Mathematics

Class X

TOPPER SAMPLE PAPER-1

SOLUTIONS

Ans1 HCF x LCM = Product of the 2 numbers

126 x LCM = 252 x 378

LCM = 756 (1 Mark)

Ans2 The zeroes are −1, 4

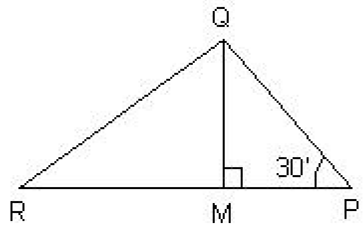
$\therefore \quad p(x) = (x+1)(x-4) = x^2 - 3x - 4$ (1 Mark)

Ans3 For intersecting lines:

$\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \Rightarrow \frac{13}{k} \neq \frac{23}{-46}$ (1 Mark)

$\Rightarrow k \neq -26$

Ans4



Since $PR^2 - PQ^2 = QR^2$

$\Rightarrow PR^2 = QR^2 + PQ^2$

$\Rightarrow \angle RQP = 90^\circ$ (Converse of Pythagoras Theorem)

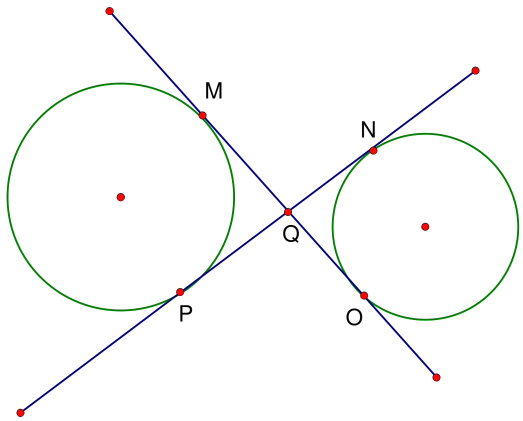
Therefore, In ΔPQM

Since $\angle QPM = 30^\circ$ and $\angle QMP = 90^\circ$

So $\angle MQP = 60^\circ$

Hence, $\angle MQR = 30^\circ$ (1 Mark)

Ans5



OM = MQ + QO
= QP + QN [Since Tangents from external point are equal]
= PN = 9cm (1 Mark)

Ans6 The two curves namely less than and more than ogives intersect at the median so the point of intersection is (45.5, 75) (1 Mark)

Ans7 Total outcomes = HH, TT, HT, TH

Favourable outcomes = HH

$P(E : Both\ Heads) = \frac{1}{4}$ (1 Mark)

Ans8 Let a_3 and a_4 be the third and fourth term of the AP
According to given Condition

$3.a_3 = 4.a_4$

$\Rightarrow 3(a+2d) = 4(a+3d)$

$\Rightarrow a = -6d$

$\Rightarrow a+6d = 0$

$\Rightarrow a_7 = 0$

(1 Mark)

Ans9 $\sin\alpha + \cos\alpha = \sqrt{2}\,\sin\alpha$

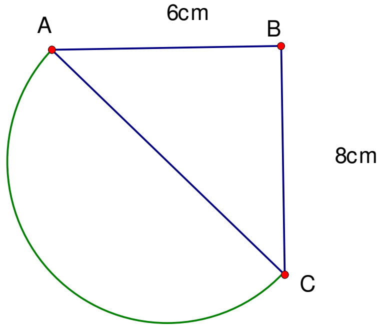
$$\cos\alpha = \sin\alpha\left(\sqrt{2}-1\right)$$

$$\frac{\cos\alpha}{\sin\alpha} = \sqrt{2}-1$$

(1 Mark)

$$\cot\alpha = \sqrt{2}-1$$

Ans10



$$AC = \sqrt{AB^2 + BC^2} \qquad \text{(Using Pythagoras Theorem)}$$

$$= \sqrt{8^2 + 6^2}$$

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

$$= 10\text{ cm}$$

Circumference of semi circle $= \pi r$

$$= 3.14 \times 5$$

$$= 15.70 cm$$

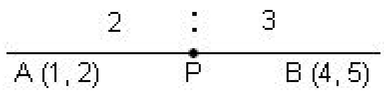
$\therefore$ Perimeter = 6 + 8 + 15 .7 (1 Mark)

= 29.7 cm

SECTION B

Ans11 Since, AP = $\frac{2}{5}$ AB

So AP: PB =2: 3

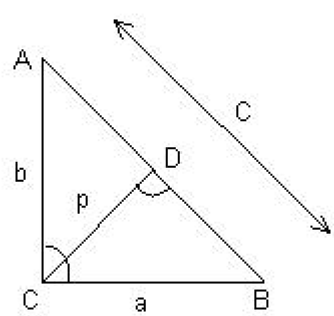


P divides AB in 2:3 ratios (1 mark)

$$P\left(\frac{2\times4+3\times1}{5}, \frac{2\times5+3\times2}{5}\right)$$ $\left(\frac{1}{2}\text{mark}\right)$

$$P\left(\frac{11}{5},\frac{16}{5}\right)$$ $\left(\frac{1}{2}\text{mark}\right)$

Ans12



Area $(\Delta ACB)=\frac{1}{2}\ AC\ .\ CB$

$=\frac{1}{2}\ a.b$

Also, area $(\Delta ACB)=\frac{1}{2}.\ AB\ .CD$ $\left(\frac{1}{2}\text{mark}\right)$

$=\frac{1}{2}$ cp

$$\Rightarrow \quad \frac{1}{2}ab = \frac{1}{2}cp$$ $\left(\frac{1}{2}\text{mark}\right)$

$$\Rightarrow \quad ab = cp$$

Now $\frac{1}{a^2} + \frac{1}{b^2} = \frac{b^2 + a^2}{a^2b^2}$

$= \frac{c^2}{a^2b^2}$ $\quad (By\ Pythagoras\ theorem)$

$= \frac{c^2}{a^2b^2}$

$= \frac{c^2}{c^2p^2}$ $\quad (Since, ab = cp)$

$= \frac{1}{p^2}$

Hence Proved (1 Mark)

Ans13 $3(2x + y) = 7xy \Rightarrow 6x + 3y = 7\ xy$ (1)

$3(x + 3y) = 11xy \Rightarrow 3x + 9\ y = 11xy$ (2)

Eq (2) × 2 gives: $6x + 18y = 22xy$ (3)

When $x \neq 0$ and $y \neq 0$ eq(1) − eq(3) gives

$-15y = -15\ xy$ $\left(\frac{1}{2}\text{mark}\right)$

$\Rightarrow \quad x = 1$ $\left(\frac{1}{2}\text{mark}\right)$

$\Rightarrow \quad y = \frac{3}{2}$ $\left(\frac{1}{2}\text{mark}\right)$

Also $x = 0, y = 0$ is a solution. $\left(\frac{1}{2}\text{mark}\right)$

Ans14 August has 31 days

$\Rightarrow$ 4 weeks and 3 days.

So 4 weeks means 4 Wednesdays

Now remaining 3 days can be

S M T	T W Th	Th F Sa	Sa. S M
M T W	W Th F	F Sa S	

(1 Mark)

Favorable outcomes are = M T W

T W Th $\left(\frac{1}{2}\text{mark}\right)$

W Th F

$\therefore$ P (3 Wednesdays) $= \frac{3}{7}$ $\left(\frac{1}{2}\text{mark}\right)$

Ans15 sin (A + B) = 1

Since $\sin 90^{\circ} = 1$

A + B = 90° (1) $\left(\frac{1}{2}\text{mark}\right)$

$\cos(A - B) = \frac{\sqrt{3}}{2}$

since $\cos 30^{o} = \frac{\sqrt{3}}{2}$

A – B = 30° (2) $\left(\frac{1}{2}\text{mark}\right)$

Solving (1) and (2)

A = 60° $\left(\frac{1}{2}\text{mark}\right)$

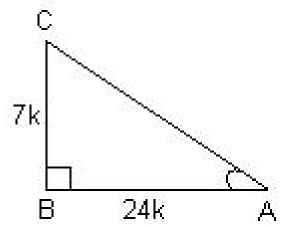
B = 30° $\left(\frac{1}{2}\text{mark}\right)$

OR

$\tan A = \frac{7}{24}$

So the ratio of adjacent and opposite side of the triangle is in the ratio 7:24

Let the common ratio term be k



Using Pythagoras Theorem

AC = 25 k. $\left(\frac{1}{2}\text{mark}\right)$

Consider $\sqrt{\frac{1-\cos A}{1+\cos A}}$

$$= \sqrt{\frac{1-\frac{24}{25}}{1+\frac{24}{25}}}$$ (1 Mark)

$$= \sqrt{\frac{1}{49}} = \frac{1}{7}$$ $\left(\frac{1}{2}\text{mark}\right)$

SECTION C

Ans16 Let us assume $\sqrt{5}$ is rational.

$\Rightarrow \sqrt{5} = \frac{p}{q}$ Where p and q are co prime integers and $q \neq 0$

$\left(\frac{1}{2}\text{mark}\right)$

$\Rightarrow \quad \sqrt{5}q = p$

$\Rightarrow \quad 5q^2 = p^2$ $\left(\frac{1}{2}\text{mark}\right)$

$\Rightarrow \quad 5\text{divides } p^2$

$\Rightarrow \quad 5\text{divides } p \quad (1)$

So p =5a for some integer a $\left(\frac{1}{2}\text{mark}\right)$

Substituting $p = 5a$ in $5q^2 = p^2$

$$5q^2 = 25a^2$$
$$\Rightarrow \quad q^2 = 5a^2 \qquad \left(\frac{1}{2}\text{mark}\right)$$
$$\Rightarrow \quad 5 \text{ divides } q^2$$
$$\Rightarrow \quad 5 \text{ divides } q \quad (2)$$

From (1) & (2) 5 is a common factor to p and q which contradicts the fact that P and q are co prime

$\therefore$ Our assumption is wrong and hence $\sqrt{5}$ is irrational. $\left(\frac{1}{2}\text{mark}\right)$

Ans17 Let $A(x, y)$ be the required point which is at a distance of 5 units from the point P(0,5) and 3 units from Q(0,1)

So AP =5 and AQ = 3

$$\Rightarrow \quad \sqrt{(x-0)^2 + (y-5)^2} = 5 \qquad \left(\frac{1}{2}\text{mark}\right)$$

$$\Rightarrow \quad (x-0)^2 + (y-5)^2 = 25$$

$$\Rightarrow \quad x^2 + y^2 - 10y = 0 \quad (1) \qquad \left(\frac{1}{2}\text{mark}\right)$$

$$\sqrt{(x-0)^2 + (y-1)^2} = 3 \qquad \left(\frac{1}{2}\text{mark}\right)$$

$$x^2 + (y-1)^2 = 9$$

$$x^2 + y^2 - 2y - 8 = 0 \quad (2) \qquad \left(\frac{1}{2}\text{mark}\right)$$

Equation (1) – Equation (2) gives:

$$-8y + 8 = 0 \Rightarrow \; y = 1$$

Substituting $y=1$ in (1)

$x^2-9=0 \Rightarrow x=\pm 3$

$\therefore$ The required points are (3, 1) and (-3, 1) $\left(\frac{1}{2}\text{mark}\right)$

Ans18 $(\sin A+\operatorname{cosec} A)^2+(\cos A+\sec A)^2$

$=\sin^2 A+\operatorname{cosec}^2 A+2\sin A\operatorname{cosec} A+\cos^2 A$

$+\sec^2 A+2\cos A\sec A$ $\left(\frac{1}{2}\text{mark}\right)$

$=(\sin^2 A+\cos^2 A)+2+2+\operatorname{cosec}^2 A+\sec^2$

(Since sin A.cosec A=1 and cosA.secA =1) (1Mark)

$=1+2+2+1+\cot^2 A+1+\tan^2 A$ (1 Mark)

(Since, $\operatorname{cosec}^2 A=1+\cot^2 A$ *and* $\sec^2 A=1+\tan^2 A$)

$=7+\cot^2 A+\tan^2 A$

=RHS $\left(\frac{1}{2}\text{mark}\right)$

OR

$(1+\cot\theta-\operatorname{cosec}\theta)(1+\tan\theta+\sec\theta)$

$=\left(1+\frac{\cos\theta}{\sin\theta}-\frac{1}{\sin\theta}\right)\left(1+\frac{\sin\theta}{\cos\theta}+\frac{1}{\cos\theta}\right)$ $\left(\frac{1}{2}\text{mark}\right)$

$=\left(\frac{\sin\theta+\cos\theta-1}{\sin\theta}\right)\left(\frac{\cos\theta+\sin\theta+1}{\cos\theta}\right)$ $\left(\frac{1}{2}\text{mark}\right)$

$=\frac{(\sin\theta+\cos^2\theta)-(1)^2}{\sin\theta\cos\theta}$ $\left(\frac{1}{2}\text{mark}\right)$

$=\frac{\sin^2\theta+\cos^2\theta+2\sin\theta\cos\theta-1}{\sin\theta\cos\theta}$ $\left(\frac{1}{2}\text{mark}\right)$

$=\frac{1+2\sin\theta\cos\theta-1}{\text{siin}\cos\theta}$ $\left(\frac{1}{2}\text{mark}\right)$

$$= \frac{2\sin\theta\cos\theta}{\sin\theta\cos\theta} = 2$$ $\left(\frac{1}{2}\text{mark}\right)$

Ans19 Let $\frac{1}{x+y} = a, \ \frac{1}{y-x} = b$

$$10a + 4b = -2 \quad \rightarrow \quad (1)$$
$$15a - 7b = 10 \quad \rightarrow \quad (2)$$ $\left(\frac{1}{2}\text{mark}\right)$

(1) × 3 and (2) × 2 gives

$$\cancel{30}\,a + 12b = -6$$
$$\cancel{30}\,a - 14b = 20$$
$$26b = -26$$
$$\Rightarrow b = -1$$ (1 mark)

Substituting b = -1 in (1):

$$10A - 4 = -2$$
$$\Rightarrow 10a = 2$$ $\left(\frac{1}{2}\text{mark}\right)$
$$\Rightarrow a = \frac{1}{5}$$

$$\therefore \quad x + y = 5$$
$$-x + y = -1$$
$$2y = 4 \Rightarrow y = 2$$
$$\therefore x = 3$$ (1 mark)

OR

For real and distinct roots: $D > 0$ $\left(\frac{1}{2}\text{mark}\right)$

Discriminant D = b^2-4ac

$$\left[-2(1+2m)\right]^2 - 4(2m)(3+2m) > 0$$ $\left(\frac{1}{2}\text{mark}\right)$

$$4(1+2m)^2 - 4(2m)(3+2m) > 0$$

$$1 + \cancel{4m^2} + 4m - 6m - \cancel{4m^2} > 0$$ $\left(\frac{1}{2}\text{mark}\right)$

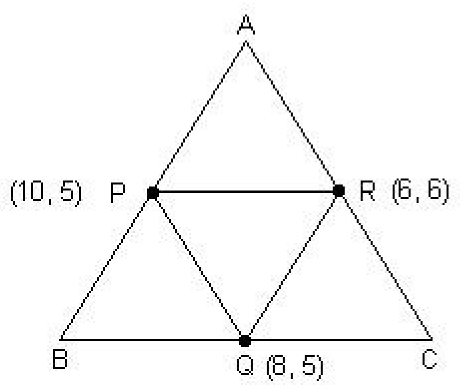
$1 - 2m > 0$ $\left(\frac{1}{2}\text{mark}\right)$

$\Rightarrow \quad 1 > 2m$

$\Rightarrow \quad \frac{1}{2} > m$

$\Rightarrow \quad m < \frac{1}{2}$ (1 mark)

Ans20



(1 mark)

We know that area of triangle formed by joining the midpoint of sides of a triangle is $\frac{1}{4}$th the area of the triangle.

ar(ΔPQR) $= \frac{1}{4}$ (ar ΔABC) $\left(\frac{1}{2}\text{mark}\right)$

ar(ΔPQR) $= \frac{1}{2}\left[10(6-5)+6(5-5)+8(5-6)\right]$ (1 mark)

$= \frac{1}{2}[10-8]$

$= 1 \text{ sq unit}$

So ar (ΔABC) = 4 sq unit $\left(\frac{1}{2}\text{mark}\right)$

Ans21 $3x^2-11x+14$

$\alpha+\beta=\frac{11}{3},\ \alpha\beta=\frac{14}{3}$ (1 mark)

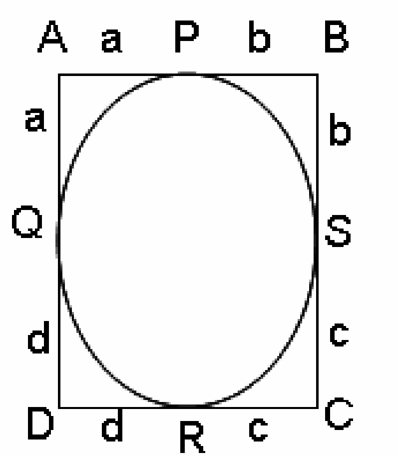
$\alpha+\beta^2=(\alpha+\beta)^2-2\alpha\beta$ (1 mark)

$=\left(\frac{11}{3}\right)^2-2\left(\frac{14}{3}\right)$ $\left(\frac{1}{2}\text{mark}\right)$

$=\frac{121}{9}-\frac{28}{3}$

$=\frac{37}{9}$ $\left(\frac{1}{2}\text{mark}\right)$

Ans22 We know that tangents drawn from an external point are equal.



$\therefore$ Let $AP=AQ=a$

$BP=BS=b$

$CS=CR=C$

$DQ=DR=d$ $\left(\frac{1}{2}\text{mark}\right)$

Since ABCD is a parallelogram, opposite sides are equal.

$\cancel{a}+b=\cancel{c}+d$

$\cancel{a}+d=\cancel{c}+b$ $\left(\frac{1}{2}\text{mark}\right)$

on subtracting , we get

$b-d = d-b$

$\Rightarrow \quad 2b = 2d$

$\Rightarrow \quad b = d$

$\therefore \quad AB = a+b$

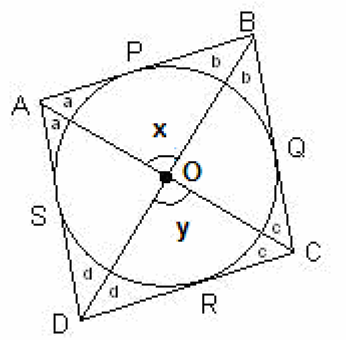
$= a+d$ $\left(\frac{1}{2}\text{mark}\right)$

$= AD$

Since adjacent sides are equal ABCD is a rhombus. $\left(\frac{1}{2}\text{mark}\right)$

OR

We know that the two tangents drawn from an external point are equally inclined to the line joining the point and centre $\left(\frac{1}{2}\text{mark}\right)$



$\left(\frac{1}{2}\text{mark}\right)$

$\therefore \quad$ Let $\angle OAP = \angle OAS = a \quad \angle OCQ = \angle OCR = c$ $\left(\frac{1}{2}\text{mark}\right)$

$\angle OBP = \angle OBQ = b \quad \angle ODR = \angle ODS = d$

In $\Delta AOB : a+b+x = 180^0$ $\left(\frac{1}{2}\text{mark}\right)$

In $\Delta COD : c+d+y = 180^0$

On adding $a+b+c+d+x+y = 360$ $\left(\frac{1}{2}\text{mark}\right)$

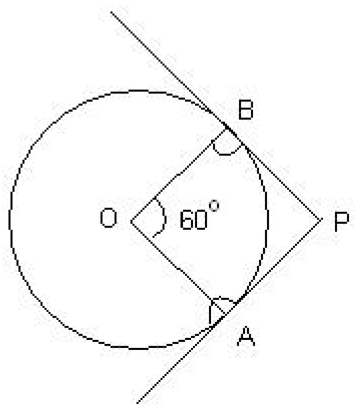
$\Rightarrow \quad 180+x+y = 360$

(Using angle sum property of quadrilateral 2a+2b+2c+2d=360)

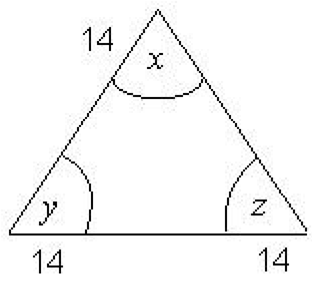
So x + y = 180° $\left(\frac{1}{2}\text{mark}\right)$

Hence proved.

Ans23 Construction of circle and 2 radii OA,OB at an angle of 60° (1 mark)
Construction of tangents through the points on the circle (2 marks)



Ans24 Let the angles of triangle be x, y, z.



Area grazed by the three horses

$$=\frac{x}{360}\pi r^2+\frac{y}{360}\pi r^2+\frac{z}{360}\pi r^2$$ (1 mark)

$$=\frac{\pi r^2}{360}(x+y+z)$$ $\left(\frac{1}{2}\text{mark}\right)$

$= \frac{\pi r^2}{360} \times 180$ $\left(\frac{1}{2}\text{mark}\right)$

$= \frac{22}{7} \times 14 \times 14 \times \frac{1}{2}$ $\left(\frac{1}{2}\text{mark}\right)$

$= 308\ m^2$ $\left(\frac{1}{2}\text{mark}\right)$

Ans25 $a_{46} = 25$

$\Rightarrow\ a + 45d = 25$ $\left(\frac{1}{2}\text{mark}\right)$

$S_{91} = \frac{91}{2}[2a + 90d]$ (1mark)

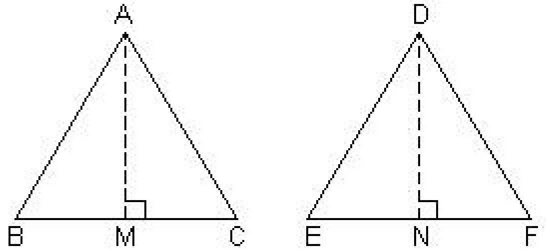
$= 91(a + 45d)$ $\left(\frac{1}{2}\text{mark}\right)$

$= 91 \times 25$ $\left(\frac{1}{2}\text{mark}\right)$

$= 2275$ $\left(\frac{1}{2}\text{mark}\right)$

Section D

Ans26 Given: $\Delta\ ABC \sim \Delta\ DEF$



To Prove: $\frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \frac{AB^2}{DE^2} = \frac{BC^2}{EF^2} = \frac{AC^2}{DF^2}$

Construction: Draw $AM \perp BC$ and $DN \perp EF$

Proof: In ΔABC and ΔDEF (1mark)

$$\frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \frac{\frac{1}{2} \times BC \times AM}{\frac{1}{2} \times EF \times DN} = \frac{BC}{EF} \cdot \frac{AM}{DN} \quad ...(i)$$

$$\left[\text{Area of } \Delta = \frac{1}{2} \times \text{base} \times \text{corresponding altitude}\right]$$

$\therefore \quad \Delta ABC \sim \Delta DEF \quad$ ...(Given)

$\therefore \quad \dfrac{AB}{DE} = \dfrac{BC}{EF} \quad$ ...(Sides are proportional)...(ii)

$\angle B = \angle E \quad$ ...$(\because \Delta ABC \sim \Delta DEF)$

$\angle M = \angle N \quad$ ...(each 90°)

$\therefore \quad \Delta ABM \sim \Delta DEN \quad$ ...(AA Similarity)

$\therefore \quad \dfrac{AB}{DE} = \dfrac{AM}{DN} \quad$ ...(*iii*)[Sides are proportional]

From (ii) and (iii), we have

$\dfrac{BC}{DE} = \dfrac{AM}{DN}$ (1 mark)

From (i) and (iv), we have

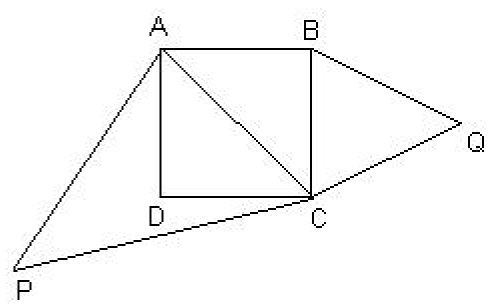
$\dfrac{ar(\Delta ABC)}{ar(\Delta DEF)} = \dfrac{BC}{EF} \cdot \dfrac{BC}{EF} = \dfrac{BC^2}{EF^2}$

Similarly, we can prove that

$\dfrac{ar(\Delta ABC)}{ar(\Delta DEF)} = \dfrac{AB^2}{DE^2} = \dfrac{AC^2}{DF^2}$

(2 marks)

$\therefore \quad \boldsymbol{\dfrac{ar(\Delta ABC)}{ar(\Delta DEF)} = \dfrac{AB^2}{DE^2} = \dfrac{BC^2}{EF^2} = \dfrac{AC^2}{DF^2}}$



ΔBCQ and ΔACP are equilateral triangles and therefore similar.

(1 mark)

$AC^2 = AB^2 + BC^2 = 2BC^2$ (By Pythagoras theorem) $\left(\frac{1}{2}\text{mark}\right)$

Using the above theorem

$$\frac{\text{area}\ \Delta\ ACP}{\text{area}\ \Delta\ BCQ} = \frac{AC^2}{BC^2} = \frac{2BC^2}{BC^2} = 2$$ $\left(\frac{1}{2}\text{mark}\right)$

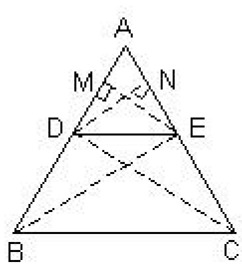
OR

Statement: If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. (1 Mark)

Given: In $\Delta ABC, DE \parallel BC$

To prove: $\frac{AD}{DB} = \frac{AE}{EC}$

Construction: Draw $EM \perp AD$ and $DN \perp AE$. Join B to E and C to D



(1 mark)

Proof: In ΔADE and ΔBDE

$$\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{\frac{1}{2}\times AD\times EM}{\frac{1}{2}\times DB\times EM} = \frac{AD}{DB} \qquad ...(i)$$

[Area of $\Delta = \frac{1}{2}\times \text{base}\times$ corresponding altitude]

In ΔADE and ΔCDE

$$\frac{ar(\Delta ADE)}{ar(\Delta CDE)} = \frac{\frac{1}{2} \times AE \times DN}{\frac{1}{2} \times EC \times DN} = \frac{AE}{EC} \qquad ...(ii)$$

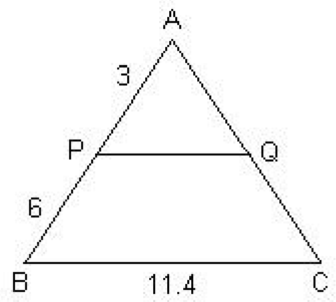
$\because$ $DE \| BC$ ...(Given)

$\therefore$ $ar(\Delta BDE) = ar(\Delta CDE)$ ...(iii)

($\because$ Δs on the same base and between the same parallel sides are equal in area)

From (i), (ii) and (iii)

$$\mathbf{\frac{AD}{DB} = \frac{AE}{EC}}$$ (2 marks)



Since $PQ \parallel BC$

$\Delta APQ \sim \Delta ABC$ (By AA condition) (1 mark)

$\therefore \quad \frac{AP}{AB} = \frac{PQ}{BC}$

$\Rightarrow \quad \frac{3}{9} = \frac{PQ}{11.4}$ (1 mark)

$\Rightarrow \quad PQ = \frac{34.2}{9} = 3.8\,cm$

Ans27 Let length of rectangle = x m

Breadth = y m

Area $= xy\ m^2$. $\left(\frac{1}{2}\text{mark}\right)$

$(x+7)(y-3) = xy$ (1 mark)

$\Rightarrow -3x + 7y - 21 = 0 \rightarrow (1)$ $\left(\frac{1}{2}\text{mark}\right)$

$(x-7)(y+5) = xy$ (1 mark)

$5x - 7y - 35 = 0 \quad \rightarrow \quad (2)$ $\left(\frac{1}{2}\text{mark}\right)$

(1) + (2) gives:

$2x - 56 = 0$

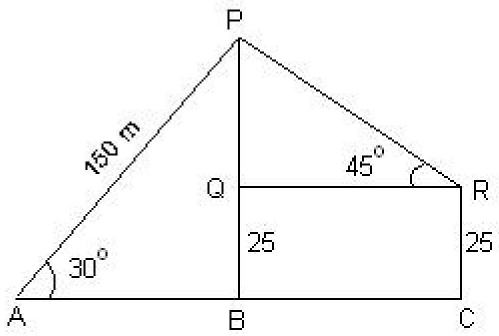
$\Rightarrow \quad x = 28m$ (1 mark)

On substituting x = 28 m in equation (2), we get y = 15 m

The length is 28 m and the breadth is 15m. $\left(\frac{1}{2}\text{mark}\right)$

Therefore, area is 420m^2 (1 mark)

Ans28 A and R are the positions of the two boys. P is the point where the two kites meet. $\left(\frac{1}{2}\text{mark}\right)$



(1 mark)

In Δ ABP

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

$$\frac{1}{2} = \frac{PB}{150}$$

$$\Rightarrow \quad PB = 75\,m$$ $\left(1\frac{1}{2}\text{mark}\right)$

and $QB = 25m$

$\Rightarrow PQ = 50m$ (1 mark)

In Δ PQR

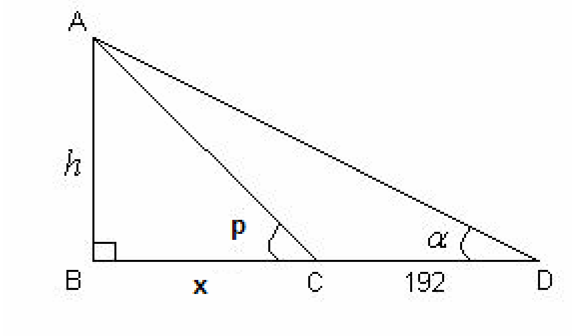
$$\sin 45^o = \frac{PQ}{PR}$$

$$\frac{1}{\sqrt{2}} = \frac{50}{PR}$$ $\left(1\frac{1}{2}\text{mark}\right)$

$$\Rightarrow \quad 50\sqrt{2} = PR$$

∴ The boy should have a string of length 70.7m $\left(\frac{1}{2}\text{mark}\right)$

OR



(1 mark)

D is the initial point of observation and C is the next point of observation.

AB is the tower of height h. Let BC = x

$$\tan\alpha = \frac{AB}{BD}$$

$$\frac{5}{12} = \frac{h}{x+192}$$ $\left(\frac{1}{2}\text{mark}\right)$

$$\Rightarrow\ 12h - 5x - 960 = 0 \quad \rightarrow (1)$$ (1 mark)

$$\tan\ p = \frac{AB}{BC}$$

$$\frac{3}{4} = \frac{h}{x}$$ $\left(\frac{1}{2}\text{mark}\right)$

$$\Rightarrow\ 3x = 4h \ \rightarrow (2)$$ (1 mark)

From (2): $12h = 9x$ and substituting in (1):

$$9x - 5x = 960$$

$$4x = 960$$ (1 mark)

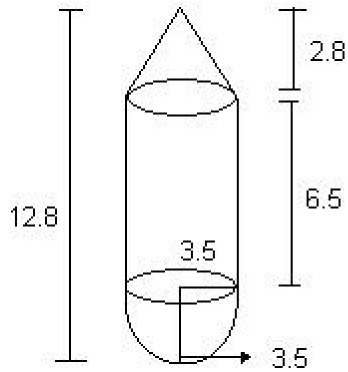
$$\Rightarrow\ x = 240$$

$$\therefore h = \frac{3\times 240}{4}\ \text{from (2)}$$

$$= 180$$ $\left(\frac{1}{2}\text{mark}\right)$

$\therefore$ The height of the tower is 180 m. $\left(\frac{1}{2}\text{mark}\right)$

Ans29



Height of cone $= 12.8 - (6.5 + 3.5)$

= 2.8 c (1 mark)

Slant height $l = \sqrt{(3.5)^2 + (2.8)^2}$

$= \sqrt{12.25 + 7.84}$

$= \sqrt{20.09}$

$= 4.48$ $\left(1\frac{1}{2}\text{mark}\right)$

$TSA = 2\pi r^2 + 2\pi rh + \pi rl$

$= \pi r(2r + 2h + l)$

$= \frac{22}{7} \times \frac{7}{2}(7 + 13 + 4.48)$ (1 mark)

$= 11 \times 24.48$

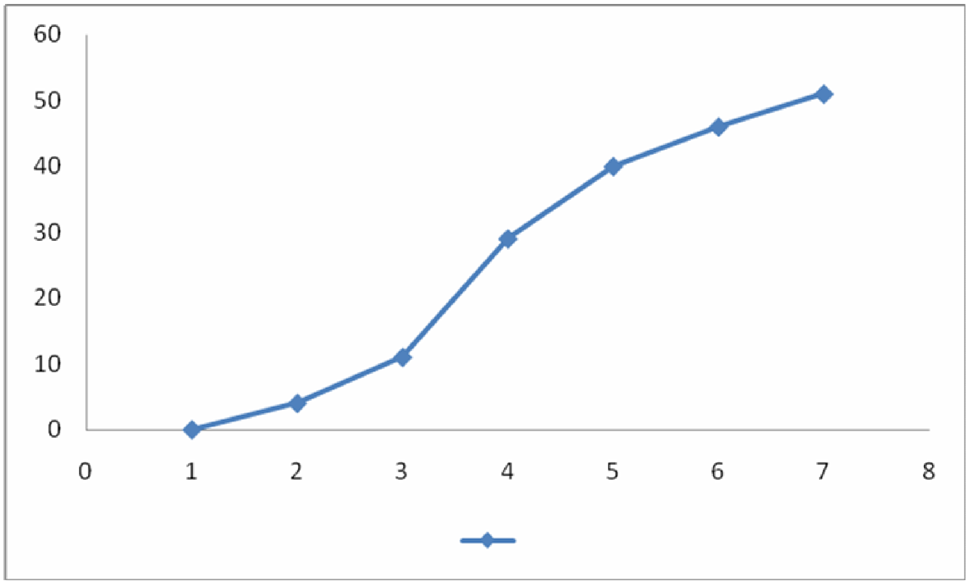
$= 269.28$ $\left(1\frac{1}{2}\text{mark}\right)$

$\therefore$ The surface area of the solid is 269.28 cm^2 $\left(\frac{1}{2}\text{mark}\right)$

Ans30

CI	f	$C.f$
Less than 140	4	4
140 - 145	7	11
145 - 150	18	29
150 – 155	11	40
155 – 160	6	46
160 – 165	5	51
	51	

(2 marks)



(2 marks)

$$n = 51 \Rightarrow \frac{n}{2} = 25.5$$

Median class $= 145 - 150$

$$\text{Median } = l + \left(\frac{\frac{n}{2} - cf}{f} \right) h$$

$$= 145 + \left(\frac{25.5 - 11}{18}\right)5$$

$$= 145 + \frac{14.5 \times 5}{18}$$ (2 marks)

$$= 145 + \frac{72.5}{18}$$

$$= 149.02$$