PRACTICE PAPER 18 (2026-27)
CHAPTER-06
PERIMETER AND AREA

SUBJECT: MATHEMATICS | MAX. MARKS : 40
CLASS : IX | DURATION : 1½ hrs

General Instructions:

(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** 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. The lengths of three sides of a triangle are 20 cm, 16 cm and 12 cm. The area of the triangle is
(a) 96 cm^2 (b) 120 cm^2 (c) 144 cm^2 (d) 160 cm^2

2. If the side of rhombus is 10 cm and one diagonal is 12 cm, then area of rhombus is
(a) 96 cm^2 (b) 48 cm^2 (c) 72 cm^2 (d) 80 cm^2

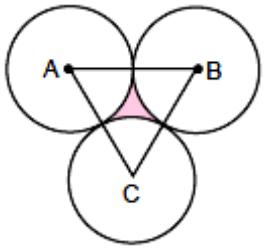
3. The area of an equilateral triangle with side $4\sqrt{3}$ cm is
(a) 20 cm^2 (b) $20\sqrt{3}$ cm^2 (c) 18.784 cm^2 (d) 20.784 cm^2

4. The base of a right triangle is 8 cm and hypotenuse is 10 cm. Its area will be
(a) 24 cm^2 (b) 40 cm^2 (c) 48 cm^2 (d) 80 cm^2

5. An arc of a circle is of length 5π cm and the sector it bounds has an area of 20π cm^2. Then the radius of the circle is:
(a) 4 cm (b) 8 cm (c) 12 cm (d) 16 cm

6. If a square ABCD is inscribed in a circle of radius 'r' and AB = 4 cm, then the value of r is:
(a) 2 cm (b) 2 √2 cm (c) 4 cm (d) 4 √2 cm

7. ABC is an equilateral triangle. The area of the shaded region if the radius of each of the circle is 1 cm, is



(a) $2-\frac{\pi}{3}$ (b) $\sqrt{3}-\pi$ (c) $\sqrt{3}-\frac{\pi}{2}$ (d) $\sqrt{3}-\frac{\pi}{4}$

8. If the difference between the circumference and the radius of of a circle is 37 cm, then using $\pi = \frac{22}{7}$, the circumference (in cm) of the circle is:

(a) 154 (b) 44 (c) 14 (d) 7

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): Area of a triangle is 6 cm^2 whose sides are 3 cm, 4 cm and 5 cm respectively.
Reason (R): Area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}$

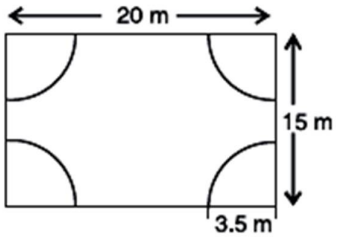
10. Assertion (A): In a circle of radius 4 cm, the angle of a sector is 45°, then the area of the sector is 44/7 cm^2.
Reason (R): Area of sector = $\pi r^2 \times \frac{\theta}{360^0}$

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. The measure of the minor arc of a circle is 1/5 of the measure of the corresponding major arc. If the radius of the circle is 10.5 cm, find the area of the sector corresponding to the major arc. [π = 22/7]

12. A rectangular piece is 20 m long and 15 m wide. From its four corners, quadrants of radii 3.5 m have been cut. Find the area of the remaining part.



13. Find the area of a triangle two sides of which are 18 cm and 10 cm and the perimeter is 42 cm.

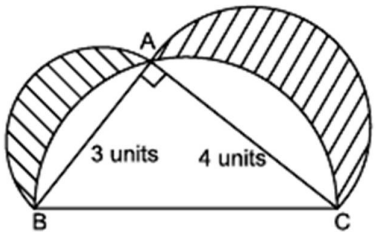
14. Two adjacent sides of a parallelogram measures 5 cm and 3.5 cm. One of its diagonal measures 6.5 cm. Find the area of the parallelogram.

SECTION – C

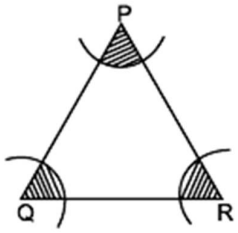
Questions 15 to 17 carry 3 marks each.

15. The perimeter of a triangle is 50 cm. One side of the triangle is 4 cm longer than the smallest side and the third side is 6 cm less than twice the smallest side. Find the area of the triangle.

16. In fig., ABC is a right-angled triangle, right-angled at A. Semicircles are drawn on AB, AC and BC as diameters. Find the area of the shaded region.



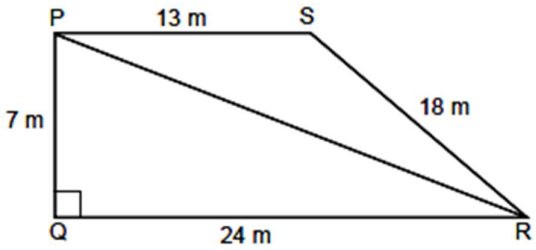
17. In figure arcs have been drawn with radii 14 cm each and with centres P, Q and R. Find the area of the shaded region.



SECTION – D

Questions 18 carry 5 marks.

18. The students of a school staged a rally for cleanliness campaign. They walked through the lanes in two groups. One group walked through the lanes PQ, QR and RP; while the other group walked through PR, RS and SP as shown in figure:



These two groups cleaned the area enclosed within their lanes. If PQ = 7 m, QR = 24 m, RS = 18 m, SP = 13 m and $\angle Q = 90°$;

(i) Which group cleaned more area and by how much?

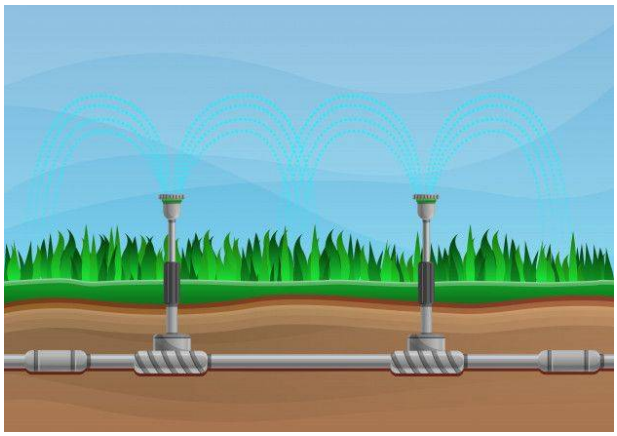
(ii) Find the total area cleaned by the students (neglecting the width of the lane).

SECTION – E (Case Study Based Questions)

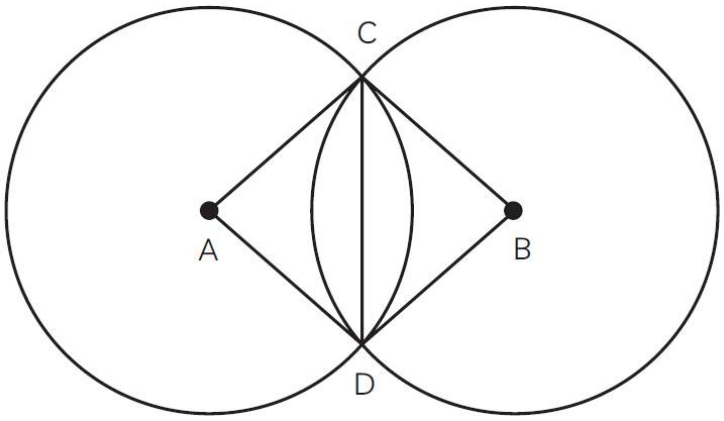
Questions 19 to 20 carry 4 marks each.

19. Sprinklers are crop irrigation equipment which rotate around a center and spay water on the crops in the circular region.

Two such high powers sprinklers, occupying negligible area are installed in a straight line in a field such that they spray water on an common area. Shown below are the side and top views where points A and B are the sprinklers.



Side view of the sprinklers



Top view of the region sprayed

(Note: The figures are not to scale.)

Both the sprinklers spray over an equal area. It is given that, CD = 400 m and ∠CAD = ∠CBD = 90°.

(a) Find the radius of the circular region sprayed by the sprinkler. (1)

(b) Find the area of the overlapping region. (2)

(c) Find the perimeter of the overlapping region. (1)

20. Triangles are used in bridges because they evenly distribute weight without changing their proportions. When force is applied on a shape like a rectangle it would flatten out. Before triangles were used in bridges, they were weak and could not be very big. To solve that problem engineers would put a post in the middle of a square and make it more sturdy. Isosceles triangles were used to construct a bridge in which the base (unequal side) of an isosceles triangle is 4 m and its perimeter is 20 m.



(i) What is the length of equal sides? [1]

(ii) In a ΔABC it is given that base = 12 m and height = 5 m. Find its area. [1]

(iii) What is the area of the given isosceles triangle? [2]

OR

(iii) Find the cost of covering the border of one isosceles triangle at the rate of Rs 200 per metre. [2]

PRACTICE PAPER 18 (2026-27) CHAPTER-06
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(ANSWERS)

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(iv). There is no overall choice.

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SECTION – A

Questions 1 to 10 carry 1 mark each.

1. The lengths of three sides of a triangle are 20 cm, 16 cm and 12 cm. The area of the triangle is

(a) 96 cm^2 (b) 120 cm^2 (c) 144 cm^2 (d) 160 cm^2

Ans: (a) 96 cm^2

Here, $a = 20cm, b = 16cm \text{ and } c = 12cm$

$s = \frac{a+b+c}{2} = \frac{20+16+12}{2} = 24cm$

$By\ Heron's\ formula,\ we\ have\ Area\ of\ triangle = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{24(24-20)(24-16)(24-12)} = \sqrt{24\times4\times8\times12}$

$= \sqrt{6\times4\times4\times4\times4\times6} = 6\times4\times4 = 96cm^2$

2. If the side of rhombus is 10 cm and one diagonal is 12 cm, then area of rhombus is

(a) 96 cm^2 (b) 48 cm^2 (c) 72 cm^2 (d) 80 cm^2

Ans: (a) 96 cm^2

3. The area of an equilateral triangle with side $4\sqrt{3}$ cm is

(a) 20 cm^2 (b) $20\sqrt{3}$ cm^2 (c) 18.784 cm^2 (d) 20.784 cm^2

Ans: (d) 20.784 cm^2

4. The base of a right triangle is 8 cm and hypotenuse is 10 cm. Its area will be

(a) 24 cm^2 (b) 40 cm^2 (c) 48 cm^2 (d) 80 cm^2

Ans: (a) 24 cm^2

Altitude of right triangle = $\sqrt{10^2-8^2} = \sqrt{100-64} = \sqrt{36}$ = 6 cm

Area of right triangle = $\frac{1}{2}$ × 8 × 6 = 24 cm^2

5. An arc of a circle is of length 5π cm and the sector it bounds has an area of 20π cm^2. Then the radius of the circle is:

(a) 4 cm (b) 8 cm (c) 12 cm (d) 16 cm

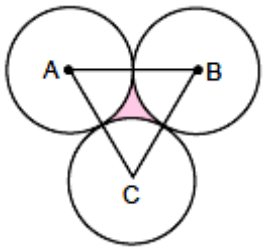
Ans. (b) 8 cm

6. If a square ABCD is inscribed in a circle of radius 'r' and AB = 4 cm, then the value of r is:

(a) 2 cm (b) 2 √2 cm (c) 4 cm (d) 4 √2 cm

Ans. (b) 2 √2 cm

7. ABC is an equilateral triangle. The area of the shaded region if the radius of each of the circle is 1 cm, is



(a) $2-\frac{\pi}{3}$ (b) $\sqrt{3}-\pi$ (c) $\sqrt{3}-\frac{\pi}{2}$ (d) $\sqrt{3}-\frac{\pi}{4}$

Ans.

Side of triangle = 2 cm

$\therefore$ Area of triangle $= \frac{\sqrt{3}}{4}\times 2^2 = \sqrt{3}\ \text{cm}^2$

Area of one sector $= \frac{60°}{360°}\times \pi \times 1^2 = \frac{1}{6}\pi\ \text{cm}^2$

Area of 3 sectors $= 3\times\frac{1}{6}\pi = \frac{1}{2}\pi\ \text{cm}^2$

Area of shaded region $= \left(\sqrt{3}-\frac{1}{2}\pi\right)\text{cm}^2$

8. If the difference between the circumference and the radius of of a circle is 37 cm, then using $\pi = \frac{22}{7}$, the circumference (in cm) of the circle is:

(a) 154 (b) 44 (c) 14 (d) 7

Ans. (b) 44

A.T.Q.

$$2\pi r - r = 37 \Rightarrow 2\times\frac{22}{7}r - r = 37$$

$$\frac{37}{7}r = 37 \Rightarrow r = 7\ \text{cm}$$

$\therefore$ Circumference $= 2\times\frac{22}{7}\times 7 = 44\ \text{cm}$

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): Area of a triangle is 6 cm^2 whose sides are 3 cm, 4 cm and 5 cm respectively.

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.

10. Assertion (A): In a circle of radius 4 cm, the angle of a sector is 45°, then the area of the sector is 44/7 cm^2.

Reason (R): Area of sector = $\pi r^2 \times \frac{\theta}{360^0}$

Ans. (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. The measure of the minor arc of a circle is 1/5 of the measure of the corresponding major arc. If the radius of the circle is 10.5 cm, find the area of the sector corresponding to the major arc. [$\pi = 22/7$]

Ans. Let measure of minor arc = $x°$

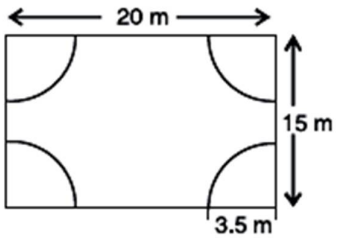
$\therefore$ Measure of major arc = $5x°$

$\Rightarrow x° + 5x° = 360° \Rightarrow 6x° = 360° \Rightarrow x = 60°$

$\therefore$ Measure of major arc = $5 \times 60° = 300°$

Area of sector = $\frac{300^0}{360^0} \times \frac{22}{7} \times 10.5^2 = 288.75 \text{ cm}^2$

12. A rectangular piece is 20 m long and 15 m wide. From its four corners, quadrants of radii 3.5 m have been cut. Find the area of the remaining part.



Ans. Angle of each quadrant = 90°

Radius of each quadrant = 3.5 m

Area of each quadrant = $\frac{90^0}{360^0} \times \pi \times (3.5)^2 \text{ m}^2 = \frac{1}{4} \times \pi \times (3.5)^2 \text{ m}^2$

$\therefore$ Area of the 4 quadrants = $4 \times \frac{1}{4} \times \pi \times (3.5)^2 = \frac{22}{7} \times (3.5)^2 = 38.5 \text{ m}^2$

Area of the rectangle = 20 m × 15 m = 300 m^2

$\therefore$ Area of the remaining portion = $(300 - 38.5)\text{m}^2 = 261.5 \text{ m}^2$

13. Find the area of a triangle two sides of which are 18 cm and 10 cm and the perimeter is 42 cm.

Ans: Let the third side of the triangle be x.

Perimeter of the given triangle = 42 cm

$\Rightarrow$ 18 cm + 10 cm + x = 42 $\Rightarrow x$ = 14 cm

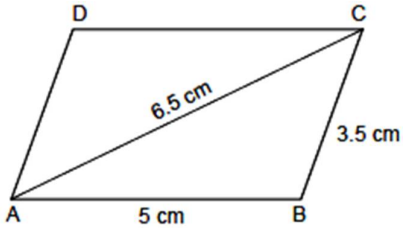
$\therefore$ Semi-perimeter of the triangle is $s = \frac{42}{2} = 21cm$

$\therefore$ By Heron's formula, $Area\ of\ \Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{21(21-18)(21-10)(21-14)} = \sqrt{21(3)(11)(7)} = 21\sqrt{11}\,cm^2$

14. Two adjacent sides of a parallelogram measures 5 cm and 3.5 cm. One of its diagonal measures 6.5 cm. Find the area of the parallelogram.

Ans: Let ABCD be the parallelogram with AB = 5 cm, BC = 3.5 cm and AC = 6.5 cm as shown in figure.



∴ Semi-perimeter of ΔABC, $s = \frac{5+3.5+6.5}{2} = \frac{15}{2}$ = 7.5 cm

∴ By Heron's formula, *Area of* $\Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{7.5(7.5-5)(7.5-3.5)(7.5-6.5)} = \sqrt{7.5(2.5)(4)(1)} = 5\sqrt{3}\,cm^2$

We know that the diagonal of a parallelogram divides it into two congruent triangles of equal area.

∴ Area of parallelogram ABCD = 2 × ar(ΔABC) = $2 \times 5\sqrt{3} = 10\sqrt{3}$ cm^2

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. The perimeter of a triangle is 50 cm. One side of the triangle is 4 cm longer than the smallest side and the third side is 6 cm less than twice the smallest side. Find the area of the triangle.

Ans: Let *ABC* be any triangle with perimeter 50 cm.

Let the smallest side of the triangle be *x*.

Then the other sides be $x + 4$ and $2x - 6$.

Now, $x + x + 4 + 2x - 6 = 50$ (âˆµ perimeter is 50 cm)

$\Rightarrow 4x - 2 = 50$

$\Rightarrow 4x = 50 + 2$

$\Rightarrow 4x = 52 \Rightarrow x = 13$

∴ The sides of the triangle are of length 13 cm, 17 cm and 20 cm.

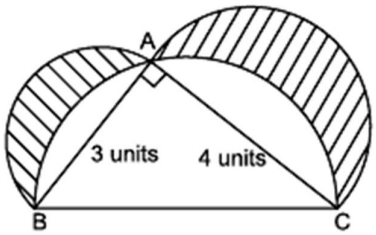
∴ Semi-perimeter of the triangle is $s = \frac{13+17+20}{2} = \frac{50}{2} = 25\,cm$

∴ By Heron's formula, *Area of* $\Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{25(25-13)(25-17)(25-20)} = \sqrt{25(12)(8)(5)} = 20\sqrt{30}\,cm^2$

Hence, the area of the triangle is $20\sqrt{30}\,cm^2$

16. In fig., ABC is a right-angled triangle, right-angled at A. Semicircles are drawn on AB, AC and BC as diameters. Find the area of the shaded region.



Ans. In right-angled ΔABC, $AB^2 + AC^2 = BC^2$ [By Pythagoras theorem]

$(3)^2 + (4)^2 = BC^2 \Rightarrow 9 + 16 = BC^2$

∴ BC = 5 units

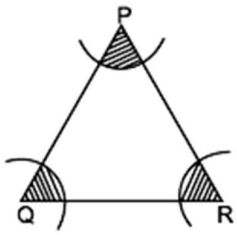
Now, Area of shaded region = area of semicircle on side AB + area of semicircle on side AC – area of semicircle on side BC + area of ΔABC.

$= \frac{1}{2}\pi \times \frac{3}{2} \times \frac{3}{2} + \frac{1}{2}\pi \times \frac{4}{2} \times \frac{4}{2} - \frac{1}{2}\pi \times \frac{5}{2} \times \frac{5}{2} + \frac{1}{2} \times 3 \times 4$

$= \frac{1}{2}\pi\left(\frac{9}{4} + \frac{16}{4} - \frac{25}{4}\right) + 6 = \frac{1}{2}\pi\left(\frac{9+16-25}{4}\right) + 6 = 0 + 6 = 6$

∴ Area of shaded region = 6 square units.

17. In figure arcs have been drawn with radii 14 cm each and with centres P, Q and R. Find the area of the shaded region.



Ans. Area of sector on P = $\frac{\angle P}{360^0} \times \pi(14)^2$

Area of sector on Q = $\frac{\angle Q}{360^0} \times \pi(14)^2$

Area of sector on R = $\frac{\angle R}{360^0} \times \pi(14)^2$

Area of shaded region = adding area of all three sectors

$= \frac{\angle P}{360^0} \times \pi(14)^2 + \frac{\angle Q}{360^0} \times \pi(14)^2 + \frac{\angle R}{360^0} \times \pi(14)^2$

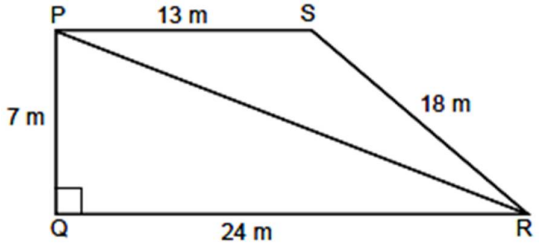
$= \frac{\pi(14)^2}{360^0}(\angle P + \angle Q + \angle R) = \frac{\pi(14)^2}{360^0} \times 180^0$ [Angle sum property of triangle]

$= \frac{22}{7} \times \frac{196}{360^0} \times 180^0 = \frac{22}{7} \times 98 = 308 cm^2$

SECTION – D

Questions 18 carry 5 marks.

18. The students of a school staged a rally for cleanliness campaign. They walked through the lanes in two groups. One group walked through the lanes PQ, QR and RP; while the other group walked through PR, RS and SP as shown in figure:



These two groups cleaned the area enclosed within their lanes. If PQ = 7 m, QR = 24 m, RS = 18 m, SP = 13 m and ∠Q = 90°;

(i) Which group cleaned more area and by how much?

(ii) Find the total area cleaned by the students (neglecting the width of the lane).

Ans: (i) Given PQ = 7 m and QR = 24 m, ∠Q = 90°

Using Pythagoras theorem in right-angled ΔPQR,

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

PR = $\sqrt{7^2 + 24^2} = \sqrt{49 + 576} = \sqrt{625}$ = 25 m

Therefore, first group has to clean the area of ΔPQR which is right-angled triangle.

∴ Area of ΔPQR = $\frac{1}{2}$ × base × height = $\frac{1}{2}$ × 24 × 7 = 84 m^2

The second group has to clean the area of ΔPRS, which is scalene having sides 25 m, 18 m and 13 m.

Its semi-perimeter, $s = \frac{25+18+13}{2} = \frac{56}{2} = 28m$

∴ By Heron's formula, *Area of* ΔPRS = $\sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{28(28-25)(28-18)(28-13)} = \sqrt{28(3)(10)(15)} = 30\sqrt{14}\,cm^2 = 30 \times 3.74 = 112.2 cm^2$

Clearly, the second group cleaned more area, i.e. 112.2 m^2 which is (112.2 – 84) = 28.2 m^2 more than the area cleaned by the first group.

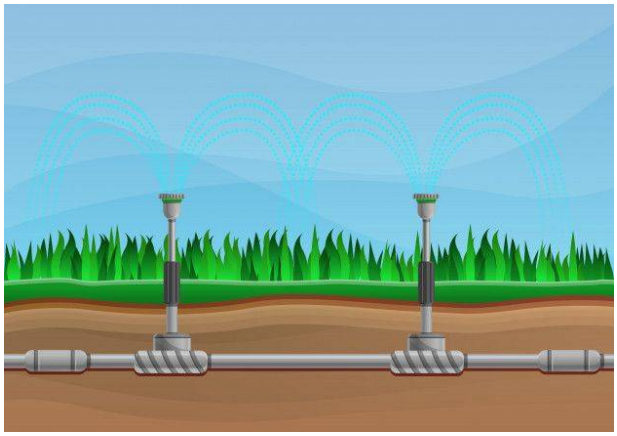
(ii) Total area cleaned by all the students = 84 + 11.2 = 196.2 m^2

SECTION – E (Case Study Based Questions)

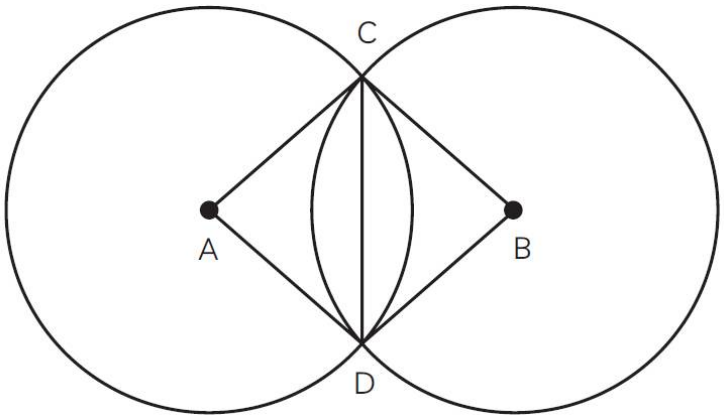
Questions 19 to 20 carry 4 marks each.

19. Sprinklers are crop irrigation equipment which rotate around a center and spay water on the crops in the circular region.

Two such high powers sprinklers, occupying negligible area are installed in a straight line in a field such that they spray water on an common area. Shown below are the side and top views where points A and B are the sprinklers.



Side view of the sprinklers



Top view of the region sprayed

(Note: The figures are not to scale.)

Both the sprinklers spray over an equal area. It is given that, CD = 400 m and ∠CAD = ∠CBD = 90°.

(a) Find the radius of the circular region sprayed by the sprinkler. (1)

(b) Find the area of the overlapping region. (2)

(c) Find the perimeter of the overlapping region. (1)

Ans. (a) Using Pythagoras Theorem in ΔACD to find the length of the AC as:

$CD^2 = AC^2 + AD^2$

$\Rightarrow 160000 = 2AC^2$

$\Rightarrow 200\sqrt{2} = AC$

(b) Area of sector CAD = area of sector CBD = $\frac{90^0}{360^0} \times 3.14 \times (200\sqrt{2})^2$

= 62800 m^2

Area of ΔCAD = area of $\Delta CBD = \frac{1}{2} \times 200\sqrt{2} \times 200\sqrt{2}$

= 40000 m^2.

Area of the overlapping region = 62800 + 62800 – 40000 – 40000 = 45600 m^2.

(c) Perimeter of overlapping region = sum of the length of the both side arc CD

$= 2 \times \frac{90^0}{360^0} \times 2\pi \times (200\sqrt{2}) = 200\sqrt{2}$ m

20. Triangles are used in bridges because they evenly distribute weight without changing their proportions. When force is applied on a shape like a rectangle it would flatten out. Before triangles were used in bridges, they were weak and could not be very big. To solve that problem engineers would put a post in the middle of a square and make it more sturdy. Isosceles triangles were used to construct a bridge in which the base (unequal side) of an isosceles triangle is 4 m and its perimeter is 20 m.



(i) What is the length of equal sides? [1]

(ii) In a ΔABC it is given that base = 12 m and height = 5 m. Find its area. [1]

(iii) What is the area of the given isosceles triangle? [2]

OR

(iii) Find the cost of covering the border of one isosceles triangle at the rate of Rs 200 per metre. [2]

Ans:

(i) Perimeter = 20 m and one unequal side = 4 m

Each equal side = (20 – 4)/2 = 16/2 = 8 m

(ii) Area of $\Delta ABC = \frac{1}{2} \times b \times h = \frac{1}{2} \times 12 \times 5 = 30\ m^2$

(iii) Semi-perimeter, $s = \frac{8+8+4}{2} = \frac{20}{2} = 10m$

$\therefore$ By Heron's formula, $Area\ of\ \Delta = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{10(10-8)(10-8)(10-4)} = \sqrt{10(2)(2)(6)} = 4\sqrt{15}\ m^2$

OR

(iii) Perimeter = 20 m

Cost of 1 m = Rs. 200

Total cost of covering = Rs. 200 x 20 = Rs. 4000