N 623

Seat No. | | | | | | | |

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.

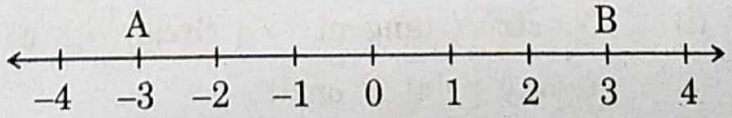
1. (A) Solve the following questions (Any *four*) : 4

(*i*) If $\Delta ABC \sim \Delta PQR$ and $\angle A = 60°$, then $\angle P = ?$

(*ii*) In right-angled ΔABC, if $\angle B = 90°$, 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 $\sin 30° + \cos 60°$.

(*vi*) Find the area of a circle of radius 7 cm.

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(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 $\angle P = 60°$, $\angle R = 30°$ 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*) Δ ABC and Δ DEF are equilateral triangles. If A(Δ ABC) : A(Δ 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 $\angle ACB = 65°$, find *m*(arc ACB) :

(*a*) 130° (*b*) 295°

(*c*) 230° (*d*) 65°

(*iv*) $1 + \tan^2 \theta = ?$

(*a*) $\sin^2 \theta$ (*b*) $\sec^2 \theta$

(*c*) $\text{cosec}^2 \theta$ (*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.

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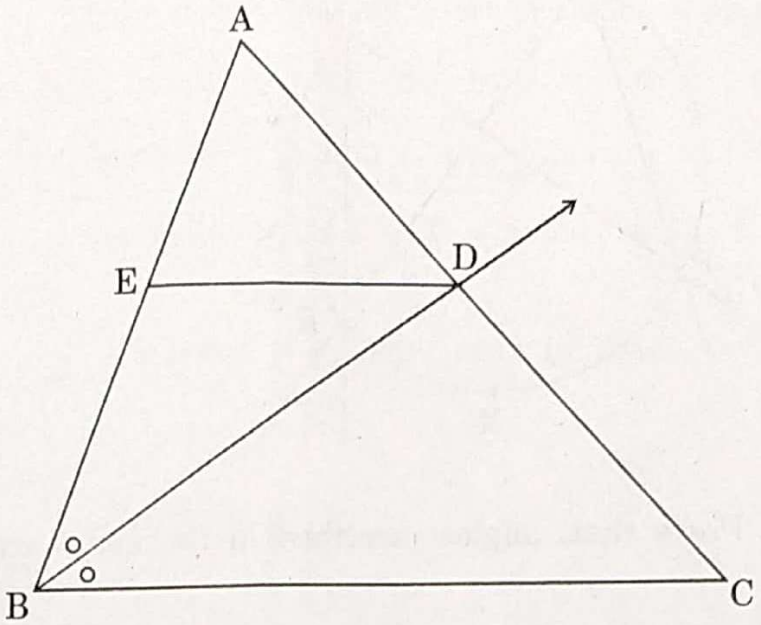
3. (A) **Complete the following activities (Any *two*) :** 4

(*i*)



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

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

In Δ ABC, seg DE $\parallel$ side BC

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

$\therefore$ $\frac{AB}{\square} = \frac{\square}{EB}$ ..... (From I and II)

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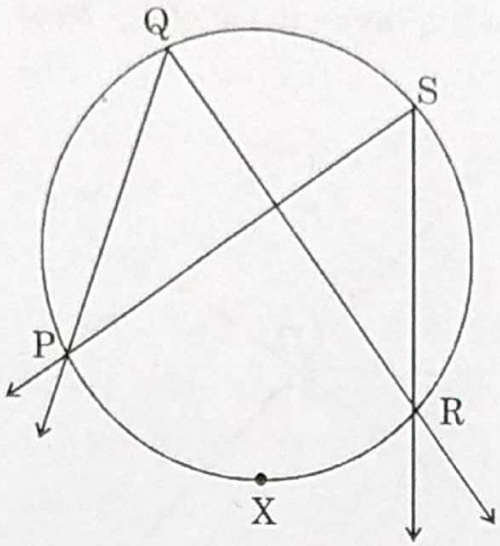
(*ii*)



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 :

$m\angle PQR = \frac{1}{2} m(\text{arc PXR})$ ..... (I) ☐

$m\angle$ ☐ $= \frac{1}{2} m(\text{arc PXR})$ ..... (II) ☐

$\therefore$ $m\angle$ ☐ $= m\angle PSR$ (from I and II)

$\therefore$ $\angle PQR \cong \angle PSR$ (Angles equal in measure are congruent)

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(*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

$$\therefore \quad \text{Number of cylinders can be made} = \frac{\text{Volume of the sphere}}{\square}$$

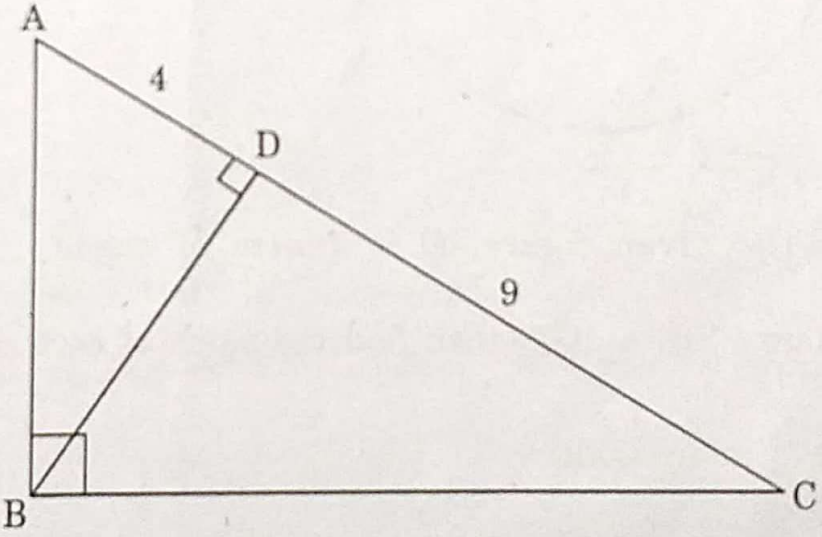
$$= \frac{\frac{4}{3}\pi r^3}{\square}$$

$$= \frac{\frac{4}{3} \times 18 \times 18 \times 18}{\square}$$

$$= \square$$

(B) Solve the following questions (Any *two*) : 4

(*i*)



In right-angled Δ ABC, BD ⊥ AC.

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

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

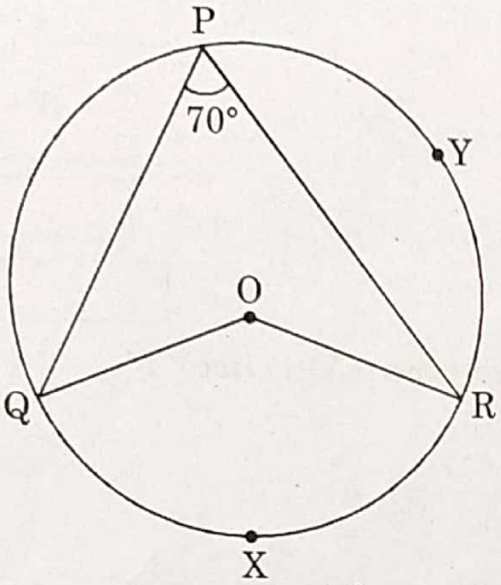
A(1, –3), B(2, –5), C(–4, 7).

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

4. Solve the following questions (Any *three*) : **9**

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

(*ii*)



In the given figure, O is centre of circle. ∠QPR = 70° and *m*(arc PYR) = 160°, then find the value of each of the following :

(*a*) *m*(arc QXR)

(*b*) ∠QOR

(*c*) ∠PQR

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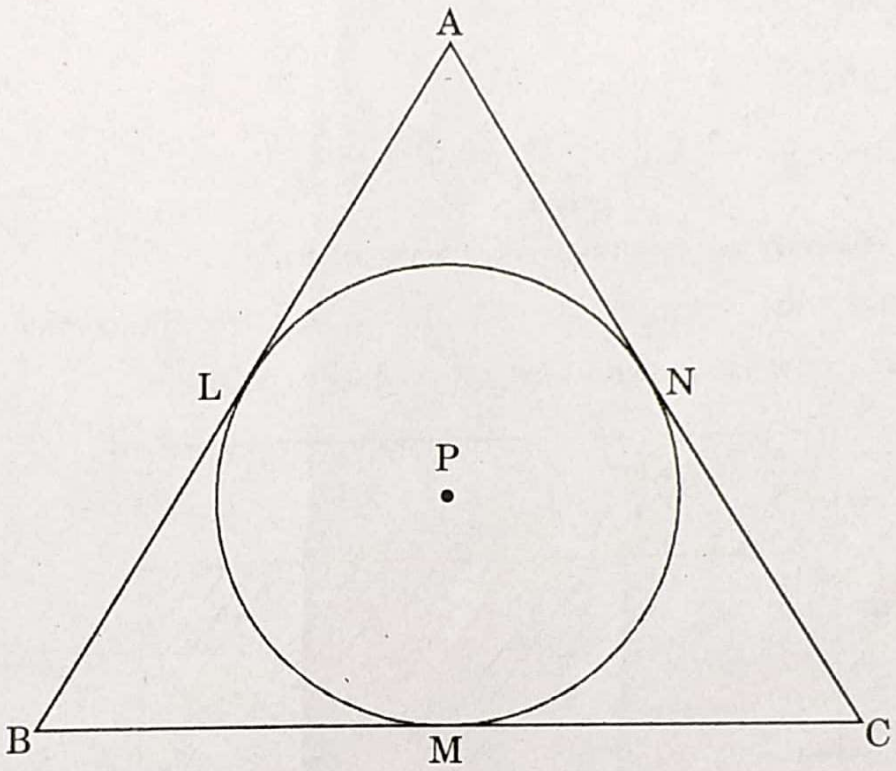
(*iii*) Draw a circle with radius 4.2 cm. Construct tangents to the circle from a point at a distance of 7 cm from the centre.

(*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 ? $\left(\sqrt{3} = 1.73\right)$

5. Solve the following questions (Any *one*) : 4

(*i*)



A circle with centre P is inscribed in the Δ ABC. 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 :

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

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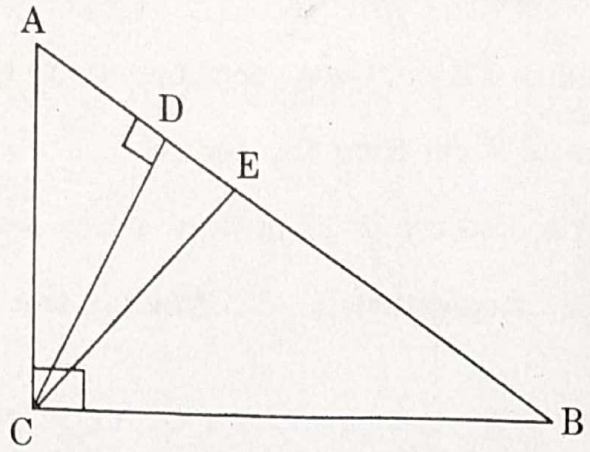
(*ii*)



In Δ ABC, ∠ACB = 90°. seg CD ⊥ side AB and seg CE is angle bisector of ∠ACB.

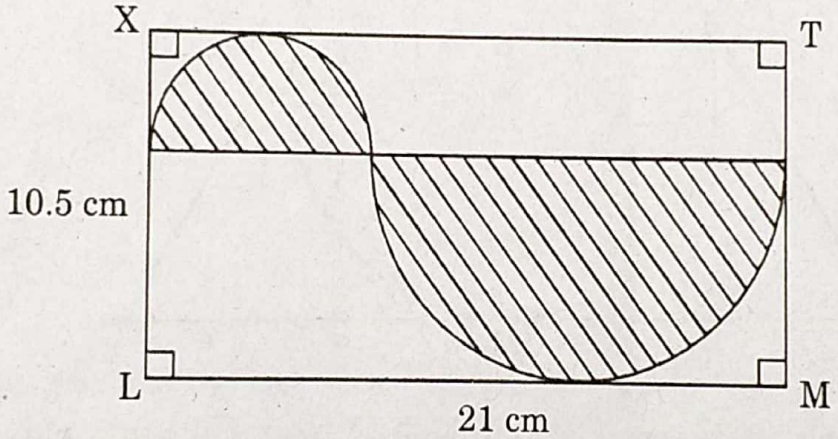
Prove that :

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

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.

(*ii*)



In the above figure, □ 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.

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