N 926

Seat No. | | | | | | |

2023 III 15 1100 – **N 926**– 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 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*) For every MCQ, the correct alternative (A), (B), (C) or (D) with sub-question number is to be written as an answer.

(*vi*) Draw the proper figures for answers wherever necessary.

(*vii*) The marks of construction should be clear and distinct. Do not erase them.

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

1. (A) **Four alternative answers are given for every subquestion. Select the correct alternative and write the alphabet of that answer :** 4

(1) If a, b, c are sides of a triangle and $a^2 + b^2 = c^2$, name the type of triangle :

(A) Obtuse angled triangle

(B) Acute angled triangle

(C) Right angled triangle

(D) Equilateral triangle

(2) Chords AB and CD of a circle intersect inside the circle at point E. If AE = 4, EB = 10, CE = 8, then find ED :

(A) 7

(B) 5

(C) 8

(D) 9

(3) Co-ordinates of origin are ....

(A) (0, 0)

(B) (0, 1)

(C) (1, 0)

(D) (1, 1)

(4) If radius of the base of cone is 7 cm and height is 24 cm, then find its slant height :

(A) 23 cm

(B) 26 cm

(C) 31 cm

(D) 25 cm

(B) Solve the following sub-questions : 4

(1) If $\Delta ABC \sim \Delta PQR$ and $\frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{16}{25}$, then find AB : PQ.

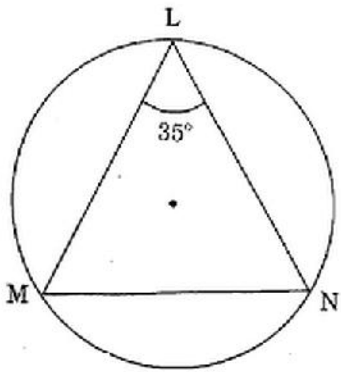
(2) In ΔRST, $\angle S = 90°$, $\angle T = 30°$, RT = 12 cm, then find RS.

(3) If radius of a circle is 5 cm, then find the length of longest chord of a circle.

(4) Find the distance between the points O (0, 0) and P (3, 4).

2. (A) **Complete the following activities (any *two*) :** 4

(1)



In the above figure, $\angle L = 35°$, find :

(*i*) m (arc MN)

(*ii*) m (arc MLN)

Solution :

(*i*) $\angle L = \frac{1}{2} m$ (arc MN).......... (By inscribed angle theorem

$\therefore$ $\boxed{} = \frac{1}{2} m$(arc MN)

$\therefore$ $2 \times 35 = m$(arc MN)

$\therefore$ m(arc MN) = $\boxed{}$

(ii) $m(\text{arc MLN}) = \boxed{} - m(\text{arc MN})$ ....

[Definition of measure of arc]

$= 360^\circ - 70^\circ$

$\therefore \quad m(\text{arc MLN}) = \boxed{}$

(2) Show that, $\cot\theta + \tan\theta = \operatorname{cosec}\theta \times \sec\theta$

Solution :

L.H.S. $= \cot\theta + \tan\theta$

$$= \frac{\cos\theta}{\sin\theta} + \frac{\sin\theta}{\cos\theta}$$

$$= \frac{\boxed{} + \boxed{}}{\sin\theta \times \cos\theta}$$

$$= \frac{1}{\sin\theta \times \cos\theta} \text{ .... } \boxed{}$$

$$= \frac{1}{\sin\theta} \times \frac{1}{\boxed{}}$$

$= \operatorname{cosec}\theta \times \sec\theta$

L.H.S. = R.H.S.

$\therefore \quad \cot\theta + \tan\theta = \operatorname{cosec}\theta \times \sec\theta.$

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

Solution :

Surface area of sphere $= 4\pi r^2$

$$= 4 \times \frac{22}{7} \times \square^2$$

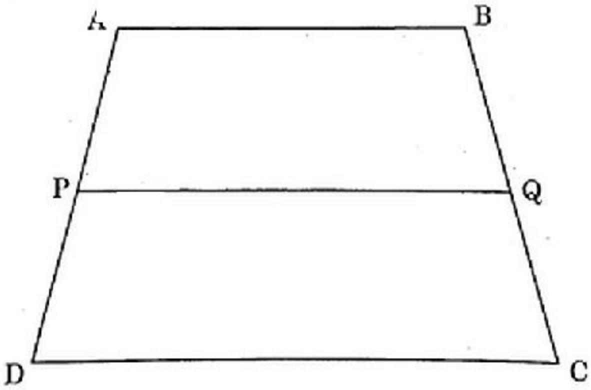
$$= 4 \times \frac{22}{7} \times \square$$

$$= \square \times 7$$

$\therefore$ Surface area of sphere $= \square$ sq.cm.

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

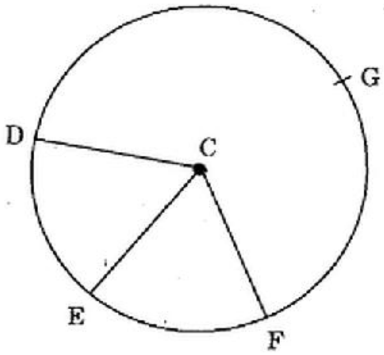
(1)



In trapezium ABCD side AB $\parallel$ side PQ $\parallel$ side DC. AP = PD = 12, QC = 14, find BQ.

(2) Find the length of the diagonal of a rectangle whose length is 35 cm and breadth is 12 cm.

(3)



In the given figure points G, D, E, F are points of a circle with centre C, $\angle ECF = 70^\circ$, m (arc DGF) $= 200^\circ$.

Find :

(*i*) m (arc DE)

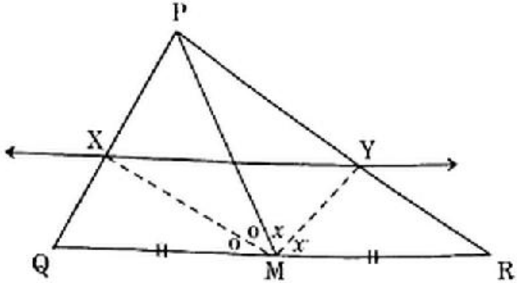
(*ii*) m (arc DEF).

(4) Show that points A(–1, –1), B(0, 1), C(1, 3) are collinear.

(5) A person is standing at a distance of 50 m from a temple looking at its top. The angle of elevation is of 45°. Find the height of the temple.

3. (A) **Complete the following activities (any *one*) :** 3

(1)



In ΔPQR, seg PM is a median. Angle bisectors of $\angle$PMQ and $\angle$PMR intersect side PQ and side PR in points X and Y respectively. Prove that XY $\parallel$ QR.

Complete the proof by filling in the boxes.

Solution :

In ΔPMQ,

Ray MX is the bisector of $\angle$PMQ

$\therefore \quad \dfrac{MP}{MQ} = \dfrac{\square}{\square}$ .... (I) [Theorem of angle bisector]

Similarly, in ΔPMR, Ray MY is bisector of $\angle$PMR

$\therefore \quad \dfrac{MP}{MR} = \dfrac{\square}{\square}$ .... (II) [Theorem of angle bisector]

But $\frac{MP}{MQ} = \frac{MP}{MR}$ .... (III) [As M is the midpoint of QR]

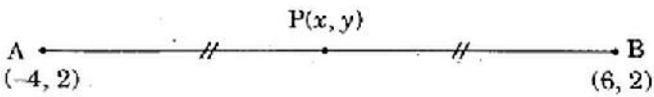
Hence MQ = MR

$\therefore \quad \frac{PX}{\square} = \frac{\square}{YR}$ .... [From (I), (II) and (III)]

$\therefore$ XY $\parallel$ QR .... [Converse of basic proportionality theorem]

(2) Find the co-ordinates of point P where P is the midpoint of a line segment AB with A(–4, 2) and B(6, 2).

Solution :



Suppose, $(-4, 2) = (x_1, y_1)$ and $(6, 2) = (x_2, y_2)$ and co-ordinates of P are (x, y)

$\therefore$ According to midpoint theorem,

$$x = \frac{x_1 + x_2}{2} = \frac{\square + 6}{2} = \frac{\square}{2} = \square$$

$$y = \frac{y_1 + y_2}{2} = \frac{2 + \square}{2} = \frac{4}{2} = \square$$

$\therefore$ Co-ordinates of midpoint P are $\square$

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

(1) In ΔABC, seg AP is a median. If $BC = 18$, $AB^2 + AC^2 = 260$, find AP.

(2) Prove that, "Angles inscribed in the same arc are congruent."

(3) Draw a circle of radius 3.3 cm. Draw a chord PQ of length 6.6 cm. Draw tangents to the circle at points P and Q.

(4) The radii of circular ends of a frustum are 14 cm and 6 cm respectively and its height is 6 cm. Find its curved surface area. $(\pi = 3.14)$

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

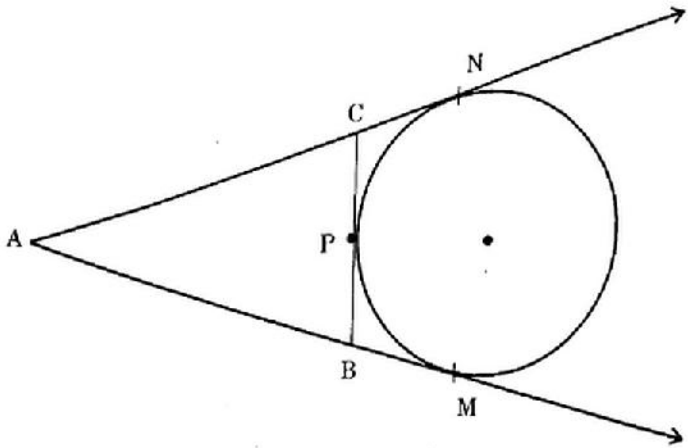
(1) In ΔABC, seg DE $\parallel$ side BC. If $2A(\Delta ADE) = A(\square DBCE)$, find AB : AD and show that $BC = \sqrt{3}\,DE$.

(2) $\Delta SHR \sim \Delta SVU$. In ΔSHR, $SH = 4.5$ cm, $HR = 5.2$ cm, $SR = 5.8$ cm and $\frac{SH}{SV} = \frac{3}{5}$, construct ΔSVU.

(3) An ice-cream pot has a right circular cylindrical shape. The radius of the base is 12 cm and height is 7 cm. This pot is completely filled with ice-cream. The entire ice-cream is given to the students in the form of right circular ice-cream cones, having diameter 4 cm and height is 3.5 cm. If each student is given one cone, how many students can be served ?

5. **Solve the following sub-questions (Any *one*) :** 3

(1)



A circle touches side BC at point P of the Δ ABC, from out-side of the triangle. Further extended lines AC and AB are tangents to the circle at N and M respectively. Prove that :

$$AM = \frac{1}{2}(\text{Perimeter of } \Delta ABC)$$

(2) Eliminate θ if $x = r\cos\theta$ and $y = r\sin\theta$.