MT

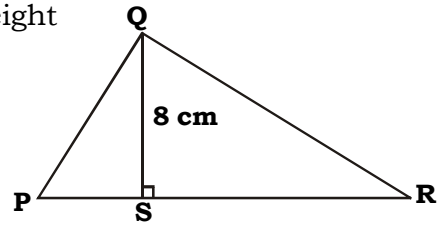
2017 ____ ____ 1100 **Seat No.** | | | | | | | |

MT-GENERAL MATHEMATICS (71) GEOMETRY - SEMI PRELIM - I - PAPER - 2 (E)

Time : 2½ Hours **Model Answer Paper** **Max. Marks : 40**

A.1. Attempt ANY FIVE of the following :

(i) Area of a triangle $= \frac{1}{2} \times$ base $\times$ height ½



$\therefore$ A (ΔPQR) $= \frac{1}{2} \times PR \times QS$

$\therefore$ $24 = \frac{1}{2} \times PR \times 8$

$\therefore$ $24 = PR \times 4$

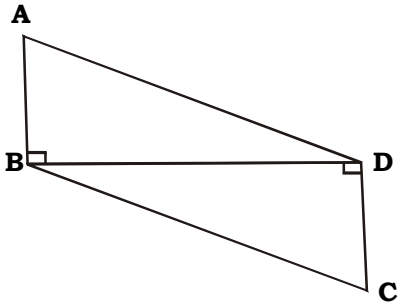
$\therefore$ $PR = \frac{24}{4}$

$\therefore$ $\boxed{PR = 6 \text{ m}}$ ½

(ii) Length of rectangular metal box (l) = 10 cm
Its breadth (b) = 8 cm
Its height (h) = 6cm ½
Volume of rectangular metal box = $l \times b \times h$
$= 10 \times 8 \times 6$
$= 480 \text{ cm}^3$

y Volume of rectangular metal box is 480 cu.cm. ½

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



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

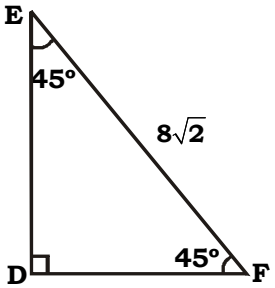
y $DC = \frac{6 \times 5}{4}$

y $DC = 7.5$ units ½

(iv) Side of cube (l) = 17 cm
Volume of cube = l^3 ½
= $(17)^3$
= $17 \times 17 \times 17$
= $4913 cm^3$ ½

y Volume of cube is 4913 cu.cm

(v) In ΔDEF,
∠D = 90°, ∠E = 45°, ∠F = 45° [Given]
∴ ΔDEF is 45° - 45° - 90° triangle



∴ $DE = \frac{1}{\sqrt{2}} \times EF$ ½

∴ $DE = \frac{1}{\sqrt{2}} \times 8\sqrt{2}$

∴ DE = 8 cm ½

(vi) radius (r) = 3.5 cm
height (h) = 6 cm
Volume of cylinder = $\pi r^2 h$ ½
= $\frac{22}{7} \times 3.5 \times 3.5 \times 6$
= $22 \times 0.5 \times 3.5 \times 6$
= 231 cu.cm.

y Volume of cylinder is 231 cu.cm ½

A.2. Solve ANY FOUR of the following :

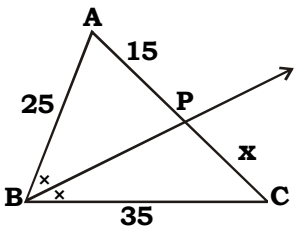
(i) In ΔABC, ray BP is the bisector of ∠ABC

∴ $\frac{AB}{BC} = \frac{AP}{PC}$ [By property of angle bisector of a triangle] ½

∴ $\frac{25}{35} = \frac{15}{x}$ ½

∴ $x = \frac{15 \times 35}{25}$ ½

∴ x = 21 ½



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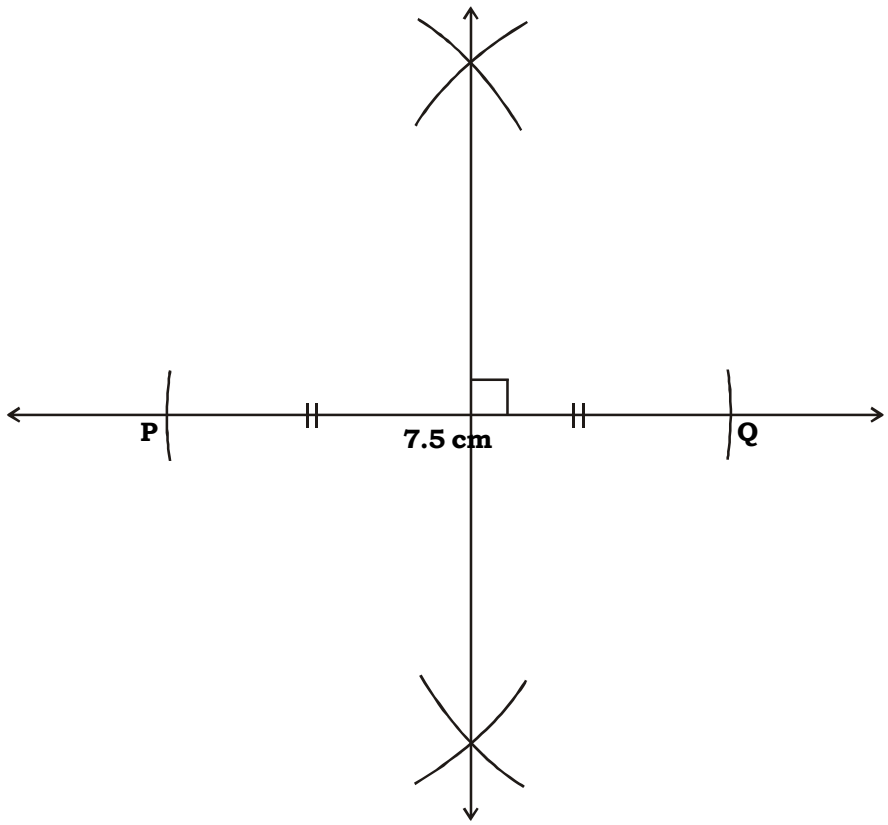


1 mark for drawing seg PQ
1 mark for drawing perpendicular bisector

(iii) Curved surface area = 616 sq.cm.

y $4\pi r^2 = 616$ ½

y $4 \times \frac{22}{7} \times r^2 = 616$

y $r^2 = \frac{616 \times 7}{4 \times 22}$

y $r^2 = 7 \times 7$

y $r^2 = 49$

y $r = 7$cm [Taking square roots] ½

y Radius of sphere is 7cm

diameter = 2r ½

= 2 × 7

= 14 cm

y Diameter of sphere is 14 cm ½

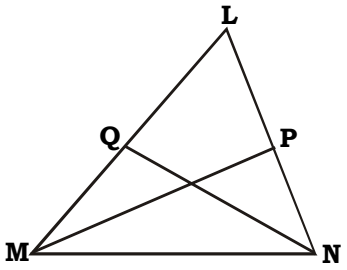
(iv) $\Delta MPL \sim \Delta NQL$ [Given]

$\therefore \quad \frac{MP}{NQ} = \frac{LM}{LN}$ [c.s.s.t.] **1**

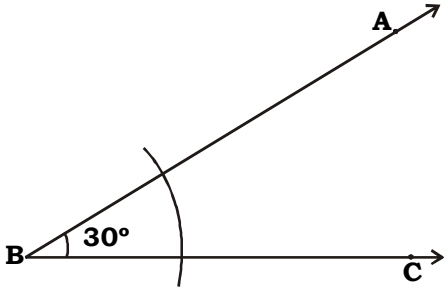
$\therefore \quad \frac{2}{3} = \frac{6}{LN}$

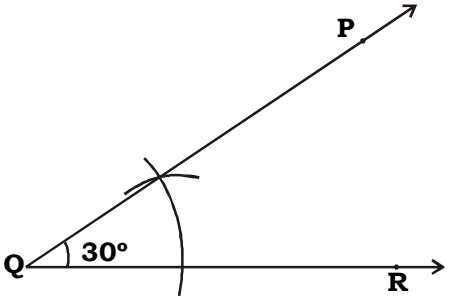
$\therefore \quad LN = \frac{6 \times 3}{2}$ **1**

$\therefore \quad \boxed{LN = 9 \text{ units}}$



(v)





1 mark for drawing ĎABC
1 mark for drawing ĎPQR

(vi) Here, r = 10 cm and curved surface area = 880 sq.cm

$\therefore$ By using the formula,

Area of curved surface of a cylinder = $2\pi rh$ ½

$880 = 2 \times \frac{22}{7} \times 10 \times h$ ½

$h = \frac{880 \times 7}{2 \times 22 \times 10}$ ½

$= 14$

$\therefore$ The height of the cylinder is 14 cm. ½

A.3. Solve ANY THREE of the following :

(i) In ΔABC,

AD is the median on side BC

$\therefore$ By Appollonius theorem, **1**

$AB^2 + AC^2 = 2AD^2 + 2BD^2$

$\therefore \quad (4)^2 + (6)^2 = 2AD^2 + 2(5)^2$ ½

$\therefore \quad 16 + 36 = 2AD^2 + 50$

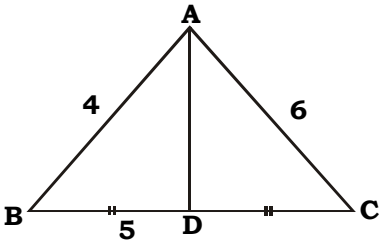
$\therefore \quad 52 = 2AD^2 + 50$ ½

$\therefore \quad 52 - 50 = 2AD^2$ ½

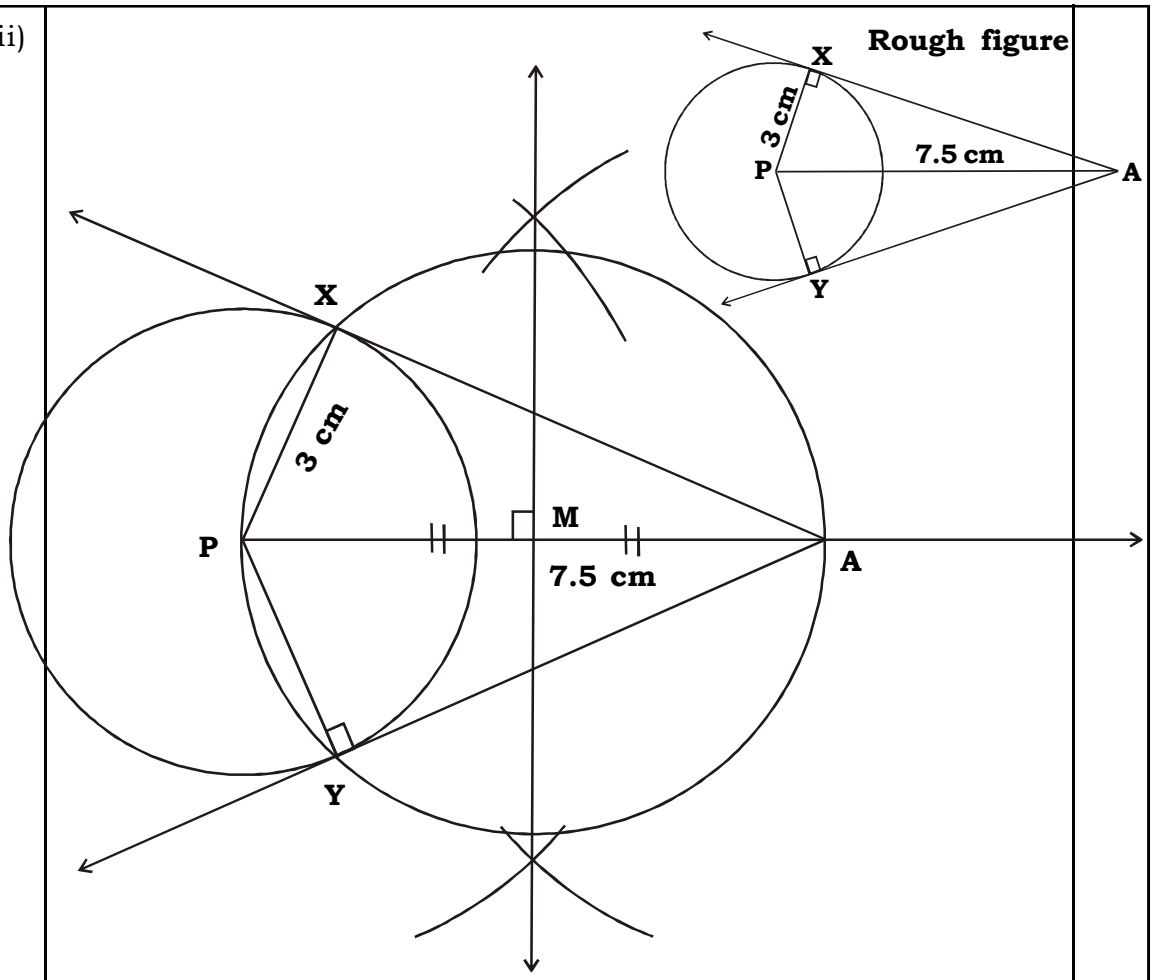
$\therefore \quad 2 = 2AD^2$

$\quad AD^2 = 1$

$\quad \boxed{AD = 1 \text{ unit}}$ [Taking squre roots] ½



(ii)



½ mark for drawing rough figure
½ mark for a drawing circle with centre p.
½ mark for drawing seg PA
½ mark for drawing perpendicular bisector of seg PA
½ mark for draw of circle with centre M
½ mark for drawing two tangents

(iii) Total surface area of cone = 770 sq.cm.

Let the radius be 'r'

y the slant height is '4r'

Total surface area = $\pi r(r + l)$ ½

y $770 = \frac{22}{7} \times r(r + 4r)$ ½

y $\frac{770 \times 7}{22} = r(r + 4r)$

y $35 \times 7 = r(5r)$ ½

y $245 = 5r^2$

y $\frac{245}{5} = r^2$

y $r^2 = 49$ ½

y $r = 7$ cm [Taking square roots]

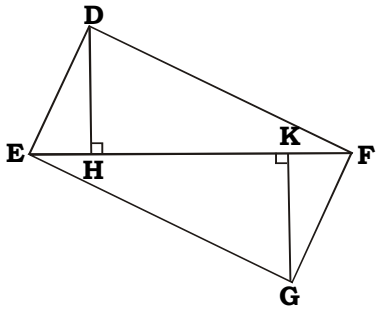
$\text{diameter} = 2r$ ½

$= 2 \times 7$

$= 14$ cm

y Diameter of cone is 14 cm. ½

(iv) (i) $A(\Delta DEF) = \frac{1}{2} \times \text{base} \times \text{height}$



$\therefore A(\Delta DEF) = \frac{1}{2} \times EF \times DH$ ½

$\therefore 300 = \frac{1}{2} \times EF \times 12$

$\therefore EF = \frac{300 \times 2}{12}$ ½

$\therefore$ EF = 50 units

(ii) $A(\Delta GEF) = \frac{1}{2} \times \text{base} \times \text{height}$ ½

$\therefore A(\Delta GEF) = \frac{1}{2} \times 50 \times 20$

$\therefore$ A (ΔGEF) = 500 sq. units ½

(iii) A ($\square$DFGE) = A (ΔDEF) + A (ΔGEF) [Area addition property] ½

$\therefore$ A ($\square$DFGE) = 300 + 500

$\therefore$ A ($\square$DFGE) = 800 sq. units ½

(v) Let the breadth of wall be 'x'.

height = 5x, length = 8x ½

Volume of wall = 16 m^3

$\therefore l \times b \times h = 16$ ½

$\therefore 8x \times x \times 5x = 16$

$\therefore \quad 40x^3 = 16$ ½

$\therefore \quad x^3 = \frac{16}{40}$ ½

$\therefore \quad x^3 = \frac{4}{10}$

$\therefore \quad x^3 = 0.4$

$\therefore \quad x = \sqrt[3]{0.4}$ ½

$\therefore$ Breadth of the wall is $\sqrt[3]{0.4}$ m. ½

A.4. Solve ANY TWO of the following :

(i) aABC is enlarged to aPQR ½

aABC ~ aPQR

$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$ [c.s.s.t] ½

y $\frac{6}{PQ} = \frac{12}{18} = \frac{8}{PR}$ ½

y $\frac{6}{PQ} = \frac{2}{3} = \frac{8}{PR}$ .....(i) ½

y $\frac{6}{PQ} = \frac{2}{3}$ [From (i)]

y $PQ = \frac{6 \times 3}{2}$

y PQ = 9 units

$\frac{2}{3} = \frac{8}{PR}$ [From (i)]

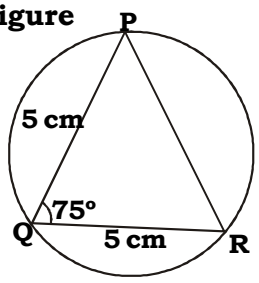
y $PR = \frac{3 \times 8}{2}$

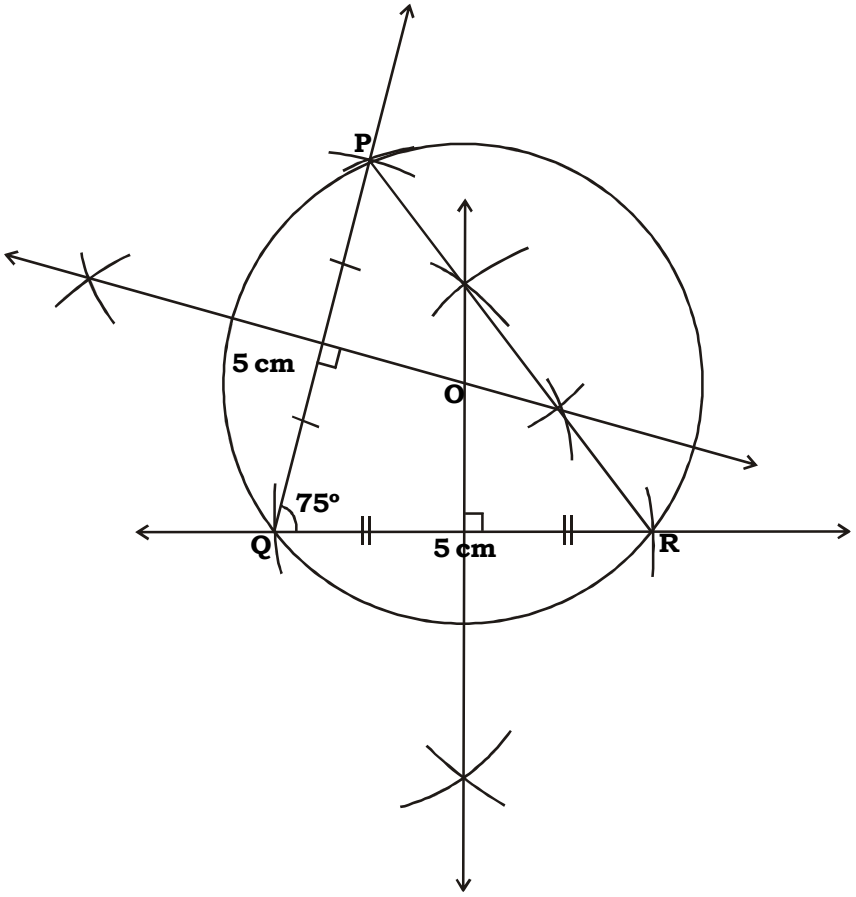
y PR = 12 units

1 1

y Ratio of the corresponding sides is 2 : 3.

(ii) **Rough figure**





½ mark for drawing rough figure
1½ mark for drawing a PQR
1 mark for drawing perpendicular bisectors
1 mark for drawing circle

(iii)

Length of the paper (l) = 22 cm
its breadth (b) = 10 cm
Area of the paper = $l \times b$ ½
= 22 × 10
= 220 cm^2 ½

Paper completely covers curved surface area of the cylinder
y Curved surface area = Area of paper of cylinder ½
y Curved surface area of cylinder = 220cm^2
its diameter = 10 cm
its radius (r) = 5 cm

Curved surface area at cylinder = $2\pi rh$ ½

y $220 = 2 \times \frac{22}{7} \times 5 \times h$ ½

y $h = \frac{220 \times 7}{2 \times 22 \times 5}$

y $h = 7$ ½

Volume of the cylinder = $\pi r^2 h$ ½

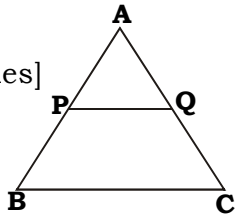
$= \frac{22}{7} \times 5 \times 5 \times 7$

$= 550 cm^3$ ½

y Volume of the cylinder is 550 cm^3. ½

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

(i)



seg PQ || seg BC

on tranversal AB

$\angle APQ \cong \angle ABC$ ...(i) [Corresponding angles] ½

In ΔAPQ and ΔABC

$\angle APQ \cong \angle ABC$ [From (i)]

$\angle PAQ \cong \angle BAC$ [Common angle]

$\therefore$ $\Delta APQ \sim \Delta ABC$ [AA test] 1

$\frac{A(\Delta APQ)}{A(\Delta ABC)} = \frac{PQ^2}{BC^2}$ [Theorem on areas of similar triangles] ½

y $\frac{A(\Delta APQ)}{A(\Delta ABC)} = \left(\frac{PQ}{BC}\right)^2$

y $\frac{A(\Delta APQ)}{A(\Delta ABC)} = \left(\frac{3}{5}\right)^2$ ½

y $\frac{A(\Delta APQ)}{A(\Delta ABC)} = \frac{9}{25}$ ½

y $\frac{A(\Delta ABC)}{A(\Delta APQ)} = \frac{25}{9}$ [By Invertendo] ½

y $\frac{A(\Delta ABC) - A(\Delta APQ)}{A(\Delta APQ)} = \frac{25 - 9}{9}$ [By Dividendo] ½

y $\frac{A(\square PBCQ)}{A(\Delta APQ)} = \frac{16}{9}$ [Area addition property] ½

y $\boxed{\frac{A(\Delta APQ)}{A(\square PBCQ)} = \frac{9}{16}}$ [By Invertendo] ½

(ii) Here, surface area of the vertical faces of the brick = 480 cm², height of the brick h = 8 cm and length l = 20 cm.

By using the formula;

Surface area of the vertical faces of the brick = perimeter of the base × height **1**

480 = perimeter of the base × 8

Perimeter of the base = 480/ 8 = 60 ½

Perimeter of the base is 60 cm

Perimeter of the base of rectangular brick = 2 (l + b) ½

y 60 = 2(20 + b)

y 30 = 20 + b ½

y b = 30 – 20 = 10 ½

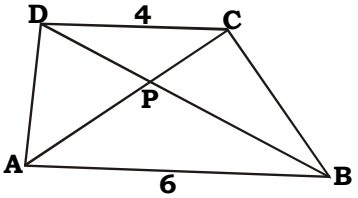
Volume of the brick = l × b × h ½

= 20 × 10 × 8 ½

= 1600 ½

y **Breadth of the brick is 10 cm and volume is 1600 cm³.** ½

(iii)



seg DC || seg AB,

On transversal CA

∠DCA ≅ ∠CAB [Alternate angles] ½

∠DCP ≅ ∠PAB .....(i) [C - P - A] ½

In ΔAPB and ΔCPD

∠DCP ≅ ∠PAB [From (i)]

∠DCA ≅ ∠CAB [Vertically opposite angles]

∴ ΔAPB ~ ΔCPD [AA test] **1**

$\frac{AP}{CP} = \frac{PB}{PD} = \frac{AB}{CD}$ [c.s.s.t] ½

∴ $\frac{AP}{CP} = \frac{PB}{2.5} = \frac{6}{4}$ .....(ii) ½

∴ $\frac{PB}{2.5} = \frac{6}{4}$ [From (ii)] ½

∴ $PB = \frac{6 \times 2.5}{4}$ ½

∴ $PB = \frac{15}{4}$ ½

∴ **PB = 3.75 units** ½

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