A.P. SET CODE
B

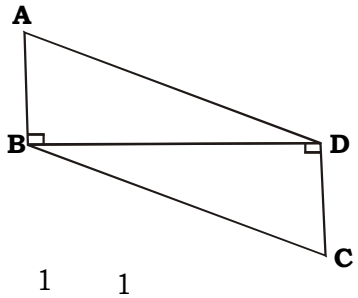
MT - x

2017 ___ ___ 1100 - MT - X - GENERAL MATHEMATICS (71)GEOMETRY- SET - B (E)

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

A.1. Solve ANY FIVE of the following :

(i) $\frac{A(\Delta ABD)}{A(\Delta CDB)} = \frac{AB}{DC}$ [Triangles having common base BD] ½



y $\frac{4}{5} = \frac{6}{DC}$

y $DC = \frac{6 \times 5}{4}$

y $\boxed{DC = 7.5 \text{ units}}$ ½

(ii) $\sin45° \times \cos45° - \sin30° = \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} - \frac{1}{2}$ ½

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

$= 0$

y $\boxed{\sin45° \times \cos45° - \sin30° = 0}$ ½

(iii) Midpoint of class $= \frac{16 + 20}{2}$ ½

$= \frac{36}{2}$

$= \boxed{18}$ ½

(iv) One and only one tangnet can be drawn to a circle from a point on the circle. **1**

(v) Diameter of the circle = 10.4 cm

Radius $= \frac{1}{2} \times$ diameter ½

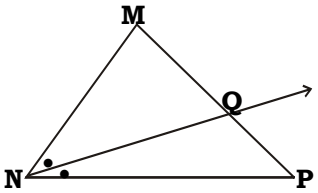
$= \frac{1}{2} \times 10.4$

$= \boxed{5.2 \text{ cm}}$ ½

(vi) Sample space of tossing a coin
S = { Head, Tail } **1**

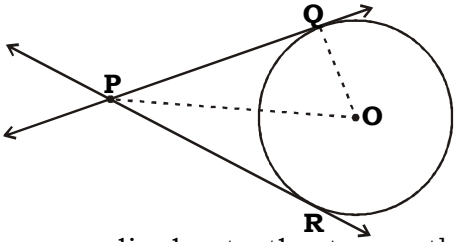
A.2. Solve ANY FOUR of the following :

(i) MP = MQ + QP [M - Q - P]



y 5.5 = 2 + QP
y QP = 3.5 **½**
In ΔMNP,
ray MQ bisects ∠MNP
y $\frac{MN}{NP} = \frac{MQ}{QP}$ [By property of angle bisector of a triangle] **½**
y $\frac{MN}{NP} = \frac{2}{35}$
y $\frac{MN}{NP} = \frac{20}{35}$ **½**
y $\frac{MN}{NP} = \frac{4}{7}$
y $\boxed{MN : NP = 4 : 7}$ **½**

(ii)



Draw seg PO and seg QO
seg OQ ⊥ line PQ [Radius is perpendicular to the tangent] **½**
In right angled ΔPOQ,
$PO^2 = PQ^2 + QO^2$ [By Pythagoras theorem] **½**
y $PO^2 = (12)^2 + (5)^2$
y $PO^2 = 144 + 25$
y $PO^2 = 169$ **½**
y PO = 13 cm [Taking square roots]
y $\boxed{OP = 13 \text{ cm}}$ **½**

(iii) Radius (r) of a cone = 7 cm
Its slant height (l) = 10 cm
Curved surface area of a cone = ®rl **½**
$= \frac{22}{7} \times 7 \times 10$ **½**
$= \boxed{220 \text{ cm}^2}$ **1**

(iv) Surface Area of sphere = 154 sq.cm.

$\therefore \quad 4\pi r^2 = 154$ ½

$\therefore \quad 4 \times \frac{22}{7} \times r^2 = 154$

$\therefore \quad r^2 = \frac{154 \times 7}{4 \times 22}$ ½

$\therefore \quad r^2 = \frac{49}{4}$

$\therefore \quad r = \sqrt{\frac{49}{4}}$

$\therefore \quad r = \frac{7}{2}$

$\therefore \quad r = 3.5$ cm ½

$\therefore$ Radius of sphere is 3.5 cm

diameter = 2r ½

= 2 × 3.5

= 7cm ½

$\therefore$ Diameter of sphere is 7cm.

(v) Number of red coloured fish = 5 ½

Number of black coloured fish = 8

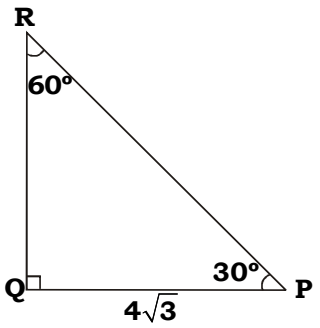
y Total number of fish in aquarium = 5 + 8 = 13 fishes ½

Probability that the fish taken out is a red coloured one = $\frac{5}{13}$ **1**

(vi) aPQR is 30° - 60° - 90° triangle [Given]

By 30° - 60° - 90° triangle theorem

side opposite to 60° = $\frac{\sqrt{3}}{2} \times$ hypotenuse ½



$\therefore \quad PQ = \frac{\sqrt{3}}{2} \times PR$

$\therefore \quad 4\sqrt{3} = \frac{\sqrt{3}}{2} \times PR$

$\therefore \quad PR = \frac{2 \times 4\sqrt{3}}{\sqrt{3}}$

$\therefore \quad PR = 2 \times 4$

$\therefore \quad$ PR = 8 units ½

side opposite to $30^\circ = \frac{1}{2} \times$ hypotenuse ½

$\therefore \quad QR = \frac{1}{2} \times PR$

$\therefore \quad QR = \frac{1}{2} \times 8$

$\therefore \quad \boxed{QR = 4 \text{ units}}$ ½

A.3. Solve ANY THREE of the following :

(i) $\triangle ABC \sim \triangle PQR$

$\frac{A(\triangle ABC)}{A(\triangle PQR)} = \frac{BC^2}{QR^2}$ [Areas of similar triangles] **1**

$\frac{144}{100} = \frac{12^2}{QR^2}$

$\frac{12}{10} = \frac{12}{QR}$ **1**

$QR = \frac{12 \times 10}{12}$

$\boxed{QR = 10 \text{ cm}}$ **1**

(ii) $\sin^2 45^\circ + \cos^2 45^\circ$

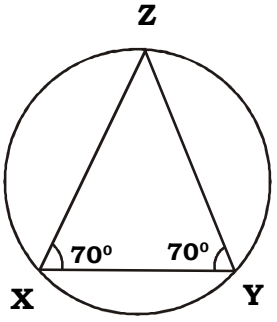
$= \left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{1}{\sqrt{2}}\right)^2$ **1**

$= \frac{1}{2} + \frac{1}{2}$ **1**

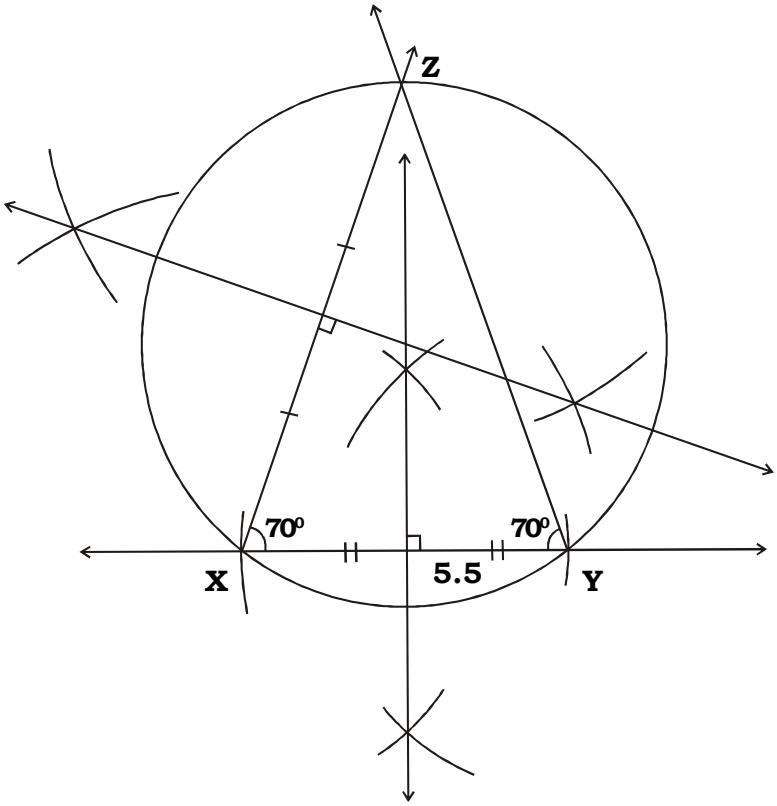
$= 1$

$\boxed{\sin^2 45^\circ + \cos^2 45^\circ = 1}$ **1**

(iii)



½ mark for drawing rough figure
1 mark for drawing triangle
1 mark for drawing two angle bisectors
½ mark for drawing circle



(iv) Ratio of length, breadth and height is 8 : 6 : 3.
Let the common multiple be x

$\therefore$ length (l) = $8x$
breadth (b) = $6x$
height (h) = $3x$ ½

Total surface area rectangular solid = 1080

y $2(lb + bh + lh) = 1080$ ½

y $2(8x \times 6x + 6x \times 3x + 3x \times 8x) = 1080$

y $2(48x^2 + 18x^2 + 24x^2) = 1080$

y $2(90x^2) = 1080$

y $180x^2 = 1080$ ½

y $x^2 = \frac{1080}{180}$

y $x^2 = 6$

y $x = \sqrt{6}$ ½

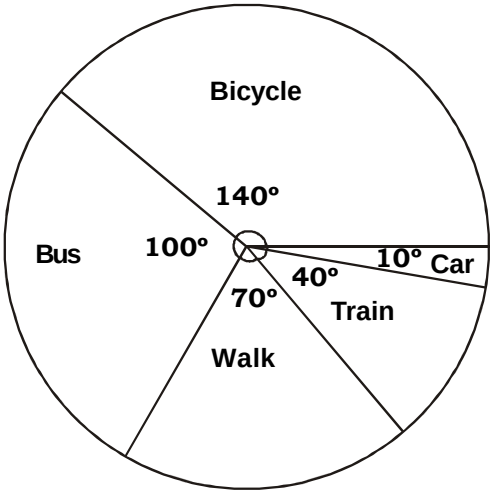
y length = $8x = 8\sqrt{6}$ cm

breadth = $6x = 6\sqrt{6}$ cm **1**

height = $3x = 3\sqrt{6}$ cm

(v)

Mode of transport	No. of Students	Measure of central angle ( )	
Bicycle	140	$\frac{140}{360} \times 360^\circ = 140^\circ$	½
Bus	100	$\frac{100}{360} \times 360^\circ = 100^\circ$	½
Walk	70	$\frac{70}{360} \times 360^\circ = 70^\circ$	
Train	40	$\frac{40}{360} \times 360^\circ = 40^\circ$	½
Car	10	$\frac{10}{360} \times 360^\circ = 10^\circ$	½
Total	**360**	**360°**	



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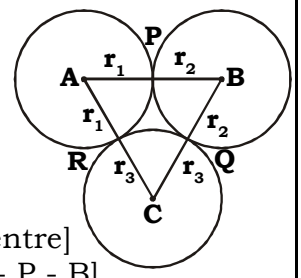
A.4. Solve ANY TWO of the following :

(i) Let thre circle with centres A, B and C touch externally in points P, Q and R as shown in the figure.



Let r_1, r_2 and r_3 be their radii respectively.

A - P - B, B - Q - C, A - R - C } [If two circles are touching circles then the common point lies on the line joining their centre]

AB = AP + PB [A - P - B] ½

$5 = r_1 + r_2$ .....(i)

BC = BQ + QC [B - Q - C] ½

$5 = r_2 + r_3$ .....(ii)

AC = AR + RC [A - R - C] ½

$\therefore \quad 4 = r_1 + r_3$ .....(iii)

Adding (i), (ii) and (iii),

$5 + 5 + 4 = r_1 + r_2 + r_2 + r_3 + r_1 + r_3$

$14 = 2r_1 + 2r_2 + 2r_3$

$\therefore \quad 14 = 2(r_1 + r_2 + r_3)$

$\therefore \quad r_1 + r_2 + r_3 = 7 \quad \ldots\ldots(iv)$ ½

Substituting (i) in (iv),

$\therefore \quad 5 + r_3 = 7$ ½

$\therefore \quad r_3 = 7 - 5$

$\therefore \quad r_3 = 2$

Substituting (ii) in (iv),

$\therefore \quad r_1 + 5 = 7$ ½

$\therefore \quad r_1 = 7 - 5$

$\therefore \quad r_1 = 2$

Substituting (iii) in (iv),

$\therefore \quad 4 + r_2 = 7$ ½

$\therefore \quad r_2 = 7 - 4$

$\therefore \quad r_2 = 3$

$\therefore$ Radii of the circles with centre A, B and C are 2 cm, 3 cm and 2 cm respectively. ½

(ii)

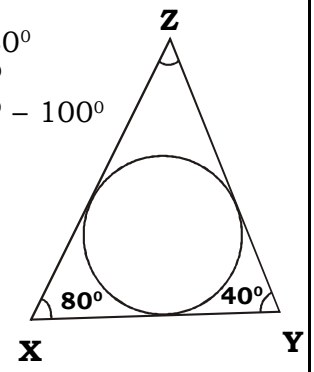
In ΔXYZ,

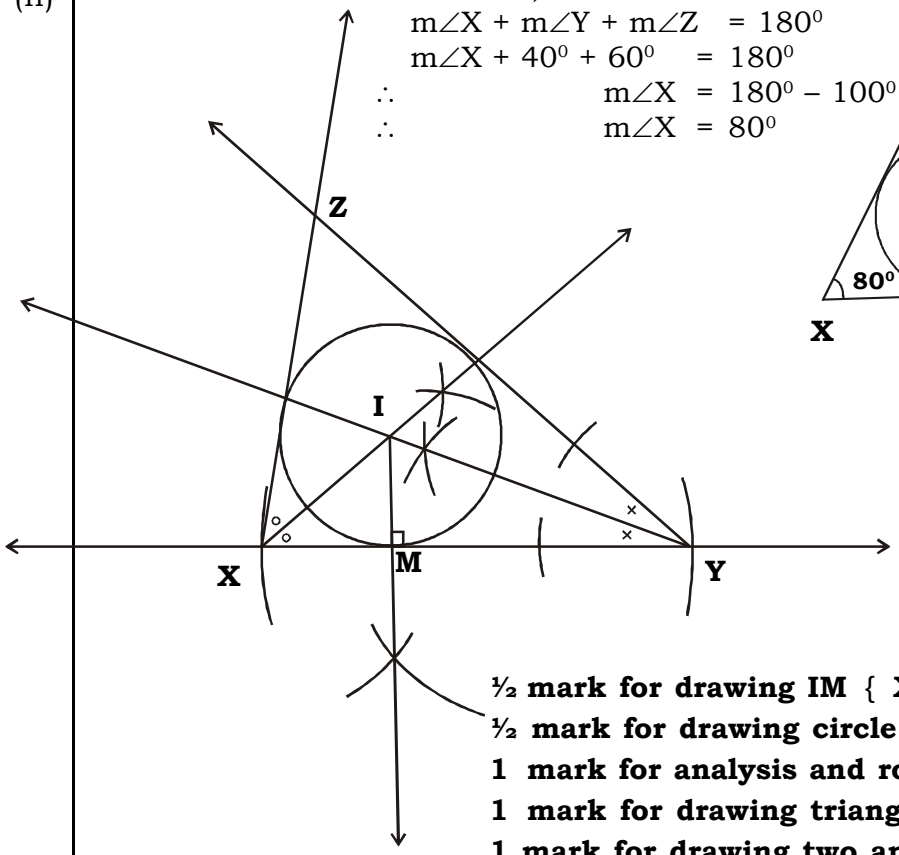
$m\angle X + m\angle Y + m\angle Z = 180^0$

$m\angle X + 40^0 + 60^0 = 180^0$

$\therefore \quad m\angle X = 180^0 - 100^0$

$\therefore \quad m\angle X = 80^0$





½ mark for drawing IM { XY

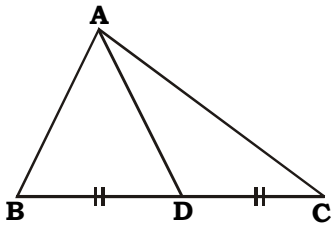
½ mark for drawing circle

1 mark for analysis and rough figure

1 mark for drawing triangle

1 mark for drawing two angle bisector

(iii) $AB^2 + AC^2 = 2AD^2 + 2BD^2$ [Apllonius theorem] **1**



y $11^2 + 17^2 = 2AD^2 + 2(6)^2$

y $121 + 289 = 2AD^2 + 2(36)$

y $410 = 2AD^2 + 72$ **1**

y $2AD^2 = 410 - 72$

y $2AD^2 = 338$

y $AD^2 = 169$

y $\boxed{AD = 13 \text{ cm}}$ **1**

A.5. Solve ANY TWO of the following :

(i) Diameter of cylinder = 40 cm

y Its radius (r) $= \frac{40}{2}$

$= 20$ cm **½**

Height (h) = 9 cm

Height of a cone (h_1) = 108 cm

Let radius of cone be 'r_1' **½**

Volume of the cone = Volume of cylinder

y $\frac{1}{3}\pi r_1^2 h_1 = \pi r^2 h$ **1**

y $r_1^2 \times 108 = 20 \times 20 \times 9 \times 3$

y $r_1^2 = \frac{20 \times 20 \times 9 \times 3}{108}$ **1**

y $r_1^2 = 100$ **1**

y $r_1 = 10$ cm

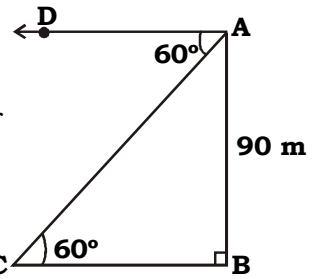
y $\boxed{\text{The radius of the base of the cone is 10 cm.}}$ **1**

(ii) Seg AB represents the lighthouse

C represents the position of ship. **1**

A represents the position of observer

∠DAC is the angle of depression



AB = 90m

m∠DAC = 60°

∠DAC ≅ ∠ACB [Converse of alternate angle test] **½**

∴ m∠ACB = 60°

In right angled ΔABC

y $\tan 60^\circ = \frac{AB}{BC}$ [By definition] ½

y $\sqrt{3} = \frac{90}{BC}$ ½

y $BC = \frac{90}{\sqrt{3}}$ ½

y $BC = \frac{90}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ ½

y $BC = \frac{90\sqrt{3}}{3}$ ½

y $BC = 30\sqrt{3}$ m ½

∴ The ship is $30\sqrt{3}$ m far from the light house. ½

(iii)

Classes (Monthly exp.)	**Frequency (f_i) (No. of households)**	**Cumulative frequency less than type**
150 - 225	65	65
225 - 300	171	236 ← *c.f.*
300 - 375	196 ← f	432
375 - 450	75	507
450 - 525	53	560
525 - 600	26	586
600 and above	14	600
Total	**600 ← N**	

1½

Here total frequency = $\sum f_i = N = 600$

y $\frac{N}{2} = \frac{600}{2} = 300$ ½

Cumulative frequency (less than type) which is just greater than 300 is 432. Therefore corresponding class 300 - 375 is median class.

L = 300, N = 600, *c.f.* = 236, f = 196, h = 75

Median $= L + \left(\frac{N}{2} - c.f.\right)\frac{h}{f}$ ½

$= 300 + \left(\frac{600}{2} - 236\right)\frac{75}{196}$

$= 300 + (300 - 236)\ \frac{75}{196}$

$= 300 + (64)\ \frac{75}{196}$ ½

$= 300 + 16\left(\frac{75}{49}\right)$

$= 300 + \frac{1200}{49}$ ½

$= 300 + 24.49$ ½

$= 324.49$

y Median of monthly expenditure is Rs. 324.49. ½

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