

PRACTICE PAPER 16 (2026-27)

CHAPTER-06

PERIMETER AND AREA

SUBJECT: MATHEMATICS

CLASS : IX

MAX. MARKS : 40

DURATION : 1½ hrs

General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- (iii). **Section A** comprises of 10 MCQs of 1 mark each. **Section B** comprises of 4 questions of 2 marks each. **Section C** comprises of 3 questions of 3 marks each. **Section D** comprises of 1 question of 5 marks each and **Section E** comprises of 2 Case Study Based Questions of 4 marks each.
- (iv). There is no overall choice.
- (v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. If the circumference of a circle and the perimeter of a square are equal, then
 - (a) Area of the circle = Area of the square
 - (b) Area of the circle > Area of the square
 - (c) Area of the circle < Area of the square
 - (d) Nothing definite can be said about the relation between the areas of the circle and square.
2. The area of a quadrant of a circle, whose circumference is 22 cm, is
 - (a) $\frac{11}{8}$ cm²
 - (b) $\frac{77}{8}$ cm²
 - (c) $\frac{77}{2}$ cm²
 - (d) $\frac{77}{4}$ cm²
3. The number of revolutions made by a circular wheel of radius 0.25m in rolling a distance of 11km is
 - (a) 2800
 - (b) 4000
 - (c) 5500
 - (d) 7000
4. If the length of an arc of a circle subtending an angle 60° at its centre is 22 cm, then the radius of the circle is :
 - (a) $\sqrt{21}$ cm
 - (b) 21 cm
 - (c) $\sqrt{42}$ cm
 - (d) 42 cm
5. If the area of an equilateral triangle is $16\sqrt{3}$ cm², then the perimeter of the triangle is
 - (a) 48 cm
 - (b) 24 cm
 - (c) 12 cm
 - (d) 36 cm
6. The base of an isosceles triangle is 16 cm and its area is 48 cm². The perimeter of the triangle is
 - (a) 41 cm
 - (b) 36 cm
 - (c) 48 cm
 - (d) 324 cm
7. The lengths of the three sides of a triangular field are 40 m, 24 m and 32 m respectively. The area of the triangle is
 - (a) 480 m²
 - (b) 320 m²
 - (c) 384 m²
 - (d) 360 m²
8. Each of the equal sides of an isosceles triangle is 13 cm and its base is 24 cm. The area of the triangle is
 - (a) 156 cm²
 - (b) 78 cm²
 - (c) 60 cm²
 - (d) 120 cm²

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.

(d) A is false but R is true.

9. **Assertion (A):** The area of a minor segment cut off by a chord in a circle of radius 10 cm with a central angle of 90° is 28.5 cm^2 (using $\pi = 3.14$).

Reason (R): The area of the corresponding sector is 78.5 cm^2 and the area of the triangle formed is 50 cm^2 .

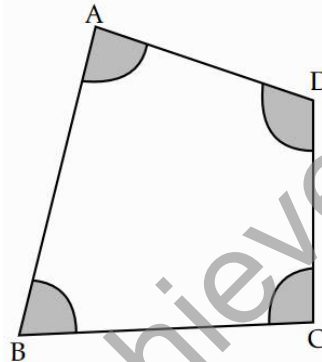
10. **Assertion (A):** Area of a triangle whose sides are 9 cm, 12 cm and 15 cm is 54 cm^2 .

Reason (R): Area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}$

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. A car has two wipers which do not overlap. Each wiper has a blade of length 21 cm sweeping through an angle of 120° . Find the total area cleaned at each sweep of the blades
12. In the given figure, arcs have been drawn of radius 7cm each with vertices A, B, C and D of quadrilateral ABCD as centres. Find the area of the shaded region.

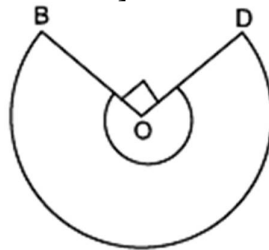


13. The length of two adjacent sides of a parallelogram are respectively 51 cm and 37 cm. One of its diagonal is 20 cm. Find the area of the parallelogram.
14. The base of an isosceles triangle is 10 cm and one of its equal sides is 13 cm. Find its area using Heron's formula.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. The perimeter of a sector of a circle of radius 5.2 cm is 16.4 cm. Find the area of the sector.
16. In fig., the shape of the top of a table in restaurant is that of a sector of a circle with centre O and $\angle BOD = 90^\circ$, if $BO = OD = 60 \text{ cm}$ find:
(i) the area of the top of the table
(ii) the perimeter of the table top. [Take $\pi = 3.14$]



17. Find the area of a triangle whose perimeter is 180 cm and its two sides are 80 cm and 18 cm. Calculate the altitude of triangle corresponding to its shortest side.

SECTION – D

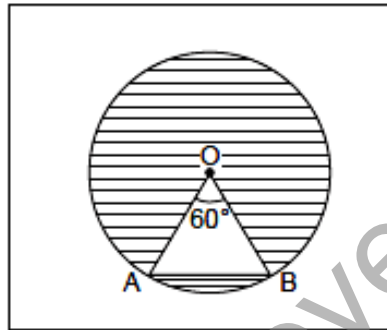
Questions 18 carry 5 marks.

18. A gardener has to put double fence all around a triangular field with sides 120 m, 80 m and 60 m. In the middle of each of the sides, there is a gate of width 10 m.
- Find the length of wire needed for fencing.
 - Find the cost of fencing at the rate of ₹ 6 per metre.
 - Find the area of triangular field.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. In the middle of a tile there is a coloured circular portion as shown. The radius of coloured position is 21 cm. The uncoloured portion (unshaded portion) subtends angle 60° at the centre as shown OA is radius. Answer the questions based on above information.

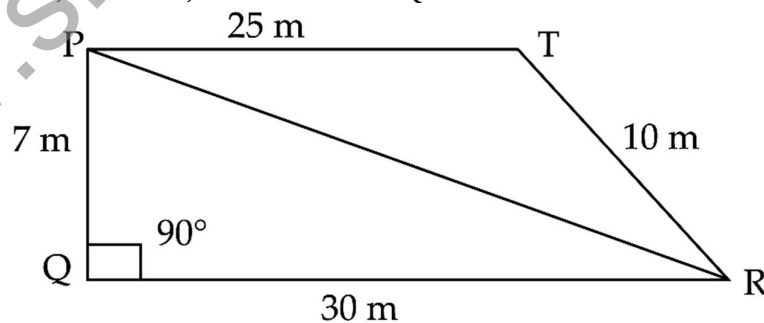


- What is the length of the arc AB?
- What is the area of minor sector AOB?
- Find the area of minor segment corresponding to chord AB?

OR

Find the area of major segment corresponding to chord AB?

20. Under Swachh Bharat Mission, a school management suggested teachers as well as students to organize Marathon Running on 2nd October in memory of Mahatma Gandhi. Both teachers and students of school dramatically made a gathering for spotlessness drive. They walked throughout the following paths in two groups. One group walked through the paths PQ QR and RP whereas the other through PR, RT and TP (As shown in figure). Then they ran over the area enclosed within their paths. If $PQ = 7\text{m}$, $QR = 30\text{m}$, $RT = 10\text{m}$, $TP = 25\text{m}$ and $\angle Q = 90^\circ$.



Analyze the above information answer the following questions:

- What is the value of longest path which is covered by Marathon participants? (1)
- Find the value area of triangle PQR in which first group is running Marathon? (1)
- How much area is covered by Group 2 of triangles PRT? (2)

PRACTICE PAPER 16 (2026-27)
CHAPTER-06
PERIMETER AND AREA (ANSWERS)

SUBJECT: MATHEMATICS
CLASS : IX

MAX. MARKS : 40
DURATION : 1½ hrs

General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- (iii). **Section A** comprises of 10 MCQs of 1 mark each. **Section B** comprises of 4 questions of 2 marks each. **Section C** comprises of 3 questions of 3 marks each. **Section D** comprises of 1 question of 5 marks each and **Section E** comprises of 2 Case Study Based Questions of 4 marks each.
- (iv). There is no overall choice.
- (v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. If the circumference of a circle and the perimeter of a square are equal, then
- (a) Area of the circle = Area of the square
 - (b) Area of the circle > Area of the square
 - (c) Area of the circle < Area of the square
 - (d) Nothing definite can be said about the relation between the areas of the circle and square.
- Ans: (b) Area of the circle > Area of the square

2. The area of a quadrant of a circle, whose circumference is 22 cm, is
- (a) $\frac{11}{8} \text{ cm}^2$
 - (b) $\frac{77}{8} \text{ cm}^2$
 - (c) $\frac{77}{2} \text{ cm}^2$
 - (d) $\frac{77}{4} \text{ cm}^2$

Ans: (b) $\frac{77}{8} \text{ cm}^2$

Let the radius of the circle be 'r'

Circumference (C) = 22 cm

$$\Rightarrow \text{radius (r)} = C/2\pi = 22/(2 \times 22/7) = (22 \times 7)/(2 \times 22) = 7/2 \text{ cm}$$

Therefore, the area of a quadrant = $1/4 \times \pi r^2$

$$= 1/4 \times 22/7 \times 7/2 \times 7/2$$

$$= 77/8 \text{ cm}^2$$

3. The number of revolutions made by a circular wheel of radius 0.25m in rolling a distance of 11km is
- (a) 2800
 - (b) 4000
 - (c) 5500
 - (d) 7000

Ans: (d) 7000

Since, radius of wheel (r) = 0.25 m

Total distance covered by a circular wheel = 11 km = 11000 m

$$\Rightarrow \text{No. of revolutions} \times 2\pi r = 11000$$

$$\Rightarrow \text{No of revolutions} = \frac{11000 \times 7}{2 \times 22 \times 0.25} = 7000$$

4. If the length of an arc of a circle subtending an angle 60° at its centre is 22 cm, then the radius of the circle is :

- (a) $\sqrt{21}$ cm
- (b) 21 cm
- (c) $\sqrt{42}$ cm
- (d) 42 cm

Ans. (b) 21 cm

5. If the area of an equilateral triangle is $16\sqrt{3} \text{ cm}^2$, then the perimeter of the triangle is

- (a) 48 cm (b) 24 cm (c) 12 cm (d) 36 cm
 Ans: (b) 24 cm

$$\text{Area of an equilateral triangle} = \frac{\sqrt{3}}{4} \times (\text{side})^2$$

$$\Rightarrow 16\sqrt{3} = \frac{\sqrt{3}}{4} \times (\text{side})^2 \Rightarrow (\text{side})^2 = 64 \Rightarrow \text{side} = 8 \text{ cm}$$

$$\text{Perimeter} = 3 \times \text{side} = 3 \times 8 \text{ cm} = 24 \text{ cm}$$

6. The base of an isosceles triangle is 16 cm and its area is 48 cm². The perimeter of the triangle is
 (a) 41 cm (b) 36 cm (c) 48 cm (d) 324 cm
 Ans: (b) 36 cm

7. The lengths of the three sides of a triangular field are 40 m, 24 m and 32 m respectively. The area of the triangle is
 (a) 480 m² (b) 320 m² (c) 384 m² (d) 360 m²
 Ans: (c) 384 m²

8. Each of the equal sides of an isosceles triangle is 13 cm and its base is 24 cm. The area of the triangle is
 (a) 156 cm² (b) 78 cm² (c) 60 cm² (d) 120 cm²
 Ans: (c) 60 cm²

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true but R is not the correct explanation of A.
 (c) A is true but R is false.
 (d) A is false but R is true.

9. **Assertion (A):** The area of a minor segment cut off by a chord in a circle of radius 10 cm with a central angle of 90° is 28.5 cm² (using $\pi = 3.14$).
Reason (R): The area of the corresponding sector is 78.5 cm² and the area of the triangle formed is 50 cm².
 Ans. (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

10. **Assertion (A):** Area of a triangle whose sides are 9 cm, 12 cm and 15 cm is 54 cm².
Reason (R): Area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}$
 Ans: (a) Both A and R are true and R is the correct explanation of A.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. A car has two wipers which do not overlap. Each wiper has a blade of length 21 cm sweeping through an angle of 120°. Find the total area cleaned at each sweep of the blades
 Ans: Here, $r = 21 \text{ cm}$, $\theta = 120^\circ$

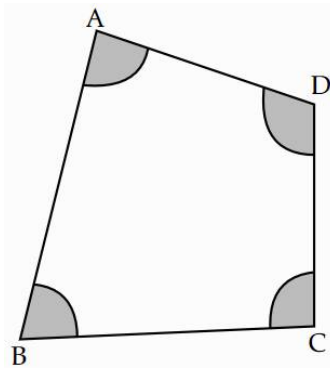
$$\text{Area of a sector} = \frac{\theta}{360^\circ} \times \pi r^2 = \frac{120^\circ}{360^\circ} \times \frac{22}{7} \times 21 \times 21$$

$$= 462 \text{ cm}^2$$

$$\therefore \text{Total area cleaned by two wipers}$$

$$= 2 \times 462 = 924 \text{ cm}^2$$

12. In the given figure, arcs have been drawn of radius 7cm each with vertices A, B, C and D of quadrilateral ABCD as centres. Find the area of the shaded region.



Ans: Let the measure of $\angle A$, $\angle B$, $\angle C$ and $\angle D$ be θ_1 , θ_2 , θ_3 and θ_4 respectively

Required area = Area of sector with centre A + Area of sector with centre B + Area of sector with centre C + Area of sector with centre D

$$\begin{aligned}
 &= \frac{\theta_1}{360} \times \pi \times 7^2 + \frac{\theta_2}{360} \times \pi \times 7^2 + \frac{\theta_3}{360} \times \pi \times 7^2 + \frac{\theta_4}{360} \times \pi \times 7^2 \\
 &= \frac{(\theta_1 + \theta_2 + \theta_3 + \theta_4)}{360} \times \pi \times 7^2 = \frac{(360)}{360} \times \frac{22}{7} \times 7 \times 7 \quad (\text{By angle sum property of a triangle}) \\
 &= 154 \text{ cm}^2
 \end{aligned}$$

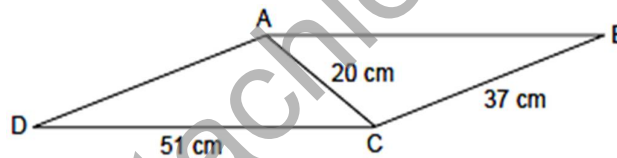
- 13.** The length of two adjacent sides of a parallelogram are respectively 51 cm and 37 cm. One of its diagonal is 20 cm. Find the area of the parallelogram.

Ans: Let ABCD be a parallelogram.

AD = BC = 37 cm

AB = DC = 51 cm

AC = 20 cm



In $\triangle ABC$, let

$a = BC = 37$ cm, $b = AB = 51$ cm, $c = AC = 20$ cm

$$\therefore \text{Semi-perimeter, } s = \frac{a+b+c}{2} = \frac{37+51+20}{2} = 54 \text{ cm}$$

Using Heron's formula,

$$\begin{aligned}
 \text{Area of } \triangle ABC &= \sqrt{s(s-a)(s-b)(s-c)} \\
 &= \sqrt{54(54-37)(54-51)(54-20)} \\
 &= \sqrt{54 \times 17 \times 3 \times 34} \\
 &= \sqrt{9 \times 3 \times 2 \times 17 \times 3 \times 17 \times 2} \\
 &= \sqrt{3 \times 3 \times 3 \times 3 \times 2 \times 2 \times 17 \times 17} \\
 &= 3 \times 3 \times 2 \times 17 = 306 \text{ cm}^2
 \end{aligned}$$

Since the diagonal divides the parallelogram into two congruent triangles of equal area,

$$\therefore \text{Area of parallelogram ABCD} = 2 \times \text{ar}(\triangle ABC) = 2 \times 306 = 612 \text{ cm}^2$$

- 14.** The base of an isosceles triangle is 10 cm and one of its equal sides is 13 cm. Find its area using Heron's formula.

Ans: Given $a = 10$ cm, $b = c = 13$ cm

$$\therefore \text{Semi-perimeter, } s = \frac{a+b+c}{2} = \frac{10+13+13}{2} = 18 \text{ cm}$$

Using Heron's formula,

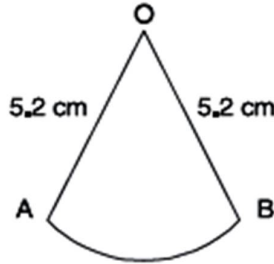
$$\begin{aligned}\text{Area of triangle} &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{18(18-10)(18-13)(18-13)} \\ &= \sqrt{18 \times 8 \times 5 \times 5} \\ &= 5\sqrt{3 \times 3 \times 2 \times 2 \times 2 \times 2} \\ &= 5 \times 3 \times 2 \times 2 = 60 \text{ cm}^2\end{aligned}$$

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. The perimeter of a sector of a circle of radius 5.2 cm is 16.4 cm. Find the area of the sector.

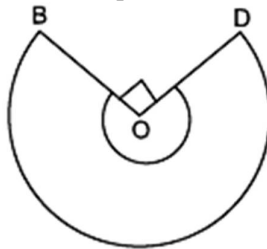
Ans. Perimeter of a sector OAB = 16.4 cm



$$\begin{aligned}\Rightarrow OA + AB + OB &= 16.4 \text{ cm} \\ \Rightarrow 5.2 \text{ cm} + 5.2 \text{ cm} + AB &= 16.4 \text{ cm} \\ \Rightarrow 10.4 \text{ cm} + AB &= 16.4 \text{ cm} \\ \Rightarrow AB &= (16.4 - 10.4) \text{ cm} \\ \text{Length of the arc} &= 6.0 \text{ cm} \\ \text{Area of the sector} &= \frac{lr}{2} = \frac{6.0 \times 5.2}{2} = 6.0 \times 2.6 \text{ cm}^2 = 15.6 \text{ cm}^2\end{aligned}$$

16. In fig., the shape of the top of a table in restaurant is that of a sector of a circle with centre O and $\angle BOD = 90^\circ$, if $BO = OD = 60 \text{ cm}$ find:

- (i) the area of the top of the table
(ii) the perimeter of the table top. [Take $\pi = 3.14$]



$$\begin{aligned}\text{Ans. } BO = OD = r &= 60 \text{ cm} \\ \theta &= 360^\circ - \angle BOD = 360^\circ - 90^\circ = 270^\circ \\ \text{(i) Area of the table top (sector)} \\ &= \frac{\theta}{360^\circ} \pi r^2 = \frac{270^\circ}{360^\circ} \times 3.14 \times 60 \times 60 \\ &= 45 \times 60 \times \frac{314}{100} = 27 \times 314 = 8478 \text{ cm}^2 \\ \text{(ii) perimeter (table top)} &= \frac{\theta}{360^\circ} 2\pi r + 2r \\ &= \frac{270^\circ}{360^\circ} \times 2 \times \frac{314}{100} \times 60 + 120 \\ &= \frac{90 \times 314}{100} + 120 = \frac{2826 + 1200}{10} = 402.6 \text{ cm}\end{aligned}$$

17. Find the area of a triangle whose perimeter is 180 cm and its two sides are 80 cm and 18 cm. Calculate the altitude of triangle corresponding to its shortest side.

Ans:

Given $a = 80$ cm and $b = 18$ cm

Perimeter of triangle $= a + b + c$

$$\Rightarrow 180 = 80 + 18 + c$$

$$\therefore c = 180 - 98 = 82 \text{ cm}$$

$$\text{and semi-perimeter, } s = \frac{180}{2} = 90 \text{ cm}$$

Using Heron's formula,

$$\begin{aligned} \text{Area of triangle} &= \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{90(90-80)(90-18)(90-82)} \\ &= \sqrt{90 \times 10 \times 72 \times 8} = \sqrt{10 \times 9 \times 10 \times 9 \times 8 \times 8} \\ &= \sqrt{10 \times 10 \times 9 \times 9 \times 8 \times 8} = 10 \times 9 \times 8 = 720 \text{ cm}^2 \end{aligned}$$

The shortest side of triangle $= 18$ cm

$$\therefore \text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{altitude}$$

$$720 = \frac{1}{2} \times 18 \times h$$

$$\therefore h = \frac{720}{9} = 80 \text{ cm}$$

$\therefore$ Altitude of triangle corresponding to its shortest side (18 cm) is 80 cm.

SECTION - D

Questions 18 carry 5 marks.

18. A gardener has to put double fence all around a triangular field with sides 120 m, 80 m and 60 m. In the middle of each of the sides, there is a gate of width 10 m.

(i) Find the length of wire needed for fencing.

(ii) Find the cost of fencing at the rate of ₹ 6 per metre.

(iii) Find the area of triangular field.

Ans: Perimeter of triangular field $= 120 + 80 + 60 = 260$ m

(i) Length of wire needed for single fencing

$= 260 - 30$ (to be left for gate on each side)

$= 230$ m

$\therefore$ Total length of wire needed for double fencing $= 2 \times 230 = 460$ m

(ii) Cost of fencing $= ₹ 6$ per metre

$\therefore$ Total cost of fencing $= 460 \times 6 = ₹ 2760$

(iii) Given $a = 120$ m, $b = 80$ m and $c = 60$ m

$$\text{The semi-perimeter, } s = \frac{260}{2} = 130 \text{ m}$$

Using Heron's formula,

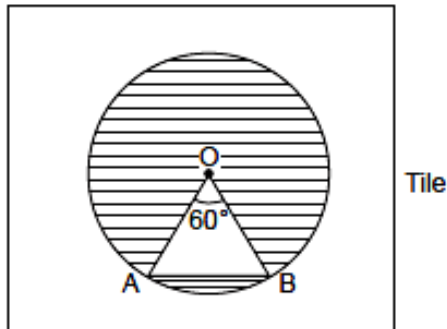
Area of triangular field

$$\begin{aligned} &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{130(130-120)(130-80)(130-60)} \\ &= \sqrt{130 \times 10 \times 50 \times 70} \\ &= 100\sqrt{13 \times 5 \times 7} \\ &= 100\sqrt{455} = 100 \times 21.33 = 2133 \text{ m}^2 \end{aligned}$$

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. In the middle of a tile there is a coloured circular zportion as shown. The radius of coloured position is 21 cm. The uncoloured portion (unshaded portion) subtends angle 60° at the centre as shown OA is radius. Answer the questions based on above information.



- (i) What is the length of the arc AB?
(ii) What is the area of minor sector AOB?
(iii) Find the area of minor segment corresponding to chord AB?

OR

Find the area of major segment corresponding to chord AB?

Ans. (i) Radius of circle = OA = 21 cm

$$\text{Length of arc AB} = \frac{\pi r \theta}{180^\circ} = \frac{\pi(21)60^\circ}{180^\circ} = 7\pi \text{ cm} = \frac{7 \times 22}{7} = 22 \text{ cm}$$

$$(ii) \text{ Area of minor sector AOB} = \frac{\pi r^2 \theta}{360^\circ} = \frac{22}{7} \times \frac{21 \times 21 \times 60^\circ}{360^\circ} = 11 \times 3 \times 7 = 231 \text{ cm}^2$$

(iii) Area of corresponding minor segment of corresponding chord AB = Area of minor sector OAB – area of ΔOAB

$$= 231 - \frac{1}{2} \times 21 \times 21 \times \sin 60^\circ$$

$$= 231 - \frac{1}{2} \times 21 \times 21 \times \frac{\sqrt{3}}{2} = \left(231 - \frac{441\sqrt{3}}{4} \right) \text{ cm}^2 = 231 - 190.95 = 40.05 \text{ cm}^2$$

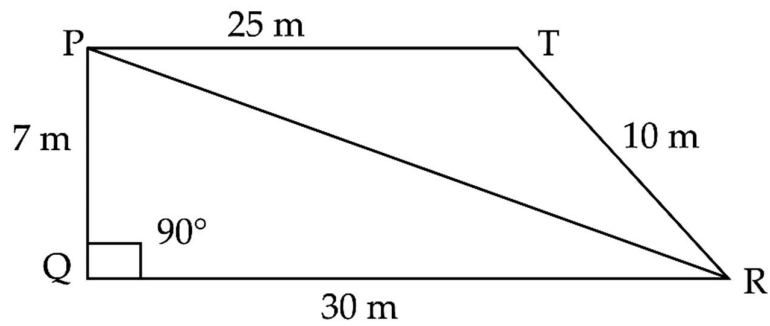
OR

Area of corresponding major segment of corresponding chord AB. = Area of major sector + area of

$$\Delta OAB = \left(1155 + \frac{441\sqrt{3}}{4} \right) \text{ cm}^2$$

$$= 1155 + 190.95 = 1345.95 \text{ cm}^2$$

20. Under Swachh Bharat Mission, a school management suggested teachers as well as students to organize Marathon Running on 2nd October in memory of Mahatma Gandhi. Both teachers and students of school dramatically made a gathering for spotlessness drive. They walked throughout the following paths in two groups. One group walked through the paths PQ QR and RP whereas the other through PR, RT and TP (As shown in figure). Then they ran over the area enclosed within their paths. If PQ = 7m, QR = 30m, RT = 10m, TP = 25m and $\angle Q = 90^\circ$.



Analyze the above information answer the following questions:

- (i) What is the value of longest path which is covered by Marathon participants? (1)
- (ii) Find the value area of triangle PQR in which first group is running Marathon? (1)
- (iii) How much area is covered by Group 2 of triangles PRT? (2)

Ans: (i) In ΔPQR , by Pythagoras theorem

$$PR^2 = PQ^2 + QR^2$$

$$\Rightarrow PR^2 = 7^2 + 30^2$$

$$\Rightarrow PR^2 = 49 + 900 = 949$$

$$\Rightarrow PR = 30.80 \text{ m}$$

$$(ii) \text{ Area of } \Delta PQR = \frac{1}{2} \times 30 \times 7$$

$$\Rightarrow \text{Area of } \Delta PQR = 15 \times 7$$

$$= 105 \text{ m}^2$$

$$(iii) s = (25 + 10 + 30.8)/2$$

$$\Rightarrow s = 32.9 \text{ m}$$

$$\text{Area of } \Delta PRT = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{32.9(32.9-25)(32.9-10)(32.9-30.8)}$$

$$= \sqrt{32.9 \times 7.9 \times 22.9 \times 2.1} = \sqrt{12499.07} = 111.8 \text{ m}^2$$

.....