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Class: EM - CLASS 10 **Subject:** Mathematics - Part 2 (Geometry) **Time:**2 hrs
Date: 18-11-2025 **Paper:** Pre-Board 1 (Solution) **Marks:**40

Q1(A))
(1) (0,0)
(2) Right angled triangle
(3) 2
(4) 25 cm

(B))
(1) Radius = 5 cm.
As, diameter is the longest chord of the circle.
∴ Diameter = 2 × Radius
= 2 × 5 = 10 cm.
The longest chord is 10 cm.

(2) $\frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{AB^2}{PQ^2}$

$\frac{16}{25} = \frac{AB^2}{PQ^2}$

$\frac{AB}{PQ} = \sqrt{\frac{16}{25}}$

$\frac{AB}{PQ} = \frac{4}{5}$

∴ AB : PQ = 4 : 5

(3) O(0, 0), P(3, 4)
∴ $(x_1, y_1) = (0, 0)$
$(x_2, y_2) = (3, 4)$.
∴ $x_1 = 0, y_1 = 0$
$x_2 = 3, y_2 = 4$
d(OP) = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
= $\sqrt{(3-0)^2 + (4-0)^2}$
= $\sqrt{3^2 + 4^2}$
= $\sqrt{9 + 16}$
= $\sqrt{25}$
d(OP) = 5 cm.

(4) In △ RST, ∠S = 90°,∠T = 30° ... [given]
∴ ∠R = 60° ... [Remaining angle of a triangle]
∴ △ RST is 30° - 60° - 90° triangle
RS = $\frac{1}{2}$ × RT ... [Side opposite to 30°]

= $\frac{1}{2}$ × 12
∴ RS = 6 cm

Q2(A))

(1)

i. $\angle L = \frac{1}{2}$ m(arc MN) ....(By inscribed angle theorem)

$\therefore \underline{\mathbf{35^\circ}} = \frac{1}{2}$ m(arc MN)

$\therefore 2 \times 35 =$ m(arc MN)

$\therefore$ m(arc MN) = $\underline{\mathbf{70^\circ}}$

ii. m(arc MLN) = $\underline{\mathbf{360^\circ}}$ – m(arc MN) ....[Definition of measure of arc]

$= 360^\circ - 70^\circ$

$\therefore$ m(arc MLN) = $\underline{\mathbf{290^\circ}}$

(2) The surface area of the sphere $= 4\pi r^2$

$= 4 \times \frac{22}{7} \times \underline{\mathbf{7}}^2$

$= 4 \times \frac{22}{7} \times \underline{\mathbf{49}}$

$= \underline{\mathbf{88}} \times 7$

$\therefore$ The surface area of the sphere = $\underline{\mathbf{616}}$ sq.cm.

(3) L.H.S = $\cot\theta + \tan\theta$

$= \frac{\cos\theta}{\sin\theta} + \frac{\sin\theta}{\cos\theta}$

$= \frac{\cos^2\theta + \sin^2\theta}{\sin\theta \cdot \cos\theta}$

$= \frac{1}{\sin\theta \cdot \cos\theta}$ ......$[\cos^2\theta + \sin^2\theta = 1]$

$= \frac{1}{\sin\theta} \times \frac{1}{\cos\theta}$

$= \text{cosec}\theta \times \sec\theta$

= R.H.S.

(B))

(1) Let PQ be the Temple with height h and R be the point from where the person is looking at its top.

The angle of elevation is 45°.

And the distance of a person from temple is 50 m.

∴ l(QR) = 50 m

As PQ⊥ QR

∴ ∠PQR = 90° and ∠PRQ = 45°

∴ By using tan 45° formula.

tan θ = 12

tan 45° = 12

1 = 12

∴ 1 × 50 = h

h = 50 m

∴ The height of the temple is 50 m.

(2)

$A(x_1, y_1) = (-1, -1)$

$B(x_2, y_2) = (0, 1)$

$C(x_3, y_3) = (1, 3)$

Slope of line

$AB = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{1-(-1)}{0-(-1)}$

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

Slope of line

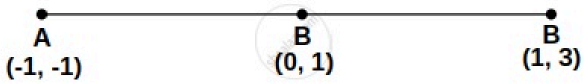
$BC = \frac{y_3 - y_2}{x_3 - x_2}$

$= \frac{3-1}{1-0}$

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

As, slope of line AB = slope of line BC

Also AB and BC Hrtes contain common point B



∴ Points A, B, C are collinear.

(3) In □ PQRS is a rectangle

∴ ∠Q = 90° [Angle of a rectangle]

In △ PQR, ∠Q = 90°

∴ $PR^2 = PQ^2 + QR^2$ ... [Pythagoras theorem]

∴ $PR^2 = 35^2 + 12^2$

∴ $PR^2 = 1225 + 144$

∴ $PR^2 = 1369$

∴ PR = 37cm ... [Taking square root]

∴ Length of diagonal of the rectangle is 37 cm.

(4) **Given:** m(arc DGE) = 2000

∠ECF = 700

To Find: m(arc DE) = ?

m(arc DEF) = ?

Solution:

m(arc DGF) = 2000 ... (given)

m(arc DEF) = 3600 - m(arc DGF) ... (by formula of measure of major arc)

∴ m(arc DEF) = 3600 - 2000

∴ m(arc DEF) = 1600 ... (1)

∠ECF = 700 ... (given)

∴ m(arc EF) = 700 ... (measure of arc is equal to corresponding central angle) ... (2)

We can see that,

m(arc DEF) = m(arc DE) + m(arc EF)

∴ 1600 = m(arc DE) + 700 ... (from 1 and 2)

∴ m (arc DE) = 900

(5) In □ ABCD

side AB ∥ side PQ ∥ side DC ... (given)

∴ $\frac{AP}{PD} = \frac{BQ}{14}$ ... (The ratio of the intercepts made on a transversal by three parallel lines is equal to the ratio of the corresponding intercepts made on any other transversal by the same parallel lines.)

∴ $\frac{15}{12} = \frac{BQ}{14}$

∴ 12 × BQ = 15 × 14

∴ BQ = $\frac{15x14}{12}$

∴ BQ = $\frac{35}{2}$

∴ BQ = 17.5 Units.

Q3(A))

(1) Solution:

Suppose, (- 4,2) = (x_1, y_1) and (6,2) = (x_2, y_2), and co-ordinates of P are (x, y)

∴ According to midpoint theorem

$$x = \frac{x_1 + x_2}{2} = \frac{\boxed{(-4)} + 6}{2} = \frac{\boxed{2}}{2} = \boxed{1}$$

$$y = \frac{y_1 + y_2}{2} = \frac{2 + \boxed{2}}{2} = \frac{4}{2} = \boxed{2}$$

∴ Co-ordinates of midpoint P are $\boxed{(1,2)}$

(2) In ΔPMQ,

Ray MX is the bisector of ZPMQ

∴ $\frac{MP}{MQ} = \frac{\boxed{PX}}{\boxed{XQ}}$ (I)... [Theorem of angle bisector]

Similarly, in ΔPMR, Ray MY is bisector of ∠PMR

∴ $\frac{MP}{MR} = \frac{\boxed{PY}}{\boxed{YR}}$ ...(II) [Theorem of angle bisector]

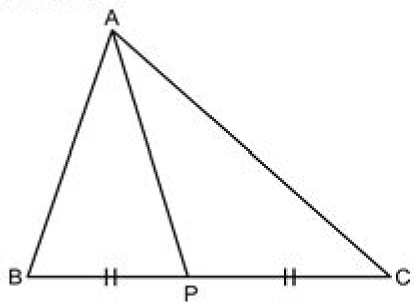
But $\frac{MP}{MQ} = \frac{MP}{MR}$ ...(III) [As M is the midpoint of QR] Hence MQ = MR

∴ $\frac{PX}{\boxed{XQ}} = \frac{\boxed{PY}}{YR}$ ... [From (I), (II) and (III)]

∴ XY ∥ QR ......[Converse of basic proportionality theorem]

(B))

(1)



BP = $\frac{1}{2}$ BC ... [P is the midpoint 7 seg BC]

= $\frac{1}{2}$ × 18

∴ BP = 9 units

In △ ABC, seg AP is the median

∴ $AB^2 + AC^2 = 2\ AP^2 + 2\ BP^2$ ... [Apollonius theorem]

$\therefore 260 = 2AP^2 + 2(9)^2$

$\therefore 260 = 2AP^2 + 2 \times 81$

$\therefore 260 = 2AP^2 + 162$

$\therefore 2AP^2 = 260 - 162$

$\therefore 2AP^2 = 98$

$\therefore AP^2 = \frac{98}{2}$

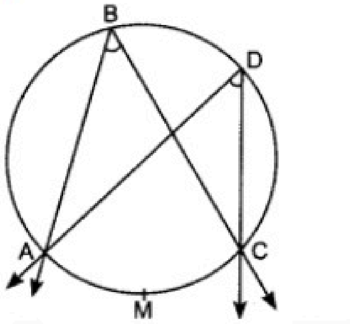
$\therefore AP^2 = 49$

$\therefore AP = 7$ units ... [Taking square root]

(2) In a circle

$\angle ABC$ and $\angle ADC$ are inscribed in the same arc i.e., arc AMC.

To prove : $\angle ABC \cong \angle ADC$



Proof: mZABC = $\frac{1}{2}$ m(arcAMC) ....(i)

...by inscribed angle theorem

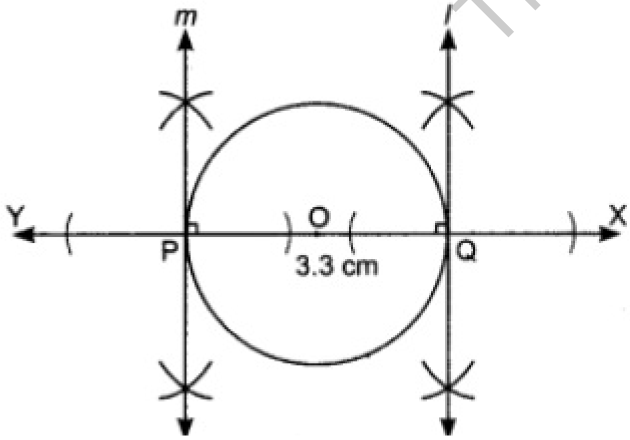
$\angle ADC = \frac{1}{2}$ m(arcAMC) ....(ii)

$\therefore$ from (i) and (ii)

$\angle ABC \cong \angle ADC$ ...(by Angle with equal measurement)

Hence proved

(3)



(4)

Let r_1 = 14 cm

r_2 = 6 cm

height = h = 6 cm.

∴ Slant height of frustum (l) = $\sqrt{h^2 + (r_1 - r_2)^2}$

= $\sqrt{6^2 + (14 - 6)^2}$

= $\sqrt{36 + 64}$

= $\sqrt{100}$

l = 10 cm ...(1)

∴ Curved surface area of frustum

= $\pi l (r_1 + r_2)$

= 3.14 × 10(14 + 6)....from (1)

= 3.14 × 10×20

= 3.14 × 200

= 628 cm^2

∴ The curved surface area of the frustum is 628 cm^2.

Q4)

(1) Cylinder:

Radius = 12 cm

Height = 7 cm

Cone:

Diameter = 4 cm

Radius = 2 cm

Height = 3.5 cm

Let there be n students.

n × Volume of cone = Volume of cylinder

$n \times \frac{1}{3}\pi r^2 h = \pi r^2 H$

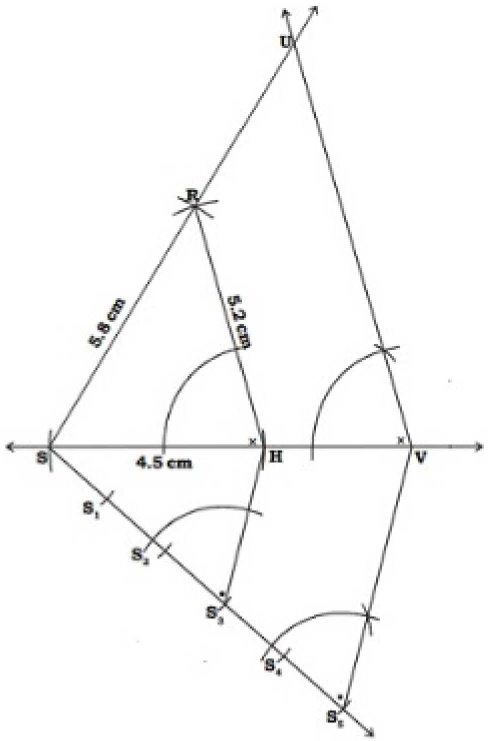
$\frac{n}{3} \times 2 \times 2 \times 3.5 = 12 \times 12 \times 7$

n = $\frac{12 \times 12 \times 3}{2}$

n = 12 × 18

n = 216 students

(2)



(3) $\therefore$ **Given:** In $\triangle ABC$, DE || side BC.

$2A(\triangle ADE) = A(\triangle DBCE)$

To find: $\frac{AB}{AD}$

To prove: BC = $\sqrt{3}DE$

Proof: In $\triangle ABC$

DE || BC

$\therefore$ ∠ADE = ∠ ABC ...Corresponding angle ... (i)

$\therefore$ In $\triangle ADE$ and $\triangle ABC$ ∠BAC = ∠DAE ...Common angle

∠ADE = ∠ABC ...By (i)

$\therefore$ By A - A test

$\triangle ADE \cong \triangle ABC$

$\frac{AB}{AD} = \frac{BC}{DE} = \frac{AC}{AE}$

Also, $2A(\triangle ADE) = A(DBCE)$

as $A(\triangle ABC) = A(\triangle ADE) + 2(DBCE)$

$A(\triangle ABC) = A(\triangle ADE) + 2A(\triangle ADE)$

$A(\triangle ABC) = 3A(\triangle ADE)$

$\frac{A(\triangle ABC)}{A(\triangle ADE)} = \frac{3}{1}$ ...(2)

$\frac{A(\triangle ABC)}{A(\triangle ADE)} = \frac{BC^2}{DE^2}$

$\frac{3}{1} = \frac{BC^2}{DE^2}$ ...(Theorem of Area of similar triangle)

$3DE^2 = BC^2$

$\sqrt{3}DE = BC$ ...(By taking square root on both sides)

$BC = \sqrt{3}DE$ Hence proved

Q5)

(1) $x = r\cos\theta$ and $y = r\sin\theta$

Squaring on both terms,

$x^2 = r^2\cos^2\theta$ ...(1)

$y^2 = r^2\sin^2\theta$ ...(2)

Add (1) + (2).

$x^2 + y^2 = r^2\sin^2\theta + r^2\cos^2\theta$

$x^2 + y^2 = r^2(\sin^2\theta + \cos^2\theta)$

But we know, $(\sin^2\theta + \cos^2\theta) = 1$

$\therefore x^2 + y^2 = r^2$

(2) Lengths of Δ drawn from an external point to a circle are equal.

⇒ AM = AN, BM = BP, CP = CN + (AN – CN)

Perimeter of ΔABC = AB + BC + CA

= AB + (BP + PC)

= (AB + BM) + PC + (AM – PC)

= AM + AM

= 2AM

AM = $\frac{1}{2}$ (perimeter of ΔABC)

All the Best