

UNIQUE STUDY POINT

By Sumeet Sahu

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Website: uniquestudyonline.com

Contact: Unique Study Point, Amitesh Nagar, Indore, MP

PRACTICE PAPER 01 (2025-26)

CHAPTER 11: AREAS RELATED TO CIRCLES

SUBJECT: MATHEMATICS

MAX. MARKS: 40

CLASS: X

DURATION: 1½ hrs

General Instructions:

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

SECTION - A

Questions 1 to 10 carry 1 mark each.

1. The circumference of a circle is 44 cm. What is its radius?
(a) 7 cm
(b) 14 cm
(c) 21 cm
(d) 22 cm
2. If the radius of a circle is tripled, by what factor does the area increase?
(a) 3
(b) 6
(c) 9
(d) 27
3. A wheel has a diameter of 70 cm. How many complete revolutions will it take to cover 1.1 km?
(a) 400
(b) 500
(c) 600
(d) 700
4. The area of a sector of angle θ° in a circle of radius r is:
(a) $\theta/180 \times \pi r^2$
(b) $\theta/360 \times \pi r^2$
(c) $\theta/90 \times \pi r^2$
(d) $\theta/720 \times \pi r^2$

5. If the perimeter of a semicircle is 36 cm, then its radius is: [Use $\pi = 22/7$]
- 3.5 cm
 - 7 cm
 - 10.5 cm
 - 14 cm
6. The length of the minute hand of a clock is 21 cm. What is the area swept by it in 10 minutes?
- 115.5 cm²
 - 231 cm²
 - 462 cm²
 - 693 cm²
7. A circular park of radius 20 m has a path of width 5 m running around it on the outside. The area of the path is:
- 225π m²
 - 275π m²
 - 325π m²
 - 400π m²
8. If the area of a circle is 154 cm², then its circumference is: [Use $\pi = 22/7$]
- 22 cm
 - 44 cm
 - 66 cm
 - 88 cm

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
- Assertion (A) is true but reason (R) is false.
- Assertion (A) is false but reason (R) is true.

9. Assertion (A): The area of a circle of radius 7 cm is equal to the total area of two circles of radii 3.5 cm and $3.5\sqrt{2}$ cm.

Reason (R): If two circles have radii r_1 and r_2 , then the sum of their areas equals $\pi r_1^2 + \pi r_2^2$.

10. Assertion (A): If a square of side 14 cm is inscribed in a circle, then the area of the circle is 308 cm².

Reason (R): When a square is inscribed in a circle, the diagonal of the square equals the diameter of the circle.

SECTION - B

Questions 11 to 14 carry 2 marks each.

11. A horse is tied to a pole with a 28 m long rope. Find the area over which the horse can graze. [Use $\pi = 22/7$]
12. Find the area of a quadrant of a circle whose circumference is 88 cm. [Use $\pi = 22/7$]
13. The wheels of a locomotive have diameter 2.1 m. What distance will the locomotive travel when its wheels make 500 revolutions? [Use $\pi = 22/7$]
14. A sector of 56° is cut off from a circle of radius 18 cm. Find the length of the arc and the area of the sector. [Use $\pi = 22/7$]

SECTION - C

Questions 15 to 17 carry 3 marks each.

15. A copper wire when bent in the form of a square encloses an area of 484 cm². If the same wire is bent in the form of a circle, find the area enclosed by it. [Use $\pi = 22/7$]

16. Four equal circles are described about the four corners of a square so that each circle touches two other circles externally. If each side of the square is 14 cm, find the area enclosed between the circumferences of the circles. [Use $\pi = 22/7$]

17. A circular pond is 21 m in diameter. It is surrounded by a 3.5 m wide path. Find the cost of gravelling the path at ₹25 per m^2 . [Use $\pi = 22/7$]

SECTION - D

Question 18 carries 5 marks.

18. A park is in the form of a rectangle $120\text{ m} \times 100\text{ m}$. At the centre of the park, there is a circular lawn. The area of the park excluding the lawn is 11304 m^2 . Find the radius of the circular lawn. Further, find the cost of fencing the circular lawn at the rate of ₹50 per metre. [Use $\pi = 3.14$]

SECTION - E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. Flower Garden Design:

A landscape designer is creating a circular flower garden with a radius of 14 m. The garden is divided into four equal sectors, each planted with a different type of flower. A circular fountain with a radius of 3.5 m is placed at the center of the garden.

Based on the above information, answer the following questions:

- (a) What is the area of one sector of the garden (excluding the fountain)? (1 mark)
(b) If a walking path of width 1.4 m is created around the outer boundary of the garden, find the area of the path. (2 marks)

OR

What is the perimeter of one sector of the garden (including the arc and two radii)? (2 marks)

- (c) Find the cost of planting flowers in one sector (excluding fountain area) at the rate of ₹80 per m^2 . (1 mark)

20. Pizza Serving Calculation:

A pizza restaurant serves two sizes of pizzas:

- Regular pizza: diameter 21 cm
- Large pizza: diameter 35 cm

The restaurant cuts each pizza into 8 equal slices. A customer wants to compare the sizes to make a better choice.

Based on the above information, answer the following questions:

- (a) Find the area of one slice of the regular pizza. (1 mark)
(b) How many regular pizza slices would equal the area of one large pizza slice? (2 marks)
(c) If a regular pizza costs ₹250 and a large pizza costs ₹400, which is more economical per square cm? (1 mark)

SECTION A - ANSWERS

1. Answer: (a) 7 cm

Given: Circumference = 44 cm

We know, Circumference = $2\pi r$

$$44 = 2 \times (22/7) \times r$$

$$44 = (44/7) \times r$$

$$r = 44 \times 7/44 = 7 \text{ cm}$$

Answer: (a) 7 cm

2. Answer: (c) 9

Original area = πr^2

New radius = $3r$

New area = $\pi(3r)^2 = \pi \times 9r^2 = 9\pi r^2$

Factor of increase = $9\pi r^2/\pi r^2 = 9$

Answer: (c) 9

3. Answer: (b) 500

Diameter = 70 cm, so radius = 35 cm

Distance in one revolution = Circumference = $2\pi r = 2 \times (22/7) \times 35 = 220 \text{ cm} = 2.2 \text{ m}$

Total distance = 1.1 km = 1100 m

Number of revolutions = $1100/2.2 = 500$

Answer: (b) 500

4. Answer: (b) $\theta/360 \times \pi r^2$

Area of full circle = πr^2 (corresponds to 360°)

Area of sector with angle $\theta^\circ = (\theta/360) \times \pi r^2$

Answer: (b) $\theta/360 \times \pi r^2$

5. Answer: (b) 7 cm

Perimeter of semicircle = $\pi r + 2r = r(\pi + 2)$

$$36 = r(22/7 + 2)$$

$$36 = r(22/7 + 14/7)$$

$$36 = r(36/7)$$

$$r = 36 \times 7/36 = 7 \text{ cm}$$

Answer: (b) 7 cm

6. Answer: (b) 231 cm²

Length of minute hand = radius = 21 cm

In 60 minutes, minute hand completes 360°

In 10 minutes, angle covered = $(10/60) \times 360^\circ = 60^\circ$

Area swept = $(\theta/360) \times \pi r^2 = (60/360) \times (22/7) \times 21^2$

$$= (1/6) \times (22/7) \times 441$$

$$= (22 \times 441)/(7 \times 6)$$

$$= 9702/42 = 231 \text{ cm}^2$$

Answer: (b) 231 cm²

7. Answer: (a) $225\pi \text{ m}^2$

Inner radius = 20 m

$$\text{Outer radius} = 20 + 5 = 25 \text{ m}$$

$$\text{Area of path} = \pi(R^2 - r^2) = \pi(25^2 - 20^2) = \pi(625 - 400) = 225\pi \text{ m}^2$$

Answer: (a) $225\pi \text{ m}^2$

8. Answer: (b) 44 cm

$$\text{Area} = 154 \text{ cm}^2$$

$$\pi r^2 = 154$$

$$(22/7) \times r^2 = 154$$

$$r^2 = 154 \times 7/22 = 49$$

$$r = 7 \text{ cm}$$

$$\text{Circumference} = 2\pi r = 2 \times (22/7) \times 7 = 44 \text{ cm}$$

Answer: (b) 44 cm

9. Answer: (a)

$$\text{Area of circle with radius 7 cm} = \pi(7)^2 = 49\pi$$

$$\text{Area of circle with radius 3.5 cm} = \pi(3.5)^2 = 12.25\pi$$

$$\text{Area of circle with radius } 3.5\sqrt{2} \text{ cm} = \pi(3.5\sqrt{2})^2 = \pi \times 12.25 \times 2 = 24.5\pi$$

$$\text{Sum} = 12.25\pi + 24.5\pi = 36.75\pi \neq 49\pi$$

So Assertion is false.

Reason is true as it correctly states the formula.

Answer: (d) Assertion (A) is false but reason (R) is true

10. Answer: (a)

$$\text{Side of square} = 14 \text{ cm}$$

$$\text{Diagonal} = 14\sqrt{2} \text{ cm}$$

$$\text{Diameter of circle} = \text{diagonal} = 14\sqrt{2} \text{ cm}$$

$$\text{Radius} = 7\sqrt{2} \text{ cm}$$

$$\text{Area of circle} = \pi(7\sqrt{2})^2 = \pi \times 49 \times 2 = 98\pi = 98 \times (22/7) = 308 \text{ cm}^2$$

Both assertion and reason are true, and reason correctly explains assertion.

Answer: (a)

SECTION B - ANSWERS

11. Solution:

The horse can graze in a circular area with radius = 28 m

$$\text{Area} = \pi r^2 = (22/7) \times 28^2$$

$$= (22/7) \times 784$$

$$= 22 \times 112$$

$$= 2464 \text{ m}^2$$

The horse can graze over an area of 2464 m²

12. Solution:

$$\text{Circumference} = 88 \text{ cm}$$

$$2\pi r = 88$$

$$2 \times (22/7) \times r = 88$$

$$r = (88 \times 7)/(2 \times 22) = 14 \text{ cm}$$

$$\text{Area of quadrant} = (1/4) \times \pi r^2$$

$$= (1/4) \times (22/7) \times 14^2$$

$$= (1/4) \times (22/7) \times 196$$

$$= (22 \times 196)/(7 \times 4)$$

$$= 4312/28 = 154 \text{ cm}^2$$

Area of quadrant = 154 cm²

13. Solution:

$$\begin{aligned}\text{Diameter} &= 2.1 \text{ m, so radius} = 1.05 \text{ m} \\ \text{Distance in one revolution} &= \text{Circumference} = 2\pi r \\ &= 2 \times (22/7) \times 1.05 \\ &= 2 \times (22/7) \times (105/100) \\ &= (2 \times 22 \times 105)/(7 \times 100) \\ &= 4620/700 = 6.6 \text{ m}\end{aligned}$$

$$\text{Distance in 500 revolutions} = 500 \times 6.6 = 3300 \text{ m} = 3.3 \text{ km}$$

The locomotive will travel 3.3 km or 3300 m

14. Solution:

$$\text{Radius} = 18 \text{ cm, Angle } \theta = 56^\circ$$

$$\begin{aligned}\text{Length of arc} &= (\theta/360) \times 2\pi r \\ &= (56/360) \times 2 \times (22/7) \times 18 \\ &= (56 \times 2 \times 22 \times 18)/(360 \times 7) \\ &= 44352/2520 \\ &= 17.6 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Area of sector} &= (\theta/360) \times \pi r^2 \\ &= (56/360) \times (22/7) \times 18^2 \\ &= (56/360) \times (22/7) \times 324 \\ &= (56 \times 22 \times 324)/(360 \times 7) \\ &= 399168/2520 \\ &= 158.4 \text{ cm}^2\end{aligned}$$

Length of arc = 17.6 cm, Area of sector = 158.4 cm²

SECTION C - ANSWERS

15. Solution:

$$\begin{aligned}\text{Area of square} &= 484 \text{ cm}^2 \\ \text{Side of square} &= \sqrt{484} = 22 \text{ cm} \\ \text{Perimeter of square} &= 4 \times 22 = 88 \text{ cm}\end{aligned}$$

This becomes the circumference of circle:

$$\begin{aligned}2\pi r &= 88 \\ 2 \times (22/7) \times r &= 88 \\ r &= (88 \times 7)/(2 \times 22) = 14 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Area of circle} &= \pi r^2 = (22/7) \times 14^2 \\ &= (22/7) \times 196 \\ &= 22 \times 28 \\ &= 616 \text{ cm}^2\end{aligned}$$

Area enclosed by circle = 616 cm²

16. Solution:

$$\begin{aligned}\text{Side of square} &= 14 \text{ cm} \\ \text{Area of square} &= 14^2 = 196 \text{ cm}^2\end{aligned}$$

$$\text{Each circle has radius} = 14/2 = 7 \text{ cm}$$

Each circle at corner contributes a quadrant inside the square

$$\text{Total area of 4 quadrants} = 4 \times (1/4) \times \pi r^2 = \pi r^2$$

$$= (22/7) \times 7^2$$

$$= (22/7) \times 49$$

$$= 22 \times 7 = 154 \text{ cm}^2$$

Area enclosed between circumferences = Area of square - Area of quadrants

$$= 196 - 154 = 42 \text{ cm}^2$$

Area enclosed between circles = 42 cm²

17. Solution:

Diameter of pond = 21 m, so radius = 10.5 m

Width of path = 3.5 m

Outer radius = 10.5 + 3.5 = 14 m

Area of path = $\pi(R^2 - r^2)$

$$= (22/7) \times (14^2 - 10.5^2)$$

$$= (22/7) \times (196 - 110.25)$$

$$= (22/7) \times 85.75$$

$$= (22 \times 85.75)/7$$

$$= 1886.5/7$$

$$= 269.5 \text{ m}^2$$

Cost of gravelling = 269.5 × 25 = ₹6737.50

Cost of gravelling the path = ₹6737.50

SECTION D - ANSWER

18. Solution:

Dimensions of park = 120 m × 100 m

Area of park = 120 × 100 = 12000 m²

Area of park excluding lawn = 11304 m²

Area of circular lawn = 12000 - 11304 = 696 m²

$$\pi r^2 = 696$$

$$3.14 \times r^2 = 696$$

$$r^2 = 696/3.14$$

$$r^2 = 221.66$$

$$r \approx 14.89 \text{ m}$$

Circumference of lawn = $2\pi r = 2 \times 3.14 \times 14.89$

$$= 93.51 \text{ m}$$

Cost of fencing = 93.51 × 50 = ₹4675.50

Radius of circular lawn ≈ 14.89 m

Cost of fencing = ₹4675.50

SECTION E - ANSWERS

19. Solution:

(a) Radius of garden = 14 m

Radius of fountain = 3.5 m

$$\text{Area of one sector of garden} = (1/4) \times \pi \times 14^2 = (1/4) \times (22/7) \times 196 = 154 \text{ m}^2$$

$$\text{Area of fountain in one sector} = (1/4) \times \pi \times 3.5^2 = (1/4) \times (22/7) \times 12.25 = 9.625 \text{ m}^2$$

$$\text{Area of one sector excluding fountain} = 154 - 9.625 = 144.375 \text{ m}^2$$

(a) Area = 144.375 m²

$$(b) \text{ Outer radius} = 14 + 1.4 = 15.4 \text{ m}$$

$$\text{Area of path} = \pi(R^2 - r^2) = (22/7) \times (15.4^2 - 14^2)$$

$$= (22/7) \times (237.16 - 196)$$

$$= (22/7) \times 41.16$$

$$= 129.36 \text{ m}^2$$

(b) Area of path = 129.36 m²

OR

$$\text{Arc length of one sector} = (1/4) \times 2\pi r = (1/4) \times 2 \times (22/7) \times 14 = 22 \text{ m}$$

$$\text{Perimeter} = \text{Arc length} + 2 \text{ radii} = 22 + 14 + 14 = 50 \text{ m}$$

OR: Perimeter = 50 m

$$(c) \text{ Cost} = 144.375 \times 80 = ₹11,550$$

(c) Cost = ₹11,550

20. Solution:

$$(a) \text{ Regular pizza: diameter} = 21 \text{ cm, radius} = 10.5 \text{ cm}$$

$$\text{Total area} = \pi \times 10.5^2 = (22/7) \times 110.25 = 346.5 \text{ cm}^2$$

$$\text{Area of one slice} = 346.5/8 = 43.3125 \text{ cm}^2$$

(a) Area of one regular slice = 43.3125 cm²

$$(b) \text{ Large pizza: diameter} = 35 \text{ cm, radius} = 17.5 \text{ cm}$$

$$\text{Total area} = \pi \times 17.5^2 = (22/7) \times 306.25 = 962.5 \text{ cm}^2$$

$$\text{Area of one large slice} = 962.5/8 = 120.3125 \text{ cm}^2$$

$$\text{Number of regular slices} = 120.3125/43.3125 \approx 2.78 \approx 3 \text{ slices}$$

(b) About 3 regular slices equal one large slice

$$(c) \text{ Regular pizza: Cost per cm}^2 = 250/346.5 = ₹0.72 \text{ per cm}^2$$

$$\text{Large pizza: Cost per cm}^2 = 400/962.5 = ₹0.42 \text{ per cm}^2$$

(c) Large pizza is more economical at ₹0.42 per cm²