CIRCUMFERENCE AND AREA OF CIRCLES

8
CHAPTER

CONTENTS

- Circle
- Circumference of a circle
- Area of a circle
- Area between two concentric circles

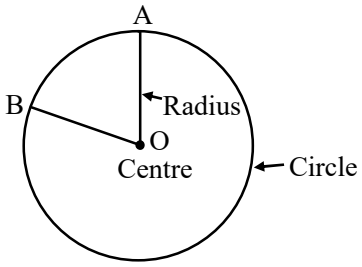
➢ CIRCLE

A circle is a geometrical figure consisting of all those points in a plane which are at a fixed distance from a point, called centre of the circle.

◈ Radius

The constant distance from centre to any point on circle is called the radius of the circle and is denoted by 'r'.

The radius is also used to mean the line segment joining the centre with any point on the circle.



There are infinite number of radii for a given circle and all are equal in length.

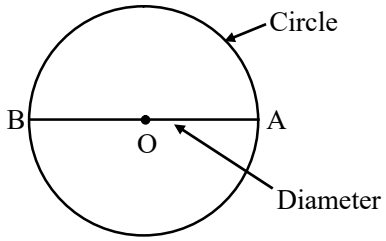
◈ Chord of a Circle

A line segment with its end points lying on a circle is called the chord.

◈ Diameter

The diameter of a circle is any line segment passing through the centre of the circle and having its end points on the circle.

Diameter = 2 × radius

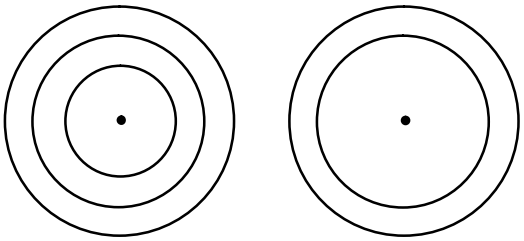


The longest chord is chord diameter.

◈ Concentric Circles

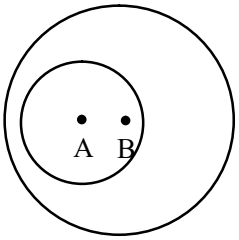
Two or more circles with the same centre are called concentric circles.

Following are concentric circles :



(i) (ii)

The following circles are not concentric circles, because they have different centres.



➢ CIRCUMFERENCE OF A CIRCLE

Circumference means, 'the perimeter of a circle'. The word has been derived from the Latin word *circumferre means to carry around*.

The distance around a circular region is also known as its circumference.

Note :

(1) The ratio of circumference to diameter is approximately the same around 3.142.

i.e. The circumference of a circle is slightly more than 3 times its diameter.

Thus, we have

$$\frac{\text{Circumference of a circle}}{\text{Diameter of the circle}} = \text{Constant or } \frac{C}{d} = \pi,$$

The constant ratio of circumference to diameter, i.e., 3.142 is denoted by Greek letter π, read as pi (π).

(2) For calculation purposes, the value of π is taken as $\frac{22}{7}$ or 3.14 approx.

$\therefore\ C = \pi \times d \Rightarrow C = \pi \times 2r$

$\Rightarrow\ C = 2\pi r$, where r is the radius of the circle.

i.e., Circumference of the Circle = 2 × radius of the circle × π

or Circumference of the Circle = diameter of the circle × π

(3) Circumference of a semi-circle = $\frac{2\pi r}{2} = \pi r$ and the perimeter of a semi-circular shape = $(\pi + 2)$ r units.

❖ EXAMPLES ❖

Ex.1 Find the circumference of a circle of diameter 7 cm (Take $\pi = \frac{22}{7}$).

Sol. We know that the formula for a circumference of a circle = $\pi \times d$

$\therefore$ Circumference = $\frac{22}{7} \times 7 = 22$ cm.

Ex.2 The radius of a hoop is 60 cm. Find its circumference (Take $\pi = 3.142$).

Sol. We know that,

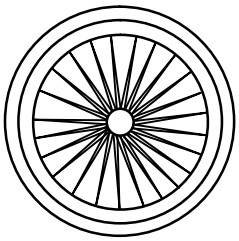
Circumference = $2 \times \pi \times r$

$= 2 \times 3.142 \times 60 = 377.04$ cm.

Ex.3 The radius of a wheel is 35 cm. Find its circumference (Take $\pi = \frac{22}{7}$).

Sol. Radius = 35 cm, Therefore, circumference $= 2 \times \pi \times r = 2 \times \frac{22}{7} \times 35 = 220$ cm

Ex.4 A circular flower bed has a diameter of 1.5 m. A metal edging is to be placed around it. Find the length of edging needed and the cost of the edging if it is sold by the metre and costs ₹ 60 a metre. (You can only buy a whole number of metres)



Sol. First find the circumference of the circle, how many metres you need.

$\therefore\ C = \pi \times d = 3.14 \times 1.5 = 4.71$ m.

As the required length is 4.71 m, therefore we have to buy 5 m of edging. So, the cost for buying 5 m = 5 × ₹ 60 = ₹ 300.

Ex.5 The diameter of a wheel of a car is 77 cm. How many revolutions will it take to travel 10 km ?

Sol. We know that,

Circumference of the wheel

$= \pi \times d = \frac{22}{7} \times 77 = 242$ cm

This means that in one revolution, the car will travel a distance = 242 cm

In other words, distance travelled by a car in 1 revolution = 242 cm

Given 10 km = 10,000 m = 10,000 × 100 cm = 10,00,000 cm

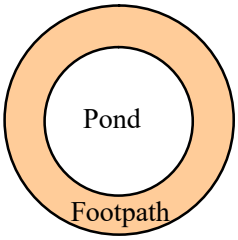
Now, 242 cm = 1 revolution

$\therefore\quad 1 \text{ cm} = \frac{1}{242}$ revolution

So, in 10,00,000 cm = $\frac{10,00,000}{242}$ revolutions

= 4132.23 (approx) revolutions

Ex.6 There is a circular pond and a footpath runs along its boundary. A man walks around it, exactly once, keeping close to the edge. If his step is 66 cm long and he takes exactly 400 steps to go around the pond. What is the diameter of the pond ?



Sol. We know that perimeter of the circle = π d

Length of one step of man = 66 cm

Length of 400 steps of man = 400 × 66 cm

= 26400 cm

This means circumference of the pond is 26400 cm

$\therefore \quad \pi d = 26400$ cm

Or $\quad d = \frac{26400}{\pi} cm = \frac{26400}{22} \times 7 cm$

= 1200 × 7 cm

= 8400 cm = 84 m.

Ex.7 The circumference of a bicycle is 198 cm. What is the approximate length of a spoke?

Sol. Circumference of bicycle = 198 cm

Here, the spoke of bicycle is the radius of the wheel of bicycle.

If r is the radius (length of a spoke), and C is the circumference,

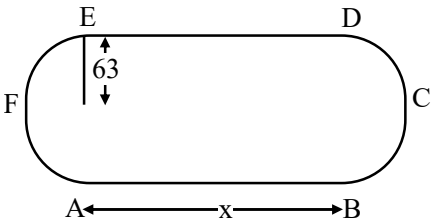
then $\quad C = 2\pi r \quad$ or $\quad 198 = 2\pi r$

or $\quad r = \frac{198}{2\pi} = \frac{198}{2 \times \frac{22}{7}} = \frac{198 \times 7}{2 \times 22} = \frac{63}{2}$

= 31.5 cm

Hence, the length of a spoke is 31.5 cm.

Ex.8 A running track has two semi-circular ends of radius 63 metres at the two straight lengths. The perimeter of the track is 1000 metres. Find the length of each straight length (correct to the nearest metres).



Sol. If we draw the sketch, we find that track is like as figure.

Then circumference of track

= AB + BCD + DE + EFA

Let AB = DE = x and BCD (Semi-circular arc) + EFA (Semi-circular arc) makes a complete circle.

Therefore, circumference of track = 2x + circumference of a circle of radius 63

or $\quad 1000 \text{ m} = 2x + 2 \times \pi \times 63$

or $\quad 2x = 1000 - 2 \times \frac{22}{7} \times 63$

or $\quad 2x = 1000 - 44 \times 9 = 1000 - 396$

or $\quad 2x = 604$ m or x = 302 m.

Ex.9 A circular table cloth has a circumference of 220 cm.

(a) Is the cloth large enough to fit on a round table which is 50 cm in diameter ?

(b) If so, what length of the table cloth would hang down on each side ?

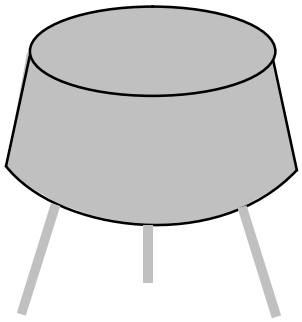


Table cloth on round table

Sol. (a) The diameter of the table is 50 cm.

Therefore, circumference of the table

= $\pi \times d = \pi \times 50$ cm $\quad$ ……(i)

and circumference of cloth = 220 cm

$\Rightarrow$ $2\pi r = 220$

$\Rightarrow$ $r = \dfrac{220}{2\times\frac{22}{7}} = \dfrac{220\times 7}{2\times 22} = 35$ cm

$\therefore$ Circumference of cloth = 220 cm

$= 2 \times \pi \times 35$ or 70π .....(ii)

Clearly from (i) and (ii), we have

The cloth is large enough to fit on a round table.

(b) Radius of the table = $\dfrac{50}{2}$ cm = 25 cm

and radius of circular cloth

$= \dfrac{\text{Circumference}}{2\pi} = \dfrac{70\pi}{2\pi} = 35$ cm

$\therefore$ Hanging length = 35 cm – 25 cm = 10 cm

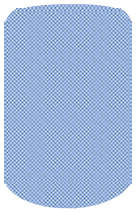
Clearly, radius of cloth is much longer than the radius of table.

Therefore, the cloth will hang down 10 cm on each side.

Ex.10 Some cotton thread is wound on a reel with a radius of 35 cm.

(a) What length of cotton round on one turn of the reel?

(b) How many turns of the reel are needed to wind 44 m of cotton on the reel?



Reel

Sol. (a) Clearly, to calculate the length of cotton fits round on one turn of the reel, we have to calculate the circumference of reel.

Now, circumference of reel = $2\pi r$, where r is the radius of the reel.

$= 2 \times \dfrac{22}{7} \times 35$ cm

$= 220$ cm

Thus, 220 cm is the required length of cotton round on one turn of the reel.

(b) Since, we know 1 m = 100 cm

$\therefore$ 44 m = 4400 cm

$\therefore$ 220 cm is the required length to complete one turn.

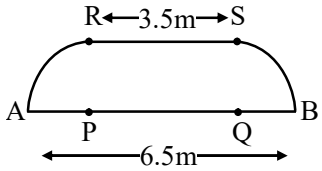
Now, the number of turns to complete 1 cm length = $\dfrac{1}{220}$ turns

So, the required number of turns to complete the length 4400 cm

$= 4400 \times \dfrac{1}{220}$ turns = 20 turns.

Ex.11 Find the circumference of each of these shapes in figure (i) and (ii).

Sol. (i) Clearly, in the given figure (i), there are two straight lengths of 3.5 m each and two quarter circles.



Now, to calculate the circumference of the given figure, we first have to calculate the radius of quarter circles.

Since AB = 6.5 m, PQ = RS = 3.5 m and AP = QB

$\therefore$ AB = AP + PQ + QB

or AB = PQ + 2QB [Θ QB = AP]

or 6.5 = 3.5 + 2QB

or 2QB = 6.5 – 3.5 = 3 m

or QB = 1.5 m

Therefore, the perimeter of given figure

= 6.5 m + 3.5 m + Circumference of two quarter circular arcs

= 10 m + Perimeter of a semi-circular arc

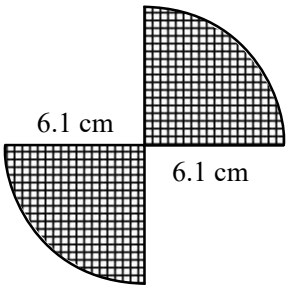
$= 10 \text{ m} + \dfrac{\text{Perimeter of a circle}}{2}$

$= 10 \text{ m} + \dfrac{2\pi\times 1.5\text{ m}}{2}$

$= 10 \text{ m} + 1.5\ \pi \text{ m} = 10 \text{ m} + 1.5 \times 3.14 \text{ m}$

= 14.71 m

(ii) Clearly, the given figure (ii) consists of two quarter circles.



∴ Required Perimeter = circumference of a semi-circular arc + 4 × radius

$$= \frac{2\pi \times 6.1\text{m}}{2} + 4 \times 6.1 \text{ m}$$

$$= \pi \times 6.1 \text{ m} + 4 \times 6.1 \text{ m} = 6.1 (\pi + 4) \text{ m}$$

$$= 6.1 (3.14 + 4) \text{ m}$$

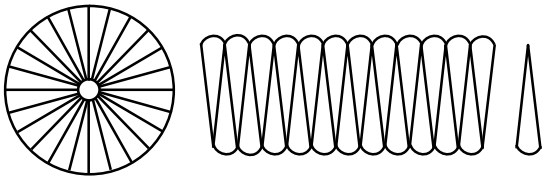
$$= 43.55 \text{ m. (approx).}$$

➢ AREA OF A CIRCLE

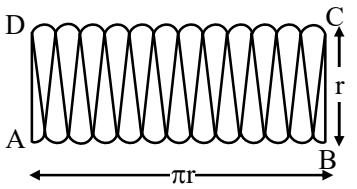
The surface covered by a circular object is called its area.

$$A = \pi r^2$$

Where r is radius of circle.



(i) (ii)



(iii)

❖ EXAMPLES ❖

Ex.12 Find the area of a circle whose radius is 5.6 cm.

Sol. We know that the area of a circle = πr^2

Given r = 5.6 cm

$$\therefore \text{ Area} = \frac{22}{7} \times 5.6 \times 5.6 \text{ sq cm}$$

$$= 22 \times 0.8 \times 5.6 \text{ sq cm} = 98.56 \text{ sq. cm}$$

Ex.13 Circumference of a circle is 44 cm. Find its area.

Sol. Given, circumference $2\pi r = 44$ cm

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

or $$r = \frac{7 \times 44}{2 \times 22} = 7 \text{ cm}$$

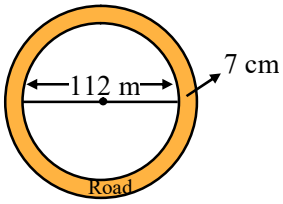
Therefore, area = πr^2

$$= \frac{22}{7} \times 7 \times 7 \text{ sq cm}$$

$$= 154 \text{ sq cm.}$$

Ex.14 The circular park has diameter 112 m. A 7 m road runs around the park. Find the area of the road.

Sol.



Area of the circular park = πr^2 sq units

Given diameter of the park = 112 m

$$\therefore \text{ Radius of the park} = \frac{112}{2} = 56 \text{ m}$$

$$\text{Area of the park} = \left(\frac{22}{7} \times 56 \times 56\right) \text{ sq m}$$

$$= 9856 \text{ sq m.} \quad \text{.....(1)}$$

Now radius of park including the road

$$= 56 \text{ m} + 7 \text{ m} = 63 \text{ m}$$

Area of the park including the road around it

$$= \frac{22}{7} \times 63 \times 63 \text{ sq m}$$

$$= 12{,}474 \text{ sq m} \quad \text{……(2)}$$

∴ Area of the road = Area of park including the road (from 2) – Area of park (from 1)

= (12,474 – 9,856) sq m = 2,618 sq m

which is the required answer.

Ex.15 A student reasoned that, if the radius of a circle is 2 units, then circumference and the area of circle are equal because they both

measure 4π. This reasoning, however, is not correct. Where did the student make an error?

Sol. Radius = 2 units, then

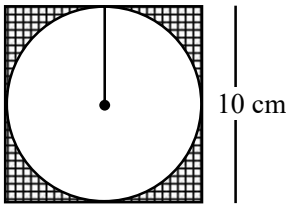
Circumference = $2\pi r = 2\pi.2 = 4\pi$ units ….(i)

Area = $\pi r^2 = \pi(2)^2 = 4\pi$ sq. units ….(2)

From (1) and (2), we see that, numerical value of circumference and area are equal but mathematically it is wrong because the units of circumference and area are different.

Ex.16 Find the area of shaded region.

Sol.



Side of square = 10 cm

and radius of circle = $\frac{10}{2}$ cm

= 5 cm

Now, area of square = $(10 \text{ cm})^2$

= 100 sq cm

Area of circle = $\pi(5^2)$ sq cm = $\pi \times 25$ sq cm

= 3.14×25 sq cm = 78.50 sq cm

So, area of shaded portion

= Area of square – Area of circle

= 100 sq cm – 78.50 sq cm

= 21.50 sq cm

Ex.17 In the figure, square ABCD is drawn about the circle with centre O. The radius of circle is 5 units. The region between the square and the circle is shaded. Find :

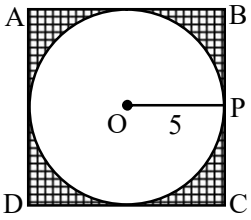
(a) the diameter of the circle

(b) the length of a side of a square

(c) the area of the square

(d) the area of the circle

(e) the area of shaded region.



Sol. (a) The length of diameter d is twice the length of radius r, so

$d = 2 \times 5 = 10$ units.

(b) Here the length of side a of the square equals to the diameter d, so

$a = 10$ units.

(c) The area of a square found by the formula $A = a^2$ sq units

i.e., $A = 10^2 = 100$ sq. units

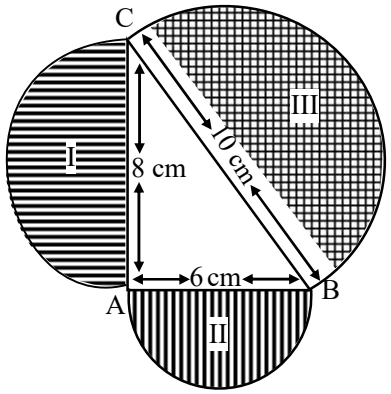
(d) The area of a circle found by the formula $A = \pi r^2$ sq units

i.e., $A = \pi.5^2 = 25\ \pi$ sq units

$= 25 \times \frac{22}{7} = 78.6$ sq units

(e) The area of shaded region is found by subtracting the area of the circle from the area of the square = 100 – 78.6 = 21.4 sq units.

Ex.18 Find the area of shaded region of following figure.



Sol. From figure we can see that three semi-circles are formed on the sides of right angled triangle ABC where AB = 6 cm, AC = 8 cm and BC = 10 cm. Clearly to get the area of shaded regions, we have to calculate the areas of three semi-circles whose diameters are 8 cm, 6 cm and 12 cm respectively.

(i) Now, area of semi-circle I whose diameter is 8 cm

$$= \frac{1}{2}\pi\left(\frac{8}{2}\right)^2 = \frac{\pi}{2} \times 16 \text{ sq cm}$$

$$= 8\pi \text{ sq cm}$$

(ii) Area of semi-circle II whose diameter is 6 cm

$$= \frac{\pi}{2}\left(\frac{6}{2}\right)^2 = \frac{\pi}{2} \times 9 \text{ sq cm}$$

$$= \frac{9}{2}\pi \text{ sq cm}$$

(iii) Area of semi-circle III whose diameter is 10 cm

$$= \frac{\pi}{2}\left(\frac{10}{2}\right)^2 = \frac{25}{2}\pi \text{ sq cm}$$

Total area of shaded regions

$$= \left(8\pi + \frac{9\pi}{2} + \frac{25\pi}{2}\right) \text{ sq cm}$$

$$= \pi\left(8 + \frac{9}{2} + \frac{25}{2}\right) \text{sq cm} = \pi\left(\frac{50}{2}\right) \text{sq cm}$$

$$= 25\,\pi \text{ sq cm} = 25 \times \frac{22}{7} \text{ sq cm} = 78.57 \text{ cm}.$$

Ex.19 A cow is tied to a pole with a 10 m long rope. The cow moves keeping the rope tight. Find the area of ground swept by the cow (Using $\pi = 3.1416$)

Sol. Clearly, to get the area of the ground swept by the cow,

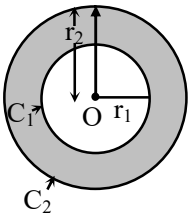
we have to calculate the area of circle with radius 10 m.

$\therefore$ Required area $= \pi (10)^2 = 100\,\pi$ sq m

$= 100 \times 3.1416$ sq m $= 314.16$ sq m

Hence, the required area of ground swept by the cow is 314.16 sq m.

➢ AREA BETWEEN TWO CONCENTRIC CIRCLES



Let C_1 and C_2 are two concentric circles with radii r_1 and r_2 ($r_2 > r_1$) respectively. So area between two concentric circles (in figure shaded region)

= Area of outer circle – Area of inner circle

$= (\pi r_2^2 - \pi r_1^2)$ unit^2.

$= \pi (r_2^2 - r_1^2)$ unit^2.

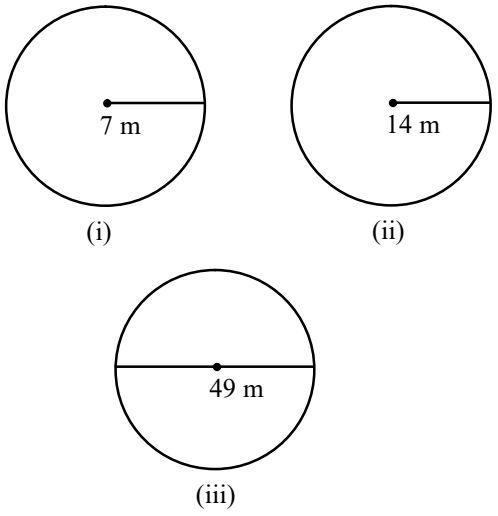
EXERCISE # 1

Q.1 Find the diameter of a circle whose radius is :
(i) 7 cm (ii) 5 m (iii) 2 km

Q.2 Find the circumference of a circle whose radius is :
(i) 7 cm (ii) 5 m (iii) 2 km

Q.3 Find the circumference of a circle whose diameter is :
(i) 14 cm (ii) 10 m (iii) 4 km

Q.4 Find the circumference of each circle.
(Take $\pi = \frac{22}{7}$)



(i) (ii) (iii)

Q.5 Find the radius of a circle whose circumference is :
(i) 26.4 cm (ii) 35 m (iii) 6.6 km

Q.6 Find the circumference and area of a circle whose radius is (i) 3.5 cm (ii) 63 mm (iii) 2.8 m. $\left(\pi = \frac{22}{7}\right)$

Q.7 Find the circumference and area of a circle whose diameter is (i) 70 cm (ii) 4.2 m
$\left(\pi = \frac{22}{7}\right)$

Q.8 Find the radius and area of a circle whose circumference is 66 m. $\left(\pi = \frac{22}{7}\right)$

Q.9 The ratio of radii of two circles is 8 : 9. Find the ratio of their circumferences and also find the ratio of their areas.

Q.10 Find the area of a circle whose radius is :
(i) 3.5 m (ii) 28 cm (iii) 56 m

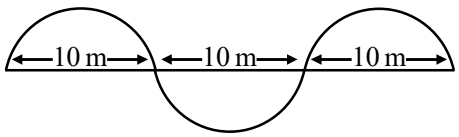
Q.11 Find the area of a circle whose diameter is :
(i) 28 m (ii) 4.2 cm (iii) 3.5 km

Q.12 A circular ground has diameter 224 cm. A 14 cm road runs around the park. Find the area of the road.

Q.13 Find the area of a circular park whose circumference is 264 m.

Q.14 The ratio of the radii of two circles is 3 : 2. What is the ratio of their circumferences?

Q.15 A wire is bent to form three semi-circles as shown in figure. Find the length of the wire in terms of π.



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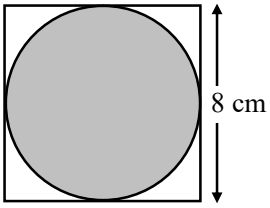
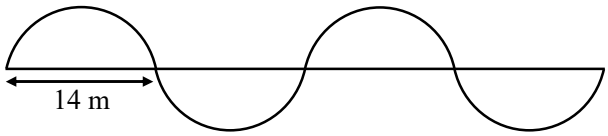
Q.16 Figure shows a circle within a square. Find the circumference of the circle.

(Take $\pi = 3.14$)

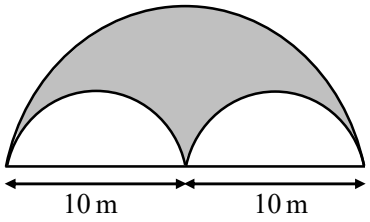


Q.17 What is the length of this curve (as in figure) which is made up of four equal semi-circles?

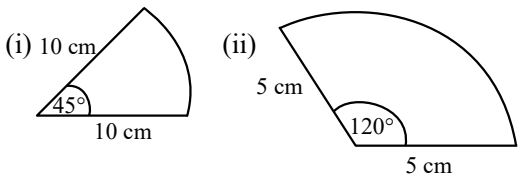
$\left(\text{Take } \pi = \frac{22}{7}\right)$

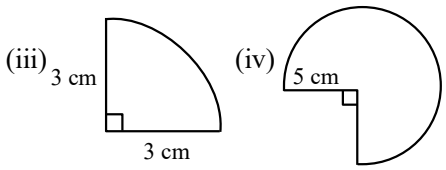


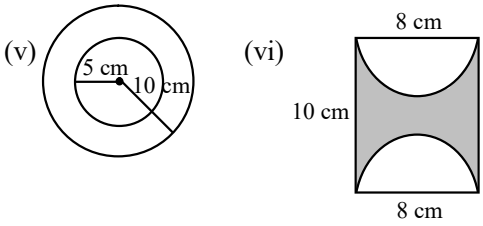
Q.18 Following figure is made up of 3 semi-circles. Find its perimeter in terms of π.



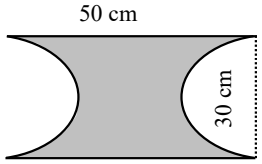
Q.19 Find the perimeter of each of the following shapes if the arc in each figure is circular :







Q.20 A rectangular sheet of metal measuring 50 cm by 30 cm has a semicircle of radius 15 cm cut from each short side as shown in figure. Find the perimeter of the shape that is left.



Q.21 A bicycle wheel has a radius of 28 cm. What is the circumference of the wheel ?

Q.22 How far does a bicycle wheel of radius 28 cm travel in one complete revolution? How many times will the wheel turn when the bicycle travels a distance of 704 m ?

Q.23 A piece of wire is bent in the shape of an equilateral triangle of side 6.6 cm. It is reframe as a circular ring. What is the diameter of the ring ?

Q.24 The moon is about 384000 km from the earth and its path around the earth is nearly circular. Find the circumference of the path described by the moon every month.

[Use $\pi = 3.14$]

Q.25 How many times will the wheel of a car rotate in a journey of 88 km if it is known that the diameter of the wheel is 56 cm?

(Take $\pi = \frac{22}{7}$)

Q.26 A wire is looped in the form of a circle of radius 63 cm. It is re-bent into a square form. Determine the length of the side of the square.

Q.27 Find the radius of a circle if its area is π sq cm.

Q.28 The diameter of a circular park is 66 m. Outside the park, there is a path 4 m wide running around it. Find the cost of turfing the path at ₹ 2.50 per square metre.

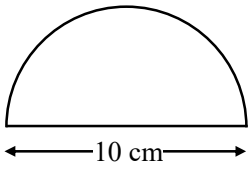
Q.29 Which has the greater area, a square of perimeter 44 cm or a circle of circumference 44 cm and by how much ?

Q.30 The ratio of the radii of two circles is 1 : 3. Find the ratio of their areas.

Q.31 The diameters of two circular plates are respectively 10 cm and 24 cm. What is the diameter of a plate which has area equal to the combined area of the two given plates?

Q.32 An iron washer is made by cutting-out from a circular plate of radius 5 cm, a concentric circular plate of radius 2 cm. Find the area of the remaining sheet.

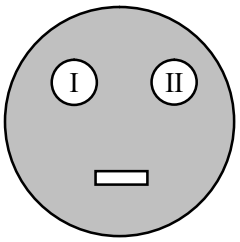
Q.33 Find the perimeter of the following figure, which is a semicircle including its diameter. ($\pi = 3.14$)



Q.34 Find the cost of polishing a circular table-top of diameter 1.6 m, if the rate of polishing is ₹ 15/m^2. ($\pi = 3.14$)

Q.35 Shazli took a wire of length 44 cm and bent into the shape of a circle. Find the radius of that circle. Also find its area. If the same wire is bent into the shape of a square, what will be the length of each of its side ?
Which figure encloses more area, circle or the square ? ($\pi = \frac{22}{7}$)

Q.36 From a circular card sheet of radius 14 cm, two circles of radius 3.5 cm and a rectangle of length 3 cm and breadth 1 cm are removed (as shown in the adjoining figure). Find the area of the remaining sheet. $\left(\pi = \frac{22}{7}\right)$

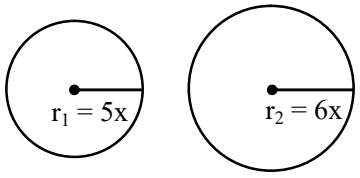


Q.37 A circular flower bed is surrounded by a path 4 m wide. The diameter of the flower bed is 66 m. What is the area of this path ? ($\pi = 3.14$)

Q.38 How many times a wheel of radius 28 cm must rotate to go 352 m ? $\left(\pi = \frac{22}{7}\right)$

Q.39 The minute hand of a circular clock is 15 cm long. How far does the tip of the minute hand move in 1 hour? ($\pi = 3.14$)

Q.40 The ratio of the radii of two circles is 5 : 6. Find the ratio of their circumferences, also find the ratio of their areas.



Q.41 A race track is in the form of a ring whose inner circumference is 220 m and outer circumference is 440 m. Find the width of the track.

Q.42 A piece of wire is in the shape of an equilateral triangle whose sides measure 4.4 cm each. This wire is rebent to form a circular ring. What is the area of the ring? $\left(\pi = \frac{22}{7}\right)$

Q.43 A wire is looked in the form of a circle of radius 70 cm. If it is rebent in the form of a square, what will be the length of each side of square. Also find the area of square so formed. Find which figure encloses more area, circle or square. $\left(\pi = \frac{22}{7}\right)$

ANSWER KEY

1. (i) 14 cm (ii) 10 m (iii) 4 km

2. (i) 44 cm (ii) $\frac{220}{7}$ m (iii) $\frac{88}{7}$ km

3. (i) 44 cm (ii) $\frac{220}{7}$ m (iii) $\frac{88}{7}$ km

4. (i) 44 m (ii) 88 m (iii) 308 m

5. (i) 4.2 cm (ii) 5.57 m (iii) 1.05 km

6. (i) c = 22 cm, A = 38.5 cm^2 (ii) c = 396 mm, A = 12474 mm^2 (iii) c = 17.6 m, A = 24.64 cm^2

7. (i) c = 220 cm, A = 3850 cm^2 (ii) c = 13.2 cm, A = 13.86 cm^2

8. r = 10.5 m, A = 346.5 m^2

9. $c_1 : c_2 = 8 : 9$, $A_1 : A_2 = 64 : 81$

10. (i) 38.5 sq. m (ii) 2464 sq. cm (iii) 9856 sq. m

11. (i) 616 sq. m (ii) 13.86 sq. cm (iii) 9.625 sq. km

12. 10472 sq. m

13. 5544 sq. m

14. 3 : 2

15. 15π m

16. 25.12 cm

17. 88 m

18. 20(π + 1)

19. (i) 27.85 cm (ii) 20.48 cm (iii) 10.71 cm (iv) 33.53 cm (v) 94.28 cm (vi) 61.14 cm

20. $\frac{1360}{7}$ cm or 194.28 cm

21. 176 cm

22. 176 cm, 400 times

23. 6.3 cm

24. 72345600 km

25. 50000 times

26. 99 cm

27. 1 cm

28. 2200

29. Area of circle is greater by 33 sq. cm

30. 1 : 9

31. 26 cm

32. 66 sq. cm

33. 25.7 cm

34. 30 (approx.)

35. 7 cm, 154 cm^2, 11 cm, circle

36. 536 cm^2

37. 879.2 m^2

38. 200 rotations

39. 94.2 cm

40. 25 : 36

41. 35 m

42. 13.86 cm^2

43. 110 cm, 12100 cm^2, circle

EXERCISE # 2

Q.1 Find the circumference of the circles with following radii $\left(\text{Take } \pi = \frac{22}{7}\right)$

(i) 28 cm (ii) 21 mm

Q.2 Find the circumference of a circle whose diameter is 28 cm.

Q.3 If the circumference of a circular sheet is 154 m, find its radius. Also find the area of the sheet.

Q.4 A gardener wants to fence a circular garden of a diameter 21 m. Find the length of the rope he needs to purchase, if he makes 2 rounds of fence. Also find the cost of the rope, if it costs ₹ 4 per meter. $\left(\pi = \frac{22}{7}\right)$.

Q.5 From a circular sheet of radius 4 cm, a circle of radius 3 cm is removed. Find the area of the remaining sheet. ($\pi = 3.14$)

Q.6 A copper wire, when bent in the form of a square, enclosed an area of 484 sq cm. If the same wire is bent in the form of a circle, find the area enclosed by it.

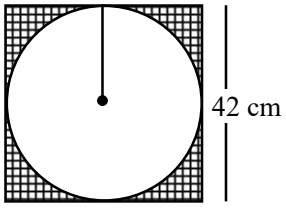
Q.7 Find the area of a circle whose radius is 14 feet :

(i) express it in terms of π

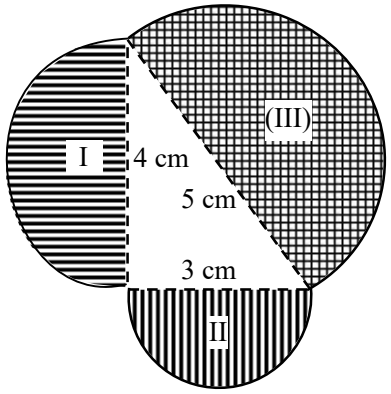
(ii) using $\pi = 3.14$

(iii) using $\pi = \frac{22}{7}$

Q.8 Find the area of shaded region of figure.



Q.9 Find the area of shaded region of the following figure :



Q.10 An ox is tied to a pole with 14 m long rope. The ox moves keeping the rope tight. Find the area swept by the rope (Use $\pi = 3.14$).

Q.11 A horse is tied to a pole at one corner of 25 m × 25 m square field of grass, by means of a 8 m long rope (Take $\pi = 3.14$) :

(i) Find the area of that part of the field in which the horse can graze.

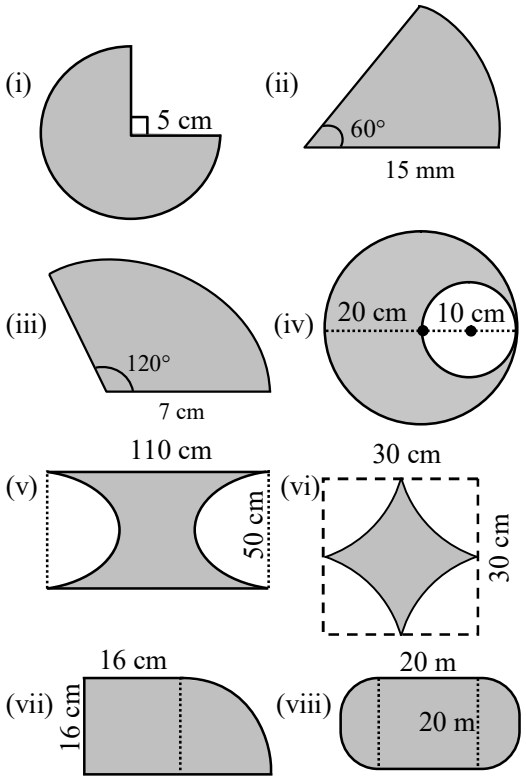
(ii) Find the increase in grazing area if the rope were 16 m long instead of being 8 m long.

Q.12 Find the area of a circle, whose circumference is same as the perimeter of a square of side 88 cm.

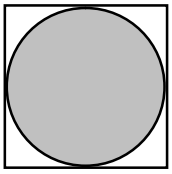
Q.13 From a rectangular metal sheet of sides 32 cm and 38 cm, a circular sheet as big as possible, is cut-off. Find the area of the remaining sheet.

Q.14 A well of diameter 180 cm has a 35 cm wide parapet running around it. Find the area of the parapet.

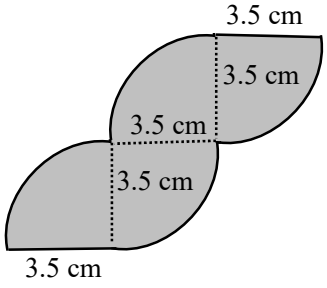
Q.15 Find the areas of the following shapes, if the arc in each figure is circular :



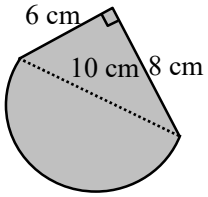
Q.16 The figure shows a circle within a square. If the area of the square is 36 sq cm, find the area and circumference of the circle.
(Take $\pi = 3.14$).



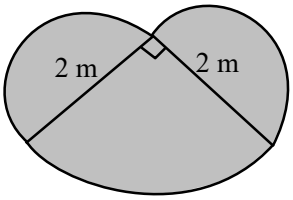
Q.17 The figure is made up of 4 quarter circles. Find its area. (Take $\pi = \frac{22}{7}$).



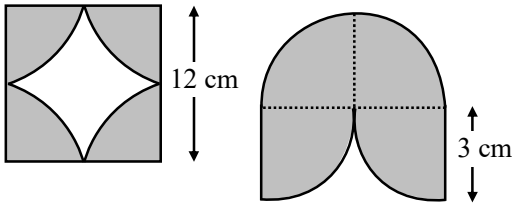
Q.18 Following figure is made up of a triangle and a semi-circle. Find its area and perimeter.
(Take $\pi = 3.14$)



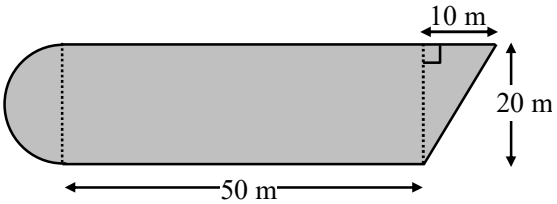
Q.19 Following figure is made up of two semi-circles and a quarter circle. Find its area and perimeter. Leave your answer in terms of π.



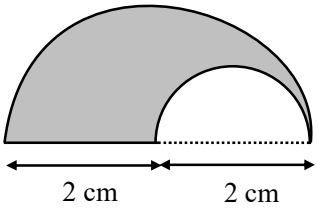
Q.20 The shaded parts in the following figures [(a) & (b)] are quarter circles. Find the total shaded area in each figure. (Take $\pi = 3.14$)



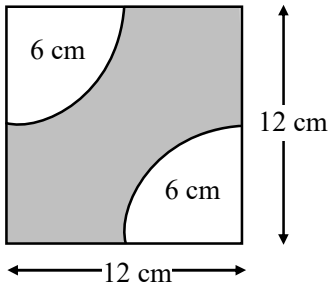
Q.21 Following figure is made up of a semi-circle, a rectangle and a triangle. Find its area.
(Take $\pi = 3.14$)



Q.22 Following figure shows two semi-circles. Find the area of the shaded part in terms of π.



Q.23 Find the area of the shaded part of the figure:



Q.24 An ornamental pond in a garden is a rectangle with a semi-circle on each short end. The rectangle measures 5 m by 3 m and the radius of each semi-circle is 1 m. Find the area of the pond.

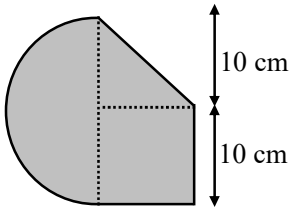
Q.25 The minute hand on a clock is 15 cm long. What area does it pass over in 1 hour?

Q.26 The diameter of ₹ 1 coin is 35 mm. Find the area of one of its flat faces.

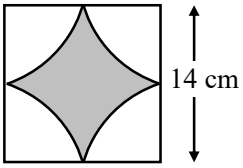
Q.27 The largest possible circle is cut from a square of paper 10 cm × 10 cm. What area of paper of left?

Q.28 Circular place mats of diameter 8 cm are made by stamping as many circles as possible from a rectangular strip of card measuring 8 cm by 64 cm. How many mats can be made from the strip of card and what area of card is wasted?

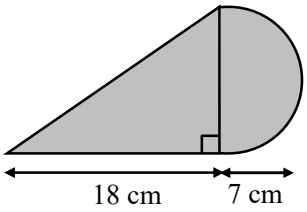
Q.29 Following figure is made up of a semi-circle, a square and a triangle. Find its area.
(Take $\pi = 3.14$)



Q.30 Following figure shows 4 quarter circles inside a square of side 14 cm. Find the area of the shaded part. $\left(\text{Take } \pi = \frac{22}{7}\right)$



Q.31 Following figure is made up of a right-angled triangle and a semi-circle. Find its area.
$\left(\text{Take } \pi = \frac{22}{7}\right)$



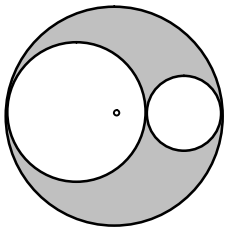
Q.32 Find the distance covered by the wheel of a truck in 100 rotations if the diameter of wheel is 49 cm.

Q.33 The radius of the wheel of a bus is 70 cm. How many revolutions will it make to travel 363 km ?

Q.34 The area of a circle is 154 cm^2. Find its circumference. $\left(\pi = \frac{22}{7}\right)$

Q.35 A rectangular sheet of paper is 55 cm by 35 cm. From it 32 circular buttons, each of radius 3.5 cm, have been cut out. Find the area of remaining sheet.

Q.36 In the given figure, a circle of radius 21 cm is given. Inside this circle two circles with radius 7 cm and 14 cm have been drawn, find the area of shaded region.



ANSWER KEY

1. (i) 176 cm (ii) 132 mm

2. 88 cm

3. 24.5 m, 1886.5 m^2

4. 132 m, j- 528

5. 21.98 cm^2

6. 616 sq. cm

7. (i) 196 π sq. feet (ii) 615.44 sq. feet (iii) 616 sq. feet

8. 378 sq. cm

9. 19.64 sq. cm

10. 615.44 sq. cm

11. (i) 50.24 sq. m (ii) 150.72 sq. m increases

12. 9856 sq. m

13. 411.43 sq. cm

14. 23650 sq. cm

15. (i) 58.93 sq. cm (ii) 117.88 sq. mm (iii) 51.33 sq. cm (iv) 235.71 sq. cm (v) 3535.71 sq. cm (vi) 192.86 sq. cm (vii) 457.14 sq. cm (viii) 714.28 sq. cm

16. 28.26 sq. cm, 18.84 cm

17. 38.5 sq. cm

18. 63.28 sq. cm, 29.71 cm

19. 2π sq. m, 3π m

20. (a) 113.04 sq. cm (b) 28.29 sq cm

21. 1557 sq. m

22. $\frac{3}{2}\pi$ sq. cm

23. 87.43 sq. cm

24. 18.14 sq. m

25. 707.14 sq. cm

26. 962.5 sq. mm

27. 21.43 sq. cm

28. 10,9.14 sq. cm

29. 307 sq. cm

30. 42 sq. cm

31. 203 sq. cm

32. 154 m.

33. 82500 revolutions

34. 44 cm

35. 693 cm^2

36. 616 cm^2