A.P. SET CODE

A

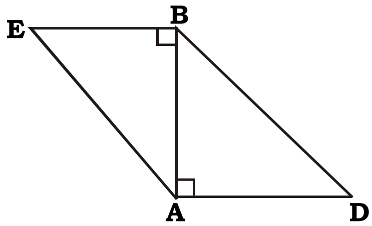
MT - w

2017 ___ __ 1100 - MT - w - MATHEMATICS (71) GEOMETRY- SET - A (E)

Time : 2 Hours **Preliminary Model Answer Paper** **Max. Marks : 40**

A.1. Solve ANY FIVE of the following :

(i) $\frac{A(aABE)}{A(aABD)} = \frac{BE}{AD}$ [Triangles with common base] ½



y $\frac{A(aABE)}{A(aABD)} = \frac{6}{9}$

y $\boxed{\frac{A(aABE)}{A(aABD)} = \frac{2}{3}}$ ½

(ii) Let $r_1 = 5$ cm and $r_2 = 3$ cm

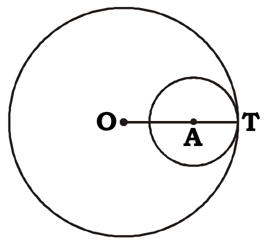
The circles are touching internally.

y Distance between their centres

= $r_1 - r_2$

= $5 - 3$

= $\boxed{2 \text{ cm}}$ 1



(iii) Given : ¯ = – 45°

tan (– ¯) = – tan ¯ ½

y tan (– 45°) = – tan 45°

y $\boxed{\tan(-45°) = -1}$ ½

(iv) m = 5, c = – 3

y By slope point form, the equation of line is

y = mx + c ½

y y = 5x – 3

y $\boxed{5x - y - 3 = 0}$ ½

(v)

radius = 7 cm

Circumference = 2®r ½

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

= 44 cm ½

y Circumference is 44 cm.

(vi)

Height of an equilateral triangle $= \frac{\sqrt{3}}{2} \times (\text{side})$ ½

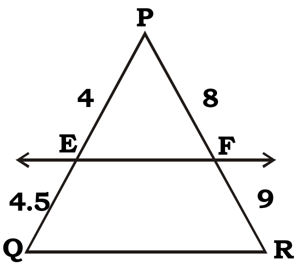
$= \frac{\sqrt{3}}{2} \times 6$

y Height of an equilateral triangle $= 3\sqrt{3}$ cm ½

A.2. Solve ANY FOUR of the following :

(i)

$\frac{PE}{EQ} = \frac{4}{4.5}$



y $\frac{PE}{EQ} = \frac{4 \times 10}{4.5 \times 10}$

y $\frac{PE}{EQ} = \frac{40}{45}$ ½

y $\frac{PE}{EQ} = \frac{8}{9}$ ……(i) ½

$\frac{PF}{FR} = \frac{8}{9}$ ……(ii) ½

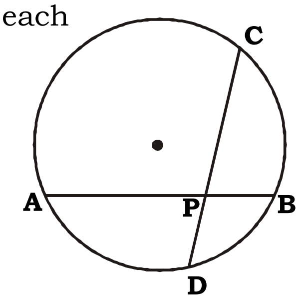
In aPQR,

$\frac{PE}{EQ} = \frac{PF}{FR}$ [From (i) and (ii)]

y **line EF || side QR** [By converse of B.P.T.] ½

(ii)

Chords AB and CD intersect each other internally at point P



y PA × PB = PC × PD 1

y 6 × 4 = 8 × PD

y $PD = \frac{24}{8}$

y PD = 3 units 1

(iii) Curved surface area of a cone = 1640 ® cm²

its radius (r) = 40 cm.

Curved surface area of a cone = ®rl ½

y 1640® = ® × 40 × l

y $\frac{1640}{40} = l$

y l = 41 cm ½

Now,

$r^2 + h^2 = l^2$ ½

y $40^2 + h^2 = 41^2$

y $h^2 = 41^2 - 40^2$

y $h^2 = 1681 - 1600$

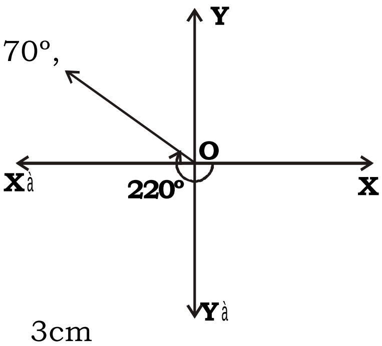
y $h^2 = 81$

y $h = 9$ cm [Taking square roots]

y **Height of a cone is 9 cm.** ½

(iv) Since the initial arm rotates in clockwise direction and the angle is more than – 180° but less than – 270°, the terminal arm lies in II quadrant.

(1 mark for figure) 1



(v) Radius of a right circular cylinder = 3cm

its height (h) = 7cm

(a) Curved surface area of a cylinder = 2 ®rh ½

$= 2 \times \frac{22}{7} \times 3 \times 7$

y **Curved surface area of a cylinder= 132 cm²** ½

(b) Total Surface area of a cylinder = 2®r (r + h) ½

$= 2 \times \frac{22}{7} \times 3\ (3 + 7)$

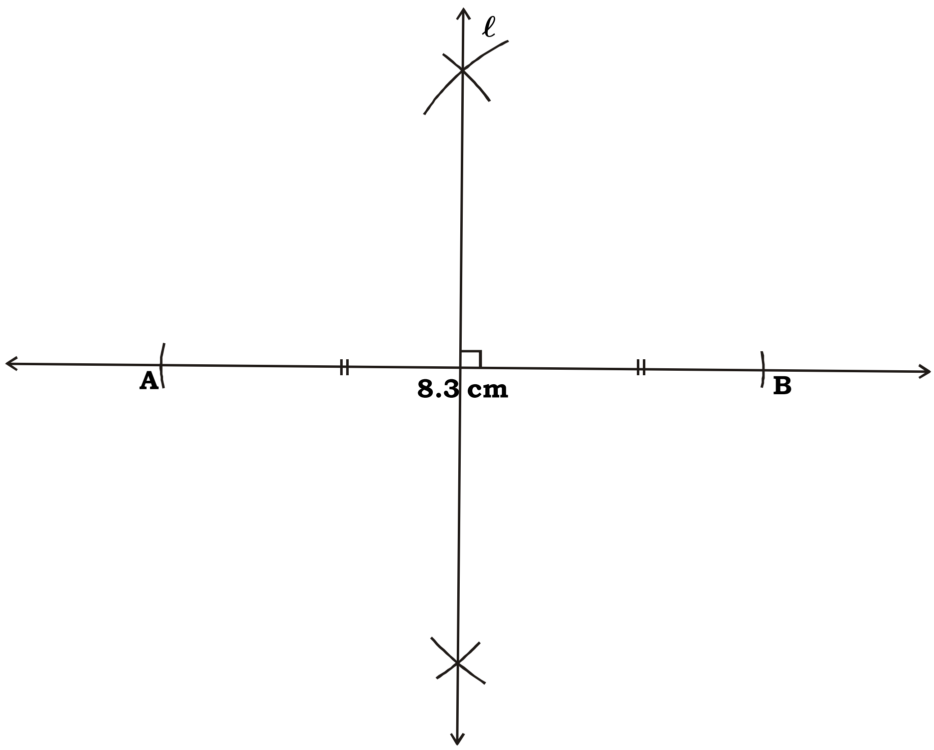
$= 2 \times \frac{22}{7} \times 3 \times 10$

$= \frac{1320}{7}$

= 188.57 cm² ½

y **Total surface area of the cylinder is 188.57 cm².**

(vi)



1 mark for drawing seg AB
1 mark for drawing perpendicular bisector of seg AB

A.3. Solve ANY THREE of the following :

(i) In aABC,

seg AP is the median [Given]

y $AB^2 + AC^2 = 2AP^2 + 2BP^2$ [By Apollonius theorem] ½

y $260 = 2(7)^2 + 2BP^2$ [Given]

y $260 = 2(49) + 2BP^2$ ½

y $260 = 98 + 2BP^2$

y $260 - 98 = 2BP^2$

y $2BP^2 = 162$ ½

y $BP^2 = \frac{162}{2}$

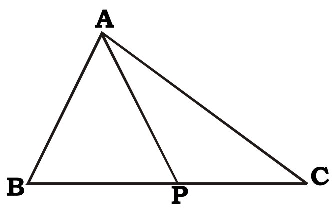
y $BP^2 = 81$

y $BP = 9$ units [Taking square roots] ½

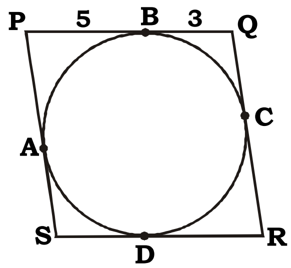
$BP = \frac{1}{2} BC$ [$\because$ P is the midpoint of seg BC] ½

y $9 = \frac{1}{2} BC$

y $\boxed{BC = 18 \text{ units}}$ ½



(ii)



PA = PB = 5
BQ = CQ = 3
Let,
AS = SD = x
CR = DR = y
} [The lengths of the two tangent segments to a circle drawn from an external point are equal] ½

□PQRS is a parallelogram [Given]

y PQ = SR [∵ Opposite sides of a parallelogram are congruent] ½

y PB + BQ = SD + DR [∵ P - B - Q and S - D - R]

y 5 + 3 = x + y

y x + y = 8 ......(i) ½

PS = QR [∵ Opposite sides of a parallelogram are congruent]

y PA +AS = QC + CR [∵ P - A - S and Q - C - R]

y 5 + x = 3 + y

y x – y = 3 – 5

y x – y = – 2 ......(ii) ½

Adding (i) and (ii)

x + y + x – y = 8 + (– 2)

y 2x = 8 – 2

y 2x = 6

y x = 3 ½

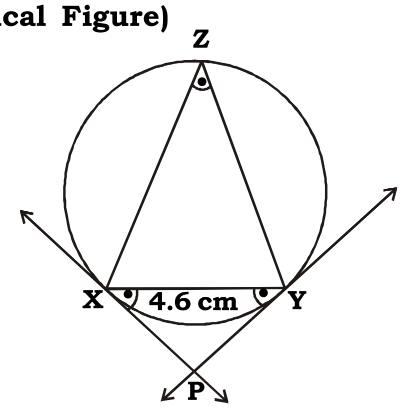
PS = PA + AS [∵ P - A - S]

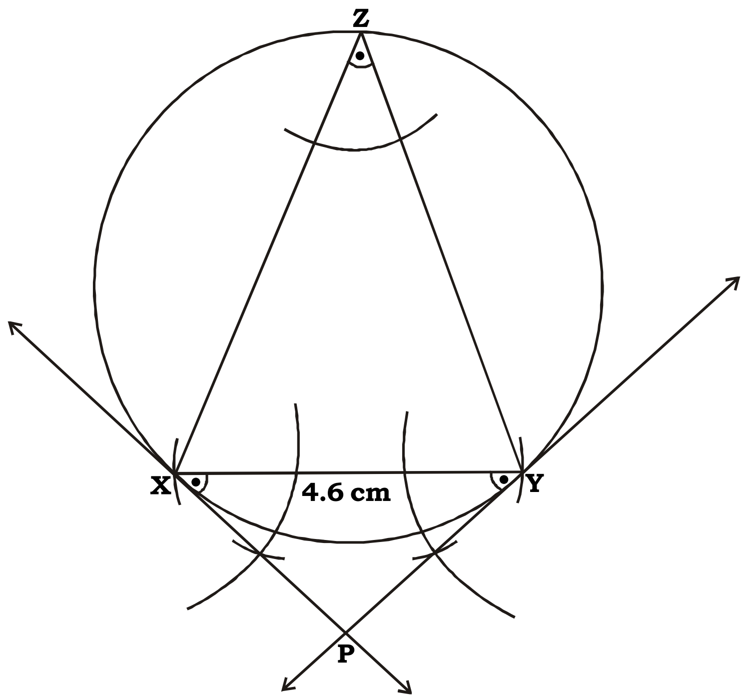
y PS = 5 + x

y PS = 5 + 3

y **PS = 8 units** ½

(iii) **(Analytical Figure)**





1 mark for drawing chord XY
1 mark for drawing tangent at X
1 mark for drawing tangnet at Y

(iv)

$$\tan\theta = 1$$

$$\therefore \quad \frac{\sin\theta}{\cos\theta} = 1$$

$$\therefore \quad \sin\theta = \cos\theta \qquad \text{.......(i)} \qquad \tfrac{1}{2}$$

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

$$\therefore \quad 1 + (1)^2 = \sec^2\theta$$

$$\therefore \quad 1 + 1 = \sec^2\theta$$

$$\therefore \quad 2 = \sec^2\theta$$

$$\therefore \quad \sec\theta = \sqrt{2} \qquad \text{[Taking square roots]} \qquad \tfrac{1}{2}$$

$$\cos\theta = \frac{1}{\sec\theta}$$

$$\therefore \quad \cos\theta = \frac{1}{\sqrt{2}}$$

$$\therefore \quad \sin\theta = \frac{1}{\sqrt{2}} \qquad \text{[From (i)]} \qquad \tfrac{1}{2}$$

$$\text{cosec}\ - = \frac{1}{\sin -}$$

$$= \frac{1}{1/\sqrt{2}}$$ ½

y $$\text{cosec}\ - = \sqrt{2}$$

y $$\frac{\sin - + \cos -}{\sec - + \text{cosec}\ -} = \frac{\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}}{\sqrt{2} + \sqrt{2}}$$ ½

$$= \frac{2/\sqrt{2}}{2\sqrt{2}}$$

$$= \frac{2}{2 \times \sqrt{2} \times \sqrt{2}}$$

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

$$= \frac{2}{4}$$

y $$\boxed{\frac{\sin - + \cos -}{\sec - + \text{cosec}\ -} = \frac{1}{2}}$$ ½

(v) Let, $A ø \left(\frac{2}{5}, \frac{1}{3}\right) ø (x_1, y_1)$

$B ø \left(\frac{1}{2}, k\right) ø (x_2, y_2)$

$C ø \left(\frac{4}{5}, 0\right) ø (x_3, y_3)$

∵ Points A, B and C are collinear

Slope of line AB = Slope of line BC ½

y $$\frac{y_2 - y_1}{x_2 - x_1} = \frac{y_3 - y_2}{x_3 - x_2}$$

y $$\frac{k - \frac{1}{3}}{\frac{1}{2} - \frac{2}{5}} = \frac{0 - k}{\frac{4}{5} - \frac{1}{2}}$$ ½

y $$\frac{\frac{3k - 1}{3}}{\frac{1}{10}} = \frac{\frac{-k}{3}}{\frac{3}{10}}$$ ½ y $\frac{3k-1}{3} \times 10 = -k \times \frac{10}{3}$ ½

y $3k - 1 = -k$

y $3k + k = 1$

y $4k = 1$ ½

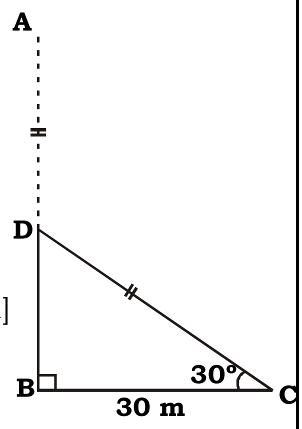
y $k = \frac{1}{4}$

y The value of k is $\frac{1}{4}$ ½

A.4. **Solve ANY TWO of the following :**

(i) AB represents the height of the tree
The tree breaks at point D
AD is the broken part of tree which
then takes the position of DC ½

(½ mark for figure)



y AD = DC
m∠DCB = 30°
BC = 30 m
In right angled aDBC,

$\tan 30^\circ = \frac{DB}{BC}$ [By definition] ½

y $\frac{1}{\sqrt{3}} = \frac{DB}{30}$

y $DB = \frac{30}{\sqrt{3}}$

y $DB = \frac{30\sqrt{3}}{3}$ ½

y $DB = 10\sqrt{3}$ m

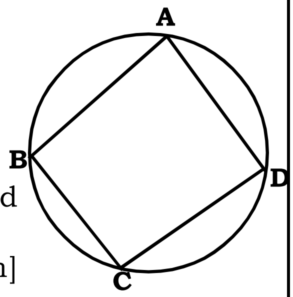
$\cos 30^\circ = \frac{BC}{DC}$ [By definition] ½

y $\frac{\sqrt{3}}{2} = \frac{30}{DC}$

y $DC = \frac{30 \times 2}{\sqrt{3}}$

y $DC = \frac{30\sqrt{3} \times 2}{3}$ ½

y $DC = 20\sqrt{3}$ m

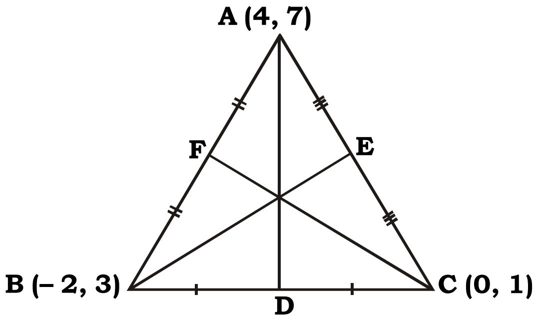
	y AD = DC = $20\sqrt{3}$ m	
	AB = AD + DB [∵ A - D - B]	½
	y AB = $20\sqrt{3} + 10\sqrt{3}$	
	y AB = $30\sqrt{3}$ m	
	y AB = 30 × 1.73	
	y AB = 51.9 m	
	y The height of tree is 51.9 m.	½
(ii)	**Given :** ☐ABCD is a cyclic	
	To Prove : m ĎABC + m ĎADC = 180°	½
	m ĎBAD + m ĎBCD = 180°	
	(½ mark for figure) 	
	Proof :	
	m ĎABC = $\frac{1}{2}$ m (arc ADC) .....(i) [Inscribed angle theorem]	1
	m ĎADC = $\frac{1}{2}$ m (arc ABC) .....(ii)	
	Adding (i) and (ii), we get	
	m ĎABC + m ĎADC = $\frac{1}{2}$ m (arc ADC) + $\frac{1}{2}$ m (arc ABC)	
	y m ĎABC + m ĎADC = $\frac{1}{2}$[m (arc ADC) + m (arc ABC)]	½
	y m ĎABC + m ĎADC = $\frac{1}{2}$ × 360° [∵ Measure of a circle is 360°]	½
	y **m ĎABC + m ĎADC = 180°** **.......(iii)**	
	In ☐ABCD,	
	m ĎBAD + m ĎBCD + m ĎABC + m ĎADC = 360°	
	[∵ Sum of measure of angles of a quadrilateral is 360°]	½
	y m ĎBAD + m ĎBCD + 180° = 360° [From (iii)]	
	y **m ĎBAD + m ĎBCD = 180°**	½

(iii) A ø (4, 7), B ø (– 2, 3), C ø (0, 1)

Let, seg AD, seg BE and seg CF be the medians on sides BC, AC and AB respectively.

y D, E and F are the midpoints of sides BC, AC and AB respectively.

By midpoint formula,



D ø $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ ½

ø $\left(\frac{-2 + 0}{2}, \frac{3 + 1}{2}\right)$

ø $\left(\frac{-2}{2}, \frac{4}{2}\right)$

ø (– 1, 2) ½

E ø $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

ø $\left(\frac{4 + 0}{2}, \frac{7 + 1}{2}\right)$

ø $\left(\frac{4}{2}, \frac{8}{2}\right)$

ø (2, 4) ½

F ø $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

ø $\left(\frac{4 + (-2)}{2}, \frac{7 + 3}{2}\right)$

ø $\left(\frac{4 - 2}{2}, \frac{10}{2}\right)$

ø $\left(\frac{2}{2}, 5\right)$

ø (1, 5) ½

By two point form,

The equation of median AD,

$$\frac{x - x_1}{x_1 - x_2} = \frac{y - y_1}{y_1 - y_2}$$ ½

y $$\frac{x - 4}{4 - (-1)} = \frac{y - 7}{7 - 2}$$

y $$\frac{x - 4}{4 + 1} = \frac{y - 7}{5}$$

y $$\frac{x - 4}{5} = \frac{y - 7}{5}$$

y $x - 4 = y - 7$

y $x - y - 4 + 7 = 0$

y $x - y + 3 = 0$ ½

The equation of the median BE

$$\frac{x - x_1}{x_1 - x_2} = \frac{y - y_1}{y_1 - y_2}$$

y $\frac{x - (-2)}{-2 - 2} = \frac{y - 3}{3 - 4}$

y $\frac{x + 2}{-4} = \frac{y - 3}{-1}$

y $x + 2 = 4(y - 3)$

y $x + 2 = 4y - 12$

y $x - 4y + 2 + 12 = 0$

y $x - 4y + 14 = 0$ ½

The equation of the median CF

$$\frac{x - x_1}{x_1 - x_2} = \frac{y - y_1}{y_1 - y_2}$$

y $\frac{x - 0}{0 - 1} = \frac{y - 1}{1 - 5}$

y $\frac{x}{-1} = \frac{y - 1}{-4}$

y $4x = y - 1$ ½

y $4x - y + 1 = 0$

y The equation of the medians of aABC are $x - y + 3 = 0$, $x - 4y + 14 = 0$ and $4x - y + 1 = 0$

A.5. **Solve ANY TWO of the following :**

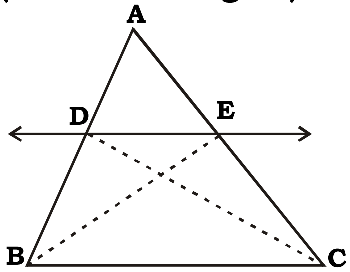
(i) **Given :** In ΔABC,

(i) Line l || side BC

(ii) Line intersects sides AB and AC at points D and E respectively. ½

A - D - B, A - E - C

(½ mark for figure)



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

Construction : Draw seg BE and seg CD. ½

Proof : ΔADE and ΔBDE have a common vertex E and their bases AD and BD lie on the same line AB.

∴ Their heights are equal

∴ $\frac{A(aADE)}{A(aBDE)} = \frac{AD}{DB}$ ...(i) [Triangles having equal heights] ½

ΔADE and ΔCDE have a common vertex D and their bases AE and EC lie on the same line AC. ½

∴ Their heights are equal.

∴ $\frac{A(aADE)}{A(aCDE)} = \frac{AE}{CE}$ ...(ii) [Triangles having equal heights] ½

line DE || side BC [Given]

ΔBDE and ΔCDE are between the same two parallel lines DE and BC. ½

∴ Their heights are equal.

Also, they have same base DE.

∴ A(ΔBDE) = A(ΔCDE) ...(iii) [Areas of two triangles having equal bases and equal heights are equal] ½

∴ $\frac{A(aADE)}{A(aBDE)} = \frac{A(aADE)}{A(aCDE)}$ ...(iv) [From (i), (ii) and (iii)] ½

∴ $\mathbf{\frac{AD}{DB} = \frac{AE}{EC}}$ [From (i), (ii) and (iv)] ½

(ii) **Analysis :** aABC ~ aDEF [Given]

y $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = \frac{2}{3}$ ......(i) [c.s.s.t.]

ĎB = ĎE = 45° [c.a.s.t.]

y $\frac{AB}{DE} = \frac{2}{3}$ [From (i)]

y $\frac{5.2}{DE} = \frac{2}{3}$

y $\frac{15.6}{2} = DE$

y DE = 7.8 cm

y $\frac{BC}{EF} = \frac{2}{3}$ [From (i)]

y $\frac{4.6}{EF} = \frac{2}{3}$

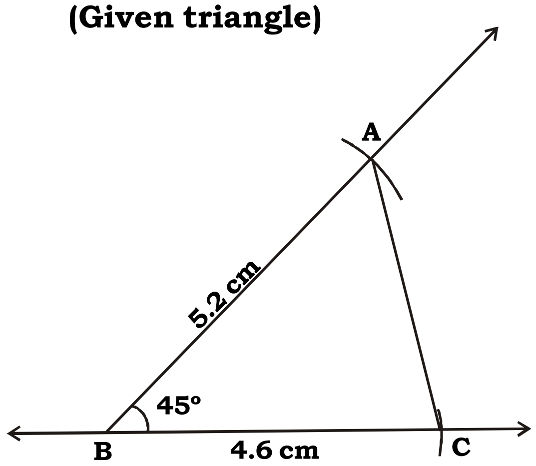
y $\frac{13.8}{2} = EF$

y EF = 6.9 cm

2

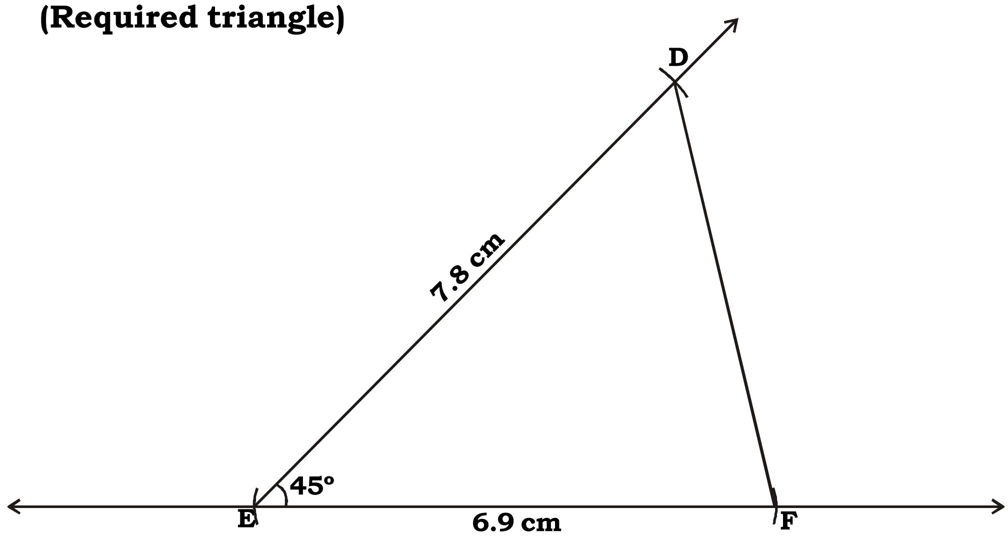
Information for constructing aDEF is complete.

(Given triangle)



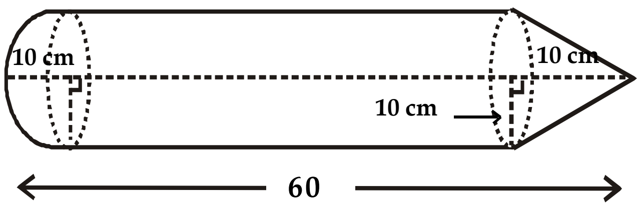
1

(Required triangle)



2

(iii)



A toy is a combination of cylinder, hemisphere and cone, each with radius 10 cm

y $r = 10$ cm

y Height of the conical part (h) = 10 cm

Height of the hemispherical part = its radius = 10cm

Total height of the toy = 60cm ½

y Height of the cylindrical part (h_1) = 60 – 10 – 10

= 60 – 20

= 40 cm

$l^2 = r^2 + h^2$ ½

y $l^2 = 10^2 + 10^2$

y $l^2 = 100 + 100$

$l^2 = 200$

y $l = \sqrt{200}$

[Taking square roots]

$l = 10\sqrt{2}$ cm ½

Slant height of the conical part (l) = $10\sqrt{2}$

= 10×1.41

= 14.1 cm ½

Total surface area of the toy

= Curved surface area of the conical part + Curved surface area of the cylindrical part + Curved surface area of the hemispherical part **1**

= ®rl + 2®rh_1 + 2®r^2 **½**

= ®r (l + 2h_1 + 2r)

= 3.14 × 10 (14.1 + 2 × 40 + 2 × 10) **½**

= 31.4 (14.1 + 80 + 20)

= 31.4 × 114.1 **½**

= 3582.74 cm^2

y Total surface area of the toy is 3582.74 cm^2. **½**

❖❖❖❖