CBSE Class 10 Mathematics Standard

Sample Paper - 02 (2020-21)

Solution

Part-A

1. HCF(45, 105) = 15

   $\therefore \text{LCM} = \frac{45 \times 105}{15} = 315$

OR

since we know that 7, is a prime number

as it has only 2, factors i,e 1 and itself

also, we know that the square root of every prime number is an irrational number.

therefore $\sqrt{7}$ is an irrational number.

2. $4x^2 - 12x + 9 = 0$

   Here a = 4, b = -12, c = 9

   $D = (-12)^2 - 4 \times 4 \times 9 = 144 - 144 = 0$

   $\therefore$ Equation has real and equal roots.

3. Given system of equations is, $3x - y - 5 = 0$ and $6x - 2y + k = 0$

   Here $a_1 = 3, b_1 = -1, c_1 = -5$ and $a_2 = 6, b_2 = -2, c_2 = k$

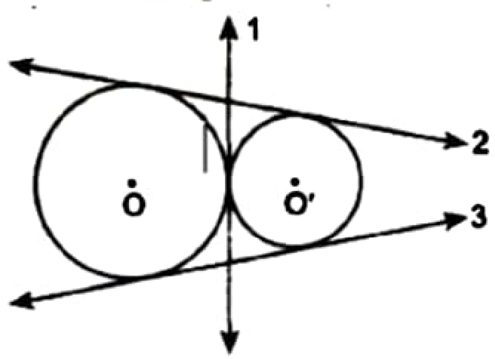
   For no solution $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

   $\Longrightarrow \frac{3}{6} = \frac{1}{2} \neq \frac{-5}{k}$

   $\Rightarrow \frac{1}{2} \neq \frac{-5}{k}$

   $\Longrightarrow k \neq -10$

4. 3 common tangents can be drawn when circles touch externally as shown in the figure.



5. a = -1, $d = \frac{1}{2}$

First term = a = -1

Second term = -1 + d $= -1 + \frac{1}{2} = -\frac{1}{2}$

Third term $= -\frac{1}{2} + d = -\frac{1}{2} + \frac{1}{2} = 0$

Fourth term = 0 + d $= 0 + \frac{1}{2} = \frac{1}{2}$

Hence, the first four terms of the given AP are -1, $-\frac{1}{2}, 0, \frac{1}{2}$.

OR

A.P. is 17,14,11,..., - 40

We have,

l = Last term = -40 , a = 17 and, d = Common difference= 14 - 17 = - 3

∴ 6th term from the end = l - (n -1)d

= l - (6-1) d

= -40 - 5 × (-3)

= -40 + 15

= -25

So, 6th term of given A.P. is -25.

6. 0.6, 1.7, 2.8, 3.9...

First term = a= 0.6

Common difference (d) = Second term - First term

= Third term - Second term and so on

Therefore, Common difference (d) = 1.7−0.6=1.1

7. $4x^2 + 5x = 0$

$\Rightarrow x(4x + 5) = 0$

$\Rightarrow x = 0 \; or \; 4x + 5 = 0$

⇒ x = 0 or x = $-\frac{5}{4}$

OR

In quadratic equation $ax^2 + bx + c = 0$, if $a + c = b$, then roots are -1 and $\frac{-c}{a}$.

Here $p^2 - q^2 + r^2 - p^2 = -(q^2 - r^2)$

∴ roots are -1 and $\frac{-(r^2 - p^2)}{p^2 - q^2}$.

8. Let PQ touch the circle at point R.

We know that tangents drawn from a external point to a circle are equal in length.

∴ AB = AC = 5 cm

⇒ AP + BP = AQ + QC = 5 cm

⇒ AP + PR = AQ + QR = 5 cm ...(i) [∵ BP = PR and QC = QR]

Now,Perimeter of $\triangle APQ$ = Addition of all three sides = AP + PQ + AQ

= AP + RP + QR + AQ [∵ from (i)]

= 5 + 5

= 10 cm

The perimeter of $\triangle APQ$ is 10 cm.

9. Since Tangent touches A circle on a distinct point. On the diameter of a circle, only two parallel tangents can be drawn.

OR

$AF = AE = 7cm$ (tangents from same external point are equal)

$\therefore BF = AB - AF = 13 - 7 = 6cm$

$BD = BF = 6cm$ (tangents from same external point)

$\therefore CD = BC - BD = 14 - 6 = 8cm$

$CE = CD = 8cm$

$\therefore AC = AE + EC$

$= 7 + 8 = 15cm.$

10. We have,

ΔPOS ~ ΔROQ

⇒ $\angle 3 = \angle 4$ and $\angle 1 = \angle 2$

Thus, PS and QR are two lines and the transversal PR cuts them in such a way that $\angle 3 = \angle 4$ i.e., alternate angles are equal. Hence, $PS \| QR$.

11. Sequence is 4,9,14,19, ...

Clearly, the given sequence is an A.P. with first term a = 4 and common difference d = 5

Let 124 be the nth term of the given sequence.

Then, $a_n = 124$

⇒ a+(n-1)d = 124

⇒ 4+(n-1) × 5 = 124

$\Rightarrow 4 + 5n - 5 = 124$

$\Rightarrow 5n-1 = 124$

$\Rightarrow 5n = 124 + 1$

$\Rightarrow 5n = 125$

$\Rightarrow n = 125/5$

$\Rightarrow n=25$

Hence, 25th term of the given sequence 4,9,14,19, ... is 124.

12. We have,

$$\text{LHS} = \frac{\sin^3\theta+\cos^3\theta}{\sin\theta+\cos\theta} + \sin\theta\cos\theta$$

$$\Rightarrow \quad \text{LHS} = \frac{(\sin\theta+\cos\theta)(\sin^2\theta+\cos^2\theta-\sin\theta\cos\theta)}{\sin\theta+\cos\theta} + \sin\theta\cos\theta$$

$\Rightarrow$ LHS = $1 - \sin\theta\cos\theta + \sin\theta\cos\theta = 1$ = RHS

13. Given $\frac{\cot A+1}{\cot A} = 1$

squaring both sides we get

$$\cot^2 A + \left(\frac{1}{\cot A}\right)^2 + 2 = 1$$

$$\cot^2 A + \frac{1}{\cot^2 A} = 1 - 2 = -1$$

14. Number of spheres $= \frac{\text{Volume of the cone}}{\text{Volume of each sphere}}$

$$= \frac{\frac{1}{3}\pi r^2 h}{\frac{4}{3}\pi R^3}$$

$$= \frac{(12)^2(24)}{4\times(2)^3}$$

$= 108$

15. First-term = a

the common difference, d = 3a - a = 2a

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

Putting the values

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

$S_n = \frac{n}{2}[2a + 2an - 2a]$

$S_n = \frac{n}{2}[2an] = (n)(an)$

$S_n = an^2$

So, the sum of n terms is an^2.

16. Total number of all possible outcomes = 52

There are 26 red cards (including 2 queens) and apart from these, there are 2 more queens.

Number of cards, each one of which is either a red card or a queen = 26 + 2 = 28

Let E be the event that the card drawn is neither a red card nor a queen.

Then, the number of favorable outcomes = (52 – 28) = 24

Therefore, P(getting neither a red card nor a queen) = P(E) = $\frac{24}{52} = \frac{6}{13}$

17. i. (b) A(1, 7), B(4, 2), C(-4, 4)

Distance travelled by Seema, AC = $\sqrt{[-4-1]^2 + [4-7]^2} = \sqrt{34}$ units

Distance travelled by Aditya, BC = $\sqrt{[-4-4]^2 + [4-2]^2} = \sqrt{68}$ units

∴ Aditya travels more distance

ii. (d) By using mid-point formula,

Coordinates of D are $\left(\frac{1+4}{2}, \frac{7+2}{2}\right) = \left(\frac{5}{2}, \frac{9}{2}\right)$

iii. $ar(\Delta ABC) = \frac{1}{2}$ [1(2 - 4) + 4(4 - 7) - 4(7 - 2)]

= 17 sq. units

iv. (b) (-4, 4)

v. (d) (4, 2)

18. i. (c) 25 m

ii. (a) 40 m

iii. (c) 25 m

iv. (d) 150 m^2

v. (a) 60 m

19. i. (a) Curve A - Less than type ogive and Curve B - More than type ogive

ii. (c) Median Wages = 50 Rs.

iii. (d) Mode = 3 Median - 2 Mean = 3(50) - 2(50) = 50 Rs.

As, Mean = Median = Mode, so it is a symmetrical distribution

iv. (a) Median

v. (b) Median

20. i. (a) 6 cm

ii. (c) 904.32 cm^3

iii. (c) 1:1

iv. (d) 527.52 cm^2

v. (c) Remain unaltered

Part-B

21. Let $x = 0.\overline{2341} = 0.2341341 \quad 341\ldots(1)$

Multiplying both sides of (1) by 10, we get

10x = 2. 341 341 341 ....(2)

Multiplying both sides of (2) by 1000, we get

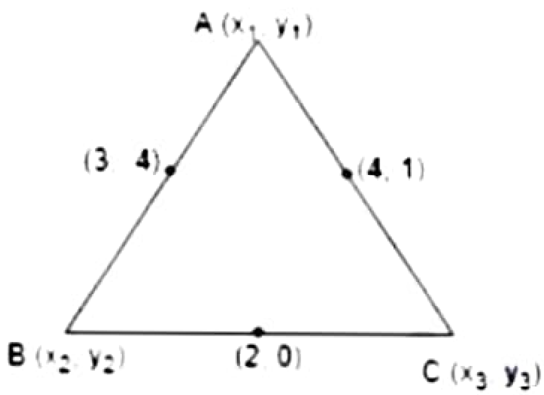
10000x = 2341. 341 341 31 ....(3)

Subtracting (2) from (3), we get

$9990x = 2339 \Rightarrow x = \frac{2339}{9990}$

Here, $p = 2339, q = 9990$

22. Let $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ be the vertices of a given triangle as shown in the figure.



Now, (3,4) is the mid-point of AB, therefore,

$3 = \frac{x_1+x_2}{2}$ and $4 = \frac{y_1+y_2}{2}$

$x_1 + x_2 = 6$ and $y_1 + y_2 = 8$ ..... (i)

(2,0) is the mid-point of BC, then,

$2 = \frac{x_2+x_3}{2}$ and $0 = \frac{y_2+y_3}{2}$

$x_2 + x_3 = 4$ and $y_2 + y_3 = 0$ ....(ii)

(4,1) is the mid-point of AC, then,

$4 = \frac{x_1+x_3}{2}$ and $1 = \frac{y_1+y_3}{2}$

$x_1 + x_3 = 8$ and $y_1 + y_3 = 2$ ....(iii)

Subtracting (ii) from (iii), we get,

$x_1 - x_2 = 4$ and $y_1 - y_2 = 2$ .... (iv)

Adding (i) and (iv), we get,

$2x_1 = 10$ and $2y_1 = 10$

$x_1 = 5$ and $y_1 = 5$

From (i), we have,

$x_2 = 6 - 5 = 1$ and $y_2 = 8 - 5 = 3$

From (ii), we have,

$x_3 = 4 - 1 = 3$ and $y_3 = 0 - y_2 = 0 - 3 = -3$

Thus (5, 5), (1, 3) and (3, -3) are the vertices of triangle.

OR

Area of triangle

$= \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$

or, $24 = \frac{1}{2}$ $[1(2k + 5) - 4(-5 + 1) - k(-1 - 2k)]$

or, $48 = 2k + 5 + 16 + k + 2k^2$

or, $2k^2 + 3k - 27 = 0$

or, $(k - 3)(2k + 9) = 0$

or, $k = 3, k = -\frac{9}{2}$

23. The zeros of the said cubic polynomial are $\frac{1}{2}$, 1 and -3

Let $\alpha = \frac{1}{2}$, $\beta = 1$ and $\gamma = -3$

Now,

$\alpha + \beta + \gamma = \frac{1}{2} + 1 - 3 = \frac{1+2-6}{2} = \frac{-3}{2}$

$\alpha\beta + \beta\gamma + \gamma\alpha = \frac{1}{2}(1) + (1)(-3) + (-3)(\frac{1}{2}) = \frac{1}{2} - 3 - \frac{3}{2} = \frac{1-6-3}{2} = \frac{-8}{2} =$

$\alpha\beta\gamma = \frac{1}{2}(1)(-3) = -\frac{3}{2}$

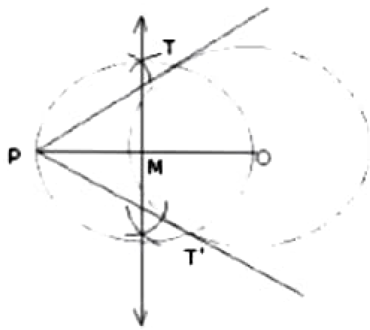
Now, a cubic polynomial whose zeros are α, β *and* γ is given by

$p(x) = x^3 - (\alpha + \beta + \gamma)x^2 + (\alpha\beta + \beta\gamma + \gamma\alpha)x - \alpha\beta\gamma$

Hence

$$p(x) = x^3 - \frac{-3}{2}x^2 + (-4)x + \frac{3}{2}$$

$$\text{or } p(x) = 2x^3 + 3x^2 - 8x + 3$$

24. 

Steps of construction:

i. Take a point O in the plane of a paper and draw a circle of the radius 4 cm.

ii. Make a point P at a distance of 7cm from the centre O and Join OP.

iii. Bisect the line segment OP. Let M be the mid-point of OP.

iv. Taking M as a centre and OM as radius draw a circle to intersect the given circle at the points, T and T'.

v. Join PT and PT', then PT and PT' are required tangents.

PT = PT' = 5.75 cm

25. LHS-

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

$$=\frac{\tan A}{1-\frac{1}{\tan A}}+\frac{\frac{1}{\tan A}}{1-\tan A}$$

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

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

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

$$=\frac{(\tan A-1)(\tan^2 A+\tan A+1)}{\tan A(\tan A-1)}$$ $[a^3-b^3=(a-b)(a^2+ab+b^2)]$

$$=\frac{\tan^2 A+\tan A+1}{\tan A}$$

$$=\tan A+1+\cot A$$

$$=\frac{\sin A}{\cos A}+\frac{\cos A}{\sin A}+1$$

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

$$=\frac{1}{\sin A\cos A}+1$$

= sec A cosec A + 1

= R.H.S

OR

Given: $\cot\theta = \frac{7}{8}$

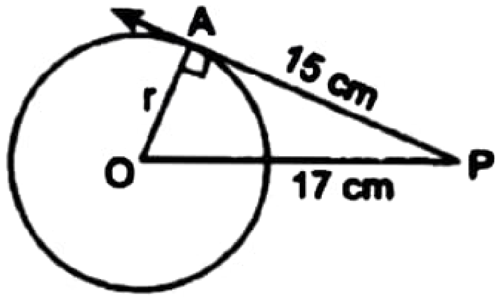
To Evaluate: $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$

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

$= \cot^2\theta$

$= \left(\frac{7}{8}\right)^2$

$= \frac{49}{64}$

26. 

$\angle OAP = 90^\circ$

in $\triangle OAP$,

By applying Pythagoras theorem , we get

$\Rightarrow 17^2 = r^2 + 15^2$

$\Rightarrow r^2 = 17^2 - 15^2 = (17-15)(17+15)$

$= 2 \times 32$

$\Rightarrow r^2 = 64 \Rightarrow r = \pm 8\text{cm}$

we should not take negative value because length cannot be negative.

$\Rightarrow$ r = 8 cm

27. Let $3 + 5\sqrt{2}$ be rational and have only common factor 1.

Let, $3 + 5\sqrt{2} = \frac{a}{b}$

$5\sqrt{2} = \frac{a}{b} - 3$

$\sqrt{2} = \frac{a-3b}{5b}$

If $\frac{a-3b}{5b}$ is rational so, $\sqrt{2}$ is also rational number but it is not true as $\sqrt{2}$ is an irrational number.

So it is a contradiction to our assumption,

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

28. Let the length of the sides of the right triangle be x cm and (x + 5) cm. Given, length of hypotenuse = 25 cm.

According to Pythagoras theorem;

$p^2 + b^2 = h^2$ (where, p, b & h are respectively perpendicular, base & hypotenuse of right angled triangle)

$\therefore x^2 + (x + 5)^2 = (25)^2$ [Using pythagoras theorem]

$\Rightarrow x^2 + x^2 + 25 + 10x = 625$

$\Rightarrow 2x^2 + 10x + 25 - 625 = 0$

$\Rightarrow 2x^2 + 10x - 600 = 0$

$\Rightarrow 2(x^2 + 5x - 300) = 0$

$\Rightarrow x^2 + 5x - 300 = 0$

$\Rightarrow x^2 + 20x - 15x - 300 = 0$

$\Rightarrow x(x + 20) - 15(x + 20) = 0$

$\Rightarrow (x + 20)(x - 15) = 0$

$\Rightarrow x - 15 = 0$ [$\because$ Length can never be negative $\therefore x + 20 \neq 0$]

$\Rightarrow x = 15$ cm

$\therefore x + 5 = 15 + 5 = 20$ cm

Hence, the lengths of required sides are 15 cm and 20 cm.

OR

Consider $\frac{1}{2a+b+2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$

$\Rightarrow \frac{1}{2a+b+2x} - \frac{1}{2x} = \frac{1}{2a} + \frac{1}{b}$

$\Rightarrow 2ab\,(2x - 2a - b - 2x) = (2a + b)2x\,(2a + b + 2x)$

$\Rightarrow 2ab\,(-2a - b) = 2(2a + b)\,(2ax + bx + 2x^2)$

$\Rightarrow -ab = 2ax + bx + 2x^2$

$\Rightarrow 2x^2 + 2ax + bx + ab = 0$

$\Rightarrow 2x\,(x + a) + b\,(x + a) = 0$

$\Rightarrow (2x + b)\,(x + a) = 0$

$\Rightarrow x = -a, -\frac{b}{2}$

Hence the roots are $-a, -\frac{b}{2}$.

29. Let α, β and γ be the zeroes of $f(x)$ and the zeroes are in AP.

Suppose $\alpha = a - d, \beta = a$ and $\gamma = a + d$

$f(x) = x^3 - 12x^2 + 39x - 28$

$\therefore \quad \alpha + \beta + \gamma = -\left(\frac{-12}{1}\right) = 12$ ...(1)

and, $\alpha\beta\gamma = -\left(\frac{-28}{1}\right) = 28$ ...(2)

From equation (1) , we have

$a - d + a + a + d = 12$

$3a = 12 \Rightarrow a = 4$.

Now from equation (2), we have

$(a-d)a(a+d) = 28$

$a(a^2-d^2) = 28$

$4(16-d^2) = 28$

$16-d^2 = 7$

$d^2 = 9$

$d = \pm 3$

Case I: When a = 4 and d = 3 : In this case,

$\alpha = a - d = 4 - 3 = 1, \beta = a = 4$ and $\gamma = a + d = 7$

CASE II: When a = 4 and d = -3: In this case,

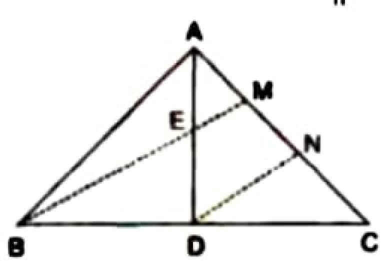
$\alpha = a - d = 4 - (-3) = 7, \beta = a = 4$ and $\gamma = a + d = 4 - 3 = 1$

Hence, in either case the zeroes of the given polynomial are 1,4 and 7.

30. Given: D is the mid-point of side BC, E is mid-point of AD, BE produced meets AC at M.

To prove: BE = 3 EM

Construction: Draw DN $\parallel$ BM



Proof: In $\triangle$ADN, EM $\parallel$ DN (construction)

$\therefore \quad \triangle AEM \sim \triangle ADN$ (AA similarity)

$\therefore \quad \frac{EM}{DN} = \frac{AE}{AD}$ (By BPT)

But AD = 2AE

$\therefore \quad \frac{EM}{DN} = \frac{AE}{2AE}$

$\therefore$ DN = 2EM ..(i)

In $\triangle$BCM, DN $\parallel$ BM (construction)

$\therefore \quad \triangle CDN \sim \triangle CBM$ (AA similarity)

$\therefore \quad \frac{DN}{BM} = \frac{CD}{CB}$ (by BPT)

But CB = 2CD

$\therefore \quad \frac{DN}{BM} = \frac{CD}{2CD}$

$\therefore$ BM = 2DN ..(ii)

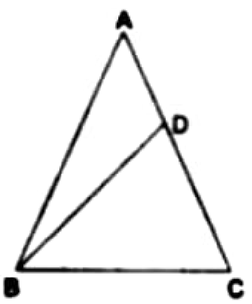
from (i) and (ii),

BM = 2(2EM)

$\therefore$ BM = 4EM

$\therefore$ BE = BM - EM = 4EM - EM = 3EM. Hence proved

OR



Given A $\triangle ABC$ in which AB = AC and D is a point on AC such that $BC^2 = AC \times DC$.

To Prove BD = BC

Proof $BC^2 = AC \times DC$ (given)

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

Thus, in $\triangle ABC$ and $\triangle BDC$, we have

$\frac{BC}{DC} = \frac{AC}{BC}$ and $\angle C = \angle C$ (common).

$\therefore \quad \triangle ABC \sim \triangle BDC$ [by SAS-similarity].

$\Rightarrow \quad \frac{AC}{BC} = \frac{AB}{BD}$

$\Rightarrow \quad \frac{AC}{BC} = \frac{AC}{BD}$ [$\because$ AB = AC (given)]

$\Rightarrow$ BD = BC

Hence BD = BC.

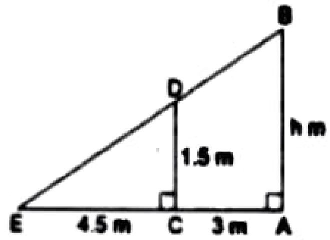
31. Number of possible outcomes = 50

Numbers which are multiple of 3 and 4 from 1 to 50 are = 12, 24, 36 and 48

No. of favorable outcomes = 4

P(the selected number is multiple of 3 and 4) = $\frac{4}{50} = \frac{2}{25}$

32. Let AB be the lamp-post and CD be the girl.



Let CE be the shadow of CD. Then,

CD = 1.5m, CE = 4.5m and AC = 3m.

Let AB = h m.

Now, ΔAEB and ΔCED are similar.

$\therefore \quad \frac{AB}{AE} = \frac{CD}{CE} \Rightarrow \frac{h}{(3+4.5)} = \frac{1.5}{4.5} = \frac{1}{3}$

$\Rightarrow h = \frac{1}{3} \times 7.5 = 2.5$

33. The given series is converted from inclusive to exclusive form and on preparing the frequency table, we get

Class	Frequency
0.5 - 5.5	3
5.5 - 10.5	8
10.5 - 15.5	13
15.5 - 20.5	18
20.5 - 25.5	28
25.5 - 30.5	20
30.5 - 35.5	13
35. 5- 40.5	8
40.5 - 45.5	6
45.5 - 50.5	4

Clearly, the modal class is 20.5 - 25.5, as it has the maximum frequency.

Now, x_k (lower limit of modal class) = 20.5, h (length of interval of modal class) = 5, f_k (

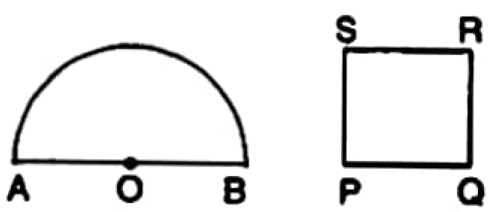
frequency of modal class) = 28, f_{k-1} (frequency of the class just preceding the modal class) = 18, f_{k+1} (frequency of the class just exceeding the modal class) = 20

Mode (M_o) is given by the formula ,

$$M_o = x_k + \left\{h \times \frac{(f_k - f_{k-1})}{(2f_k - f_{k-1} - f_{k+1})}\right\}$$
$$= 20.5 + \left[5 \times \frac{(28-18)}{(56-18-20)}\right]$$
$$= 20.5 + \left[\frac{5\times10}{18}\right]$$
= 20.5 + 2.78

= 23.28

Hence, mode = 23.28

34. 

Let radius of semicircular region be r units.

Perimeter = $2r + \pi r$

Let side of square be x units

Perimeter = 4x units.

A.T.Q, $4x = 2r + \pi r \Rightarrow x = \frac{2r+\pi r}{4}$

Area of semicircle = $\frac{1}{2}\pi r^2$

Area of square = x^2

A.T.Q, $x^2 = \frac{1}{2}\pi r^2 + 4$

$\Rightarrow \left(\frac{2r+\pi r}{4}\right)^2 = \frac{1}{2}\pi r^2 + 4$

$\Rightarrow \frac{1}{16}\left(4r^2 + \pi^2 r^2 + 4\pi r^2\right) = \frac{1}{2}\pi r^2 + 4$

$\Rightarrow 4r^2 + \pi^2 r^2 + 4\pi r^2 = 8\pi r^2 + 64$

$\Rightarrow 4r^2 + \pi^2 r^2 - 4\pi r^2 = 64$

$\Rightarrow r^2\left(4 + \pi^2 - 4\pi\right) = 64$

$\Rightarrow r^2(\pi - 2)^2 = 64$

$\Rightarrow r = \sqrt{\frac{64}{(\pi-2)^2}}$

$\Rightarrow r = \frac{8}{\pi - 2} = \frac{8}{\frac{22}{7} - 2}$ = 7 cm

Perimeter of semicircle =$2 \times 7 + \frac{22}{7} \times 7$= 36 cm

Perimeter of square = 36 cm

Side of square = $\frac{36}{4}$ = 9 cm

Area of square = 9× 9 = 81 cm^2

Area of semicircle = $\frac{\pi r^2}{2} = \frac{22}{2 \times 7} \times 7 \times 7$= 77 cm^2

35. Let the dimensions (i.e., length and width) of the garden be x and y m respectively.

Then, x = y + 4 and $\frac{1}{2}$(2x + 2y) = 36

⇒ x - y = 4 ...(1)

x + y = 36 ...(2)

Let us draw the graphs of equations (1) and (2) by finding two solutions for each of the equations. These two solutions of the equations (1) and (2) are given below in table 1 and table 2 respectively.

For equation (1)

x - y = 4

⇒ y = x - 4

Table 1 of the solutions

x	4	2
y	0	-2

For equation (2) x + y = 36

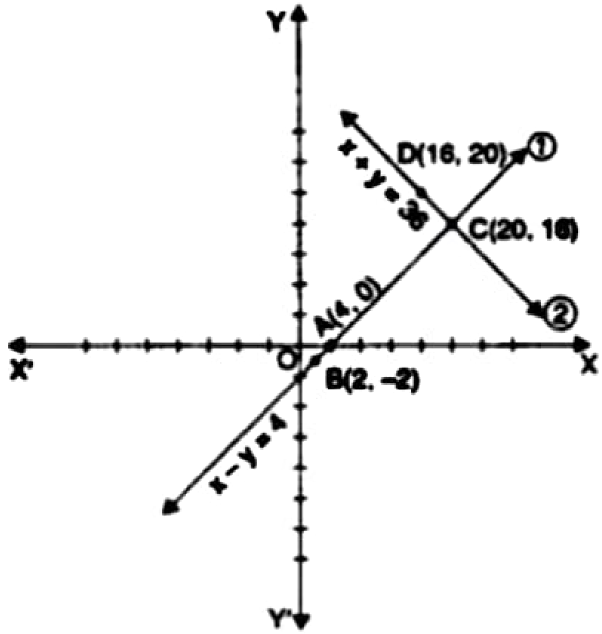
⇒ y = 36 - x

Table 2 of the solutions

x	20	16
y	16	20

We plot the points A(4, 0) and B(2, -2) on a graph paper and join these points to form the line AB representing. The equation (1) as shown in the figure.

Also, we plot the points C(20, 16) and D(16, 20) on the same graph paper and join these points to form the line CD representing the equation (2) as shown in the same figure.



In the figure, we observe that the two lines intersect at the point C(20, 16) So x = 20, y = 16 is the required solution of the pair of linear equations formed. i.e., the dimensions of the garden are 20 m and 16 m.

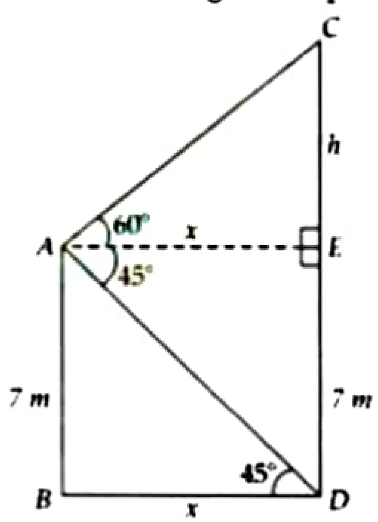
Verification : substituting x = 20 and y = 16 in (1) and (2), we find that both the equations are satisfied as shown below:

20 - 16 = 4

20 + 16 = 36

This verifies the solution.

36. Given: The height of the building is 7m and the angle of elevation of the top of a tower is 60° and the angle of depression of its foot is 45°.



In $\triangle ABD, \angle ADB = \angle EAD = 45°$

(alternate angles)

$\therefore \quad \frac{AB}{BD} = \tan 45°$

x = 7

In $\triangle AEC, \frac{CE}{AE} = \tan 60°$

$\Rightarrow \quad \frac{h-7}{x} = \sqrt{3}$

$\Rightarrow \quad h - 7 = x\sqrt{3}$

$\Rightarrow \quad h - 7 = 7\sqrt{3}$ (using x = 7)

$\Rightarrow \quad h = 7\sqrt{3} + 7$

$= 7(\sqrt{3} + 1)$

= 7(1.732 + 1)

Hence, the height of the tower = 19.124 m