Solution

PRE BOARD EXAM- I (2025-26)

Class 10 - Mathematics

Section A

1.

(b) (18, 25)

Explanation:

The numbers that do not share any common factor other than 1 are called co-primes.

factors of 18 are: 1, 2, 3, 6, 9 and 18

factors of 25 are: 1, 5, 25

The two numbers do not share any common factor other than 1.

They are co-primes to each other.

2. **(a)** 936

Explanation:

LCM (72, 234) = $\frac{(72\times234)}{18}$ = 936

Therefore, the LCM of (72, 234) is 936.

3. **(a)** $\frac{7}{5}, -\frac{7}{5}$

Explanation:

p(x) = 25x^2 - 49 = 0

= (5x - 7)(5x + 7) = 0

$\therefore$ x = $\frac{7}{5}$ and $\frac{-7}{5}$

4.

(b) $\frac{101}{4}$

Explanation:

Polynomial can be re-written

as 2x^2 - 9x - 5

Let zero's are α and β

$\alpha+\beta=\frac{-(-9)}{2}=\frac{9}{2}$

$\alpha\beta=\frac{-5}{2}$

Now,

$\alpha^2+\beta^2$

$=\alpha^2+\beta^2+2\alpha\beta-2\alpha\beta$

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

$=\left(\frac{9}{2}\right)^2-2\left(\frac{-5}{2}\right)$

$=\frac{81}{4}+5$

$=\frac{81+20}{4}=\frac{101}{4}$

5. **(a)** -15x + 9y = 5

Explanation:

For lines to be parallel

$\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$

6.

(c) x^3 - x^2 + 2x + 1 = $(x + 1)^3$

Explanation:

Degree of the equation is more than 2 i.e. 3.

7.

(d) (2n - 15)

Explanation:

We have, T_7 = -1 $\Rightarrow$ a + 6d = -1 ...(i)

T_{16} = 17 $\Rightarrow$ a + 15d = 17 ...(ii)

On solving (i) and (ii), we get

a = -13 and d = 2.

$\therefore$ T_n = a + (n - 1)d

= -13 + (n -1) $\times$ 2

= (2n -15).

8. **(a)** 15 cm.

Explanation:

Given: $\Delta ABC \sim \Delta PQR$

$\therefore \frac{\text{Perimeter of } \Delta \text{ABC}}{\text{Perimeter of } \Delta \text{PQR}} = \frac{\text{BC}}{\text{QR}}$

$\Rightarrow \frac{\text{Perimeter of } \Delta \text{ABC}}{3+2+2.5} = \frac{4}{2}$

$\Rightarrow$ Perimeter of $\triangle$ABC = 15 cm

9.

(b) 2 : 1

Explanation:

The centroid of a triangle is the centre of the triangle which is the point of intersection of all the three medians of the triangle and divides the median in the ratio 2 : 1

The median is a line drawn from the mid-point of a side to the opposite vertex.

10.

(b) $\frac{3}{5}$

Explanation:

6 cot θ + 2 cosec θ = cot θ + 5 cosec θ

5 cot θ = 3 cosec θ

$5 \frac{\cos\theta}{\sin\theta} = \frac{3\times 1}{\sin\theta}$

5 cos θ = 3

cos θ = $\frac{3}{5}$

11.

(c) $\frac{7}{8}$

Explanation:

$\tan^2\theta = \frac{8}{7} \Rightarrow \tan\theta = \frac{\sqrt{8}}{\sqrt{7}} = \frac{2\sqrt{2}}{\sqrt{7}} \quad = \frac{\text{Perpendicular}}{\text{Base}}$

By Pythagoras Theorem

$(\text{Hyp.})^2 = (\text{Base})^2 + (\text{Perp.})^2$

$= (\sqrt{7})^2 + (2\sqrt{2})^2 = 7 + 8 = 15$

$\therefore \text{Hyp.} = \sqrt{15}$

$\therefore \sin\theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}} = \frac{2\sqrt{2}}{\sqrt{15}}$

$\cos\theta = \frac{\text{Base}}{\text{Hypotenuse}} = \frac{\sqrt{7}}{\sqrt{15}}$

Now, $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$

$= \frac{1-\sin^2\theta}{1-\cos^2\theta} = \frac{1-\left(\frac{2\sqrt{2}}{\sqrt{15}}\right)^2}{1-\left(\frac{\sqrt{7}}{\sqrt{15}}\right)^2}$

$= \frac{1-\frac{8}{15}}{1-\frac{7}{15}} = \frac{\frac{15-8}{15}}{\frac{15-7}{15}} = \frac{\frac{7}{15}}{\frac{8}{15}}$
$= \frac{7}{15} \times \frac{15}{8} = \frac{7}{8}$

12.

(c) 72^{o}
Explanation:
Area of the sector $= \frac{\theta}{360^\circ} \times \pi r^2$
$5\pi = \frac{\theta}{360^\circ} \times \pi \times 5 \times 5$
$\Rightarrow \theta = \frac{5\pi}{\pi} \times \frac{360^\circ}{5\times 5}$
$\Rightarrow \theta$ = 72^{o}

Hence, sector angle = 72^{o}

13.

(d) 231 cm^2
Explanation:
Area swept by minute hand in 60 minutes = πR^2
Area swept by it in 10 minutes
$= \left(\frac{\pi R^2}{60} \times 10\right) \mathrm{cm}^2 = \left(\frac{22}{7} \times 21 \times 21 \times \frac{1}{6}\right) \mathrm{cm}^2$
= 231 cm^2

14.

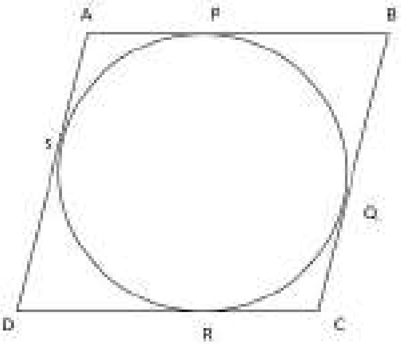
(d) 1 : 2
Explanation:
$2\pi r^2 = \pi rl \Rightarrow \frac{r}{l} = \frac{1}{2}$

15.

(d) 81
Explanation:
Mean of first n odd natural numbers = $\frac{n^2}{81}$ ...(i)
Also, First odd natural number = 1
n-th odd natural number = (2n - 1)
Sum of first 'n' odd natural numbers
= $\left(\frac{n}{2}\right) \times$ (1 + 2n - 1) = (n $\times$ n) = n^2
Therefore,
Mean of first n odd natural numbers = $\frac{n^2}{n}$ = n ...(ii)
From (i) and (ii) we get
$\frac{n^2}{81}$ = n $\Rightarrow$ n = 81

16.

(c) AB + CD = BC + AD
Explanation:



Property: If two tangents are drawn to a circle from one external point, then their tangent segments (lines joining the external point and the points of tangency on circle) are equal.

By the above property,

AP = AS (tangent from A)

BP = BQ (tangent from B)

CR = CQ (tangent from C)

DR = DS (tangent from D)

Now we add above 4 equations,

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

$\Rightarrow$ AB + CD = BC + AD [$\because$ AP + BP = AB, CR + DR = CD, AS + DS = AD, BQ + CQ = BC]

Hence, the right option is AB + CD = BC + AD

17.

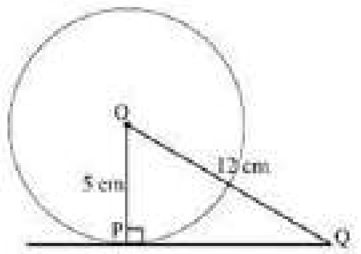
(d) $\sqrt{119}$

Explanation:

We know that the line drawn from the centre of the circle to the tangent is perpendicular to the tangent.

$OP \perp PQ$

By applying Pythagoras theorem in ΔOPQ,



$OP^2 + PQ^2 = OQ^2$

$5^2 + PQ^2 = 12^2$

$PQ^2 = 144 - 25$

$\mathrm{PQ} = \sqrt{119}\mathrm{cm}$

18.

(c) 60°

Explanation:

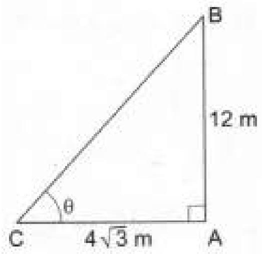
Let AB be the pole and AC be its shadow.

AB = 12 m and AC = $4\sqrt{3}$ m.

Let $\angle$ACB = θ. Then, tan θ = $\frac{AB}{AC} = \frac{12}{4\sqrt{3}}$

$\Rightarrow$ tan θ = $\frac{12}{4\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \sqrt{3}$ = tan 60°

$\Rightarrow \theta = 60^o$



19.

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

Explanation:

Two lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are parallel if $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

So, both A and R are true but R is not the correct explanation of A.

20.

(d) A is false but R is true.

Explanation:

A is false but R is true.

Section B

21. Let us assume that $7 - 2\sqrt{3}$ is a rational number

$\Rightarrow 7 - 2\sqrt{3} = \frac{a}{b}$, where a and b are integers, $b \neq 0$

$\Rightarrow \sqrt{3} = \frac{7b - a}{2b}$

RHS is a rational number but LHS is irrational.

$\therefore$ Our assumption was wrong. Hence, $7 - 2\sqrt{3}$ is irrational.

22. According to question the given arithmetic progression is 20, $19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \ldots$

common difference $= 19\frac{1}{4} - 20 = \frac{77}{4} - 20 = \frac{-3}{4}$ Also we know that

the general term of an arithmatic progressionis given by

$a_n = a + (n-1)d < 0$

$\Rightarrow a + (n-1)d < 0$

$\Rightarrow 20 + (n-1)(\frac{-3}{4}) < 0$

$\Rightarrow 20 - \frac{3n}{4} + \frac{3}{4} < 0$

$\Rightarrow -\frac{3n}{4} + \frac{83}{4} < 0$

$\Rightarrow -3n + 83 < 0$

$\Rightarrow -3n < -83$

$\Rightarrow n > \frac{83}{3}$

$\Rightarrow n > 27.6$

So, n=28

Hence, the first negative term would be the 28th term.

OR

The numbers lying between 10 and 300, which when divided by 4 leave a remainder 3 are

11, 15, 19............,299

This is an A.P. with a = 11, d = 4 and l = 299

Let the number of terms be n.

then, $a_n = 299$

$\Rightarrow a + (n - 1)d = 299$

$\Rightarrow 11 + (n - 1)4 = 299$

$\Rightarrow (n - 1)4 = 288$

$\Rightarrow n - 1 = 72$

$\Rightarrow$ n = 73

Thus, the required number of terms are 73.

23. Let the point C(4, 5) divides the join of A(2, 3) and B(7, 8) in the ratio k:1

The point C is $\left(\frac{7k+2}{k+1}, \frac{8k+3}{k+1}\right)$

But C is (4, 5)

$\Rightarrow \frac{7k+2}{k+1} = 4$

or 7k + 2 = 4k + 4

or 3k = 2

$\therefore k = \frac{2}{3}$

Thus, C divides AB in the ratio 2:3

24. The Radii of two cylinders are in the ratio of = 3 : 5

and ratio in their heights = 2 : 3

Let r_1, r_2 be the radii and h_1, h_2 be the heights of the two cylinders respectively, then

$\frac{r_1}{r_2} = \frac{3}{5}$ and $\frac{h_1}{h_2} = \frac{2}{3}$

Now $\frac{Curved\ surface\ of\ first\ cylinder}{Curved\ surface\ of\ second\ cylinder}$

$= \frac{2\pi r_1 h_1}{2\pi r_2 h_2}$

$= \frac{r_1 h_1}{r_2 h_2} = \frac{r_1}{r_2} \times \frac{h_1}{h_2}$

$= \frac{3}{5} \times \frac{2}{3} = \frac{2}{5}$

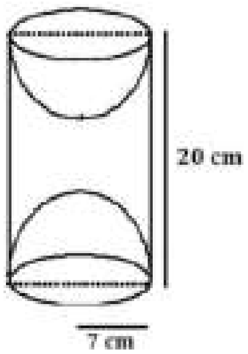
$\therefore$ Their ratio = 2 : 5

OR

Total surface area $= 4\pi r^2 + 2\pi rh$

$= 4 \times \frac{22}{7} \times 7 \times 7 + 2 \times \frac{22}{7} \times 7 \times 20$

= 616 + 880 = 1496 cm^2



25. Total playing cards = 52 - 8 = 44
    a. P(ace of hearts) = $\frac{1}{44}$
    b. P(Black card) = $\frac{22}{44}$ or $\frac{1}{2}$
    c. P(jack of spades) = $\frac{1}{44}$

Section C

26. The given polynomial p(x) = $x^2 + 2\sqrt{2}x - 6$

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

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

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

p(x) = 0 if $x+3\sqrt{2} = 0$ or $x = \sqrt{2}$

Zeroes of the polynomials are $\sqrt{2}$ and $-3\sqrt{2}$

For p(x) = $x^2 + 2\sqrt{2}x - 6$

a = 1, b = $2\sqrt{2}$, c = -6

Sum of the zeroes $\sqrt{2} - 3\sqrt{2} = -2\sqrt{2} = -\frac{2\sqrt{2}}{1} = -\frac{b}{a}$

Product of the zeroes $=\sqrt{2} \times -3\sqrt{2} = \frac{-6}{1} = \frac{c}{a}$

Hence, the relationship is verified.

OR

P (x) = $2x^2 - 4x + 5$
Here, a = 2 , b = – 4, c = 5
Let zeroes be α, β
Sum of zeroes $\alpha + \beta = \frac{-b}{a} = \frac{-(-4)}{2} = 2$
Product of zeroes $\alpha \times \beta = \frac{c}{a} = \frac{5}{2}$

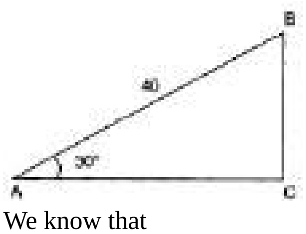
i. $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$
 $= (2)^2 - 2(\frac{5}{2})$
 = 4 – 5
 $\Rightarrow \alpha^2 + \beta^2 = -1$

ii. $(\alpha - \beta)^2 = (\alpha + \beta)^2 - 4\alpha\beta$
 $= (2)^2 - 4(\frac{5}{2})$
 = 4 – 2(5)
 = 4 – 10
 = - 6
 $(\alpha - \beta)^2 = -6$

27. The given equation are
x + 2y + 7 = 0
2x + ky + 14 = 0
The given equations are of the form
$a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$,
After comparing the given equation with standard equation
We get, $a_1 = 1$, $b_1 = 2$, $c_1 = 7$ and $a_2 = 2$, $b_2 = k$, $c_2 = 14$
The given equations will represent coincident lines if they have infinitely many solutions. The condition for which is
$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
$\Rightarrow \frac{1}{2} = \frac{2}{k} = \frac{7}{14}$
$\Rightarrow$ k = 4
Hence, the given system of equations will represent coincident lines, if k = 4.

28. According to question
$\frac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} = \frac{1-\sqrt{3}}{1+\sqrt{3}}$
$\Rightarrow \quad \frac{(\cos\theta-\sin\theta)+(\cos\theta+\sin\theta)}{(\cos\theta-\sin\theta)-(\cos\theta+\sin\theta)} = \frac{(1-\sqrt{3})+(1+\sqrt{3})}{(1-\sqrt{3})-(1+\sqrt{3})}$ $[Applying\ componendo\ and\ dividendo]$
$\Rightarrow \quad \frac{2\cos\theta}{-2\sin\theta} = \frac{2}{-2\sqrt{3}}$
$\Rightarrow \quad \cot\theta = \frac{1}{\sqrt{3}} \Rightarrow \tan\theta = \sqrt{3} \Rightarrow \tan\theta = \tan 60^\circ \Rightarrow \theta = 60^\circ$

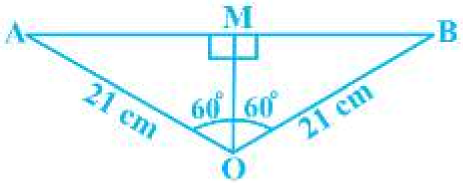
OR



We know that
$\angle A + \angle B + \angle C = 180^\circ$
$\Rightarrow \quad 30^\circ + \angle B + 90^\circ = 180^\circ$
$\Rightarrow \quad \angle B = 180^\circ - 120^\circ = 60^\circ$
Now, $\cos A = \frac{AC}{AB}$
$\Rightarrow \quad \cos 30^\circ = \frac{AC}{40}$
$\Rightarrow \frac{\sqrt{3}}{2} = \frac{AC}{40}$
$\Rightarrow \quad AC = \frac{\sqrt{3}}{2} \times 40$
$\Rightarrow AC = 20\sqrt{3}$ units
and, $\sin A = \frac{BC}{AB}$

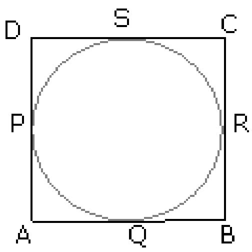
$\Rightarrow \quad \sin 30^\circ = \frac{BC}{40}$
$\Rightarrow \quad \frac{1}{2} = \frac{BC}{40}$
$\Rightarrow BC = 40 \times \frac{1}{2} = 20$
Hence, $\angle B = 60^\circ$, $AC = 20\sqrt{3}$ units
and BC = 20 units

29. Area of the segment AYB = Area of sector OAYB - Area of Δ OAB
Now, area of the sector OAYB = $\frac{120}{360} \times \frac{22}{7} \times 21 \times 21\text{cm}^2 = 462\text{cm}^2$
For finding the area of Δ OAB, draw OM ⊥ AB as shown in Fig.



Note that OA = OB. Therefore, by RHS congruence, Δ AMO ≅ Δ BMO.
So, M is the mid-point of AB and $\angle\text{AOM} = \angle\text{BOM} = \frac{1}{2} \times 120^\circ = 60^\circ$
Let OM = x cm
So, from Δ OMA, $\frac{\text{OM}}{\text{OA}} = \cos 60^\circ$
or, $\frac{x}{21} = \frac{1}{2} \quad \left(\cos 60^\circ = \frac{1}{2}\right)$
or, $x = \frac{21}{2}$
So, $\text{OM} = \frac{21}{2}\text{cm}$
Also, $\frac{\text{AM}}{\text{OA}} = \sin 60^\circ = \frac{\sqrt{3}}{2}$
So, $\text{AM} = \frac{21\sqrt{3}}{2}\text{cm}$
Therefore, $AB = 2AM = \frac{2\times 21\sqrt{3}}{2}\text{cm} = 21\sqrt{3}\text{cm}$
So, area of Δ OAB $= \frac{1}{2}\text{AB} \times \text{OM} = \frac{1}{2} \times 21\sqrt{3} \times \frac{21}{2}\text{cm}^2$
$= \frac{441}{4}\sqrt{3}\text{cm}^2$
Therefore, area of the segment AYB = $\left(462 - \frac{441}{4}\sqrt{3}\right)\text{cm}^2$ [From (1), (2) and (3)]
$= \frac{21}{4}(88 - 21\sqrt{3})\text{cm}^2$

30. Total no. of possibilities are {1,2, 3 ... 99, 100}
So n=100
   i. Number divisible by 9 and perfect square are {9, 36,81}
   So m = 3
   ∴Required probability P =$\frac{m}{n} = \frac{3}{100}$
   ii. Now the prime number more than 80 upto 100 are 83,89,97 .So m=3
   Hence, the probability P=$\frac{m}{n} = \frac{3}{100}$

31. 

Given ABCD is a parallelogram in which all the sides touch a given circle
To prove:- ABCD is a rhombus
Proof:-
∵ ABCD is a parallelogram
∴ AB = DC and AD = BC
Again AP, AQ are tangents to the circle from the point A
∴ AP = AQ
Similarly, BR = BQ
CR = CS
DP = DS

$\therefore$(AP + DP) + (BR + CR) = AQ + DS + BQ + CS = (AQ + BQ) + (CS + DS)

$\Rightarrow$ AD + BC = AB + DC

$\Rightarrow$ BC + BC = AB + AB [$\because$ AB = DC, AD = BC]

$\Rightarrow$ 2BC = 2AB

$\Rightarrow$ BC = AB

Hence, parallelogram ABCD is a rhombus

Section D

32. Given that a train travelling at a uniform speed for 360 km

Let the original speed of the train be x km/hr

Time taken $= \frac{\text{Distance}}{\text{Speed}} = \frac{360}{x}$

Time taken at increased speed $= \frac{360}{x+5}$ hours.

According to the question

$\frac{360}{x} - \frac{360}{x+5} = \frac{48}{60}$

$360\left[\frac{1}{x} - \frac{1}{x+5}\right] = \frac{4}{5}$

$or, \frac{360(x+5-x)}{x^2+5x} = \frac{4}{5}$

$or, \frac{1800}{x^2+5x} = \frac{4}{5}$

$\Rightarrow \quad x^2 + 5x - 2250 = 0$

$\Rightarrow \quad x^2 + (50 - 45)x - 2250 = 0$

$\Rightarrow \quad x^2 + 50x - 45x - 2250 = 0$

$\Rightarrow \quad (x + 50)(x - 45) = 0$

Either x = - 50 or x = 45

As speed cannot be negative

$\therefore$ Original speed of train = 45 km/hr.

OR

Let the original price of the book = ₹ x

$\therefore$ Number of books bought for ₹ 600 = $\frac{600}{x}$

Reduced price of the book = ₹ (x - 5)

$\therefore$ Number of books bought for ₹ 600 = $\frac{600}{x-5}$

It is given that

$\frac{600}{x-5} - \frac{600}{x} = 4$

$\Rightarrow \frac{600x-600x+3000}{x^2-5x}$ = 4

$\Rightarrow$ 3000 = $4x^2$ - 20x

$\Rightarrow$ $4x^2$ - 20x - 3000 = 0

$\Rightarrow$ x^2 - 5x - 750 = 0

$\Rightarrow$ x^2 - 30x + 25x - 750 = 0

$\Rightarrow$ x(x - 30) + 25(x - 30) = 0

$\Rightarrow$ x - 30 = 0 or x + 25 = 0

$\Rightarrow$ x = 30 or x = -25

Since the price of a book cannot be negative, x $\neq$ -25

$\Rightarrow$ x = 30

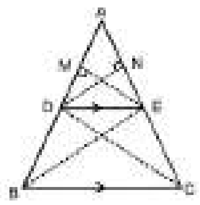
Hence, the original price of a book is ₹ 30

33. Given: ABC is a triangle in which DE $\parallel$ BC.

To prove: $\frac{AD}{BD} = \frac{AE}{CE}$

Construction: Draw $DN \perp AE$ and $EM \perp AD$., Join BE and CD.

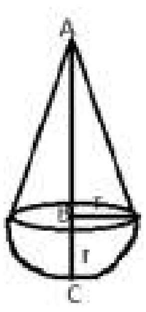
Proof :



In $\triangle ADE$,
Area of $\Delta ADE = \frac{1}{2} \times AE \times DN$ ...(i)
In ΔDEC,
Area of $\Delta\, DCE = \frac{1}{2} \times CE \times DN$ ...(ii)
Dividing equation (i) by equation (ii),
$\Rightarrow \frac{\text{area } (\Delta ADE)}{\text{area } (\Delta DEC)} = \frac{\frac{1}{2} \times AE \times DN}{\frac{1}{2} \times CE \times DN}$
$\Rightarrow \frac{\text{area } (\Delta ADE)}{\text{area } (\Delta DEC)} = \frac{AE}{CE}$ ...(iii)
Similarly, In ΔADE,
Area of $\Delta\, ADE = \frac{1}{2} \times AD \times EM$ ...(iv)
In ΔDEB,
Area of $\Delta\, DEB = \frac{1}{2} \times EM \times BD$ ...(v)
Dividing equation (iv) by equation (v),
$\Rightarrow \frac{\text{area } (\Delta ADE)}{\text{area } (\Delta DEB)} = \frac{\frac{1}{2} \times AD \times EM}{\frac{1}{2} \times BD \times EM}$
$\Rightarrow \frac{\text{area } (\Delta ADE)}{\text{area } (\Delta DEB)} = \frac{AD}{BD}$ ...(vi)
ΔDEB and ΔDEC lie on the same base DE and between two parallel lines DE and BC.
$\therefore$ Area (ΔDEB) = Area (ΔDEC)
From equation (iii),
$\Rightarrow \frac{\text{area } (\Delta ADE)}{\text{area } (\Delta DEB)} = \frac{AE}{CE}.$ ...(vii)
From equation (vi) and equation (vii),
$\frac{AE}{CE} = \frac{AD}{BD}$
$\therefore$ If a line is drawn parallel to one side of a triangle to intersect the other two sides in two points, then the other two sides are divided in the same ratio.

34. We have;
A Cube,
Cube's $\frac{length}{Edge}$, a = 7 cm
A Cylinder:
Cylinder's Radius, r = 2.1 cm or r = $\frac{21}{10}$cm
Cylinder's Height, h = 7 cm
$\because$ A cylinder is scooped out from a cube,
$\therefore$ TSA of the resulting cuboid:
= TSA of whole Cube - 2 $\times$ (Area of upper circle or Area of lower circle) + CSA of the scooped out Cylinder
= $6a^2 + 2\pi rh - 2 \times (\pi r^2)$
= $6 \times (7)^2 + 2 \times (22 \div 7 \times 2.1 \times 7) - 2 \times [22 \div 7 \times (2.1)^2]$
= $6 \times 49 + (44 \div 7 \times 14.7) - (44 \div 7 \times 4.41)$
= 294 + 92.4 - 27.72
= 294 + 64.68
= 358.68 cm^2
Hence, the total surface area of the remaining solid is 358.68 cm^2

OR



From the given figure,

Height (AB) of the cone = AC - BC (Radius of the hemisphere)
Thus, height of the cone = Total height - Radius of the hemisphere
= 9.5 - 3.5
= 6 cm
Volume of the solid = Volume of the cone + Volume of the hemisphere
$= \left(\frac{1}{3}\pi r^2 h\right) + \left(\frac{2}{3}\pi r^3\right)$
$= \frac{1}{3}\pi r^2(h + 2r)$
$= \frac{1}{3} \times \frac{22}{7} \times 3.5 \times 3.5(6 + 2 \times 3.5)$
$= \frac{1}{3} \times \frac{22}{7} \times 3.5 \times 3.5 \times 13$
= 166.83 cm^3
Thus, total volume of the solid is 166.83 cm^3.

35.

Monthly Consumption	**Number of consumers** (f_i)	**Cumulative Frequency**
0-10	5	5
10-20	x	5 + x
20-30	20	25 + x
30-40	15	40 + x
40-50	y	40 + x + y
50-60	5	45 + x + y
Total	$\sum f_i = n = 60$	

Here, $\sum f_i = n = 60$, then $\frac{n}{2} = \frac{60}{2} = 30$, also, median of the distribution is 28.5, which lies in interval 20 – 30.
$\therefore$ Median class = 20 – 30
So, l = 20, n = 60, f = 20, cf = 5 + x and h = 10
$\because 45 + x + y = 60$
$\Rightarrow x + y = 15$ ……….........(i)
Now, Median = $l + \left[\frac{\frac{n}{2} - cf}{f}\right] \times h$
$\Rightarrow 28.5 = 20 + \left[\frac{30-(5+x)}{20}\right] \times 10$
$\Rightarrow 28.5 = 20 + \frac{30-5-x}{2}$
$\Rightarrow 28.5 = \frac{40+25-x}{2}$
$\Rightarrow 57.0 = 65 - x$
$\Rightarrow x = 65 - 57 = 8$
$\Rightarrow$ x = 8
Putting the value of x in eq. (i), we get,
8 + y = 15
$\Rightarrow$ y = 7
Hence the value of x and y are 8 and 7 respectively.

Section E

36. i. Let 1^{st} year production of TV = x
Production in 6^{th} year = 16000
t_6 = 16000
t_9 = 22,600
t_6 = a + 5d
t_9 = a + 8d

$16000 = x + 5d$ ...(i)
$22600 = x + 8d$ ...(ii)
$-\quad\;\; -\quad\; -$
$-6600 = -3d$

d = 2200

Putting d = 2200 in equation ...(i)

16000 = x + 5 $\times$ (2200)

16000 = x + 11000

x = 16000 - 11000

x = 5000

$\therefore$ Production during 1^{st} year = 5000

ii. Production during 8th year is (a + 7d) = 5000 + 7(2200) = 20400

iii. Production during first 3 year = Production in (1^{st} + 2^{nd} + 3^{rd}) year

Production in 1^{st} year = 5000

Production in 2^{nd} year = 5000 + 2200

= 7200

Production in 3^{rd} year = 7200 + 2200

= 9400

$\therefore$ Production in first 3 year = 5000 + 7200 + 9400

= 21,600

OR

Let in n^{th} year production was = 29,200

t_n = a + (n - 1)d

29,200 = 5000 + (n - 1) 2200

29,200 = 5000 + 2200n - 2200

29200 - 2800 = 2200n

26,400 = 2200n

$\therefore n = \frac{26400}{2200}$

n = 12

i.e., in 12^{th} year, the production is 29,200

37. i. Point of intersection of diagonals is their midpoint

So, $\left[\frac{(1+7)}{2}, \frac{(1+5)}{2}\right]$

= (4, 3)

ii. Length of diagonal AC

AC = $\sqrt{(7-1)(7-1)+(5-1)(5-1)}$

= $\sqrt{52}$ units

iii. Area of campaign board

= 6 $\times$ 4

= 24 units square

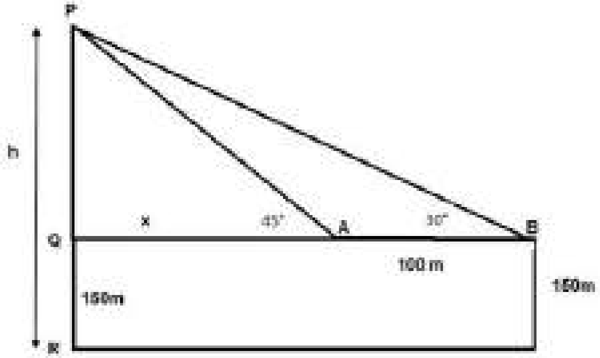
OR

Ratio of lengths = $\frac{AB}{AC}$

= $\frac{6}{\sqrt{52}}$

= 6 : $\sqrt{52}$

38. i. The above figure can be redrawn as shown below:



Let PQ = y

In △PQA,

tan 45 = $\frac{PQ}{QA}$ = $\frac{y}{x}$

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

x = y ...(i)

In △PQB,

tan 30 = $\frac{PQ}{QB} = \frac{PQ}{x+100} = \frac{y}{x+100} = \frac{x}{x+100}$

$\frac{1}{\sqrt{3}} = \frac{x}{x+100}$

x$\sqrt{3}$ = x + 100

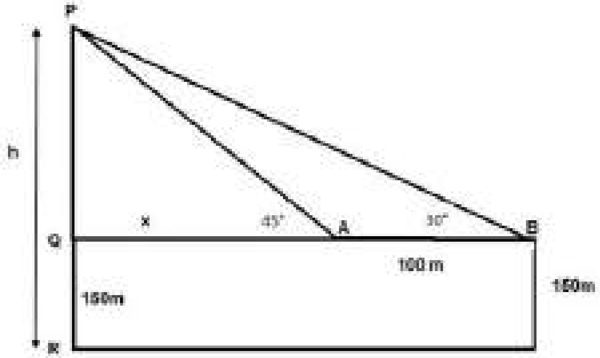
x = $\frac{100}{\sqrt{3}-1}$ = 136.61 m

From the figure, height of tower h = PQ + QR

= x + 150 = 136.61 + 150

h = 286.61 m

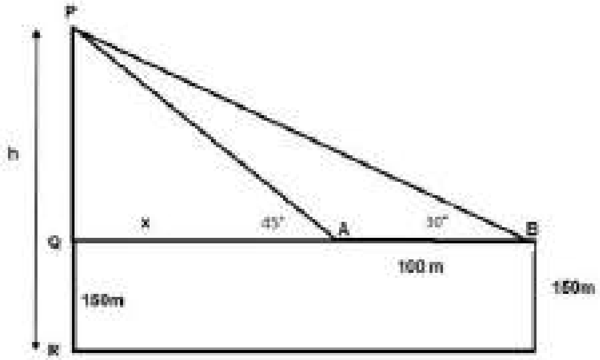
ii. The above figure can be redrawn as shown below:



Distance of Sooraj's house from tower = QA + AB

= x + 100 = 136.61 + 100 = 236.61 m

iii. The above figure can be redrawn as shown below:



Distance between top of tower and Top of Sooraj's house is PB

In △PQB

sin 30^o = $\frac{PQ}{PB}$

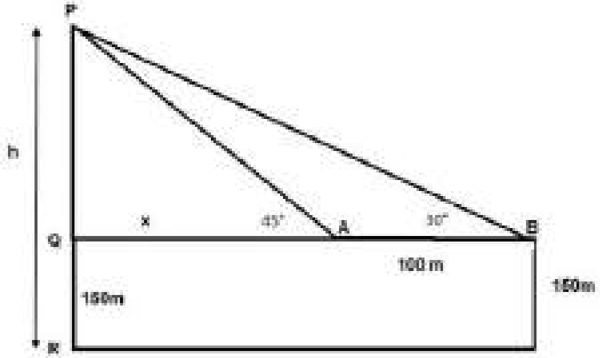
$\Rightarrow PB = \frac{PQ}{\sin 30^o}$

⇒ PB = $\frac{y}{\frac{1}{2}} = 2 \times 136.61$

$\Rightarrow$ PB = 273.20 m

OR

The above figure can be redrawn as shown below:



Distance between top of the tower and top of Ajay's house is PA

In $\triangle$PQA

sin $45^o = \frac{PQ}{PA}$

$\Rightarrow PA = \frac{PQ}{\sin 45^o}$

$\Rightarrow$ PA = $\frac{y}{\frac{1}{\sqrt{2}}} = \sqrt{2} \times 136.61$

$\Rightarrow$ PA = 193.20 m