

# 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

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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.

## 2/N 632

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

# 3/N 632

(A) 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.

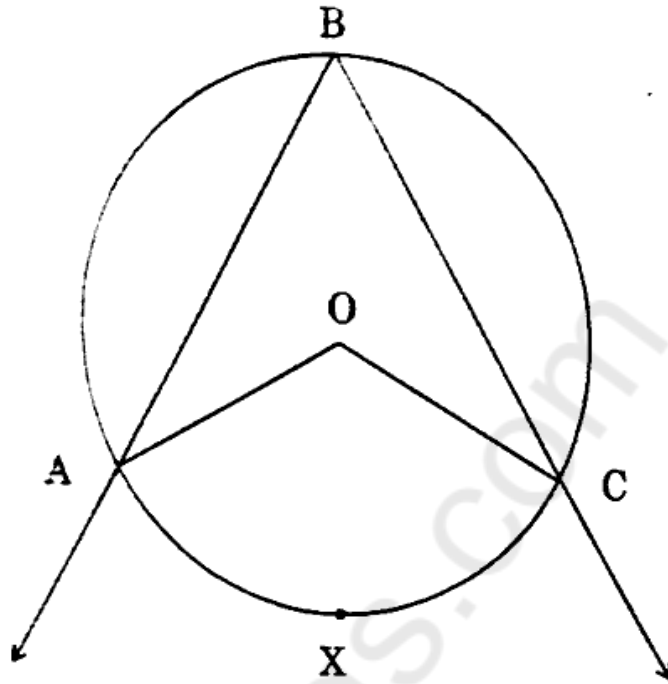
(4) Angle made by the line with the positive direction of X-axis is  $45^\circ$ . Find the slope of that line.

# 4/N 632

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 :**

$$\angle ABC = \frac{1}{2} m(\text{arc } AXC) \dots\dots\dots \boxed{\phantom{000}}$$

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

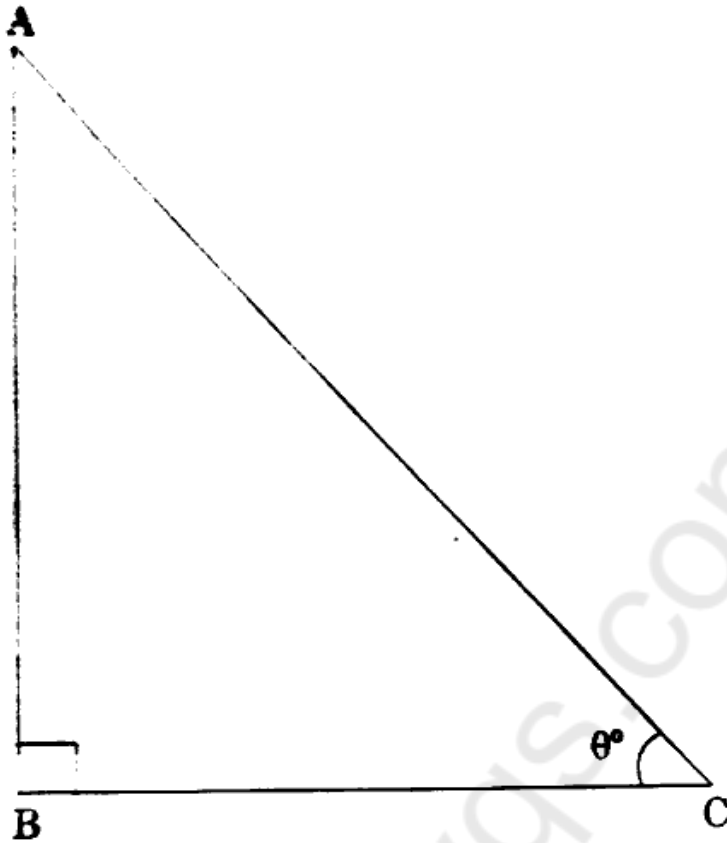
$$\boxed{\phantom{000}} = m(\text{arc } AXC)$$

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

$$\therefore m\angle AOC = \boxed{\phantom{000}}$$

# 5/N 632

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



**Solution :**

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

$$AB^2 + BC^2 = \boxed{\phantom{000}} \dots\dots\dots \text{(Pythagoras theorem)}$$

Divide both sides by  $AC^2$

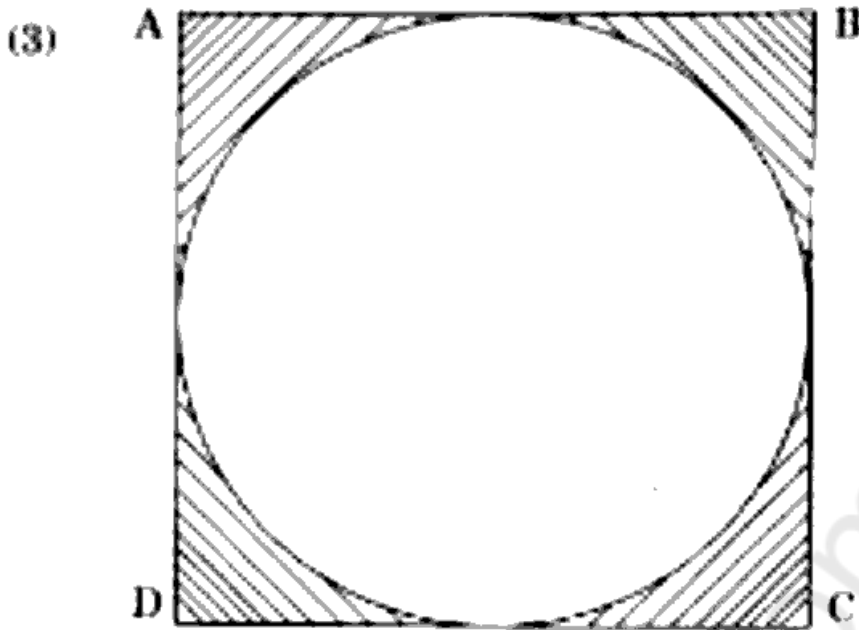
$$\frac{AB^2}{AC^2} + \frac{BC^2}{AC^2} = \frac{AC^2}{AC^2}$$

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

$$\text{But } \frac{AB}{AC} = \boxed{\phantom{000}} \text{ and } \frac{BC}{AC} = \boxed{\phantom{000}}$$

$$\therefore \sin^2 \theta + \cos^2 \theta = \boxed{\phantom{000}}$$

# 6/N 632



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 :** <https://www.maharashtrastudy.com>

$$\text{Area of square} = (\square)^2 \dots\dots\dots (\text{Formula})$$

$$= 14^2$$

$$= \square \text{ cm}^2$$

$$\text{Area of circle} = \square \dots\dots\dots (\text{Formula})$$

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

$$= 154 \text{ cm}^2$$

$$\left( \begin{array}{l} \text{Area of} \\ \text{shaded portion} \end{array} \right) = \left( \begin{array}{l} \text{Area of} \\ \text{square} \end{array} \right) - \left( \begin{array}{l} \text{Area of} \\ \text{circle} \end{array} \right)$$

$$= 196 - 154$$

$$= \square \text{ cm}^2$$

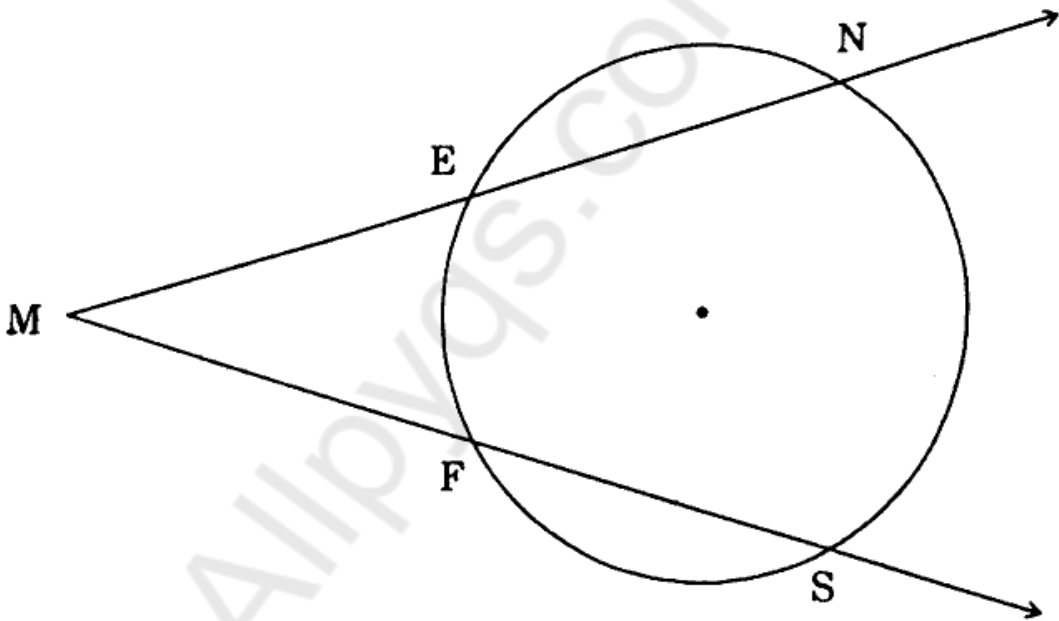
# 7/N 632

(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  $\angle NMS$ .

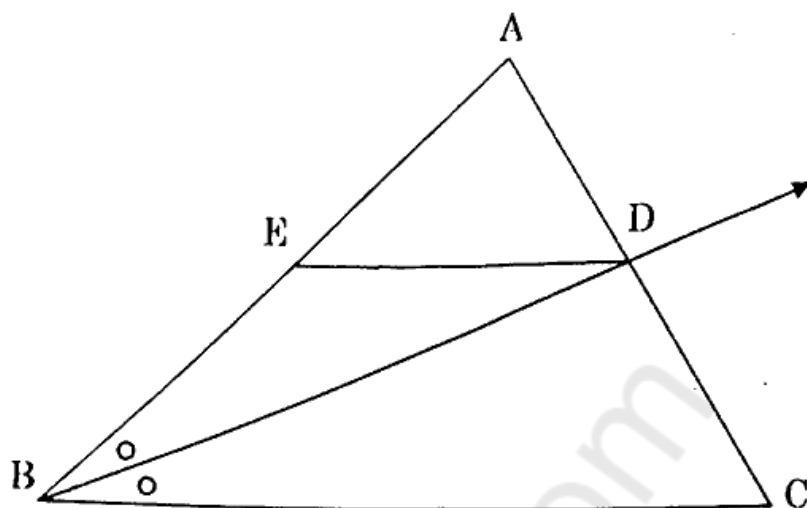
- (4) Find the slope of the line passing through the points A(2, 3), B(4, 7).
- (5) Find the surface area of a sphere of radius 7 cm.

P.T.O.

# 8/N 632

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  $\angle B$

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

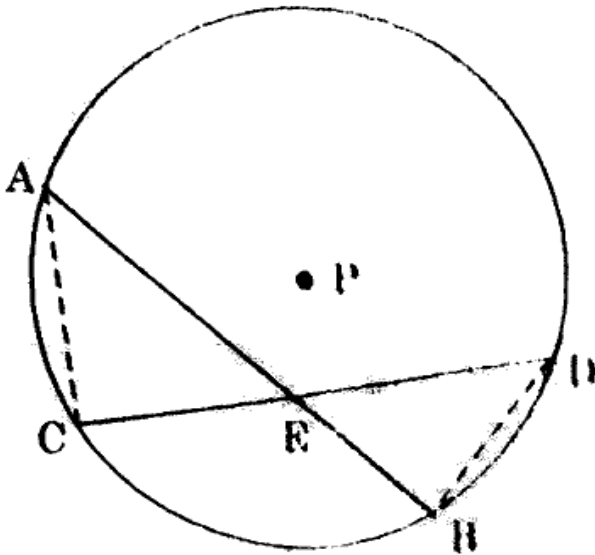
In  $\triangle ABC$ ,  $DE \parallel BC$

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

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



(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  $\triangle BDE$

$$\angle AEC \cong \angle DEB \dots\dots\dots \boxed{\phantom{000}}$$

$$\boxed{\phantom{000}} \cong \angle BDE \text{ (angles inscribed in the same arc)}$$

$$\therefore \triangle CAE \sim \triangle BDE \dots\dots\dots \boxed{\phantom{000}}$$

$$\therefore \frac{\boxed{\phantom{000}}}{DE} = \frac{CE}{\boxed{\phantom{000}}} \dots\dots\dots \boxed{\phantom{000}}$$

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

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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  $\Delta ABC$ ,  $AB = 5.5$  cm,  $BC = 6$  cm,  $CA = 4.5$  cm. Construct  $\Delta ABC$  and  $\Delta LMN$  such that

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

(3) Seg  $PM$  is a median of  $\Delta PQR$ ,  $PM = 9$  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  $\theta$ .


(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)  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.