

N 623

Seat No.

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2019 III 13 1100 – N 623 – MATHEMATICS (71) GEOMETRY—PART II (E)

(NEW COURSE)

Time : 2 Hours

(Pages 8)

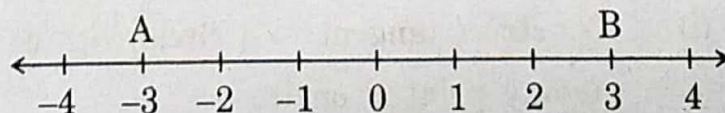
Max. Marks : 40

Note :—

- (i) All questions are compulsory.
- (ii) Use of calculator is not allowed.
- (iii) Figures to the right of questions indicate full marks.
- (iv) Draw proper figures for answers wherever necessary.
- (v) The marks of construction should be clear and distinct. Do not erase them.
- (vi) While writing any proof, drawing relevant figure is necessary. Also the proof should be consistent with the figure.

1. (A) Solve the following questions (Any four) : 4

- (i) If $\Delta ABC \sim \Delta PQR$ and $\angle A = 60^\circ$, then $\angle P = ?$
- (ii) In right-angled ΔABC , if $\angle B = 90^\circ$, $AB = 6$, $BC = 8$, then find AC .
- (iii) Write the length of largest chord of a circle with radius 3.2 cm.
- (iv) From the given number line, find $d(A, B)$:



- (v) Find the value of $\sin 30^\circ + \cos 60^\circ$.
- (vi) Find the area of a circle of radius 7 cm.

P.T.O.

(B) Solve the following questions (Any *two*) :

4

- (i) Draw seg AB of length 5.7 cm and bisect it.
- (ii) In right-angled triangle PQR, if $\angle P = 60^\circ$, $\angle R = 30^\circ$ and $PR = 12$, then find the values of PQ and QR.
- (iii) In a right circular cone, if perpendicular height is 12 cm and radius is 5 cm, then find its slant height.

2. (A) Choose the correct alternative :

4

- (i) ΔABC and ΔDEF are equilateral triangles. If $A(\Delta ABC) : A(\Delta DEF) = 1 : 2$ and $AB = 4$, then what is the length of DE ?
 - (a) $2\sqrt{2}$
 - (b) 4
 - (c) 8
 - (d) $4\sqrt{2}$
- (ii) Out of the following which is a Pythagorean triplet ?
 - (a) (5, 12, 14)
 - (b) (3, 4, 2)
 - (c) (8, 15, 17)
 - (d) (5, 5, 2)
- (iii) $\angle ACB$ is inscribed in arc ACB of a circle with centre O. If $\angle ACB = 65^\circ$, find $m(\text{arc ACB})$:
 - (a) 130°
 - (b) 295°
 - (c) 230°
 - (d) 65°
- (iv) $1 + \tan^2 \theta = ?$
 - (a) $\sin^2 \theta$
 - (b) $\sec^2 \theta$
 - (c) $\operatorname{cosec}^2 \theta$
 - (d) $\cot^2 \theta$

(B) Solve the following questions (Any *two*) , :

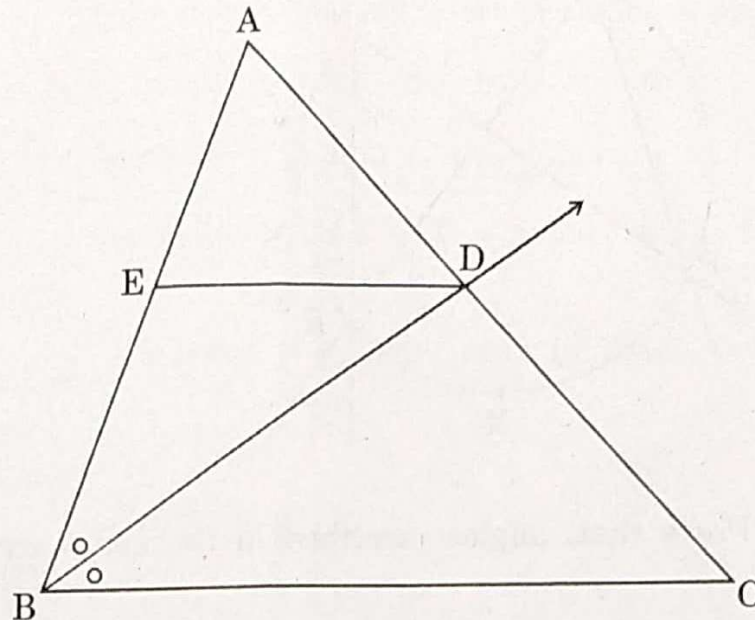
4

- (i) Construct tangent to a circle with centre A and radius 3.4 cm at any point P on it.
- (ii) Find slope of a line passing through the points A(3, 1) and B(5, 3).
- (iii) Find the surface area of a sphere of radius 3.5 cm.

3. (A) Complete the following activities (Any two) :

4

(i)



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

If A-D-C, A-E-B and seg ED \parallel side BC, then prove that :

$$\frac{AB}{BC} = \frac{AE}{EB}$$

Proof :

In $\triangle ABC$, ray BD is bisector of $\angle ABC$.

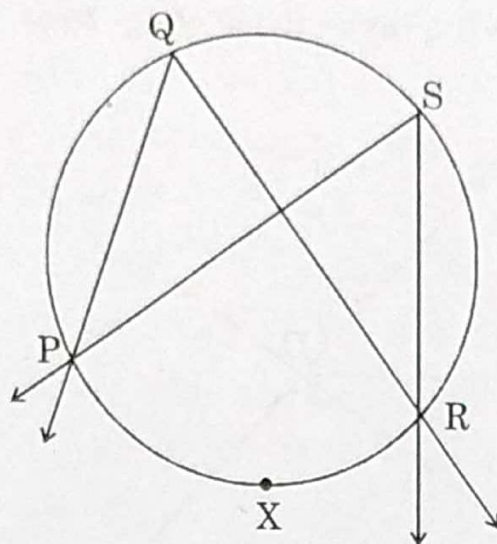
$$\therefore \frac{AB}{BC} = \frac{\boxed{\dots\dots\dots}}{\boxed{\dots\dots\dots}} \quad \text{(I) (By angle bisector theorem)}$$

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

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

$$\therefore \frac{AB}{\boxed{}} = \frac{\boxed{}}{EB} \quad \text{(From I and II)}$$

(ii)



Prove that, angles inscribed in the same arc are congruent.

Given : $\angle PQR$ and $\angle PSR$ are inscribed in the same arc.

Arc PXR is intercepted by the angles.

To prove :

$$\angle PQR \cong \angle PSR$$

Proof :

$$m\angle PQR = \frac{1}{2}m(\text{arc PXR}) \dots\dots\dots \text{(I)} \quad \boxed{}$$

$$m\angle \boxed{} = \frac{1}{2}m(\text{arc PXR}) \dots\dots\dots \text{(II)} \quad \boxed{}$$

$$\therefore m\angle \boxed{} = m\angle PSR \quad (\text{from I and II})$$

$$\therefore \angle PQR \cong \angle PSR \quad (\text{Angles equal in measure are congruent})$$

5/N 623

- (iii) How many solid cylinders of radius 6 cm and height 12 cm can be made by melting a solid sphere of radius 18 cm ?

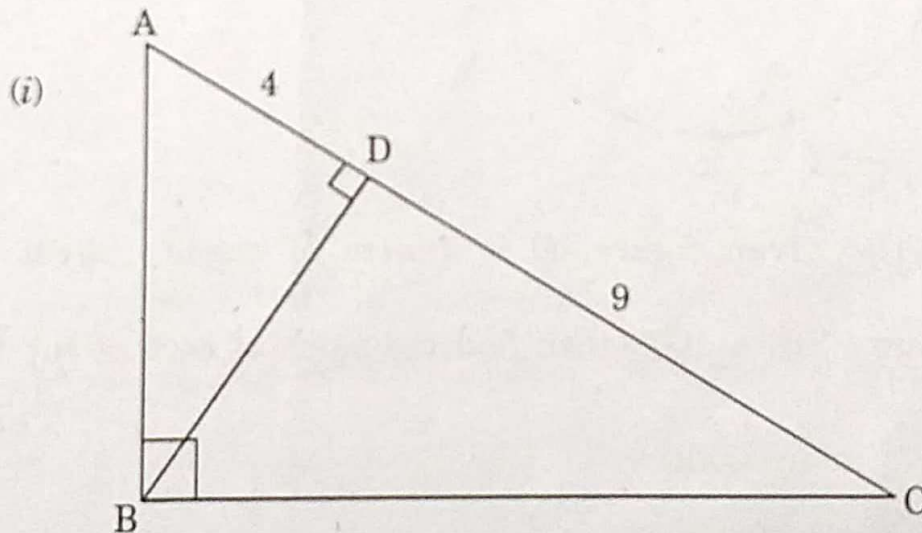
Activity : Radius of the sphere, $r = 18$ cm

For cylinder, radius $R = 6$ cm, height $H = 12$ cm

$$\begin{aligned}
 \therefore \text{Number of cylinders can be made} &= \frac{\text{Volume of the sphere}}{\text{Volume of cylinder}} \\
 &= \frac{\frac{4}{3}\pi r^3}{\pi R^2 H} \\
 &= \frac{\frac{4}{3} \times 18 \times 18 \times 18}{\pi \times 6^2 \times 12} \\
 &= \frac{4 \times 18 \times 18 \times 18}{3 \times 6 \times 6 \times 12} \\
 &= \frac{4 \times 18 \times 18 \times 18}{3 \times 6 \times 6 \times 12}
 \end{aligned}$$

(B) Solve the following questions (Any two) :

4



In right-angled $\triangle ABC$, $BD \perp AC$.

If $AD = 4$, $DC = 9$, then find BD .

6/N 623

(ii) Verify whether the following points are collinear or not :

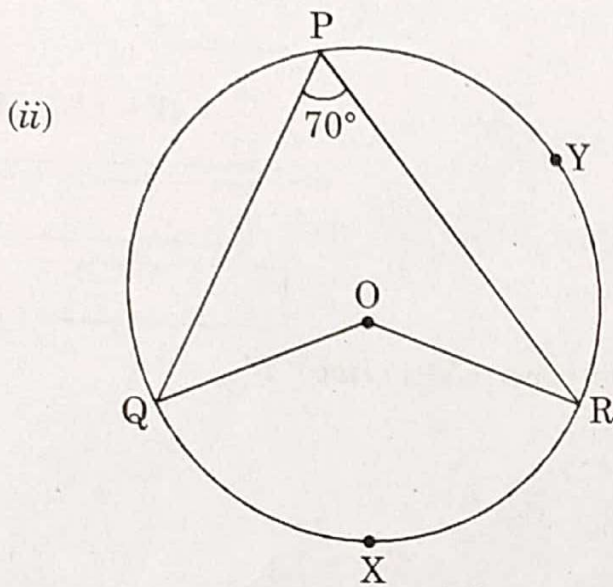
$$A(1, -3), B(2, -5), C(-4, 7).$$

(iii) If $\sec \theta = \frac{25}{7}$, then find the value of $\tan \theta$.

4. Solve the following questions (Any *three*) :

9

(i) In ΔPQR , seg PM is a median, $PM = 9$ and $PQ^2 + PR^2 = 290$. Find the length of QR .



In the given figure, O is centre of circle. $\angle QPR = 70^\circ$ and $m(\text{arc } PYR) = 160^\circ$, then find the value of each of the following :

(a) $m(\text{arc } QXR)$

(b) $\angle QOR$

(c) $\angle PQR$

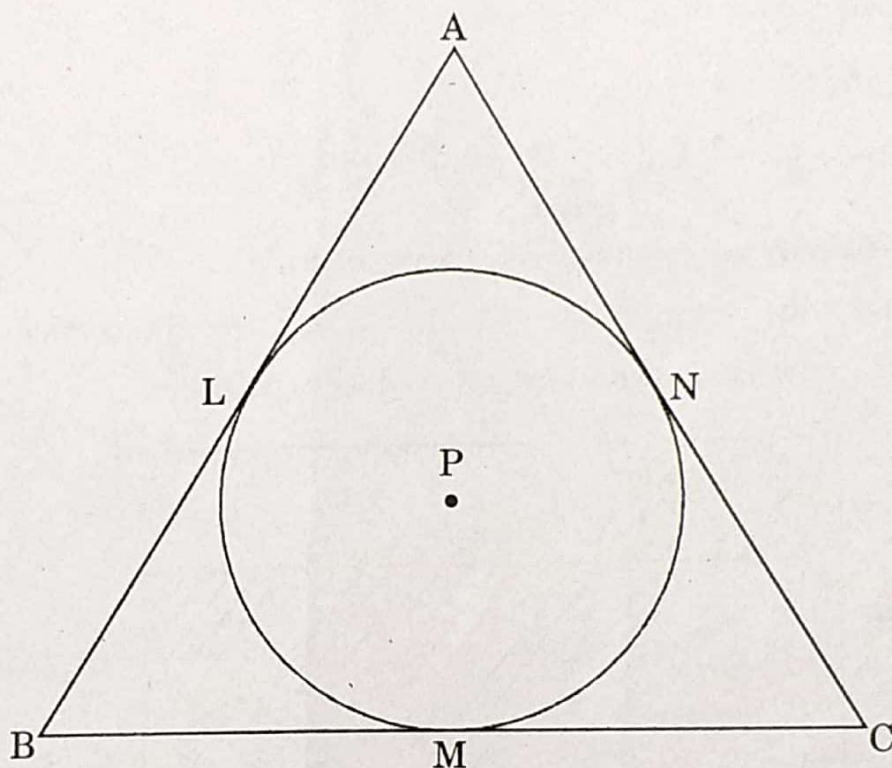
7/N 623

- (iii) Draw a circle with radius 4.2 cm. Construct tangents to the circle from a point at a distance of 7 cm from the centre.
- (iv) When an observer at a distance of 12 m from a tree looks at the top of the tree, the angle of elevation is 60° . What is the height of the tree ? $(\sqrt{3} = 1.73)$

5. Solve the following questions (Any one) :

4

(i)

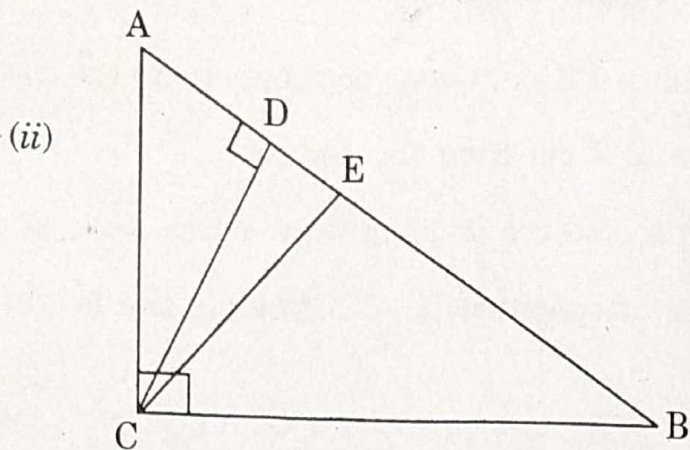


A circle with centre P is inscribed in the ΔABC . Side AB, side BC and side AC touch the circle at points L, M and N respectively. Radius of the circle is r .

Prove that :

$$A(\Delta ABC) = \frac{1}{2} (AB + BC + AC) \times r.$$

P.T.O.



In $\triangle ABC$, $\angle ACB = 90^\circ$. seg $CD \perp$ side AB and seg CE is angle bisector of $\angle ACB$.

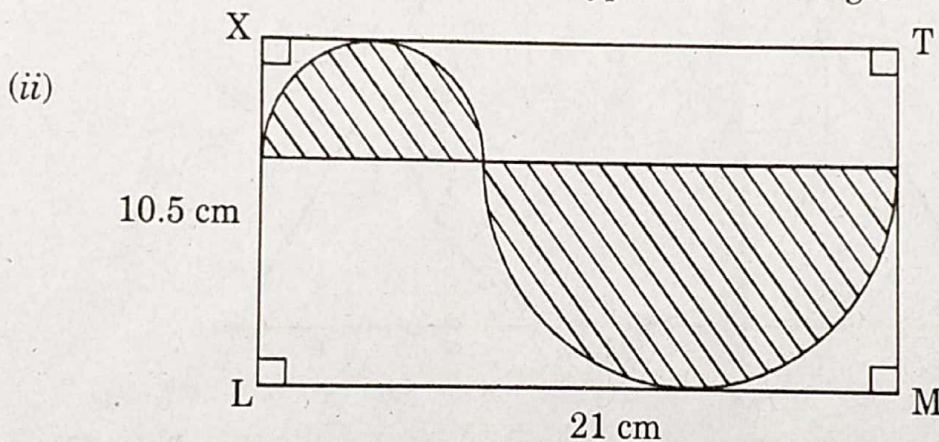
Prove that :

$$\frac{AD}{BD} = \frac{AE^2}{BE^2}.$$

6. Solve the following questions (Any one) :

3

- (i) Show that the points $(2, 0)$, $(-2, 0)$ and $(0, 2)$ are the vertices of a triangle. Also state with reason the type of the triangle.



In the above figure, $\square XLMT$ is a rectangle. $LM = 21$ cm, $XL = 10.5$ cm. Diameter of the smaller semicircle is half the diameter of the larger semicircle. Find the area of non-shaded region.