

SAMPLE QUESTION PAPER
MARKING SCHEME
SUBJECT: MATHEMATICS- STANDARD
CLASS X

SECTION - A

| | | |
|------------|---|---|
| 1 | (c) 35 | 1 |
| 2 | (b) $x^2-(p+1)x +p=0$ | 1 |
| 3 | (b) $2/3$ | 1 |
| 4 | (d) 2 | 1 |
| 5 | (c) (2,-1) | 1 |
| 6 | (d) 2:3 | 1 |
| 7 | (b) $\tan 30^\circ$ | 1 |
| 8 | (b) 2 | 1 |
| 9 | (c) $x = \frac{ay}{a+b}$ | 1 |
| 10 | (c) 8cm | 1 |
| 11 | (d) $3\sqrt{3}$ cm | 1 |
| 12 | (d) $9\pi \text{ cm}^2$ | 1 |
| 13 | (c) 96 cm^2 | 1 |
| 14 | (b) 12 | 1 |
| 15 | (d) 7000 | 1 |
| 16 | (b) 25 | 1 |
| 17 | (c) $11/36$ | 1 |
| 18 | (a) $1/3$ | 1 |
| 19 | (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A) | 1 |
| 20. | (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A) | 1 |

SECTION – B

- 21** Adding the two equations and dividing by 10, we get : $x+y = 10$ 1/2
 Subtracting the two equations and dividing by -2, we get : $x-y = 1$ 1/2
 Solving these two new equations, we get, $x = 11/2$ 1/2
 $y = 9/2$ 1/2

- 22** In $\triangle ABC$,
 $\angle 1 = \angle 2$
 $\therefore AB = BD$ (i) 1/2
 Given,
 $AD/AE = AC/BD$
 Using equation (i), we get 1/2
 $AD/AE = AC/AB$ (ii)
 In $\triangle BAE$ and $\triangle CAD$, by equation (ii),
 $AC/AB = AD/AE$ 1/2
 $\angle A = \angle A$ (common)
 $\therefore \triangle BAE \sim \triangle CAD$ [By SAS similarity criterion] 1/2

- 23** $\angle PAO = \angle PBO = 90^\circ$ (angle b/w radius and tangent) 1/2
 $\angle AOB = 105^\circ$ (By angle sum property of a triangle) 1/2
 $\angle AQB = \frac{1}{2} \times 105^\circ = 52.5^\circ$ (Angle at the remaining part of the circle is half the angle subtended by the arc at the centre) 1

- 24** We know that, in 60 minutes, the tip of minute hand moves 360°
 In 1 minute, it will move $= 360^\circ / 60 = 6^\circ$ 1/2
 \therefore From 7 : 05 pm to 7: 40 pm i.e. 35 min, it will move through $= 35 \times 6^\circ = 210^\circ$ 1/2
 \therefore Area of swept by the minute hand in 35 min = Area of sector with sectorial angle θ
 of 210° and radius of 6 cm
 $= \frac{210}{360} \times \pi \times 6^2$ 1/2
 $= \frac{7}{12} \times \frac{22}{7} \times 6 \times 6$
 $= 66\text{cm}^2$ 1/2

OR

Let the measure of $\angle A, \angle B, \angle C$ and $\angle D$ be $\theta_1, \theta_2, \theta_3$ and θ_4 respectively
 Required area = Area of sector with centre A + Area of sector with centre B 1/2
 + Area of sector with centre C + Area of sector with centre D

$$\begin{aligned}
&= \frac{\theta_1}{360} \times \pi \times 7^2 + \frac{\theta_2}{360} \times \pi \times 7^2 + \frac{\theta_3}{360} \times \pi \times 7^2 + \frac{\theta_4}{360} \times \pi \times 7^2 && \frac{1}{2} \\
&= \frac{(\theta_1 + \theta_2 + \theta_3 + \theta_4)}{360} \times \pi \times 7^2 \\
&= \frac{(360)}{360} \times \frac{22}{7} \times 7 \times 7 \text{ (By angle sum property of a triangle)} && \frac{1}{2} \\
&= 154 \text{ cm}^2 && \frac{1}{2}
\end{aligned}$$

- 25 $\sin(A+B) = 1 = \sin 90$, so $A+B = 90$(i) 1/2
 $\cos(A-B) = \sqrt{3}/2 = \cos 30$, so $A-B = 30$(ii) 1/2
From (i) & (ii) $\angle A = 60^\circ$ 1/2
And $\angle B = 30^\circ$ 1/2

OR

$$\begin{aligned}
\frac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} &= \frac{1-\sqrt{3}}{1+\sqrt{3}} \\
\text{Dividing the numerator and denominator of LHS by } \cos\theta, &\text{ we get} && \frac{1}{2} \\
\frac{1 - \tan\theta}{1 + \tan\theta} &= \frac{1-\sqrt{3}}{1+\sqrt{3}} && \frac{1}{2} \\
\text{Which on simplification (or comparison) gives } \tan\theta &= \sqrt{3} && \frac{1}{2} \\
\text{Or } \theta &= 60^\circ && \frac{1}{2}
\end{aligned}$$

SECTION - C

- 26 Let us assume $5 + 2\sqrt{3}$ is rational, then it must be in the form of p/q where p and q are co-prime integers and $q \neq 0$ 1
i.e $5 + 2\sqrt{3} = p/q$ 1/2
So $\sqrt{3} = \frac{p-5q}{2q}$(i) 1/2
Since $p, q, 5$ and 2 are integers and $q \neq 0$, HS of equation (i) is rational. But LHS of (i) is $\sqrt{3}$ which is irrational. This is not possible. 1/2
This contradiction has arisen due to our wrong assumption that $5 + 2\sqrt{3}$ is rational. So, $5 + 2\sqrt{3}$ is irrational. 1/2

- 27 Let α and β be the zeros of the polynomial $2x^2 - 5x - 3$
Then $\alpha + \beta = 5/2$ 1/2
And $\alpha\beta = -3/2$. 1/2
Let 2α and 2β be the zeros $x^2 + px + q$
Then $2\alpha + 2\beta = -p$ 1/2
 $2(\alpha + \beta) = -p$
 $2 \times 5/2 = -p$
So $p = -5$ 1/2
And $2\alpha \times 2\beta = q$ 1/2
 $4\alpha\beta = q$
So $q = 4 \times -3/2$
 $= -6$ 1/2

28 Let the actual speed of the train be x km/hr and let the actual time taken be y hours. 1/2
 Distance covered is xy km
 If the speed is increased by 6 km/hr, then time of journey is reduced by 4 hours i.e.,
 when speed is $(x+6)$ km/hr, time of journey is $(y-4)$ hours.
 \therefore Distance covered $= (x+6)(y-4)$
 $\Rightarrow xy = (x+6)(y-4)$
 $\Rightarrow -4x + 6y - 24 = 0$ 1/2
 $\Rightarrow -2x + 3y - 12 = 0$ (i)
 Similarly $xy = (x-6)(y+6)$
 $\Rightarrow 6x - 6y - 36 = 0$
 $\Rightarrow x - y - 6 = 0$ (ii) 1/2
 Solving (i) and (ii) we get $x=30$ and $y=24$ 1
 Putting the values of x and y in equation (i), we obtain
 Distance $= (30 \times 24)$ km $= 720$ km. 1/2
 Hence, the length of the journey is 720km.

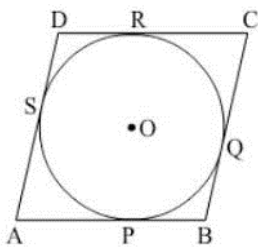
OR

Let the number of chocolates in lot A be x 1/2
 And let the number of chocolates in lot B be y
 \therefore total number of chocolates $= x+y$
 Price of 1 chocolate = ₹ $\frac{2}{3}$, so for x chocolates $= \frac{2}{3}x$
 and price of y chocolates at the rate of ₹ 1 per chocolate $= y$.
 \therefore by the given condition $\frac{2}{3}x + y = 400$ 1/2
 $\Rightarrow 2x + 3y = 1200$ (i)
 Similarly $x + \frac{4}{5}y = 460$ 1/2
 $\Rightarrow 5x + 4y = 2300$ (ii)
 Solving (i) and (ii) we get
 $x=300$ and $y=200$
 $\therefore x+y=300+200=500$ 1
 So, Anuj had 500 chocolates. 1/2

29 LHS : $\frac{\sin^3\theta / \cos^3\theta}{1 + \sin^2\theta / \cos^2\theta} + \frac{\cos^3\theta / \sin^3\theta}{1 + \cos^2\theta / \sin^2\theta}$ 1/2

$$\begin{aligned}
&= \frac{\sin^3\theta / \cos^3\theta}{(\cos^2\theta + \sin^2\theta) / \cos^2\theta} + \frac{\cos^3\theta / \sin^3\theta}{(\sin^2\theta + \cos^2\theta) / \sin^2\theta} \\
&= \frac{\sin^3\theta}{\cos\theta} + \frac{\cos^3\theta}{\sin\theta} && \frac{1}{2} \\
&= \frac{\sin^4\theta + \cos^4\theta}{\cos\theta\sin\theta} && \frac{1}{2} \\
&= \frac{(\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta\cos^2\theta}{\cos\theta\sin\theta} && \frac{1}{2} \\
&= \frac{1 - 2\sin^2\theta\cos^2\theta}{\cos\theta\sin\theta} && \frac{1}{2} \\
&= \frac{1}{\cos\theta\sin\theta} - \frac{2\sin^2\theta\cos^2\theta}{\cos\theta\sin\theta} \\
&= \sec\theta\operatorname{cosec}\theta - 2\sin\theta\cos\theta && \frac{1}{2} \\
&= \text{RHS}
\end{aligned}$$

30

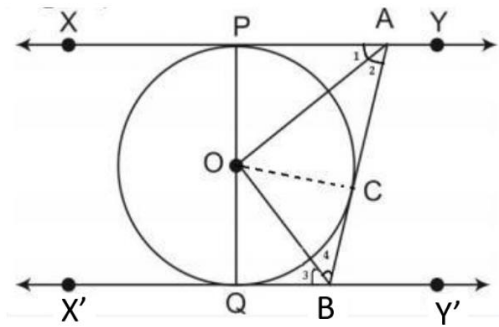


Let ABCD be the rhombus circumscribing the circle with centre O, such that AB, BC, CD and DA touch the circle at points P, Q, R and S respectively.

We know that the tangents drawn to a circle from an exterior point are equal in length.

$$\begin{aligned}
&\therefore AP = AS \dots\dots\dots(1) \\
&BP = BQ \dots\dots\dots(2) \\
&CR = CQ \dots\dots\dots(3) && 1 \\
&DR = DS \dots\dots\dots(4). \\
&\text{Adding (1), (2), (3) and (4) we get} \\
&AP+BP+CR+DR = AS+BQ+CQ+DS \\
&(AP+BP) + (CR+DR) = (AS+DS) + (BQ+CQ) \\
&\therefore AB+CD=AD+BC \text{-----}(5) && 1 \\
&\text{Since } AB=DC \text{ and } AD=BC \text{ (opposite sides of parallelogram ABCD)} && \frac{1}{2} \\
&\text{putting in (5) we get, } 2AB=2AD \\
&\text{or } AB = AD. \\
&\therefore AB=BC=DC=AD \\
&\text{Since a parallelogram with equal adjacent sides is a rhombus, so ABCD is a} && \frac{1}{2} \\
&\text{rhombus}
\end{aligned}$$

OR



Join OC

In $\triangle OPA$ and $\triangle OCA$

$OP = OC$ (radii of same circle)

$PA = CA$ (length of two tangents from an external point)

1

$AO = AO$ (Common)

Therefore, $\triangle OPA \cong \triangle OCA$ (By SSS congruency criterion)

$\frac{1}{2}$

Hence, $\angle 1 = \angle 2$ (CPCT)

$\frac{1}{2}$

Similarly $\angle 3 = \angle 4$

$\angle PAB + \angle QBA = 180^\circ$ (co interior angles are supplementary as $XY \parallel X'Y'$)

$\frac{1}{2}$

$$2\angle 2 + 2\angle 4 = 180^\circ$$

$$\angle 2 + \angle 4 = 90^\circ \text{-----(1)}$$

$\frac{1}{2}$

$\angle 2 + \angle 4 + \angle AOB = 180^\circ$ (Angle sum property)

Using (1), we get, $\angle AOB = 90^\circ$

- 31**
- (i) $P(\text{At least one head}) = \frac{3}{4}$
 - (ii) $P(\text{At most one tail}) = \frac{3}{4}$
 - (iii) $P(\text{A head and a tail}) = \frac{2}{4} = \frac{1}{2}$

1

1

1

SECTION D

- 32** Let the time taken by larger pipe alone to fill the tank = x hours
Therefore, the time taken by the smaller pipe = $x+10$ hours

$\frac{1}{2}$

Water filled by larger pipe running for 4 hours = $\frac{4}{x}$ litres

Water filled by smaller pipe running for 9 hours = $\frac{9}{x+10}$ litres

We know that

$$\frac{4}{x} + \frac{9}{x+10} = \frac{1}{2}$$

1

Which on simplification gives:

1

$$x^2 - 16x - 80 = 0$$

$$x^2 - 20x + 4x - 80 = 0$$

$$x(x-20) + 4(x-20) = 0$$

$$(x+4)(x-20) = 0$$

$$x = -4, 20$$

1

x cannot be negative.

1/2

Thus, x=20

1/2

$$x+10 = 30$$

Larger pipe would alone fill the tank in 20 hours and smaller pipe would fill the tank alone in 30 hours.

1/2

OR

Let the usual speed of plane be x km/hr

1/2

and the reduced speed of the plane be (x-200) km/hr

Distance = 600 km [Given]

According to the question,

(time taken at reduced speed) - (Schedule time) = 30 minutes = 0.5 hours.

1

$$\frac{600}{x-200} - \frac{600}{x} = \frac{1}{2}$$

Which on simplification gives:

1

$$x^2 - 200x - 240000 = 0$$

$$x^2 - 600x + 400x - 240000 = 0$$

$$x(x-600) + 400(x-600) = 0$$

$$(x-600)(x+400) = 0$$

$$x = 600 \text{ or } x = -400$$

1

But speed cannot be negative.

1/2

∴ The usual speed is 600 km/hr and

1/2

the scheduled duration of the flight is $\frac{600}{600} = 1$ hour

1/2

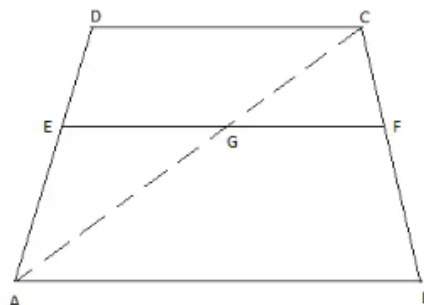
33 For the Theorem :

Given, To prove, Construction and figure

1 1/2

Proof

1 1/2



1/2

Let ABCD be a trapezium $DC \parallel AB$ and EF is a line parallel to AB and hence to DC.

To prove : $\frac{DE}{EA} = \frac{CF}{FB}$

Construction : Join AC, meeting EF in G.

Proof :

In $\triangle ABC$, we have

$GF \parallel AB$

$$CG/GA = CF/FB \quad [\text{By BPT}] \quad \dots(1) \quad \frac{1}{2}$$

In $\triangle ADC$, we have

$EG \parallel DC$ ($EF \parallel AB$ & $AB \parallel DC$)

$$DE/EA = CG/GA \quad [\text{By BPT}] \quad \dots(2) \quad \frac{1}{2}$$

From (1) & (2), we get,

$$\frac{DE}{EA} = \frac{CF}{FB} \quad \frac{1}{2}$$

34. Radius of the base of cylinder (r) = 2.8 m = Radius of the base of the cone (r)

Height of the cylinder (h) = 3.5 m

Height of the cone (H) = 2.1 m.

Slant height of conical part (l) = $\sqrt{r^2 + H^2}$

$$= \sqrt{(2.8)^2 + (2.1)^2} \quad 1$$

$$= \sqrt{7.84 + 4.41} \quad 1$$

$$= \sqrt{12.25} = 3.5 \text{ m} \quad 1$$

Area of canvas used to make tent = CSA of cylinder + CSA of cone 1

$$= 2 \times \pi \times 2.8 \times 3.5 + \pi \times 2.8 \times 3.5$$

$$= 61.6 + 30.8$$

$$= 92.4 \text{ m}^2 \quad 1$$

Cost of 1500 tents at ₹120 per sq.m 1

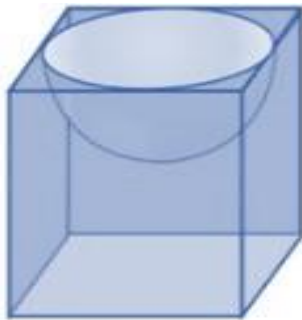
$$= 1500 \times 120 \times 92.4$$

$$= 16,632,000$$

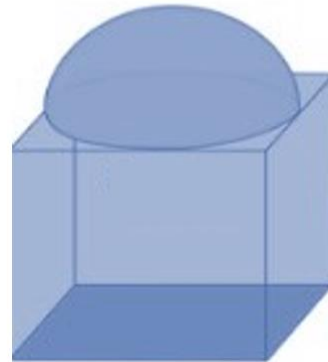
Share of each school to set up the tents = $16632000/50 = ₹332,640$

OR

First Solid



Second Solid



(i) SA for first new solid (S_1):

$$6 \times 7 \times 7 + 2\pi \times 3.5^2 - \pi \times 3.5^2$$

$$= 294 + 77 - 38.5$$

$$= 332.5 \text{ cm}^2$$

1

SA for second new solid (S_2):

$$6 \times 7 \times 7 + 2\pi \times 3.5^2 - \pi \times 3.5^2$$

$$= 294 + 77 - 38.5$$

$$= 332.5 \text{ cm}^2$$

1

1

So $S_1 : S_2 = 1 : 1$

(ii) Volume for first new solid (V_1) = $7 \times 7 \times 7 - \frac{2}{3}\pi \times 3.5^3$

$$= 343 - \frac{539}{6} = \frac{1519}{6} \text{ cm}^3$$

1

Volume for second new solid (V_2) = $7 \times 7 \times 7 + \frac{2}{3}\pi \times 3.5^3$

$$= 343 + \frac{539}{6} = \frac{2597}{6} \text{ cm}^3$$

1

35 Median = 525, so Median Class = 500 – 600

½

| Class interval | Frequency | Cumulative Frequency |
|----------------|-----------|----------------------|
| 0–100 | 2 | 2 |
| 100–200 | 5 | 7 |
| 200–300 | x | 7+x |
| 300–400 | 12 | 19+x |
| 400–500 | 17 | 36+x |
| 500–600 | 20 | 56+x |
| 600–700 | y | 56+x+y |
| 700–800 | 9 | 65+x+y |
| 800–900 | 7 | 72+x+y |
| 900–1000 | 4 | 76+x+y |

1½

$$76+x+y=100 \Rightarrow x+y=24 \dots(i)$$

1

$$\text{Median} = l + \frac{\frac{n}{2} - cf}{f} \times h$$

1/2

Since, $l=500$, $h=100$, $f=20$, $cf=36+x$ and $n=100$

Therefore, putting the value in the Median formula, we get;

$$525 = 500 + \frac{50 - (36+x)}{20} \times 100$$

1/2

$$\text{so } x = 9$$

$$y = 24 - x \text{ (from eq.i)}$$

$$y = 24 - 9 = 15$$

Therefore, the value of $x = 9$

1/2

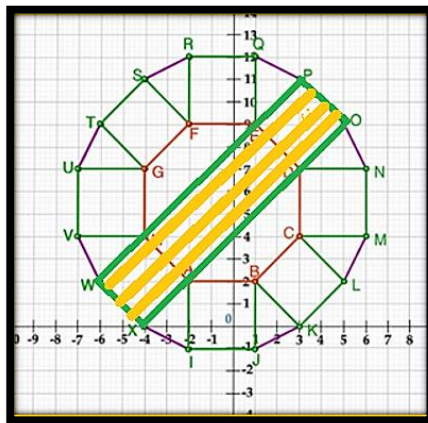
and $y = 15$.

1/2

- 36** (i) $B(1,2)$, $F(-2,9)$
 $BF^2 = (-2-1)^2 + (9-2)^2$
 $= (-3)^2 + (7)^2$
 $= 9 + 49$
 $= 58$
 So, $BF = \sqrt{58}$ units

1

(ii)



$$W(-6,2), X(-4,0), O(5,9), P(3,11)$$

1/2

Clearly WXOP is a rectangle

Point of intersection of diagonals of a rectangle is the mid point of the diagonals. So the required point is mid point of WO or XP

$$= \left(\frac{-6+5}{2}, \frac{2+9}{2} \right)$$

$$= \left(\frac{-1}{2}, \frac{11}{2} \right)$$

1/2

- (iii) $A(-2,2)$, $G(-4,7)$
 Let the point on y-axis be $Z(0,y)$
 $AZ^2 = GZ^2$

1/2

1/2

$$\begin{aligned}
 (0+2)^2 + (y-2)^2 &= (0+4)^2 + (y-7)^2 \\
 (2)^2 + y^2 + 4 - 4y &= (4)^2 + y^2 + 49 - 14y \\
 8 - 4y &= 65 - 14y \\
 10y &= 57
 \end{aligned}$$

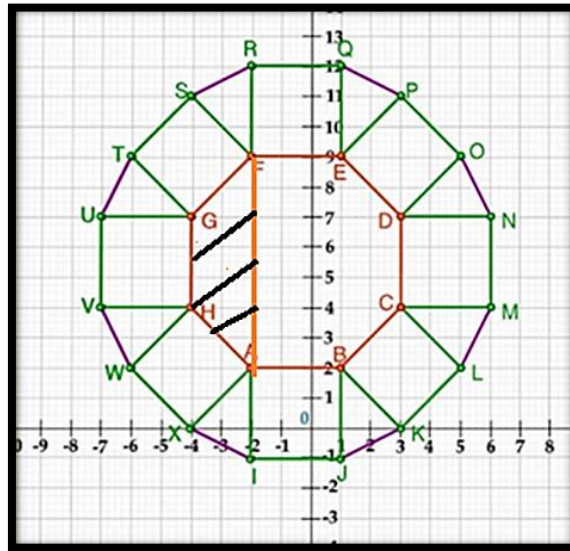
So, $y = 5.7$

i.e. the required point is $(0, 5.7)$

$\frac{1}{2}$

$\frac{1}{2}$

OR



$A(-2, 2)$, $F(-2, 9)$, $G(-4, 7)$, $H(-4, 4)$

Clearly $GH = 7 - 4 = 3$ units

$AF = 9 - 2 = 7$ units

So, height of the trapezium $AFGH = 2$ units

So, area of $AFGH = \frac{1}{2}(AF + GH) \times \text{height}$

$$= \frac{1}{2}(7 + 3) \times 2$$

$$= 10 \text{ sq. units}$$

$\frac{1}{2}$

$\frac{1}{2}$

$\frac{1}{2}$

$\frac{1}{2}$

37. (i) Since each row is increasing by 10 seats, so it is an AP with first term $a = 30$, and common difference $d = 10$.

$\frac{1}{2}$

So number of seats in 10th row = $a_{10} = a + 9d$

$$= 30 + 9 \times 10 = 120$$

$\frac{1}{2}$

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

$$1500 = \frac{n}{2}(2 \times 30 + (n-1)10)$$

$\frac{1}{2}$

$$3000 = 50n + 10n^2$$

$$n^2 + 5n - 300 = 0$$

$\frac{1}{2}$

$$n^2 + 20n - 15n - 300 = 0$$

$$(n+20)(n-15) = 0$$

$\frac{1}{2}$

Rejecting the negative value, $n = 15$

$\frac{1}{2}$

OR

No. of seats already put up to the 10th row = S_{10}

$\frac{1}{2}$

$$S_{10} = \frac{10}{2} \{2 \times 30 + (10-1)10\}$$

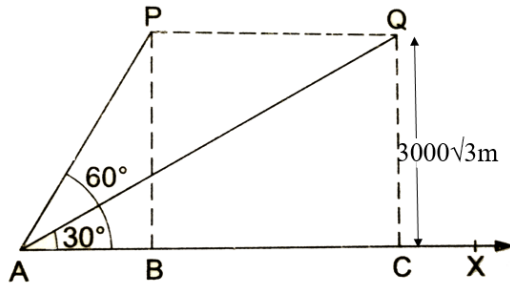
$\frac{1}{2}$

$$= 5(60 + 90) = 750 \quad \frac{1}{2}$$

So, the number of seats still required to be put are $1500 - 750 = 750$ $\frac{1}{2}$

- (iii) If no. of rows = 17
then the middle row is the 9th row $\frac{1}{2}$
 $a_8 = a + 8d$
 $= 30 + 80$
 $= 110$ seats $\frac{1}{2}$

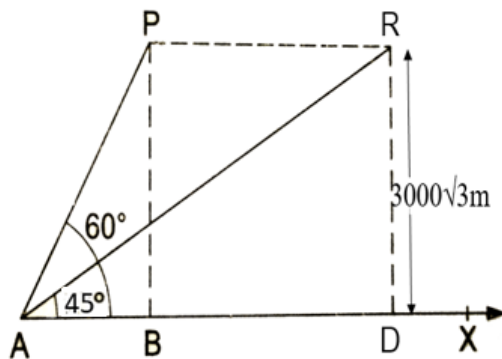
38 (i)



P and Q are the two positions of the plane flying at a height of $3000\sqrt{3}$ m.
A is the point of observation.

- (ii) In $\triangle PAB$, $\tan 60^\circ = PB/AB$
Or $\sqrt{3} = 3000\sqrt{3}/AB$
So $AB = 3000$ m $\frac{1}{2}$
 $\tan 30^\circ = QC/AC$
 $1/\sqrt{3} = 3000\sqrt{3}/AC$
 $AC = 9000$ m $\frac{1}{2}$
distance covered = $9000 - 3000$
 $= 6000$ m. $\frac{1}{2}$

OR



- In $\triangle PAB$, $\tan 60^\circ = PB/AB$
Or $\sqrt{3} = 3000\sqrt{3}/AB$
So $AB = 3000$ m $\frac{1}{2}$
 $\tan 45^\circ = RD/AD$
 $1 = 3000\sqrt{3}/AD$ $\frac{1}{2}$

$$\begin{aligned} AD &= 3000\sqrt{3} \text{ m} \\ \text{distance covered} &= 3000\sqrt{3} - 3000 && \frac{1}{2} \\ &= 3000(\sqrt{3} - 1)\text{m}. \end{aligned}$$

$$\begin{aligned} \text{(iii) speed} &= 6000/30 && \frac{1}{2} \\ &= 200 \text{ m/s} \\ &= 200 \times 3600/1000 && \frac{1}{2} \\ &= 720\text{km/hr} \end{aligned}$$

$$\begin{aligned} \text{Alternatively: speed} &= \frac{3000(\sqrt{3} - 1)}{15(\sqrt{3} - 1)} && \frac{1}{2} \\ &= 200 \text{ m/s} \\ &= 200 \times 3600/1000 && \frac{1}{2} \\ &= 720\text{km/hr} \end{aligned}$$