N 632

Seat No. 1 0 2 8 9 8 4

2024 III 15 1100 – N 632– MATHEMATICS (71) GEOMETRY—PART II (E)

(REVISED COURSE)

Time : 2 Hours (Pages 11) Max. Marks : 40

Note :—

(*i*) *All* questions are compulsory.

(*ii*) Use of a calculator is not allowed.

(*iii*) The numbers to the right of the questions indicate full marks.

(*iv*) In case of MCQs [Q. No. 1(A)] only the first attempt will be evaluated and will be given credit.

(*v*) Draw proper figures wherever necessary.

(*vi*) The marks of construction should be clear. Do not erase them.

(*vii*) Diagram is essential for writing the proof of the theorem.

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1. (A) **Four alternative answers for each of the following sub-questions are given. Choose the correct alternative and write its alphabet :** 4

(1) Out of the dates given below which date constitutes a Pythagorean triplet ?

(A) 15/8/17

(B) 16/8/16

(C) 3/5/17

(D) 4/9/15

(2) $\sin\theta \times \operatorname{cosec}\theta = ?$

(A) 1

(B) 0

(C) $\frac{1}{2}$

(D) $\sqrt{2}$

(3) Slope of X-axis is ..... .

(A) 1

(B) –1

(C) 0

(D) Cannot be determined

(4) A circle having radius 3 cm, then the length of its largest chord is ..... .

(A) 1.5 cm

(B) 3 cm

(C) 6 cm

(D) 9 cm

(B) Solve the following sub-questions : **4**

(1) If $\Delta ABC \sim \Delta PQR$ and AB : PQ = 2 : 3, then find the value of $\frac{A(\Delta ABC)}{A(\Delta PQR)}$.

(2) Two circles of radii 5 cm and 3 cm touch each other externally. Find the distance between their centres.

(3) Find the side of a square whose diagonal is $10\sqrt{2}$ cm.

(4) Angle made by the line with the positive direction of X-axis is 45°. Find the slope of that line.

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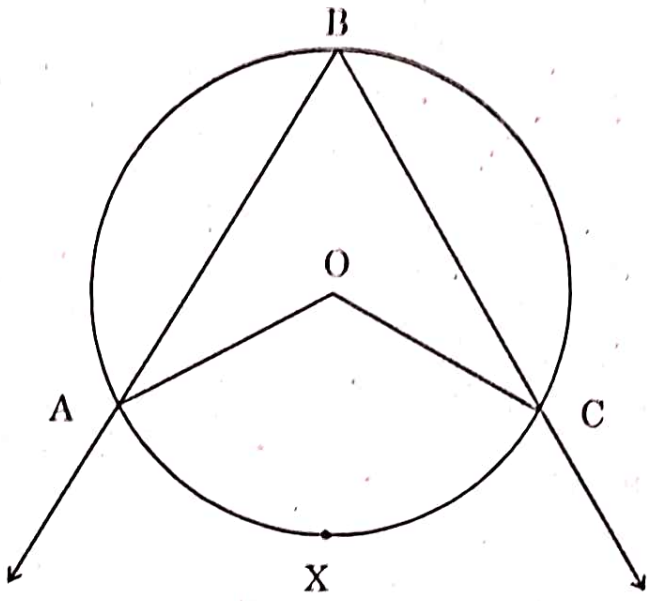
1.

2. **(A) Complete any *two* activities and rewrite it :** 4

(1)



In the above figure, $\angle ABC$ is inscribed in arc ABC.

If $\angle ABC = 60^\circ$, find $m\angle AOC$.

Solution :

$\angle ABC = \frac{1}{2} m(\text{arc AXC})$ ..... 60°

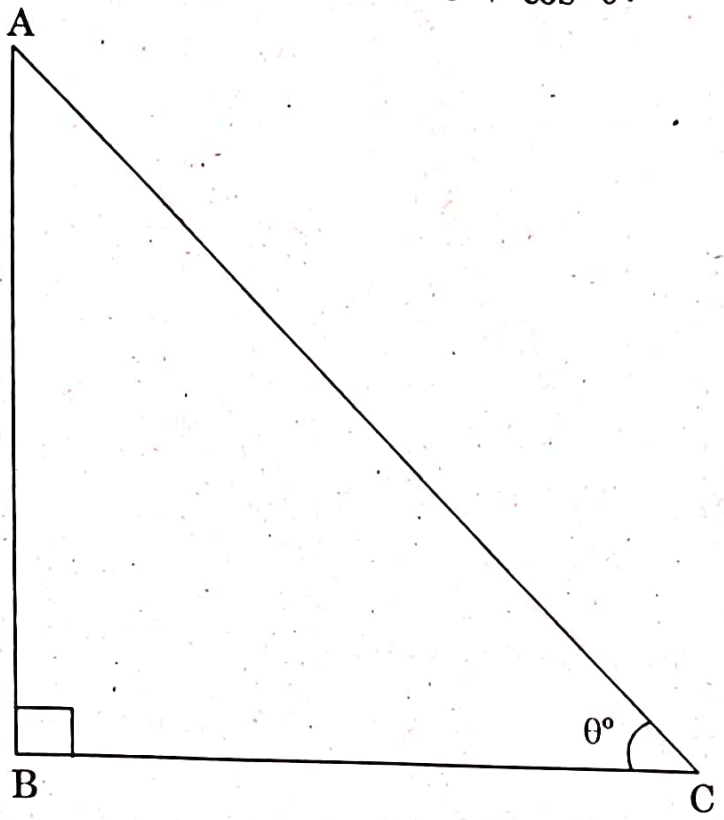
$60^\circ = \frac{1}{2} m(\text{arc AXC})$

120° = $m(\text{arc AXC})$

But $m\angle AOC =$ m(arc AXC) ..... (Property of central angle)

$\therefore \quad m\angle AOC =$ m(arc AXC)

(2) Find the value of $\sin^2\theta + \cos^2\theta$.



Solution :

In ΔABC, $\angle ABC = 90°$, $\angle C = \theta°$.

$AB^2 + BC^2 =$ [=] ..... (Pythagoras theorem)

Divide both sides by AC^2

$$\frac{AB^2}{AC^2} + \frac{BC^2}{AC^2} = \frac{AC^2}{AC^2}$$

$$\therefore \quad \left(\frac{AB}{AC}\right)^2 + \left(\frac{BC}{AC}\right)^2 = 1$$

But $\frac{AB}{AC} =$ [ ] and $\frac{BC}{AC} =$ [ ]

$$\therefore \quad \sin^2\theta + \cos^2\theta = [\ ]$$

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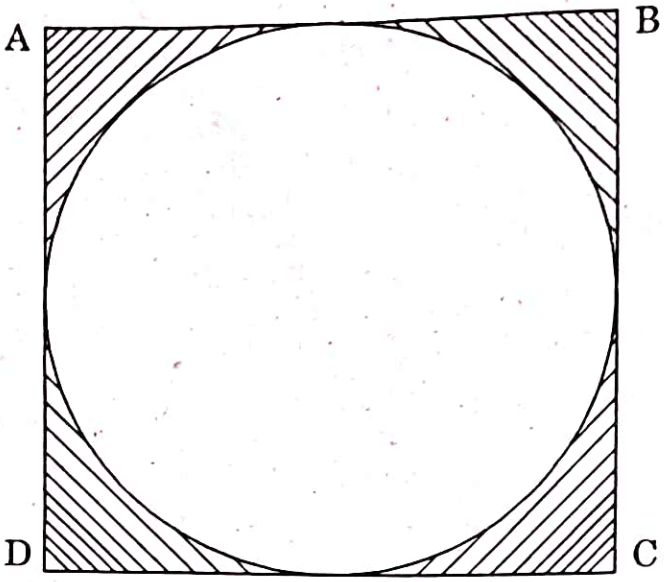
1. (3)



In the figure given above, □ ABCD is a square and a circl is inscribed in it. All sides of a square touch the circle.

If AB = 14 cm, find the area of shaded region.

Solution :

Area of square = $(\square)^2$ ..... (Formula)

= 14^2

= □ cm^2

Area of circle = □ ..... (Formula)

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

= 154 cm^2

$\begin{pmatrix}\text{Area of} \\ \text{shaded portion}\end{pmatrix} = \begin{pmatrix}\text{Area of} \\ \text{square}\end{pmatrix} - \begin{pmatrix}\text{Area of} \\ \text{circle}\end{pmatrix}$

= 196 – 154

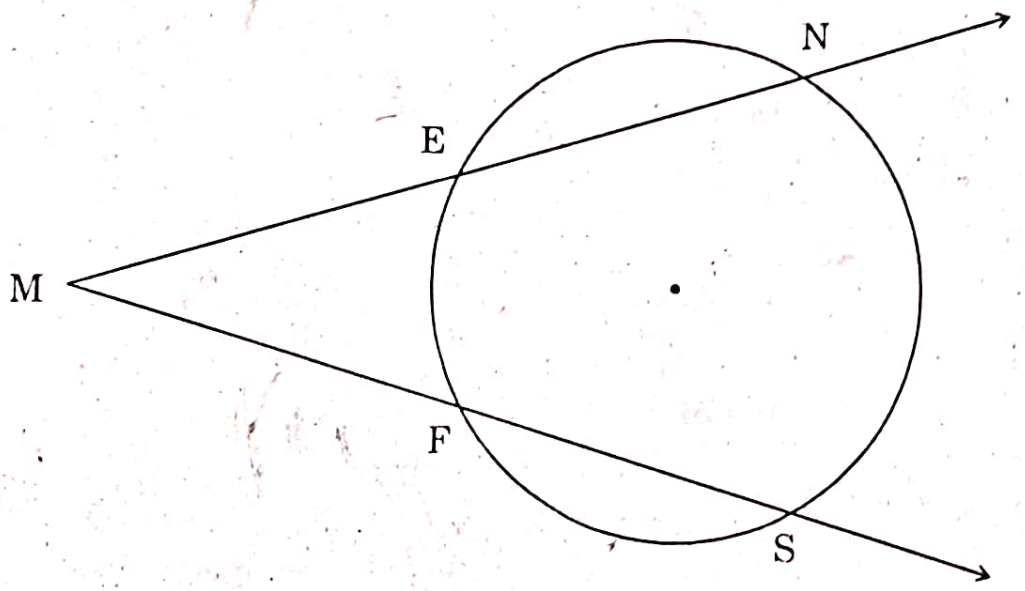
= □ cm^2

(B) Solve any *four* of the following sub-questions : 8

(1) Radius of a sector of a circle is 3.5 cm and length of its arc is 2.2 cm. Find the area of the sector.

(2) Find the length of the hypotenuse of a right-angled triangle if remaining sides are 9 cm and 12 cm.

(3)



In the above figure, $m(\text{arc NS}) = 125°$, $m(\text{arc EF}) = 37°$.

Find the measure of $\angle NMS$.

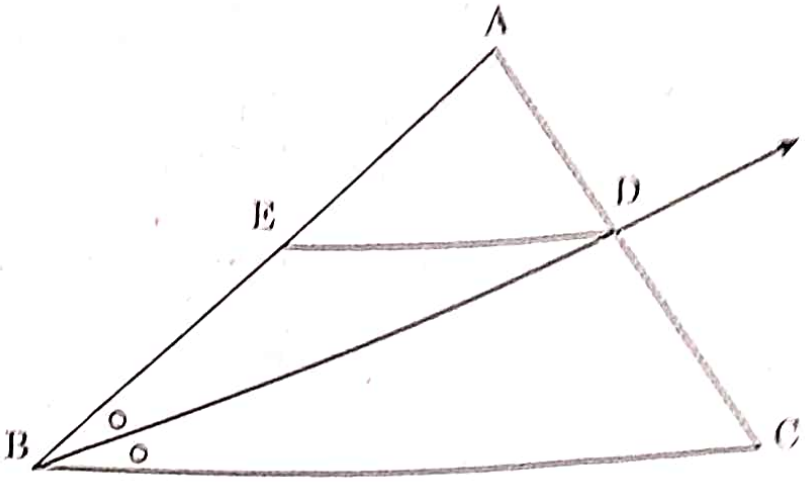
(4) Find the slope of the line passing through the points A(2, 3), B(4, 7).

(5) Find the surface area of a sphere of radius 7 cm.

1.

3. (A) **Complete any *one* activity of the following and rewrite it :** 3

(1)



In ΔABC, ray BD bisects $\angle ABC$, A – D – C, seg DE ∥ side BC, A – E – B, then for showing $\frac{AB}{BC} = \frac{AE}{EB}$, complete the following activity :

Proof :

In ΔABC, ray BD bisects $\angle B$

$\therefore$ $\frac{\boxed{AB}}{BC} = \frac{AD}{DC}$ ..... (I) (☐)

In ΔABC, DE ∥ BC

$\therefore$ $\frac{\boxed{AE}}{EB} = \frac{AD}{DC}$ ..... (II) (☐)

$\frac{AB}{\boxed{BC}} = \frac{\boxed{AE}}{EB}$ ..... [from (I) and (II)]

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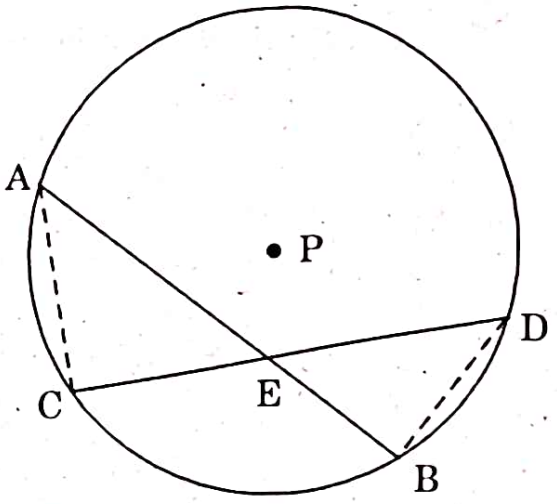
(2)



Given :

Chords AB and CD of a circle with centre P intersect at point E.

To prove :

$$AE \times EB = CE \times ED$$

Construction :

Draw seg AC and seg BD.

Fill in the blanks and complete the proof.

Proof :

In ΔCAE and ΔBDE

$\angle AEC \cong \angle DEB$ ..... [corresponding] corresponding $\angle AEC$ to $\angle DEB$

[$\angle CAE$] $\cong \angle BDE$ (angles inscribed in the same arc)

$\therefore$ $\Delta CAE \sim \Delta BDE$ ..... [Inscribed] inscribed angle theorem

$\therefore$ $\frac{[BD]}{DE} = \frac{CE}{[CA]}$ ..... [ ] inscribed angle theorem

$\therefore$ $AE \times EB = CE \times ED.$

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(B) Solve any *two* of the following sub-questions : 6

(1) Determine whether the points are collinear.

A(1, –3), B(2, –5), C(–4, 7)

(2) $\Delta ABC \sim \Delta LMN$. In ΔABC, AB = 5.5 cm, BC = 6 cm, CA = 4.5 cm. Construct ΔABC and ΔLMN such that $\frac{BC}{MN} = \frac{5}{4}$.

(3) Seg PM is a median of ΔPQR, PM = 9 and $PQ^2 + PR^2 = 290$, then find QR.

(4) Prove that, 'If a line parallel to a side of a triangle intersects the remaining sides in two distinct points, then the line divides the side in the same proportion'.

4. Solve any *two* of the following sub-questions : 8

(1) $\frac{1}{\sin^2\theta} - \frac{1}{\cos^2\theta} - \frac{1}{\tan^2\theta} - \frac{1}{\cot^2\theta} - \frac{1}{\sec^2\theta} - \frac{1}{\text{cosec}^2\theta} = -3$, then find the value of θ.

(2) A cylinder of radius 12 cm contains water up to the height 20 cm. A spherical iron ball is dropped into the cylinder and thus water level raised by 6.75 cm. What is the radius of iron ball ?

(3) Draw a circle with centre O having radius 3 cm. Draw tangent segments PA and PB through the point P outside the circle such that $\angle APB = 70°$.

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Solve any *one* of the following sub-questions : 3

(1) $\square$ ABCD is trapezium, AB || CD diagonals of trapezium intersects in point P.

Write the answers of the following questions :

(*a*) Draw the figure using given information.

(*b*) Write any one pair of alternate angles and opposite angles.

(*c*) Write the names of similar triangles with test of similarity.

(2) AB is a chord of a circle with centre O. AOC is diameter of circle, AT is a tangent at A.

Write answers of the following questions :

(*a*) Draw the figure using given information.

(*b*) Find the measures of $\angle CAT$ and $\angle ABC$ with reasons.

(*c*) Whether $\angle CAT$ and $\angle ABC$ are congruent ? Justify your answer.