Board Paper of Class 10 2023 Maths (Standard) Delhi(Set 1) - Solutions

Total Time: 180

Total Marks: 80.0

Section A

Solution 1

Least composite number = 2
Least prime number = 1
Therefore, the ratio of LCM and HCF of the least composite and the least prime numbers is 2:1.

Hence, the correct answer is option (b).

Solution 2

Given: $x^2 + 3x - 10 = 0$

$\Rightarrow x^2 + 5x - 2x - 10 = 0$

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

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

$\Rightarrow x = -5, 2$

Hence, the correct answer is option (a).

Solution 3

$$\text{Given AP}: \sqrt{6}, \sqrt{24}, \sqrt{54}, \ldots$$
$$\Rightarrow \text{ AP}: \sqrt{6}, \sqrt{4\times 6}, \sqrt{9\times 6}, \ldots$$
$$\Rightarrow \text{ AP}: \sqrt{6}, 2\sqrt{6}, 3\sqrt{6}, \ldots$$
$$\text{Here, } a_1 = \sqrt{6}$$
$$d = a_2 - a_1 = 2\sqrt{6} - \sqrt{6} = \sqrt{6}$$
$$\therefore a_4 = a_1 + 3d$$
$$\Rightarrow a_4 = \sqrt{6} + 3\sqrt{6}$$
$$\Rightarrow a_4 = 4\sqrt{6}$$
$$\Rightarrow a_4 = \sqrt{16\times 6}$$
$$\Rightarrow a_4 = \sqrt{96}$$

Hence, the correct answer is option (b).

Solution 4

The distance of any point from *x*-axis is the *y*-coordinate.

Therefore, the distance of the point (−1, 7) from *x*-axis is 7.

Hence, the correct answer is option (b).

Solution 5

The area of the circle of diameter *d* is given by $\frac{1}{4}\pi d^2$.

Thus, the area of the semi-circle of diameter *d* is $\frac{1}{8}\pi d^2$.

Hence, the correct answer is option (c).

Solution 6

Empirical relationship between mean median and mode of a distribution can be given as:

Mean – Mode = 3(Mean – Median)

⇒ Mode = 3Median – 2Mean

Hence, the correct answer is option (a).

Solution 7

Given equation are, $2x = 5y + 6$

⇒ $2x - 5y = 6$ .....(1)

And, $15y = 6x - 18$

$6x - 15y = 18$ .....(2)

Here, $a_1 = 2$, $b_1 = -5$, $c_1 = 6$
$a_2 = 6$, $b_2 = -15$, $c_2 = 18$

$\therefore \frac{a_1}{a_2} = \frac{2}{6} = \frac{1}{3}$,
$\frac{b_1}{b_2} = \frac{-5}{-15} = \frac{1}{3}$
$\frac{c_1}{c_2} = \frac{6}{18} = \frac{1}{3}$
Here, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
Therefore, this system of equations has infinite solutions.

It is represented by coincident lines.

Hence, the correct answer is option (c).

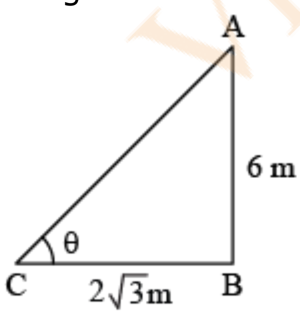
Solution 8

Given that, α and β are the zeros of $x^2 - 1$.
$\therefore \ \alpha + \beta = \frac{-0}{1}$
$= 0$

Hence, the correct answer is option (d).

Solution 9

Given that,
Height of the pole = 6m
Length of shadow = $2\sqrt{3}$m



Let θ be the elevation of the sun, then

$\Rightarrow \tan\theta = \frac{AB}{BC}$

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

$= \sqrt{3}$

$= \tan(60^\circ)$

$\therefore\ \theta = 60^\circ$

Hence, the correct answer is option (a).

Solution 10

We have,

$1 + \tan^2\theta = sec^2\theta$

$\Rightarrow sec^2\theta = 1 + \frac{1}{cot^2\theta}$

$\Rightarrow sec^2\theta = \frac{1+cot^2\theta}{cot^2\theta}$

$\Rightarrow sec\theta = \frac{\sqrt{1+cot^2\theta}}{cot\theta}$

Hence, the correct answer is option (c).

Solution 11

Total number of outcomes = 36
Possible favorable outcomes = (1, 4), (2, 5), (3, 6), (4, 1), (5, 2), (6, 3)
Favorable outcomes = 6

$\therefore$ Probability of getting difference of numbers $3 = \frac{6}{36}$

$= \frac{1}{6}$

Hence, the correct answer is option (c).

Solution 12

Given that:

$\triangle\ \mathrm{ABC} \sim \triangle\ \mathrm{QPR}$

$\Rightarrow \frac{\mathrm{AB}}{\mathrm{QP}} = \frac{\mathrm{BC}}{\mathrm{PR}} = \frac{\mathrm{CA}}{\mathrm{RQ}}$

$\Rightarrow \frac{6}{3} = \frac{5}{x}$

$\Rightarrow x = \frac{5}{2}$

$\Rightarrow x = 2.5\ \mathrm{cm}$

Hence, the correct answer is option (b).

Solution 13

From the distance formula, we have

Distance of point (−6, 8) from O(0, 0) = $\sqrt{(8-0)^2+(-6-0)^2}$

$=\sqrt{64+36}$
$=10$

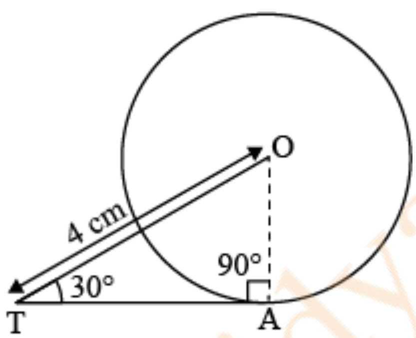
Hence, the correct answer is option (d).

Solution 14

OQ ⊥ PQ
as radius is perpendicular to the tangent
∴ In ΔPOQ
$x+y+\angle \mathrm{PQO}=180^{\circ}$
$x+y+90^{\circ}=180^{\circ}$
$\Rightarrow x+y=90^{\circ}$

Hence, the correct answer is option (b).

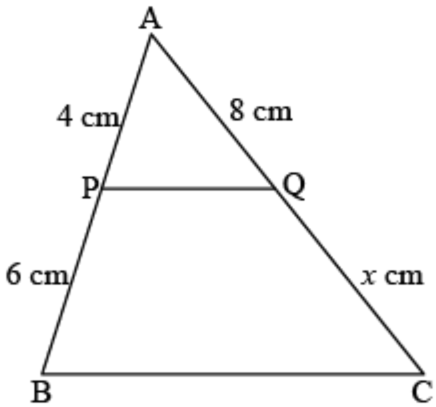
Solution 15



Join OA (Radius is perpendicular to the tangent)
In ΔOTA
$\frac{\mathrm{TA}}{\mathrm{OT}}=\cos\ 30^{\circ}$
$\frac{\mathrm{TA}}{4}=\cos\ 30^{\circ}$
$\mathrm{TA}=4\times\frac{\sqrt{3}}{2}$
$=2\sqrt{3}\ \mathrm{cm}$

Hence, the correct answer is option (a).

Solution 16



Given, in ΔABC, PQ || BC

Also, PB = 6 cm, AP = 4 cm and AQ = 8 cm

Using basic proportionality theorem,

$$\Rightarrow \frac{\mathrm{AP}}{\mathrm{PB}} = \frac{\mathrm{AQ}}{\mathrm{QC}}$$
$$\Rightarrow \frac{4}{6} = \frac{8}{x}$$
$$\Rightarrow x = 12 \text{ cm}$$

So, AC = AQ + QC = 8 cm + 12 cm = 20 cm.

Hence, the correct answer is option (b).

Solution 17

$$p(x) = 4x^2 - 3x - 7$$
$$\alpha + \beta = \frac{-b}{a}$$
$$\Rightarrow \alpha + \beta = \frac{3}{4} \qquad .....(1)$$
$$\alpha\beta = \frac{c}{a}$$
$$\Rightarrow \alpha\beta = \frac{-7}{4} \qquad .....(2)$$
$$\text{Now, } \frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha+\beta}{\alpha\beta}$$
$$\Rightarrow \frac{1}{\alpha} + \frac{1}{\beta} = \frac{\frac{3}{4}}{\frac{-7}{4}} \qquad [\text{From } (1) \text{ and } (2)]$$
$$\Rightarrow \frac{1}{\alpha} + \frac{1}{\beta} = \frac{-3}{7}$$

Hence, the correct answer is option (d).

Solution 18

Total number of outcomes = 52

Number of Ace cards = 4

Probability of getting an ace card

$= \frac{\text{Number of favourable outcomes}}{\text{Total outcomes}}$

$= \frac{4}{52} = \frac{1}{13}$

Probability of not getting an ace card

$= 1 - \frac{1}{13}$

$= \frac{12}{13}$

Hence, the correct answer is option (d).

Solution 19

The leap year has 366 days i.e., 52 week and 2 days.

These two days can be: Sun Mon, Mon Tue, Tue Wed, Wed Thu, Thu Fri, Fri Sat, Sat Sun.

Thus, the probability of 53 Sundays = $\frac{2}{7}$.

So, Assertion(A) is true.

Now, the non-leap year has 365 days i.e., 52 week and 1 day.

Thus, the probability of 53 Sundays = $\frac{1}{7}$.

So, Reason(R) is false.

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

Hence, the correct answer is option (c).

Solution 20

Since *a*, *b*, and *c* are in A.P.

$\therefore b - a = c - b \quad (\because \text{ Common difference will be same})$

$\Rightarrow 2b = a + c$

So, Assertion(A) is true.

Now,
The first *n* odd natural numbers will be 1, 3, 5, 7, 9, ..., *n*th term

$$\begin{aligned}\therefore \text{ Sum of } n \text{ natural numbers} &= \frac{n}{2}[2 \times 1 + (n-1) \times 2] \\ &= \frac{n}{2}[2 + 2n - 2] \\ &= \frac{n}{2} \times 2n \\ &= n^2\end{aligned}$$

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

Hence, the correct answer is option (b).

Section B

Solution 21

Let the two numbers be 2*x* and 3*x*. So, their HCF is *x*.

We know that,

Product of two number=Product of their LCM and HCF

$2x \times 3x = x \times 180$

$\Rightarrow 6x = 180$

$\Rightarrow x = 30$

Hence, the HCF of these numbers is 30.

Solution 22

Let *a* be the first zero of the polynomial then the other zero will be $\frac{1}{a}$.

$\therefore \text{Product of zeroes} = \frac{c}{a}$

$\Rightarrow a \times \frac{1}{a} = \frac{-(k-2)}{6}$

$\Rightarrow k - 2 = -6$

$\Rightarrow k = -4$

Solution 23

Given: $2x^2 - 9x + 4 = 0$

$\Rightarrow 2x^2 - 8x - x + 4 = 0$

$\Rightarrow 2x(x - 4) - 1(x - 4) = 0$

$\Rightarrow (2x - 1)(x - 4) = 0$

$\Rightarrow x = \frac{1}{2}, 4$

$\therefore \text{Sum of roots} = \frac{1}{2} + 4 = \frac{9}{2}$

$\text{And, product of roots} = \frac{1}{2} \times 4 = 2$

OR

Given quadratic equation , $4x^2 - 5 = 0$
Comparing the above equation with $ax^2 + bx + c = 0$, we get
$a = 4, b = 0 \text{ and } c = -5$
Now, discriminant D will be
$D = b^2 - 4ac$
$= (0)^2 - 4 \times 4 \times (-5)$
$= 80$

Since $D > 0$, therefore the given quadratic equation will have 2 real and distinct roots.

Solution 24

Given, a coin is tossed two times.
The possible outcomes are {TT, HH, TH, HT}
Number of possible outcomes = 4
Favourable outcomes = {TT, HT, TH}
Number of favourable outcomes = 3
$\text{Probability} = \frac{\text{Number of favorable outcomes}}{\text{Number of possible outcomes}}$

$\Rightarrow \text{Probability of getting atmost one head} = \frac{3}{4}$

Therefore, the probability of getting at most one head is $\frac{3}{4}$.

Solution 25

We have,

$\frac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$

$= \frac{5 \times \left(\frac{1}{2}\right)^2 + 4\left(\frac{2}{\sqrt{3}}\right)^2 - (1)^2}{\left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2}$ $\left(\because \ \cos 60^\circ = \frac{1}{2},\ sec30^\circ = \frac{2}{\sqrt{3}},\ \tan 45^\circ = 1,\ \sin 30^\circ\right.$

$= \frac{\frac{5}{4} + \frac{16}{3} - 1}{\frac{1}{4} + \frac{3}{4}}$

$= \frac{5}{4} + \frac{16}{3} - 1$

$= \frac{67}{12}$

OR

Given that,
sin (A − B) = 0
⇒ sin (A − B) = sin 0
⇒ A − B = 0
⇒ A = B .....(1)

Also,
2 cos (A + B) − 1 = 0
$\Rightarrow \cos(\mathrm{A} + \mathrm{B}) = \frac{1}{2}$

$\Rightarrow \cos(\mathrm{A} + \mathrm{B}) = \cos\left(\frac{\pi}{3}\right)$

$\Rightarrow \mathrm{A} + \mathrm{B} = \frac{\pi}{3}$

$\Rightarrow 2\mathrm{A} = \frac{\pi}{3}$ [Using (1)]

$\Rightarrow \mathrm{A} = \frac{\pi}{6}$

$\therefore \mathrm{A} = \mathrm{B} = \frac{\pi}{6}$

Section C

Solution 26

First term of A.P. = −14
Fifth term of A.P. = 2
Last term = 62
a = −14

$a + 4d = 2$
$-14 + 4d = 2$
$4d = 16$
$d = 4$
$a_n = a + (n - 1)d$
$62 = -14 + (n - 1)4$
$62 + 14 = 4n - 4$
$76 + 4 = 4n$
$4n = 80$
$n = 20$
Number of terms = 20

OR

Given AP: 65, 61, 57, 53, ...
Let a_n is a first negative term

$$a_n < 0$$
$$a + \left(n - 1\right)d < 0$$
$$a = 65$$
$$d = 61 - 65$$
$$= -4$$
$$\therefore\ 65 + \left(n - 1\right)(-4) < 0$$
$$\Rightarrow 65 - 4n + 4 < 0$$
$$\Rightarrow 69 < 4n$$
$$\Rightarrow n > \frac{69}{4}$$
$$\Rightarrow n > 17\frac{1}{4}$$

$\therefore$ First negative term = 18^{th} term.

Solution 27

Lets assume that $\sqrt{5}$ is a rational number
$\therefore\ \sqrt{5} = \frac{p}{q}$ where p and q are non-zero coprime integers.
$\Rightarrow\ \sqrt{5}q = p$
Squaring on both sides
$5q^2 = p^2$ .....(i)
$\Rightarrow$ 5 is a factor of p^2
$\Rightarrow$ 5 is also a factor of p ......(ii)
Therefore, we can write $p = 5c$ where c is non-zero integer.
Squaring on both sides
$p^2 = 25c^2$
From (i) $5q^2 = 25c^2$
$\Rightarrow q^2 = 5c^2$

⇒ 5 is a factor of *q*2

⇒ 5 is also a factor of *q* .....(iii)

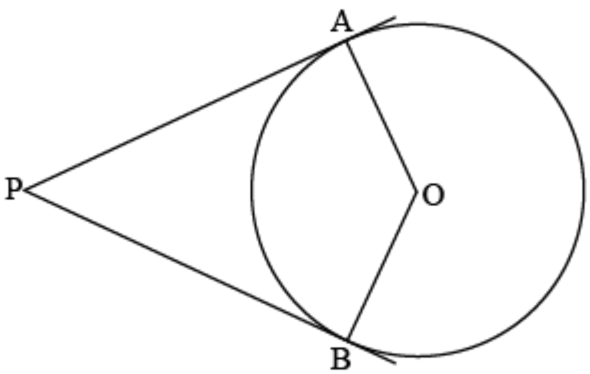
From (ii) and (iii), 5 is a common factor of *p* and *q*.

It contradicts our assumption that *p* and *q* are co-prime integers.

∴ $\sqrt{5}$ cannot be a rational number.

Hence it is an irrational number.

Solution 28



Given: PA and PB are tangents to the circle.

O is the centre of the circle

To prove: ∠P + ∠AOB = 180º

Prrof: Here, OA and OB are radii of the circle and we know that, at the point of contact, radius is perpendicular to the tangent.

∴ ∠PAO = 90º and ∠PBO = 90º .....(i)

In quad PAOB

∠P + ∠PAO + ∠AOB +∠PBO = 360º

∠P + 90º + ∠AOB + 90º = 360º (From (i))

⇒ ∠P + ∠AOB = 180º

∴ Angle between the tangents and the angle subtended by the line-segment joining the points of contact at the centre are supplementary.

Solution 29

We have,

$$\frac{\sin A-2\sin^3 A}{2\cos^3 A-\cos A}$$
$$=\frac{\sin A\left(1-2\sin^2 A\right)}{\cos A(2\cos^2 A-1)}$$
$$=\frac{\sin A\left(1-2\sin^2 A\right)}{\cos A\left\{2\left(1-\sin^2 A\right)-1\right\}}$$
$$=\frac{\sin A\left(1-2\sin^2 A\right)}{\cos A\left(1-2\sin^2 A\right)}$$
$$=\tan A$$

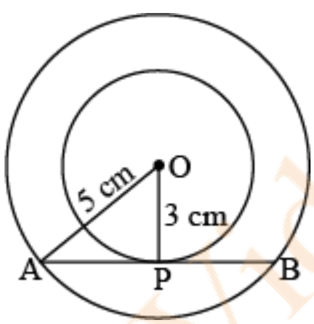
OR

We have,

secA(secA + tanA) (1 − sinA)

$$=\sec A\left(\frac{1}{\cos A}+\frac{\sin A}{\cos A}\right)(1-\sin A)$$
$$=\sec A\left(\frac{1+\sin A}{\cos A}\right)(1-\sin A)$$
$$=\sec A\left(\frac{1-\sin^2 A}{\cos A}\right)$$
$$=\sec A\left(\frac{\cos^2 A}{\cos A}\right)$$
$$=\sec A\times\cos A$$
$$=1$$

Solution 30



Given, two concenric circles having same cetnre O and AB is a chord of the larger circle touching the samller circle at P.
Also, OA = 5 cm and OP = 3 cm
Now in ΔOPA, using Pythagoras theorem
We get $OA^2 = OP^2 + AP^2$
⇒ $(5)^2 = (3)^2 + AP^2$
⇒ $25 = 9 + AP^2$
⇒ $AP^2 = 25 - 9$
⇒ $AP^2 = 16$
⇒ AP = 4 cm
Since, perpendicular drop from the centre of the circle bisect the chord.
∴ AB = 2 × AP = 2 × 4 = 8 cm

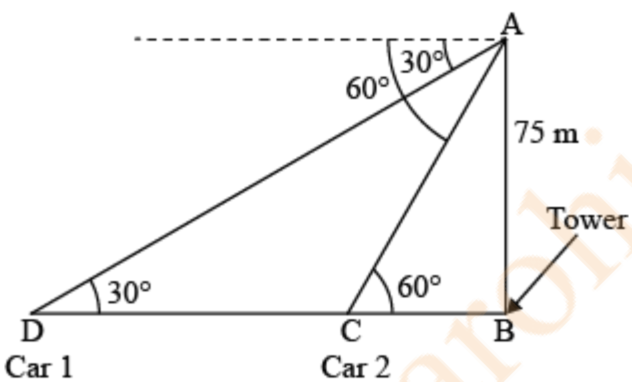
So, the length of the chord of the larger circle is 8 cm.

Solution 31

Given, a quadratic equation $px(x - 2) + 6 = 0$
$\Rightarrow px^2 - 2px + 6 = 0 \qquad ...(1)$
On comparing equation (1) with $ax^2 + bx + c = 0$
we get $a = p$, $b = -2p$ and $c = 6$.
Given, the quadratic equation has equal real roots, therefore D = 0
$\Rightarrow b^2 - 4ac = 0$
$\Rightarrow (-2p)^2 - 4(p)(6) = 0$
$\Rightarrow 4p^2 - 24p = 0$
$\Rightarrow 4p\,[p - 6] = 0$
$\Rightarrow p = 0$ or $p = 6$
$\because$ if $p = 0$ then given equation is not quadractic equations. Hence, the value of p is 6.

Section D

Solution 32



Let AB be the tower of height 75 m. The angle of depression of two cars at points D and C from the top of the tower are 30º and 60º respectively.

In ΔACB

$\frac{AB}{BC} = \tan\ 60º$

$\Rightarrow \frac{75}{BC} = \sqrt{3}$

$\Rightarrow BC = \frac{75}{\sqrt{3}} \qquad .....(1)$

$\Rightarrow BC = 25\sqrt{3} \qquad .....(1)$

In Δ ABD,

$\frac{AB}{BD} = \tan 30º$

$\Rightarrow \frac{75}{BD} = \frac{\sqrt{3}}{2}$

$\Rightarrow \frac{150}{\sqrt{3}} = BC + CD$

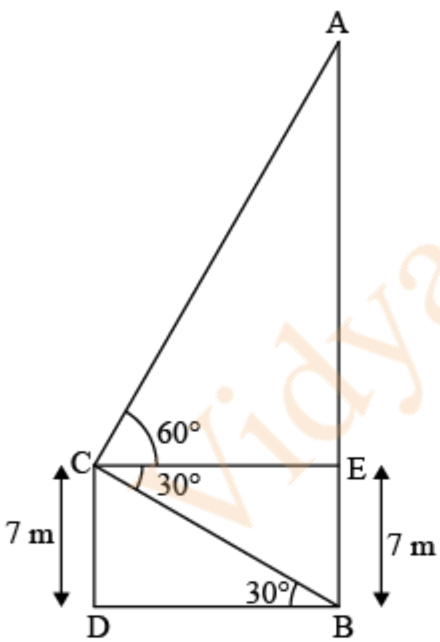
$\Rightarrow 50\sqrt{3} = BC + CD$

$\Rightarrow CD = 50\sqrt{3} - 25\sqrt{3}$

$\Rightarrow CD = 25\sqrt{3}$

Hence, the distance between $25\sqrt{3}$ m.

OR



Let CD be 7m high building.

AB be the cable twoer. Angle of elevation from top of building to top of cable tower is 60º & angle of depression of its foot is 30º.

In ΔCEB,

$\frac{CD}{CE} = \tan 30º$

$\Rightarrow \frac{7}{CE} = \frac{1}{\sqrt{3}}$

$\Rightarrow CE = 7\sqrt{3}$ cm

Now, in $\triangle ACE$

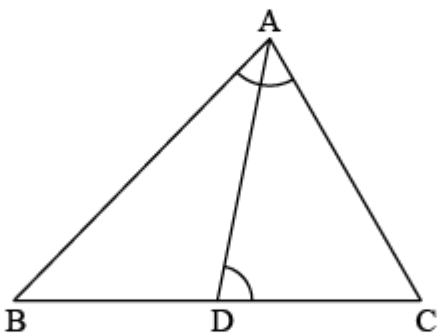
$\frac{AE}{CE} = \tan 60º$

$\Rightarrow \frac{AE}{7\sqrt{3}} = \sqrt{3}$

$\Rightarrow AE = 21$ cm

Height of the tower $= AE + BE = 21 + 7 = 28$ m

Solution 33



Given: ∠BAC = ∠ADC

To prove: $CA^2 = CB \cdot CD$

Proof: In ΔABC and ΔADC

∠BAC = ∠ADC (Given)

∠C = ∠C (Common)

Therefore, by AA similarity criterion

ΔBAC ~ ΔADC

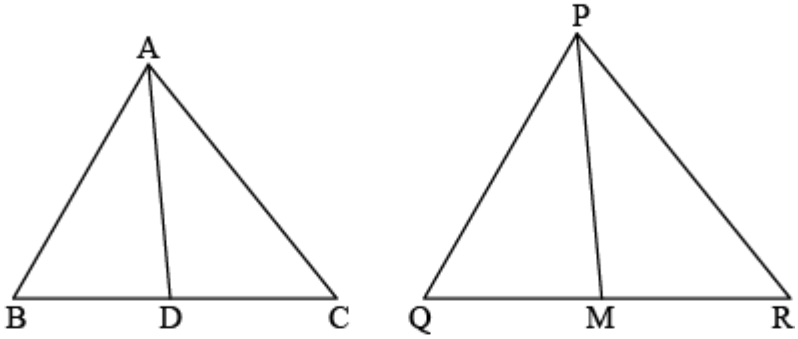
In similar triangles, corresponding sides are proportional

$\therefore \frac{CA}{CD} = \frac{CB}{CA}$

$\Rightarrow CA^2 = CB \cdot CD$

Hence proved.

OR



Given: (i) ΔABC ~ ΔPQR
(ii) AD is a median
(iii) PM is a median

Top prove: $\frac{AB}{PQ} = \frac{AD}{PM}$

Proof: Since ΔABC ~ ΔPQR

⇒ ∠B = ∠Q (Corresponding angles of similar triangles are equal) .....(1)

and $\frac{AB}{PQ} = \frac{BC}{QR}$ (Corresponding sides of similar triangles are proportional)

$\Rightarrow \frac{AB}{PQ} = \frac{2\,BD}{2\,QM}$ $(\because \text{ AD and PM are medians})$

$\Rightarrow \frac{AB}{PQ} = \frac{BD}{QM}$ $\ldots\ldots(2)$

Now in ΔABD and ΔPQM

∠B = ∠Q [From (1)]

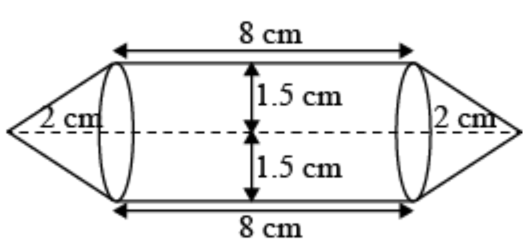
$\frac{AB}{PQ} = \frac{BD}{QM}$ [From (2)]

∴ ΔABD ~ ΔPQM (By SAS similarity criterion)

$\therefore \frac{AB}{PQ} = \frac{AD}{PM}$ (Corresponding sides of similar triangles are proportional)

Hence proved.

Solution 34



From the figure above, we can observe that

Height of each conical part = 2 cm = h_1

Height of cylindrical part = 12 – 2(h_1)
= 12 – 2 (2)
= 8 cm = h_2

Radius of cylindrical part = $\frac{3}{2} = 1.5\ \text{cm}\ = r$

Radius of conical part = $\frac{3}{2} = 1.5\ \text{cm} = r$

Volume of air present in the model = Volume of cylinder + 2 × Volume of cone

$$= \pi r^2 h_2 + 2 \times \frac{1}{3}\pi r^2 h_1$$
$$= \pi \times (1.5)^2 \times (8) + 2 \times \frac{1}{3} \times \pi \times (1.5)^2 \times 2$$
$$= \pi \times 2.25 \times 8 + \frac{2}{3} \times \pi \times 2.25 \times 2$$
$$= 18\pi + 3\pi$$
$$= 21\pi$$
$$= 21 \times \frac{22}{7} \qquad \left[\because \pi = \frac{22}{7}\right]$$
$$= 66\ \text{cm}^3$$

Hence, the volume of air contained in the model is 66 cm^3.

Solution 35

Expenditure (in ₹)	**Number of Families (f_i)**	x_i	$f_i x_i$	**c.f**
1000 - 1500	24	1250	30000	24
1500 - 2000	40	1750	70000	64
2000 - 2500	33	2250	74250	97
2500 - 3000	28	2750	77000	125
3000 - 3500	30	3250	97500	155
3500 - 4000	22	3750	82500	177
4000 - 4500	16	4250	68000	193
4500 - 5000	7	4750	33250	200
Total	**200**		**532500**	

Given, sum of frequencies = Σf_i = 200

According to given table, $\Sigma f_i = 172 + x$

On equating we get, $172 + x = 200$

$\Rightarrow x = 200 - 172$

$\Rightarrow x = 28$

Now, from table it can be observed that, $\Sigma f_i = 200$ and $\Sigma f_i x_i = 532500$

So, $\text{Mean } (\overline{x}) = \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{532500}{200} = 2662.5$

Then, $\frac{N}{2} = \frac{\text{Sum of frequencies}}{2} = \frac{200}{2} = 100$

For finding the median class, we will check which cumulative frequency is just greater than 100. In this, it is 125 therefor median class will be 2500 – 3000.

Using formula,

$$\text{Median} = l + \left[\frac{\frac{N}{2} - cf}{f}\right] \times h$$

$$= 2500 + \left[\frac{100-97}{28}\right] \times 500$$

$$= 2500 + \frac{3 \times 500}{28}$$

$$= 2500 + 53.57$$

$$= 2553.57$$

Solution 36

Given,
Prize amount for Hockey is ₹x per student
Prize amount for Cricket is ₹y per student
(i) According to question,
For school P, 5 and 4 students were awarded with prize amount for Hockey and Cricket respectively.
$\therefore\ 5x + 4y = 9500 \ldots \text{(i)}$
For school Q, 4 and 3 students were awarded with prize amount for Hockey and Cricket respectively.
$\therefore\ 4x + 3y = 7370 \ldots \text{(ii)}$
(ii) (a) Multiply equation (1) by 3 and equation (2) by 4, we get
$15x + 12y = 28500 \quad \ldots \text{(i)}$

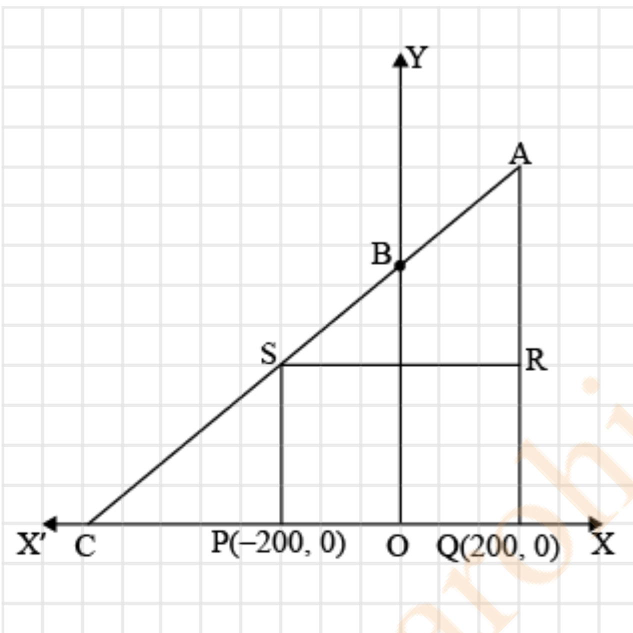
$16x + 12y = 29480 \quad \ldots \text{(ii)}$

On solving both equations, we get the prize amount for hockey = ₹x = ₹980.
(b) On substituting the value of x in equation (1) , we get the prize amount for cricket = ₹y = 1150.
Difference between prize amount = ₹y − ₹x
⇒ 1150 − 980 = ₹170.
∴ Prize amount on Cricket is ₹170 more than prize amount on Hockey.
(iii) Total prize amount for 2 students for each game = $2x + 2y$
$\Rightarrow (2 \times 980) + (2 \times 1150)$

$\Rightarrow 1960 + 2300$

$\Rightarrow$ ₹4260

Solution 37



(i) 1 unit on x-axis = 100 units
Since PQRS is square
1 unit on y-axis must also be 100 units
∴ Coordinates of R(200, 400)
Coordinates of S(−200, 400)

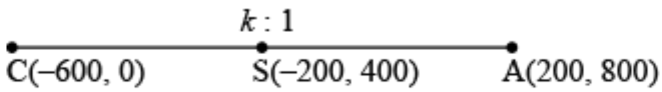
(ii) (a) Area of the square PQRS = $(PQ)^2$
= $(200 + 200)^2 + (0 - 0)^2$
= $(400)^2$
= 160000 sq. units
(Used distance formula, $PQ^2 = (x_2 - x_1)^2 + (y_2, y_1)^2]$
(b) Length of diagonal PR in square PQRS

$$PR=\sqrt{(x_2-x_1)^2+(y_2-\ y_1)^2}$$

$$=\sqrt{(200+200)^2+(400-0)^2}$$

$$=\sqrt{(400)^2+(400)^2}$$

$$=400\sqrt{2}\ \text{units}$$

(iii) 

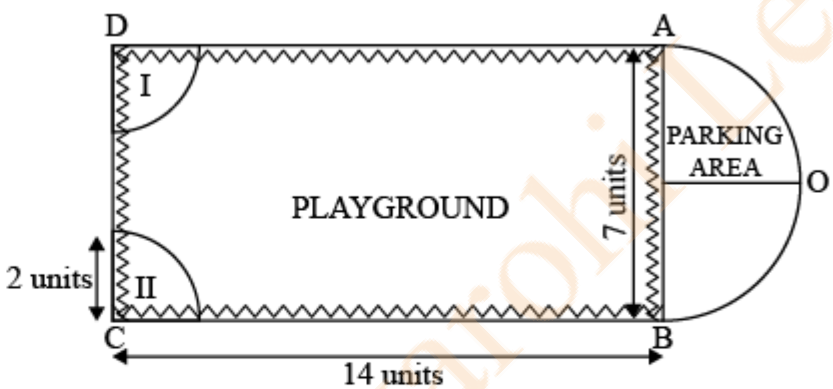
y-coordinate of S using section formula

$$400=\frac{800k+0}{k+1}$$

$$\Rightarrow 400k+400=800k$$

$$\Rightarrow \boxed{k=1}$$

Solution 38



(i) Total Perimeter of parking area

$$=\overset{\frown}{\text{AOB}}+AB$$

$$=\frac{2\pi r}{2}+7$$

$$=\frac{\pi\left(\frac{7}{2}\right)}{2}+7$$

$$=\frac{22}{7}\times\frac{7}{2}+7$$

$$=11+7=18\ \text{units}$$

(ii) (a) Total area of parking and two quadrant = Area of parking area + 2 × Area of one quadrant

$$= \frac{\pi\left(\frac{7}{2}\right)^2}{2} + 2 \times \frac{90}{360} \times \pi(2)^2$$
$$= \pi\left(\frac{49}{8} + 2 \times \frac{1}{4} \times 4\right)$$
$$= \pi\left(\frac{49}{8} + 2\right)$$
$$= \pi\frac{(49+16)}{8}$$
$$= \frac{22}{7} \times \frac{65}{8}$$
$$= 25.53 \text{ units}^2$$

OR

b) Area of play ground $= 14 \times 7$

$= 98 \text{ units}^2$

Area of parking = $\frac{\pi\left(\frac{7}{2}\right)^2}{2}$

$$= \frac{22}{7} \times \frac{7\times7}{4\times2}$$
$$= \frac{77}{4}$$

Ratio of area of play ground to area of parking area

$$= \frac{98\times4}{77}$$
$$= \frac{56}{11}$$

Ratio = 56 : 11

(c) Perimeter of playground $= 2 \times (14 + 7)$

$= 2 \times 21$

$= 42 \text{ units}$

Length of $\overset{\frown}{\text{AOB}} = \frac{2\pi r}{2}$

$= \pi \times \frac{7}{2}$

$= 11 \text{ units}$

Total perimeter for fencing $= 42 + 11$

$= 53$ units

Cost of fencing $= 53 \times 2$

$= 106$