

N 632

Seat No.

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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

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(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 :

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(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.

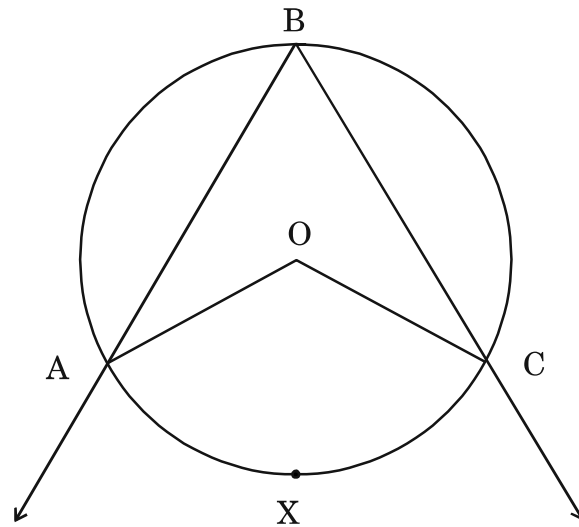
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2. (A) Complete any *two* activities and rewrite it :

4

(1)



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

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

Solution :

$$\angle ABC = \frac{1}{2} m(\text{arc } AXC) \dots\dots\dots \boxed{}$$

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

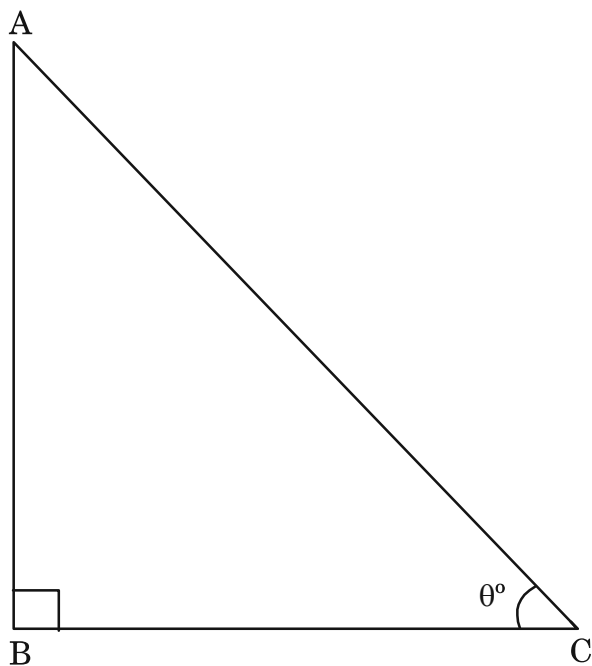
$$\boxed{} = m(\text{arc } AXC)$$

But $m \angle AOC = \boxed{m(\text{arc } \dots)}$ (Property of central angle)

$$\therefore m \angle AOC = \boxed{}$$

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



Solution :

In $\triangle ABC$, $\angle ABC = 90^\circ$, $\angle C = \theta^\circ$.

$$AB^2 + BC^2 = \boxed{} \dots\dots\dots (\text{Pythagoras theorem})$$

Divide both sides by AC^2

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

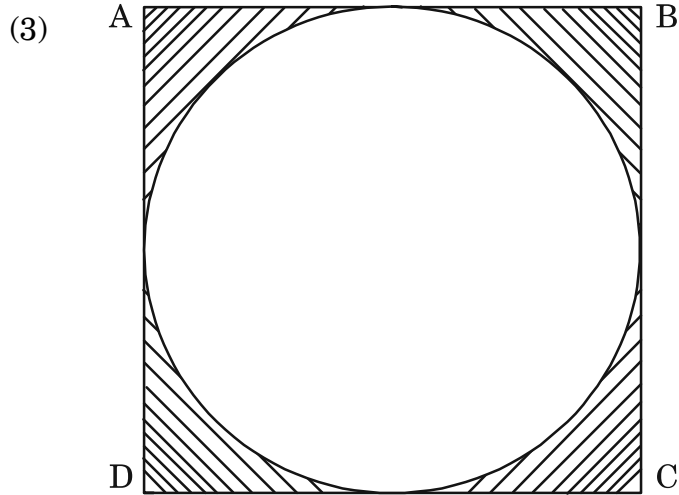
$$\therefore \left(\frac{AB}{AC}\right)^2 + \left(\frac{BC}{AC}\right)^2 = 1$$

$$\text{But } \frac{AB}{AC} = \boxed{} \text{ and } \frac{BC}{AC} = \boxed{}$$

$$\therefore \sin^2 \theta + \cos^2 \theta = \boxed{}$$

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

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

Solution :

$$\begin{aligned} \text{Area of square} &= (\square)^2 \dots\dots\dots \text{(Formula)} \\ &= 14^2 \\ &= \square \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of circle} &= \square \dots\dots\dots \text{(Formula)} \\ &= \frac{22}{7} \times 7 \times 7 \\ &= 154 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \left(\begin{array}{l} \text{Area of} \\ \text{shaded portion} \end{array} \right) &= \left(\begin{array}{l} \text{Area of} \\ \text{square} \end{array} \right) - \left(\begin{array}{l} \text{Area of} \\ \text{circle} \end{array} \right) \\ &= 196 - 154 \\ &= \square \text{ cm}^2 \end{aligned}$$

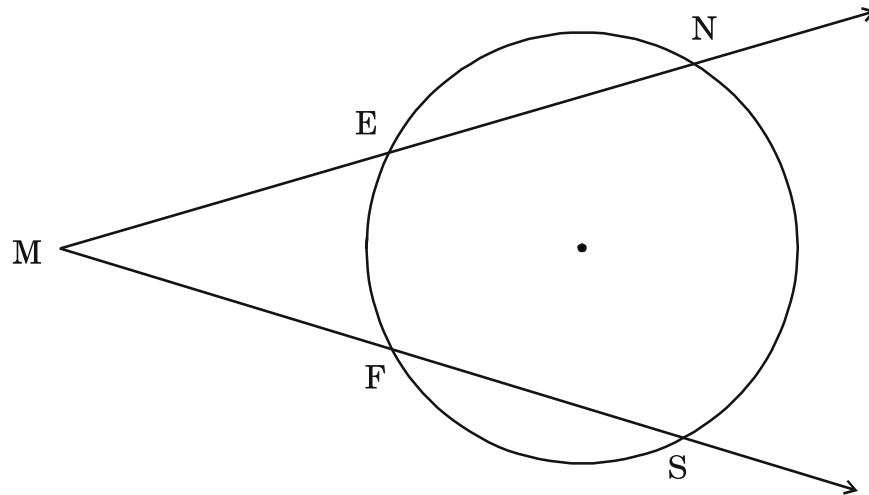
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(B) Solve any *four* of the following sub-questions : 8

(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, $m(\text{arc NS}) = 125^\circ$, $m(\text{arc EF}) = 37^\circ$.

Find the measure of $\angle NMS$.

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

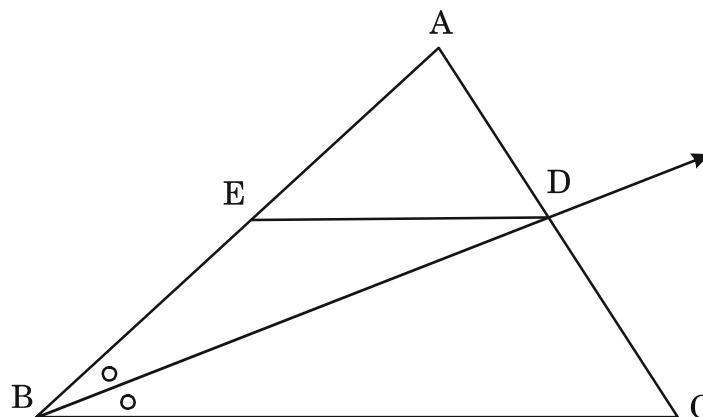
(5) Find the surface area of a sphere of radius 7 cm.

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

(1)



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

Proof :

In $\triangle ABC$, ray BD bisects $\angle B$

$$\therefore \frac{\boxed{}}{BC} = \frac{AD}{DC} \dots\dots\dots \text{(I)} \left(\boxed{} \right)$$

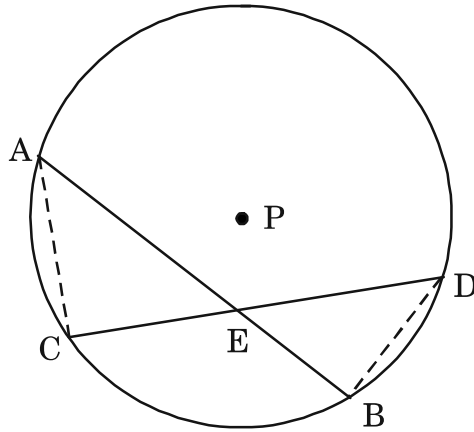
In $\triangle ABC$, $DE \parallel BC$

$$\therefore \frac{\boxed{}}{EB} = \frac{AD}{DC} \dots\dots\dots \text{(II)} \left(\boxed{} \right)$$

$$\frac{AB}{\boxed{}} = \frac{\boxed{}}{EB} \dots\dots\dots \text{[from (I) and (II)]}$$

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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 $\triangle CAE$ and $\triangle BDE$

$$\angle AEC \cong \angle DEB \dots\dots\dots \boxed{}$$

$$\boxed{} \cong \angle BDE \text{ (angles inscribed in the same arc)}$$

$$\therefore \triangle CAE \sim \triangle BDE \dots\dots\dots \boxed{}$$

$$\therefore \frac{\boxed{}}{DE} = \frac{CE}{\boxed{}} \dots\dots\dots \boxed{}$$

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

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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) $\triangle ABC \sim \triangle LMN$. In $\triangle ABC$, $AB = 5.5$ cm, $BC = 6$ cm, $CA = 4.5$ cm. Construct $\triangle ABC$ and $\triangle LMN$ such that

$$\frac{BC}{MN} = \frac{5}{4}.$$

- (3) Seg PM is a median of $\triangle PQR$, $PM = 9$ 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) $\frac{1}{\sin^2 \theta} - \frac{1}{\cos^2 \theta} - \frac{1}{\tan^2 \theta} - \frac{1}{\cot^2 \theta} - \frac{1}{\sec^2 \theta} - \frac{1}{\operatorname{cosec}^2 \theta} = -3$, 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 $\angle APB = 70^\circ$.

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

- (1) \square ABCD is trapezium, $AB \parallel CD$ diagonals of trapezium intersect 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.