Perimeter and Area: Exercise 11.3

Q.1 Find the circumference of the circle with the following radius: (Take π = 22/7).
(a) 14 cm   (b) 28 mm   (c) 21 cm

Sol: Since, Circumference of the circle = 2πr
(a) Given: Radius = 14 cm
Circumference = 2 x (22/7) x 14
            = 2 x 22 x 2
            = 88 cm

(b) Given: Radius = 28 mm
Circumference = 2 x (22/7) x 28
            = 2 x 22 x 4
            = 176 mm

(c) Given: Radius = 21 cm
Circumference = 2 x (22/7) x 21
            = 2 x 22 x 3
            = 132 cm

Q.2 Find the area of the following circles, given that:
(a) Radius = 14 mm (Take π = 22/7)   (b) Diameter = 49 m
(c) Radius = 5 cm
Sol: Since, Area of the circle = πr²

(a) Given: Radius = 14 mm
Area = (22/7) x (14)²
    = (22/7) x 196
    = 4312/7
    = 616 cm²

(b) Given: Diameter = 49 m
Radius = Diameter/2 = 49/2 m
Area = (22/7) x (24.5)²
    = (22/7) x 600.25
    = 13205.5 / 7
    = 1886.5 m²

(c) Given: Radius = 5 cm
Area = (22/7) x (5)²
    = (22/7) x 25
    = 550/7
    = 78.57 cm²

Q.3 If the circumference of a circular sheet is 154 m, find its radius. Also find the area of the sheet. (Take π = 22/7)

Sol: **Given:** Circumference of a circular sheet = 154 m
Since, Circumference of the circle = 2πr
$$154 = 2 \times (22/7) \times r$$
$$154 = 44/7 \times r$$
$$r = (154 \times 7)/44$$
$$r = 49/2$$
$$r = 24.5 \text{ m}$$
Now, Area of the circle = πr^2
$$= 22/7 \times (24.5)^2$$
$$= 22/7 \times 600.25$$
$$= 13205.5/7$$
$$= 1886.5 \text{ m}^2$$
Thus, the radius of circle = 24.5 and area of circle = 1886.5

Q.4 A gardener wants to fence a circular garden of diameter 21m. 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. (Take π = 22/7)
Sol: **Given:** Diameter of circular garden = 21 m
So, radius = 21/2 = 10.5 m
So, circumference of the circular garden = 2πr
$$= 2 \times (22/7) \times 10.5$$
$$= 462/7$$
$$= 66 \text{ m}$$
Since, gardener makes 2 rounds of fence.
So, the length of rope required for fencing = 2 × 66 = 132 m
Since, Cost of 1 m rope = ₹ 4
So, Cost of 132 m rope = ₹ 4 × 132
$$= ₹ 528$$

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. (Take π = 3.14)
Sol: **Given:** radius of circular sheet = 4 cm and radius of removed circular sheet = 3 cm.
So, Area of the remaining sheet = Area of circular sheet of radius 4 cm − Area of circular sheet of radius 3 cm
$$= \pi R^2 - \pi r^2$$
$$= \pi (R^2 - r^2)$$
$$= 3.14 (4^2 - 3^2)$$
$$= 3.14 (16 - 9)$$
$$= 3.14 \times 7$$
$$= 21.98 \text{ cm}^2$$
Thus, the area of the remaining sheet = 21.98 cm²

Q.6 Saima wants to put a lace on the edge of a circular table cover of diameter 1.5 m. Find the length of the lace required and also find its cost if one meter of the lace costs ₹ 15. (Take π = 3.14)
Sol: **Given:** Diameter of circular table cover = 1.5 m
Radius = 1.5/2 = 0.75 m
Since, Circumference of the circle = 2πr
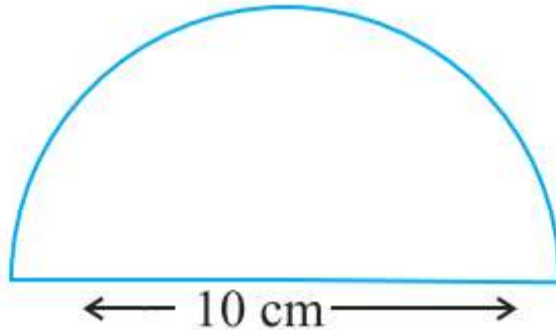
$$= 2 \times 3.14 \times 0.75$$
$$= 4.71 \text{ m}$$

Thus, the lace required = 4.71 m

Since, Cost of 1 m lace = ₹ 15

So, Cost of 4.71 m lace = ₹ 15 × 4.71

$$= ₹ 70.65$$

Q.7 Find the perimeter of the adjoining figure, which is a semicircle including its diameter.

Sol: **Given:** From the figure, diameter of semi-circle = 10 cm

Radius (r) = 10/2 = 5 cm

Circumference of the semi-circle = πr

$$= (22/7) \times 5$$
$$= 110/7$$
$$= 15.71 \text{ cm}$$

Since, Perimeter of the adjoining figure = Circumference of the semi-circle + Diameter

$$= 15.71 + 10$$
$$= 25.71 \text{ cm}$$

Thus, Perimeter of the adjoining figure is 25.71 cm.

Q.8 Find the cost of polishing a circular table-top of diameter 1.6 m, if the rate of polishing is ₹15/m². (Take π = 3.14)

Sol: **Given:** Diameter of a circular table-top = 1.6 m

So, radius = 1.6/2 = 0.8 m

Since, Area of the circular table-top = πr²

$$= 3.14 \times (0.8)^2$$
$$= 3.14 \times 0.8 \times 0.8$$
$$= 2.0096 \text{ m}^2$$

Since, Cost of polishing 1 m² area = ₹ 15

So, Cost of polishing 2.0096 m² area = ₹ 15 × 2.0096

$$= ₹ 30.144$$

Thus, the Cost of polishing 2.0096 m² area = ₹ 30.144

Q.9 Shazli took a wire of length 44 cm and bent it 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 sides? Which figure encloses more area, the circle or the square? (Take π = 22/7)

Sol: **Given:** length of wire = 44 cm

Since, firstly, Shazli bends the wire into circular shape.
So, circumference of circle = 44 cm
So circumference of circular shape = 2πr
$$44 = 2 \times (22/7) \times r$$
$$44 = 44/7 \times r$$
$$r = (44 \times 7)/44$$
$$r = 7 \text{ cm}$$
Now the area of the circle = πr²
$$= (22/7) \times 7^2$$
$$= (22/7) \times 7 \times 7$$
$$= 22 \times 7$$
$$= 154 \text{ cm}^2$$
Then, Shazli bends the same wire into square shape.
So perimeter of the square = 44 cm
$$4 \times \text{side of the square} = 44$$
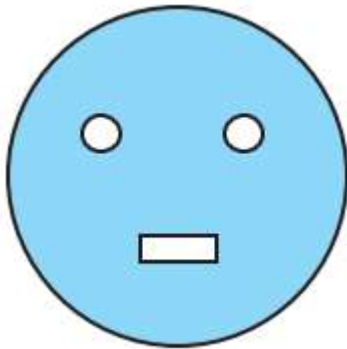$$\text{Side of the square} = 44/4$$
$$= 11$$
Now area of the square = (side)²
$$= (11)^2$$
$$= 121 \text{ cm}^2$$
From above calculation, circle encloses more area.

Q.10 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 1cm are removed. (as shown in the adjoining figure). Find the area of the remaining sheet. (Take π = 22/7)

Sol: **Given:** Radius of circular sheet = 14 cm
Radius of two removed circular part = 3.5 cm
Dimension of removed rectangle shape, length = 3 cm and breadth = 1 cm
So, Area of the remaining sheet = Area of circular sheet of radius 14 cm − (Area of two removed circular shapes + one removed rectangle shape)
$$= \pi R^2 - [(2 \times \pi r^2) + (l \times b)]$$
$$= \{(22/7) \times (14)^2\} - [\{2 \times (22/7) \times (3.5)^2\} + \{3 \times 1\}]$$
$$= 616 - (77 + 3)$$
$$= 616 - 80$$
$$= 536 \text{ cm}^2$$
Thus, Area of the remaining sheet is 536 cm².

Q.11 A circle of radius 2 cm is cut out from a square piece of an aluminium sheet of side 6 cm. What is the area of the left over aluminium sheet? (Take π = 3.14)

Sol: Given: Radius of the circle removed from aluminium sheet = 2 cm

Side of square shaped aluminium sheet = 6 cm

So, area of the left over aluminium sheet = Area of square sheet – Area of removed circular sheet.

$$= (side)^2 - \pi r^2$$
$$= (6)^2 - 3.14 \times (2)^2$$
$$= 36 - 12.56$$
$$= 23.44 \text{ cm}^2$$

Thus, area of the left over aluminium sheet = 23.44 cm²

Q.12 The circumference of a circle is 31.4 cm. Find the radius and the area of the circle? (Take π = 3.14)

Sol: Given: Circumference of a circle = 31.4 cm

Since, Circumference of a circle = $2\pi r$

$$31.4 = 2 \text{ x } \pi \text{ x } (r)$$
$$31.4 = 2 \times 3.14 \times r$$
$$31.4 = 6.28 \times r$$
$$r = 31.4/6.28$$
$$r = 5 \text{ cm}$$

Now, Area of the circle = πr^2

$$= 3.14 \times 5^2$$
$$= 3.14 \times 25$$
$$= 78.5 \text{ cm}^2$$

Thus, Radius of the circle = 5 cm and area = 78.5 cm²

Q.13 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? (π = 3.14)

Sol: Given: Diameter of the flower bed = 66 m

Radius = 66/2 = 33 m

Since, it is surrounded by a path 4 m wide.

So, radius of flower bed with path = 33 + 4 = 37 m

Now Area of the path = Area of the flower bed with path – Area of flower bed

$$= \pi R^2 - \pi r^2$$
$$= \pi (R^2 - r^2)$$
$$= 3.14 \text{ x } (37^2 - 33^2)$$
$$= 3.14 \text{ x } (1369 - 1089)$$
$$= 3.14 \text{ x } 280$$
$$= 879.20 \text{ m}^2$$

Thus, area of the path = 879.20 m²

Q.14 A circular flower garden has an area of 314 m². A sprinkler at the centre of the garden can cover an area that has a radius of 12 m. Will the sprinkler water the entire garden? (Take π = 3.14)

Sol: Given: Area of the circular flower garden = 314 m²

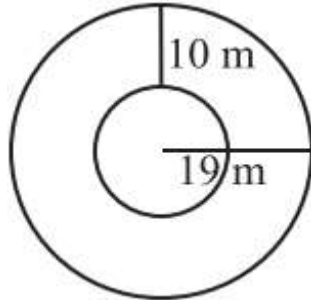Radius of circular area covered by sprinkler = 12 m

So, area covered by sprinkler = πR^2

$$= 3.14 \text{ x } (12)^2$$
$$= 3.14 \text{ x } 144$$

= 446.4 m²
Since, area covered sprinkler is greater than area of circular flower garden. So, the sprinkler will water the whole garden.

Q.15 Find the circumference of the inner and the outer circles, shown in the adjoining figure? (Take π = 3.14)

Sol: Since, from the figure,
Radius of outer circle = 19 m
Circumference of the outer circle = 2πR
$$= 2 × 3.14 × 19$$
$$= 119.32 \text{ m}$$
Now, Radius of inner circle = radius of outer circle − 10
$$= 19 − 10$$
$$= 9 \text{ m}$$
Circumference of the inner circle = 2πr
$$= 2 × 3.14 × 9$$
$$= 56.52 \text{ m}$$
Thus, Circumference of the outer circle = 119.32 m and Circumference of the inner circle = 56.32 m

Q.16 How many times a wheel of radius 28 cm must rotate to go 352 m? (Take π = 22/7)
Sol: **Given:** Radius of wheel = 28 cm
Circumference of wheel = 2πr
$$= 2 × 22/7 × 28$$
$$= 2 × 22 × 4$$
$$= 176 \text{ cm}$$
Let n number of times be wheel rotate to go 352 m or 35200.
$$n × 176 = 35200$$
$$n = 35200/176$$
$$n = 200$$
Thus, 200 number of times wheel rotate to go 352 m or 35200.

Q.17 The minute hand of a circular clock is 15 cm long. How far does the tip of the minute hand move in 1 hour? (Take π = 3.14)
Sol: **Given:** In a circular clock, Length of the minute hand = 15 cm
So, distance covered by the tip of minute hand in 1 hour will be equal to circumference of the clock.
So, distance covered by the tip of minute hand in 1 hour = 2πr
$$= 2 × 3.14 × 15$$
$$= 94.2 \text{ cm}$$