the tip of minute hand moves 360°.

In 1 minute, it will move $= \frac{360^o}{60^o} = 6^o$

$\therefore$ From 7 : 05 p.m. to 7 : 40 p.m., i.e., 35 min, it will move through

= 35 × 6° = 210°

$\therefore$ Area swept by the minute hand in 35 min.

= Area of sector with angle 210° and radius of 6 cm

$$= \frac{210^o}{360^o} \times \pi \times 6^2$$

$$= \frac{7}{12} \times \frac{22}{7} \times 6 \times 6$$

= 66 cm^2

25. $\angle A = \angle OPA = \angle OSA = 90^o$

Hence, $\angle SOP = 90^o$

Also, AP = AS

Hence, OSAPO is a square

AP = AS = 10 cm

CR = CQ = 27 cm

BQ = BC – CQ

= 38 – 27 = 11 cm

BP = BQ = 11 cm

x = AB = AP + BP

x = 10 + 11

x = 21 cm

26. Let $\frac{2+\sqrt{3}}{5}$ is a rational number

$\therefore$ we can write it in the form of p/q

$$\therefore \frac{2+\sqrt{3}}{5} = \frac{p}{q}$$

(p and q are co-prime, q ≠ 0)

$$\Rightarrow 2 + \sqrt{3} = \frac{5p}{q} \qquad \Rightarrow \sqrt{3} = \frac{5p}{q} - 2$$

$$\Rightarrow \sqrt{3} = \frac{5p - 2q}{q}$$

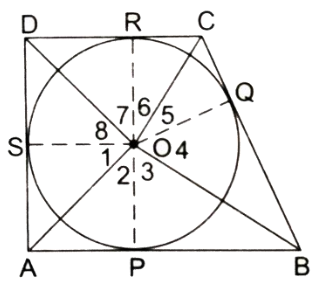
Since, p and q are co-prime integers, then $\frac{5p-2q}{q}$ is a rational number.

But this contradicts the fact that $\sqrt{3}$ is an irrational number.

So, our assumption is wrong.

Therefore, $\frac{2+\sqrt{3}}{5}$ is an irrational number

27.



Given : A quad. ABCD circumscribes a circle with centre O.

To prove : $\angle AOB + \angle COD = 180^o$,

And $\angle AOD + \angle BOC = 180^o$,

Construction : Join OP, OQ, OR and

OS.

Proof : We know that the tangents drawn from an external point of a circle subtend equal angles at the centre.

$\therefore \angle 1 = \angle 2$, $\angle 3 = \angle 4$, $\angle 5 = \angle 6$ and $\angle 7 = \angle 8$.

and, $\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360^\circ$ [$\angle$s at a point]

$\Rightarrow 2(\angle 2 + \angle 3) + 2(\angle 6 + \angle 7) = 360^\circ$, and

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

$\Rightarrow \angle 2 + \angle 3 + \angle 6 + \angle 7 = 180^\circ$

and $\angle 1 + \angle 8 + \angle 4 + \angle 5 = 180^\circ$

$\Rightarrow \angle AOB + \angle COD = 180^\circ$ and $\angle AOD + \angle BOC = 180^\circ$.

28. Let α and β be the zeros of the polynomial

Then $\alpha + \beta = \frac{5}{2}$

And $\alpha\beta = -\frac{3}{2}$

Let 2α and 2β be the zeros x^2+px+q

Then $2\alpha + 2\beta = -p$

$2(\alpha + \beta) = -p$

$2 \times \frac{5}{2} = -p$

So $p = -5$

And $2\alpha \times 2\beta = q$

$4\alpha\beta = q$

So $q = 4 \times -\frac{3}{2}$

$= -6$

29. We have

$m^2n = (\text{cosec}\theta - \sin\theta)^2.(\sec\theta - \cos\theta)$

$= \left(\frac{1}{\sin\theta} - \sin\theta\right)^2 . \left(\frac{1}{\cos\theta} - \cos\theta\right)$

$= \frac{(1-\sin^2\theta)^2}{\sin^2\theta} . \frac{(1-\cos^2\theta)}{\cos\theta} = \frac{\cos^4\theta}{\sin^2\theta} \times \frac{\sin^2\theta}{\cos\theta} = \cos^3\theta$

$\therefore (m^2n)^{1/3} = \cos\theta$. ....(i)

Again, $mn^2 = (\text{cosec}\theta - \sin\theta).(\sec\theta - \cos\theta)^2$

$= \left(\frac{1}{\sin\theta} - \sin\theta\right) . \left(\frac{1}{\cos\theta} - \cos\theta\right)^2$

$= \frac{(1-\sin^2\theta)}{\sin\theta} . \frac{(1-\cos^2\theta)^2}{\cos^2\theta}$

$= \left(\frac{\cos^2\theta}{\sin\theta} . \frac{\sin^4\theta}{\cos^2\theta}\right) = \sin^3\theta$

$\therefore (mn^2)^{1/3} = \sin\theta$. ....(ii)

On squaring (i) and (ii) and adding the results, we get

$(m^2n)^{2/3} + (mn^2)^{2/3} = 1$

$[\because \cos^2\theta + \sin^2\theta = 1]$

Hence, $(m^2n)^{2/3} + (mn^2)^{2/3} = 1$.

OR

Given $a\cos\theta - b\sin\theta = c$. …….(i)

Now, $(a\sin\theta - b\cos\theta)^2 + (a\sin\theta + b\cos\theta)^2$

$= a^2(\cos^2\theta + \sin^2\theta) + b^2(\sin^2\theta + \cos^2\theta) = (a^2+b^2)$.

Thus, $(a\cos\theta - b\sin\theta)^2 + (a\sin\theta + b\cos\theta)^2 = (a^2+b^2)$

$\Rightarrow c^2 + (a\sin\theta + b\cos\theta)^2 = (a^2+b^2)$

$\Rightarrow (a\sin\theta + b\cos\theta)^2 = (a^2+b^2-c^2)$

$\Rightarrow (a\sin\theta + b\cos\theta) = \pm\sqrt{a^2+b^2-c^2}$

Hence, $(a\sin\theta + b\cos\theta) = \pm\sqrt{a^2+b^2-c^2}$

30. All possible outcomes are

(H H H) , (H H T), (H T H), (H T T), (T H H), (T H T), (T T H), (T T T)

$\therefore$ Total number of possible outcomes=8

(a) Favourable outcomes for vidhi are (H H H) (H H T) (T H H) which are 3

$\therefore$ probability of Vidhi = $\frac{3}{8}$

(b) Favourable outcomes for Unnati are (H H T) (H T H) (T H T) (H T T) which are 4

probability of Unnati $\frac{4}{8} = \frac{1}{2}$

Thus, Unnati is more likely to drive the car.

31. Let the length and breadth of the rectangle be x units and y units respectively.

Then, area of the rectangle = xy sq units.

Case I : When the length is reduced by 5 units and the breadth is increased by 2 units.

Then, new length = (x–5) units

and new breadth = (y + 2) units.

$\therefore$ new area = (x-5)(y+2) sq units.

$\therefore$ xy– (x–5)(y+2)=80

5y – 2x = 70 .... (i)

Case II : When the length is increased by 10 units and the breadth is decreased by 5 units.

Then, new length = (x + 10) units

and new breadth = (y–5) units.

$\therefore$ new area = (x+10)(y–5) sq units.

$\therefore$ (x+10) (y–5) –xy = 50

$\Rightarrow$ 10y–5x=100 = 2y–x=20. …. (ii)

On multiplying (ii) by 2 and subtracting the result from (i), we get y = 30.

Putting y = 30 in (ii), we get

(2×30) –x = 20 $\Rightarrow$ 60–x = 20

$\Rightarrow$ x = (60–20) = 40.

$\therefore$ x = 40 and y = 30.

Hence, length = 40 units

and breadth = 30 units.

OR

We have the following table for

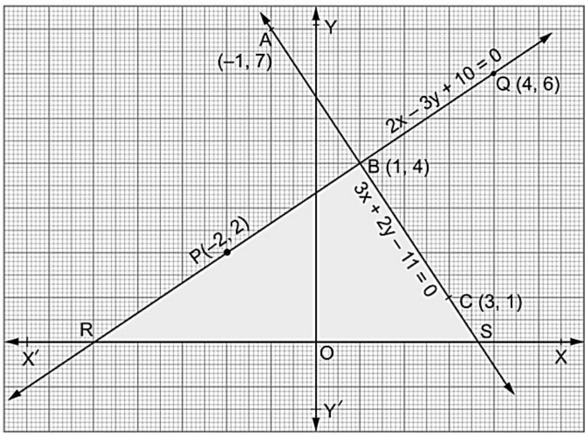
3x+2y–11 = 0.

x	–1	1	3
y	7	4	1

We have the following table for

2x–3y+10 = 0

x	–2	1	4
y	2	4	6



32. Let the total number of arrows carried by Arjun = x.

Given, Number of arrows used to cut arrows of Bheeshm = Half of total arrows = $\frac{x}{2}$ ….(1)

Number of arrows used to kill the rath driver = 6 ....(2)

Number of other arrows used to knock down rath, flag and bow = 1 + 1+1=3 ....(3)

The number of arrows, with which he laid Bheeshm unconscious = 4 times the square root of his total arrows +1

= $4\sqrt{x}$ +1

Hence, clearly the total number of arrows carried by Arjun

x = Sum of arrows used by him for different purpose

= Arrows used in (1) + (2) + (3) + (4)

$\Rightarrow x = \frac{x}{2} + 6 + 3 + 4\sqrt{x} + 1$

$\Rightarrow 2x = x+20+8\sqrt{x}$

$\Rightarrow x - 8\sqrt{x} - 20 = 0$

$\Rightarrow x - 20 = 8\sqrt{x}$

Squaring both the sides, we get

$(x - 20)^2 = 64x$

$\Rightarrow x^2-40x+400 = 64x$

$\Rightarrow x^2-104x+400 = 0$

$\Rightarrow x^2-4x-100x+400 = 0$

$\Rightarrow$ x (x-4) –100 (x-4)=0

$\Rightarrow$ (x-4) (x-100) = 0

$\Rightarrow$ either x – 4 = 0

$\Rightarrow$ x = 4

or x–100 = 0

$\Rightarrow$ x = 100

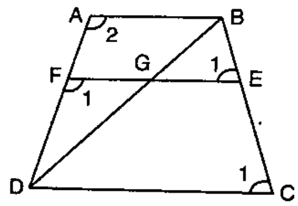
33. Given, In trapezium ABCD, AB||DC and DC = 2AB, EF||AB and $\frac{BE}{EC} = \frac{3}{4}$

To prove, 7FE = 10 AB

Proof. In ΔDFG and ΔDAB,

∠1 = ∠2

[∵ AB||DC||EF ∵ ∠1 and ∠2 are corresponding angles]



∠FDG = ∠ADB {Common}

So, by AA corollary

$\Rightarrow \frac{DF}{DA} = \frac{FG}{AB}$ ......(1)

In trapezium ABCD, EF||AB||DC.

$\therefore \frac{AF}{DF} = \frac{BE}{EC} \Rightarrow \frac{AF}{DF} = \frac{3}{4}$

$\left[\because \frac{BE}{EC} = \frac{3}{4}(\text{Given})\right]$

$\Rightarrow \frac{AF}{DF} + 1 = \frac{3}{4} + 1$

(Adding 1 on both sides)

$\Rightarrow \frac{AF+DF}{DF} = \frac{7}{4} \Rightarrow \frac{AD}{DF} = \frac{7}{4} \Rightarrow \frac{DF}{AD} = \frac{4}{7}$ .....(2)

From (1) and (2), we get

$\frac{FG}{AB} = \frac{4}{7} \Rightarrow FG = \frac{4}{7}AB$

In ΔBEG and ΔBCD,

$\angle BEG = \angle BCD$

[corresponding angles]

$\angle B = \angle B$ [Common]

$\Rightarrow \Delta BEG \sim \Delta BCD$ [By AA corollary]

$\Rightarrow \dfrac{BE}{BC} = \dfrac{EG}{CD} \Rightarrow \dfrac{3}{7} = \dfrac{EG}{CD}$

$\left[\because \dfrac{BE}{EC} = \dfrac{3}{4} \Rightarrow \dfrac{EC}{BE} = \dfrac{4}{3} \Rightarrow \dfrac{EC}{BE} + 1 = \dfrac{4}{3} + 1 \Rightarrow \dfrac{BC}{BE} = \dfrac{7}{3}\right]$

$\Rightarrow EG = \dfrac{3}{7} CD \Rightarrow EG = \dfrac{3}{7} \times 2AB$

$[\because CD = 2AB \text{ (Given)}]$

$\Rightarrow EG = \dfrac{6}{7} AB$

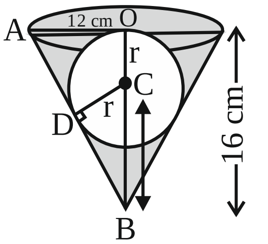
Adding (3) and (4), we get

$FG + EG = \dfrac{4}{7} AB + \dfrac{6}{7} AB$

$\Rightarrow EF = \dfrac{10}{7} AB \Rightarrow 7EF = 10AB$

$[\because FG + EG = EF]$

34.



To find r

Now, $\Delta BOA \approx \Delta BDC$,

$\Rightarrow \dfrac{AO}{CD} = \dfrac{AB}{BC} \left[\begin{array}{l} AB = \sqrt{OB^2 + OC^2} = \sqrt{16^2 + 12^2} \\ = \sqrt{256 + 144} = \sqrt{400} = 20 \end{array}\right]$

$\Rightarrow \dfrac{12}{r} = \dfrac{20}{16 - r}$

$\Rightarrow 16 \times 12 - 12r = 20r$

$\Rightarrow 32r = 16 \times 12$

$r = \dfrac{16 \times 12}{32}$ cm = 6 cm

Volume of water that overflows = Volume of the sphere

$= \dfrac{4}{3}\pi r^3 = \dfrac{4}{3} \times \dfrac{22}{7} (6)^3 = \dfrac{6336}{7} cm^3$

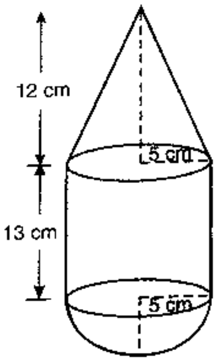
Volume of water in conical vessel

$\dfrac{1}{3}\pi R^2 h = \dfrac{1}{3} \times \dfrac{22}{7} \times (12)^2 \times 16 = \dfrac{1}{3} \times \dfrac{22}{7} \times 12 \times 12 \times 16 = \dfrac{16896}{7} cm^3$

Fraction of water that over flows

$= \dfrac{\text{Volume of water overflows}}{\text{Volume of water in conical vessel}} = \dfrac{6336}{7} \times \dfrac{7}{16896} = \dfrac{3}{8}$

OR



(i) Radius of hemispherical part = 5 cm

Curved surface area of hemispherical portion = $2\pi r^2$

$= 2 \times \dfrac{22}{7} \times 5 \times 5 = \dfrac{1100}{7} cm^2.$

(ii) Height of cylindrical part = 13 cm.

And radius = 5 cm.

$\therefore$ Curved surface area of cylindrical portion = $2\pi rh$

$= 2 \times \dfrac{22}{7} \times 5 \times 3 = \dfrac{2860}{7} cm^2.$

(iii) Height of conical part = 12 cm

And radius = 5 cm

Salnt height =

$\sqrt{r^2 + h^2} = \sqrt{5^2 + 12^2} = \sqrt{25 + 144} = \sqrt{169} = 13$ cm.

$\therefore$ Curved surface area =

$\pi rl = \dfrac{22}{7} \times 5 \times 13 = \dfrac{1430}{7} cm^2$

$\therefore$ Total surface area of the toy

$= \left(\dfrac{1100}{7} + \dfrac{2860}{7} + \dfrac{1430}{7}\right) cm^2 = \dfrac{5390}{7} cm^2 = 770 \ cm^2$

35.

Marks	Number of students (cumulative frequency)	Number of students (Frequency)	Cumulative frequency (less than type)
0-10	80	3	3
10-20	77	5	8
20-30	72	7	15
30-40	65	10	25
40-50	55	12	37
50-60	43	15	52
60-70	28	12	64
70-80	16	6	70
80-90	10	2	72
90-100	8	8	80

$N = 80 \Rightarrow \dfrac{N}{2} = 40$

$\therefore$ 50–60 is the median class

$$\text{Median} = \ell + \frac{\frac{N}{2} - c.f.}{f} \times h$$

Where, $\frac{N}{2}$ = 40, c.f. = 37, f = 15

and h = 10

$\Rightarrow$ Median = $50 + \frac{40-37}{15} \times 10 = 52$

50–60 is the modal class

Further, mode = $\ell + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$

where, l = 50, f_1 = 15, f_0 = 12,

f_2 = 12 and h = 10

$\Rightarrow$ Mode $= 50 + \frac{15-12}{2\times 15 - 12 - 12} \times 10 = 55$

OR

(a) Mean (Using Assumed Mean Method)

Let A = 35, h = 10

Class	f	x_i	$d_i = x_i - 35$	f_id_i
0-10	5	5	–30	–150
10-20	8	15	–20	–160
20-30	12	25	–10	–120
30-40	15	35 = A	0	0
40-50	14	45	10	140
50-60	6	55	20	120
	$\Sigma f_i = 60$			$\sum f_i d_i = -170$

$\Sigma f_i = 60$, $\Sigma f_id_i = -170$

$\Rightarrow$ Mean = $a + \frac{\sum f_i d_i}{\sum f_i}$

$35 + \frac{(-170)}{60}$

= 35–2.83 = 32.17

Mode

Modal class = 30–40

[Highest frequency = 15]

l = 30,

f_1 = 15,

f_0 = 12,

f_2 = 14,

h = 10

$$\text{Mode} = \ell + \frac{f_1 - f_0}{2f_1 - f_0 - f_1} \times h$$

= $30 + \frac{15-12}{2\times 15 - 12 - 14} \times 10$

= $30 + \frac{3}{4} \times 10 = 37.5$

36. (i) For first tree

=20 m distance is covered in to fro from well

(ii) For second tree

=2(10+1×5) =30 m distance is covered in to fro from well

(iii) For 25th tree =

2(10+24×5)=260 m

Distance is covered in to-fro from well.

OR

So total distance = 20 + 30 + 40 +....+ 260

This is a A.P with a=20,d=10 and n=25

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

$$S_{25} = \frac{25}{2}[2\times 20 + (25-1)10]$$

$$S_{25} = \frac{25}{2}[40 + 24\times 10]$$

$$S_{25} = 25[20 + 12\times 10]$$

$S_{25} = 25\times 140$

S_{25} = 3500m

37. (i) Coordinate of A = (-5, 4)

Coordinate of X = (2, 6)

$\therefore$ Distance = $\sqrt{(-5-2)^2 + (4-6)^2}$

$= \sqrt{53}$ units

(ii) Coordinate of A = (-5, 4)

Coordinate of Y = (5, 2)

$\therefore$ Distance = $\sqrt{(-5-5)^2 + (4-2)^2}$

$= \sqrt{104} = 2\sqrt{26}$ units

(iii) Coordinate of X = (2, 6)

Coordinate of Y = (5, 2)

Mid-point = $\left(\frac{2+5}{2}, \frac{6+2}{2}\right) = (3.5, 4)$

OR

Coordinate of A = (-5, 4)

Coordinate of X = (2, 6)

$\therefore$ Coordinate of P

$= \left(\frac{3\times(-5) + 2\times 2}{5}, \frac{4\times 3 + 6\times 2}{5}\right)$

$= \left(-\frac{11}{5}, \frac{24}{5}\right)$

38. (i) $\sin 60° = \frac{PC}{PA}$

$$\Rightarrow \frac{\sqrt{3}}{2} = \frac{18}{PA} \Rightarrow PA = 12\sqrt{3}m$$

(ii) $\sin 30^\circ = \frac{PC}{PB}$

$$\Rightarrow \frac{1}{2} = \frac{18}{PB} \Rightarrow PB = 36\,m$$

(iii) $\tan 60^\circ = \frac{PC}{AC} \Rightarrow \sqrt{3} = \frac{18}{AC}$

$$\Rightarrow AC = 6\sqrt{3}m$$

$$\tan 30^\circ = \frac{PC}{CB} \Rightarrow \frac{1}{\sqrt{3}} = \frac{18}{CB} \Rightarrow CB = 18\sqrt{3}m$$

Width AB = AC + CB

$$= 6\sqrt{3} + 18\sqrt{3} = 24\sqrt{3}m$$

OR

RB = PC = 18m and PR = CB = $18\sqrt{3}$ m

$$\tan 30^o = \frac{QR}{PR} \Rightarrow \frac{1}{\sqrt{3}} = \frac{QR}{18\sqrt{3}} \Rightarrow QR = 18m$$

QB = QR + RB = 18 + 18 = 36 m

Hence height BQ is 36 m