

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

**SECTION - A**

<b>1</b>	(c) 35	1
<b>2</b>	(b) $x^2-(p+1)x +p=0$	1
<b>3</b>	(b) $2/3$	1
<b>4</b>	(d) 2	1
<b>5</b>	(c) (2,-1)	1
<b>6</b>	(d) 2:3	1
<b>7</b>	(b) $\tan 30^\circ$	1
<b>8</b>	(b) 2	1
<b>9</b>	(c) $x = \frac{ay}{a+b}$	1
<b>10</b>	(c) 8cm	1
<b>11</b>	(d) $3\sqrt{3}$ cm	1
<b>12</b>	(d) $9\pi \text{ cm}^2$	1
<b>13</b>	(c) $96 \text{ cm}^2$	1
<b>14</b>	(b) 12	1
<b>15</b>	(d) 7000	1
<b>16</b>	(b) 25	1
<b>17</b>	(c) $11/36$	1
<b>18</b>	(a) $1/3$	1
<b>19</b>	(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)	1
<b>20.</b>	(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  $360^\circ$   
 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  $\theta$   
 of  $210^\circ$  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  $\theta_4$  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  $\alpha$  and  $\beta$  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  $2\alpha$  and  $2\beta$  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.

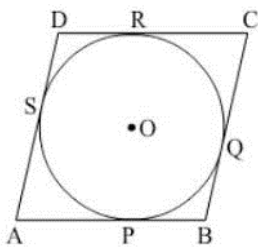
**OR**

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

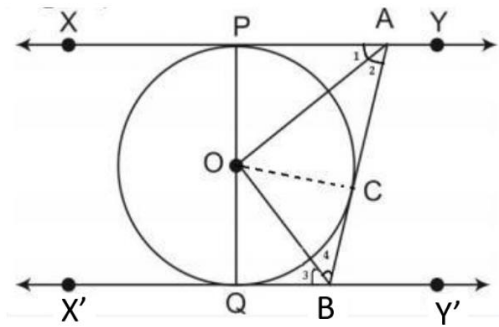


Let ABCD be the rhombus circumscribing the circle with centre O, such that AB, BC, CD and DA touch the circle at points P, Q, R and S respectively.

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  $XY \parallel X'Y'$ )

$\frac{1}{2}$

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

$\angle 2 + \angle 4 = 90^\circ$ -----(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

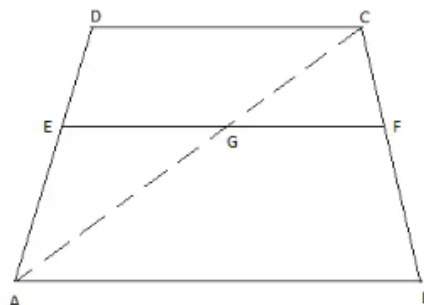
**33** For the Theorem :

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

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

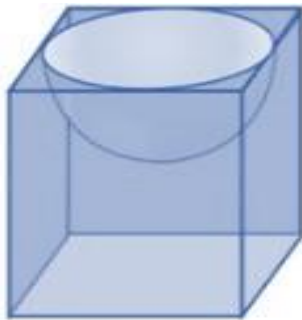
$$= 16,632,000$$

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

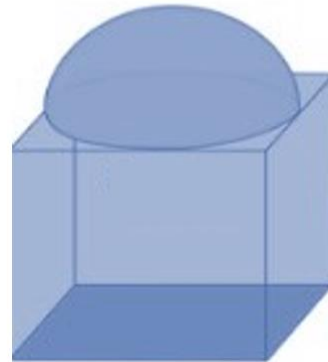
**OR**



First Solid



Second Solid



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

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

$$= 294 + 77 - 38.5$$

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

SA for second new solid ( $S_2$ ):

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

$$= 294 + 77 - 38.5$$

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

So  $S_1 : S_2 = 1 : 1$

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

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

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

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

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

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

$$76+x+y=100 \Rightarrow x+y=24 \quad \dots(i) \quad 1$$

$$\text{Median} = l + \frac{\frac{n}{2} - cf}{f} \times h \quad 1/2$$

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

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

$$525 = 500 + \frac{50 - (36+x)}{20} \times 100 \quad 1/2$$

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

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

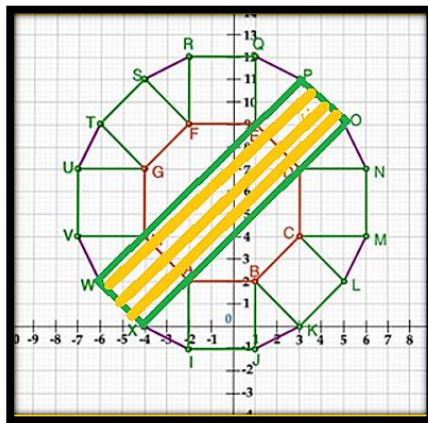
$$y = 24 - 9 = 15$$

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)



$$W(-6,2), X(-4,0), O(5,9), P(3,11) \quad 1/2$$

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

$$= \left( \frac{-6+5}{2}, \frac{2+9}{2} \right) \quad 1/2$$

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

- (iii)  $A(-2,2)$ ,  $G(-4,7)$   
 Let the point on y-axis be  $Z(0,y)$  1/2  
 $AZ^2 = GZ^2$  1/2

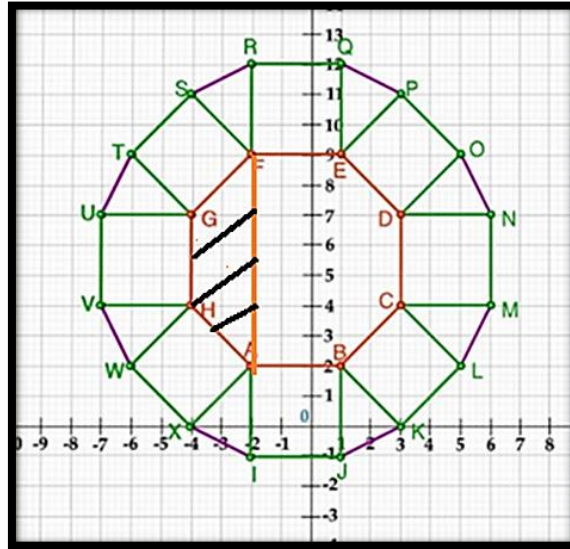
$$\begin{aligned}
 (0+2)^2 + (y-2)^2 &= (0+4)^2 + (y-7)^2 \\
 (2)^2 + y^2 + 4 - 4y &= (4)^2 + y^2 + 49 - 14y \\
 8 - 4y &= 65 - 14y \\
 10y &= 57
 \end{aligned}$$

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  $d = 10$ .

$$\begin{aligned}
 \text{So number of seats in } 10^{\text{th}} \text{ row} &= a_{10} = a + 9d \\
 &= 30 + 9 \times 10 = 120
 \end{aligned}$$

$\frac{1}{2}$   
 $\frac{1}{2}$

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

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

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

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

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

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

Rejecting the negative value,  $n = 15$

$\frac{1}{2}$   
 $\frac{1}{2}$   
 $\frac{1}{2}$   
 $\frac{1}{2}$

**OR**

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

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

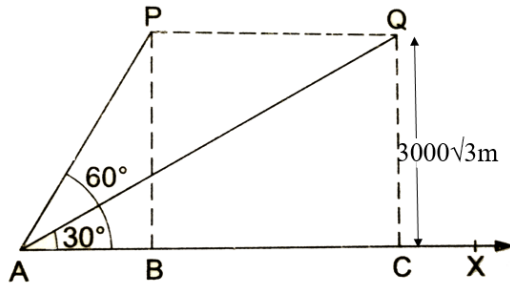
$\frac{1}{2}$   
 $\frac{1}{2}$

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

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 9<sup>th</sup> row  $\frac{1}{2}$   
 $a_8 = a + 8d$   
 $= 30 + 80$   
 $= 110$  seats  $\frac{1}{2}$

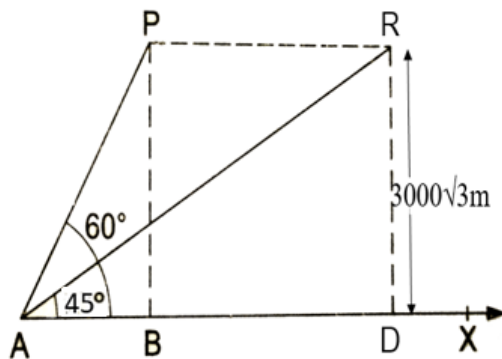
38 (i)



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  $\frac{1}{2}$   
 $\tan 45^\circ = RD/AD$   
 $1 = 3000\sqrt{3}/AD$   $\frac{1}{2}$

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

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

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