CHAPTER 9

VII-MATHEMATICS-NCERT(2024-25)

9. Perimeter and Area (Notes)

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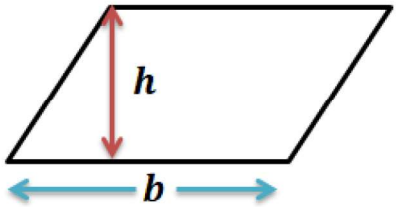
https://sureshmathsmaterial.com

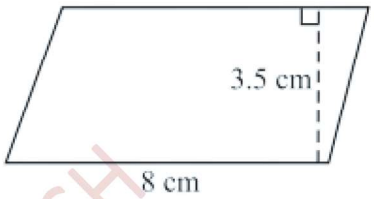
1. **Area of parallelogram** = base × height = b × h.

Any side of a parallelogram can be chosen as base(b) of the parallelogram. The perpendicular dropped on that side from the opposite vertex is known as height (h)(altitude).



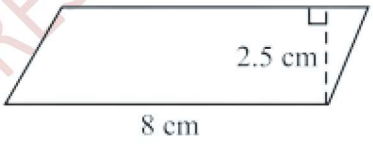
TRY THESE

Find the area of following parallelograms:



(i) Area of parallelogram = base × height

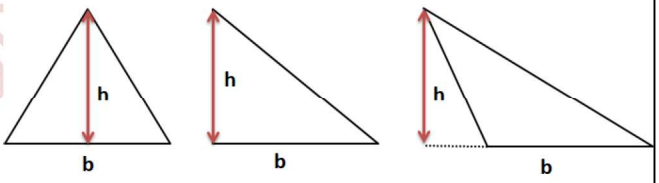
= b × h=8 cm×3.5 cm=28 cm²



(ii) Area of parallelogram = base × height

= b × h=8 cm×2.5 cm=20 cm²

AREA OF A TRIANGLE



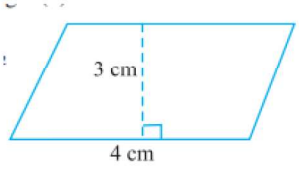
Area of each triangle

$$= \frac{1}{2} \times (\text{base} \times \text{height})$$

$$= \frac{1}{2} \times b \times h$$

All the congruent triangles are equal in area but the triangles equal in area need not be congruent.

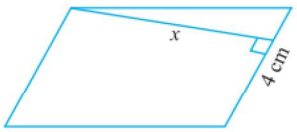
Example 1: One of the sides and the corresponding height of a parallelogram are 4 cm and 3 cm respectively. Find the area of the parallelogram (Fig 9.8).



Sol: Base (b) = 4 cm, height (h) = 3 cm

Area of the parallelogram = b × h= 4 cm × 3 cm = 12 cm²

Example 2: Find the height 'x' if the area of the parallelogram is 24 cm² and the base is 4 cm



Sol: Base (b) = 4 cm, height (h) = x cm

The area of the parallelogram = 24 cm²

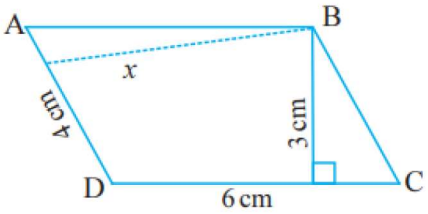
$b \times h = 24$

$4 \times x = 24$

$x = \frac{24}{4} = 6\ cm$

$\therefore$ The height of the parallelogram is 6 cm.

Example 3: The two sides of the parallelogram ABCD are 6 cm and 4 cm. The height corresponding to the base CD is 3 cm (Fig 9.10). Find the (i) area of the parallelogram. (ii) the height corresponding to the base AD.



Sol: (i) Area of parallelogram = b × h = 6 cm × 3 cm = 18 cm²

(ii) Base (b) = 4 cm, height = x (say),

Area = 18 cm²

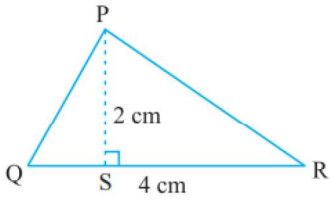
b × h = 18

$4 \times x = 18$

$x = \frac{18}{4} = 4.5\ cm$

Thus, the height corresponding to base AD is 4.5 cm.

Example 4: Find the area of the following triangles

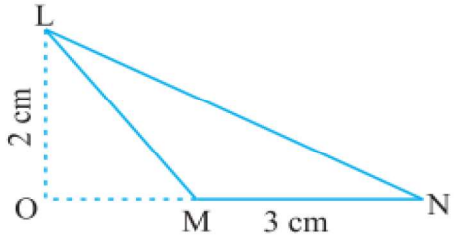


(i) Base (b) = 4 cm, height = 2 cm

Area of each triangle $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 4\ cm \times 2\ cm = 4\ cm^2$

(ii) Base (b) = 3 cm, height = 2 cm

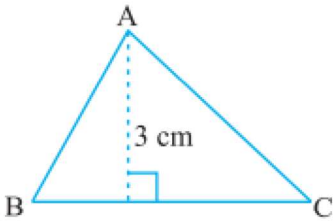


Area of each triangle $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 3\ cm \times 2\ cm = 3\ cm^2$

Example 5: Find BC, if the area of the triangle ABC is 36 cm² and the height AD is 3 cm

Sol: Height (h) = 3 cm



Area = 36 cm²

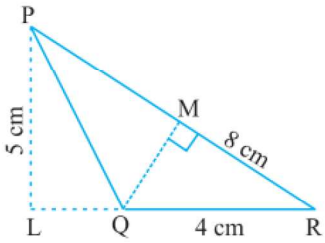
$\frac{1}{2} \times b \times h = 36$

$\frac{1}{2} \times b \times 3 = 36$

$b = \frac{36 \times 2}{3} = 12 \times 2 = 24\ cm$

BC $= 24\ cm$

Example 6: In ΔPQR, PR = 8 cm, QR = 4 cm and PL = 5 cm (Fig 9.13). Find: (i) the area of the ΔPQR (ii) QM



Sol: (i) QR = base(b) =4 cm, PL = height (h)= 5 cm

Area of the triangle PQR $= \frac{1}{2}bh = \frac{1}{2} \times 4\text{ cm} \times 5\text{ cm} = 10\text{ cm}^2$

(ii) Base=PR=8 cm, Height=QM=?

Area of the triangle PQR $= 10\ cm^2$

$\frac{1}{2} \times b \times h = 10$

$\frac{1}{2} \times 8 \times h = 10$

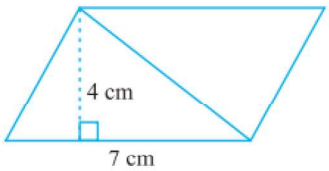
$h = \frac{10 \times 2}{8} = 2.5\ cm$

QM $= 2.5\ cm$

EXERCISE 9.1

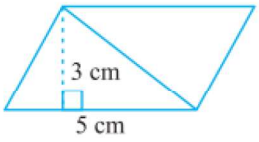
1. Find the area of each of the following parallelograms:

(a)



Area of the parallelogram $= b \times h$
$= 7\text{ cm} \times 4\text{ cm} = 28\text{ cm}^2$

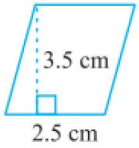
(b)



Area of the parallelogram $= b \times h$

$= 5\text{ cm} \times 3\text{ cm} = 15\text{ cm}^2$

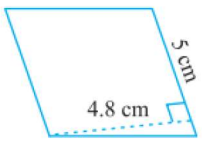
(c)



Area of the parallelogram $= b \times h$

$= 2.5\text{ cm} \times 3.5\text{ cm} = 8.75\text{ cm}^2$

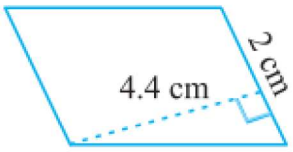
(d)



Area of the parallelogram $= b \times h$

$= 5\text{ cm} \times 4.8\text{ cm} = 24\text{ cm}^2$

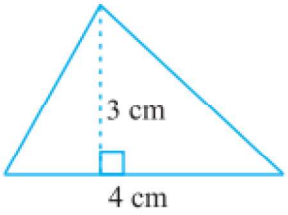
(e)



Area of the parallelogram $= b \times h = 2 \text{ cm} \times 4.4 \text{ cm} = 8.8 \text{ cm}^2$

2. Find the area of each of the following triangles:

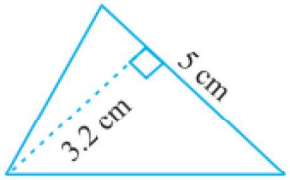
(a)



Area of the triangle $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 4 \text{ cm} \times 3 \text{ cm} = 6 \text{ cm}^2$

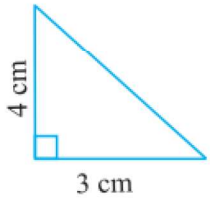
(b)



Area of the triangle $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 5 \text{ cm} \times 3.2 \text{ cm} = 8 \text{ cm}^2$

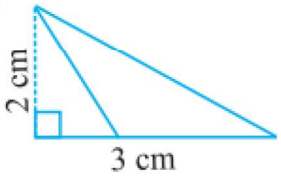
(c)



Area of the triangle $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 3 \text{ cm} \times 4 \text{ cm} = 6 \text{ cm}^2$

(d)



Area of the triangle $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 3 \text{ cm} \times 2 \text{ cm}$

$= 3 \text{ cm}^2$

3. Find the missing values:

Base = b, Height = h, Area of the Parallelogram = A

(a) $b = 20\ cm$, h =?, $A = 246\ cm^2$

Sol: b × h = A

$20 \times h = 246$

$h = \frac{246}{20} = 12.3$

Height=12.3 cm

(b) b =?, h = 15 cm, A = 154.5 cm²

Sol: b × h = A

$b \times 15 = 154.5$

$b = \frac{154.5}{15} = 10.3$

Base=10.3 cm

(c) $\boldsymbol{b = ?,\ h = 8.4\ cm,\ A = 48.72\ cm^2}$

Sol: $b \times h = A$

$b \times 8.4 = 48.72$

$b = \frac{48.72}{8.4} = \frac{487.2}{84} = 5.8$

Base=5.8 cm

(d) $\boldsymbol{b = 15.6\ cm,\ h = ?,\ A = 16.38\ cm^2}$

Sol: $b \times h = A$

$15.36 \times h = 16.38$

$h = \frac{16.38}{15.36} = \frac{1638}{1536} = 1.06$

Height=1.06 cm

4. Find the missing values:

(i) Base = 15 cm, Height =?, Area of Triangle = 87 cm^2

Sol: $\frac{1}{2} \times$ Base × Height = Area of the triangle

$\frac{1}{2} \times 15 \times$ Height $= 87$

Height $= \frac{87 \times 2}{15} = \frac{174}{5} = 11.6$ cm

(*ii*) Base =?, Height = 31.4 cm, Area of Triangle = 1256 cm^2

Sol: $\frac{1}{2} \times$ Base × Height = Area of the triangle

$\frac{1}{2} \times$ Base $\times 31.4 = 1256$

Base $= \frac{1256 \times 2}{31.4} = \frac{2512}{31.4} = \frac{25120}{314} = 80\ cm$

(iii) Base = 22 cm, Height =?, Area of Triangle = 170.5 cm^2

Sol: $\frac{1}{2} \times$ Base $\times$ Height $=$ Area of the triangle

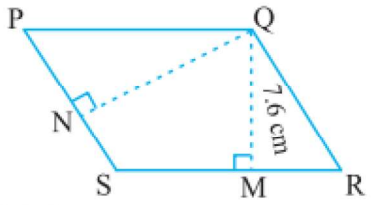
$$\frac{1}{2} \times 22 \times \text{Height} = 170.5$$

$$\text{Height} = \frac{170.5 \times 2}{22} = \frac{170.5}{11} = 15.5\ cm$$

5. PQRS is a parallelogram (Fig 9.14). QM is the height from Q to SR and QN is the height from Q to PS. If SR = 12 cm and QM = 7.6 cm. Find: (a) the area of the parallegram PQRS (b) QN, if PS = 8 cm

Sol: (a) The area of the parallelogram PQRS = Base × Height

$$= \text{SR} \times \text{QM} = 12 \times 7.6 = 91.2\ cm^2$$



(b) The area of the parallelogram PQRS=91.2 cm^2

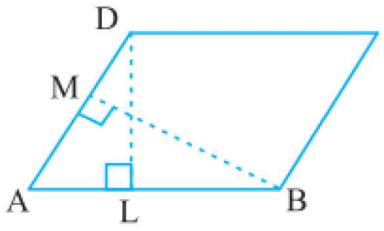
$$\text{PS} \times \text{QN} = 91.2$$

$$8 \times \text{QN} = 91.2$$

$$\text{QN} = \frac{91.2}{8} = 11.4\ cm$$

6. DL and BM are the heights on sides AB and AD respectively of parallelogram ABCD (Fig 9.15). If the area of the parallelogram is 1470 cm2 , AB = 35 cm and AD = 49 cm, find the length of BM and DL.

Sol: **The area of the parallelogram = 1470 cm²**



Taking AD is base

$\text{AD} \times \text{BM} = 1470$

$49 \times \text{BM} = 1470$

$$\text{BM} = \frac{1470}{49} = 30 \text{ cm}$$

Taking AB is base

$\text{AB} \times \text{DL} = 1470$

$35 \times \text{DL} = 1470$

$$\text{DL} = \frac{1470}{35} = 42 \text{ cm}$$

7. ΔABC is right angled at A (Fig 9.16). AD is perpendicular to BC. If AB = 5 cm, BC = 13 cm and AC = 12 cm, Find the area of ΔABC. Also find the length of AD.

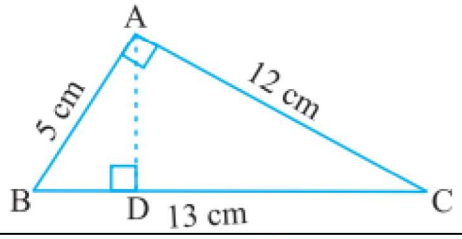
Sol: In ΔABC, $\angle A = 90^0$

Base 5cm and height=12 cm

$$\text{Area of } \Delta\text{ABC} = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 5 \times 12$$

$$= 30\ cm^2$$

If take base=BD=13 cm then height=AD



Area of $\Lambda ABC = 30cm^2$

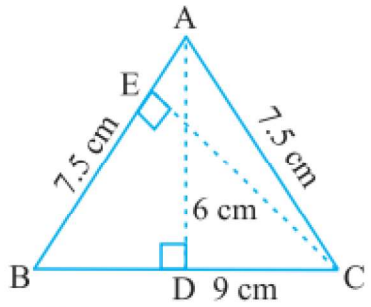
$\frac{1}{2} \times BD \times AD = 30$

$\frac{1}{2} \times 13 \times AD = 30$

$AD = \frac{30 \times 2}{13} = \frac{60}{13} = 4.61\ cm$

8. ΔABC is isosceles with AB = AC = 7.5 cm and BC = 9 cm (Fig 9.17). The height AD from A to BC, is 6 cm. Find the area of ΔABC. What will be the height from C to AB i.e., CE?

Sol: If take base=BC=9 cm then height=AD=6 cm



Area of $\Delta ABC = \frac{1}{2} \times$ base $\times$ height $= \frac{1}{2} \times 9 \times 6 = 27\ cm^2$

If take base=AB=7.5 cm then height=CE

Area of $\Delta ABC = 27\ cm^2$

Area of $\Delta ABC = 27cm^2$

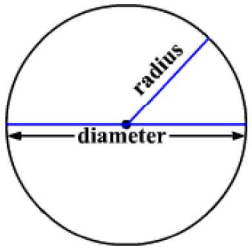
$\frac{1}{2} \times AB \times CE = 27$

$\frac{1}{2} \times 7.5 \times CE = 27$

$CE = \frac{27 \times 2}{7.5} = \frac{54}{7.5} = \frac{540}{75} = \frac{108}{15} = \frac{36}{5} = 7.2\ cm$

CIRCLES

Circumference of a Circle: The distance around a circular region is known as its circumference.



The ratio of Circumference to Diameter is a constant and is denoted by π (pi). Its approximate value is $\frac{22}{7}$ or 3.14.

The diameter (d) of a circle is twice the radius (r) i.e., d = 2r

Circumference of a Circle= πd =2πr.

Example 7 : What is the circumference of a circle of diameter 10 cm (Take π = 3.14)?

Sol: Diameter of the circle (d) = 10 cm

Circumference of circle = πd = 3.14 × 10 cm = 31.4 cm

Example 8: What is the circumference of a circular disc of radius 14 cm? $\left(\text{Use } \pi = \frac{22}{7}\right)$

Sol: Radius of circular disc (r) = 14 cm

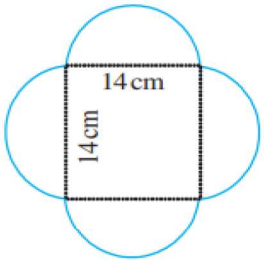
Circumference of disc $= 2\pi r = 2 \times \frac{22}{7} \times 14\ cm = 88\ cm$

Example 9: The radius of a circular pipe is 10 cm. What length of a tape is required to wrap once around the pipe (π = 3.14)

Sol: Radius of the pipe (r) = 10 cm

Circumference of the pipe = $2\pi r == 2 \times 3.14 \times 10$ cm$== 62.8$ cm

$\therefore$ Length of the tape needed to wrap once around the pipe is 62.8 cm.



Example 10: **Find the perimeter of the given shape (Take $\pi = \frac{22}{7}$).**

Sol: Circumference of the semicircle $= \frac{1}{2}\pi d = \frac{1}{2} \times \frac{22}{7} \times 14\ cm = 22\ cm.$

Therefore, perimeter of the given figure = 4 × 22 cm = 88 cm

Example 11: **Sudhanshu divides a circular disc of radius 7 cm in two equal parts. What is the perimeter of each semicircular shape disc? (Use $\pi = \frac{22}{7}$).**

Sol: Radius (r) = 7 cm

The circumference of circle = 2πr

The circumference of the semicircle $= \frac{1}{2} \times 2\pi r = \pi r = \frac{22}{7} \times 7$ cm $= 22$cm

The diameter of the circle = 2r = 2 × 7 cm = 14 cm

Perimeter of each semi-circular disc = 22 cm + 14 cm = 36 cm.

Area of Circle

$The\ area\ of\ the\ circle = \pi r^2 = \pi \times \frac{d^2}{4}$

Example 12: **Find the area of a circle of radius 30 cm (use π = 3.14).**

Sol: Radius(r) = 30 cm

Area of the circle $= \pi r^2 = 3.14 \times 30^2 = 3.14 \times 900 = 2{,}826$ cm^2

Example13: Diameter of a circular garden is 9.8 m. Find its area.

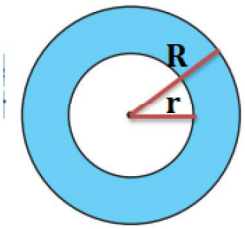
Sol: Diameter (d) = 9.8 m.

Radius (r) = 9.8 ÷ 2 = 4.9 m

Area of the circle $= \pi r^2 = \frac{22}{7} \times (4.9)^2 = \frac{22}{\cancel{7}} \times \cancel{4.9}^{0.7} \times 4.9 = 22 \times 0.7 \times 4.9 = 75.46\ m^2$

Example 14:The adjoining figure shows two circles with the same centre. The radius of the larger circle is 10 cm and the radius of the smaller circle is 4 cm.

Find: (a) the area of the larger circle (b) the area of the smaller circle (c) the shaded area between the two circles. (π = 3.14)



Sol: (a) Radius of the larger circle (R) = 10 cm

Area of the larger circle $= \pi R^2 = 3.14 \times 10 \times 10 = 3.14 \times 100 = 314\ cm^2$

(b) Radius of the smaller circle (r)= 4 cm

Area of the smaller circle $= \pi r^2 = 3.14 \times 4 \times 4 = 3.14 \times 16 = 50.24\ cm^2$

(c) Area of the shaded region = 314 – 50.24 = 263.76 cm^2

EXERCISE 9.2

1. Find the circumference of the circles with the following radius: (Take $\pi = \frac{22}{7}$).
(a) 14 cm (b) 28 mm (c) 21 cm

Sol: (a) Radius (r)=14 cm

Circumference of the circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 14\ cm = 44 \times 2\ cm = 88\ cm$

(b) Radius (r)=28 mm

Circumference of the circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 28\ mm = 44 \times 4\ mm = 176\ mm$

(c) Radius (r)=21 cm

Circumference of the circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 21\ cm = 44 \times 3\ cm = 132\ cm$

2. Find the area of the following circles, given that:
(a)radius = 14 mm $\left(\text{Take } \pi = \frac{22}{7}\right)$. (b)diameter = 49 m , (c) radius = 5 cm

Sol: (a)radius (r) = 14 mm

Area of the circle $= \pi r^2$

$= \frac{22}{7} \times 14\ mm \times 14\ mm = 22 \times 2 \times 14\ mm^2 = 616\ mm^2$

(b)diameter(d) = 49 m, radius (r) $= \frac{d}{2} = \frac{49}{2} = 24.5$ m.

Area of the circle $= \pi r^2$

$= \frac{22}{7} \times 24.5\ m \times 24.5\ m = 22 \times 3.5 \times 24.5\ m^2 = 1886.5\ m^2$

(c)radius (r) = 5 cm

Area of the circle $= \pi r^2$

$= \frac{22}{7} \times 5 \text{ cm} \times 5 \text{ cm} = \frac{550}{7} \ cm^2 = 78.57 \ cm^2$

3. If the circumference of a circular sheet is 154 m, find its radius. Also find the area of the sheet. (Take $\pi = \frac{22}{7}$).

Sol: Circumference of the circular sheet =154 m

$2\pi r = 154$

$2 \times \frac{22}{7} \times r = 154$

$r = \frac{\cancel{154}^{\cancel{77}^{7}} \times 7}{\cancel{2} \times \cancel{22}_{2}} = \frac{49}{2} = 24.5 \ m$

Area of the circular sheet $= \pi r^2 = \frac{22}{7} \times 24.5 \text{ m} \times 24.5 \text{ m}$

$= 22 \times 3.5 \times 24.5 \ m^2 = 1886.5 \ m^2$

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

Sol: Diameter(d) = 21m, Radius(r) $= \frac{21}{2}$ m

Circumference of circular garden $= 2\pi r = \cancel{2} \times \frac{22}{\cancel{7}} \times \frac{\cancel{21}^{3}}{\cancel{2}} = 22 \times 3 = 66 \ m$

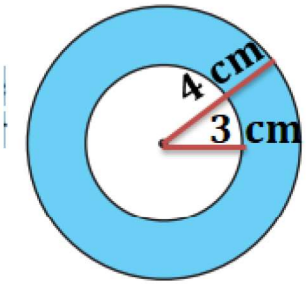
The length of rope required for fencing=2×66 m=132 m

The cost of 1 m rope=₹ 4

Total cost of the rope=₹ 4×132=₹ 528

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: (a) Radius of the larger circle (R) = 4 cm



Area of the larger circle $= \pi R^2 = 3.14 \times 4 \times 4$

$= 3.14 \times 16 = 50.24 \ cm^2$

(b) Radius of the smaller circle (r)= 3 cm

Area of the smaller circle $= \pi r^2 = 3.14 \times 3 \times 3$

$= 3.14 \times 9 = 28.26 \text{ cm}^2$

(c) Area of the remaining sheet $=50.24-28.16=21.98 cm^2$

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: Diameter(d) $= 1.5 = \frac{15}{10} = \frac{3}{2} m$, radius(r) $= \frac{3}{2 \times 2} = \frac{3}{4} m$

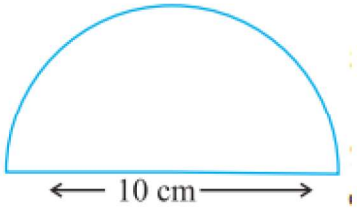
Circumference of the table $= 2\pi r = \cancel{2} \times \cancel{3.14}^{1.57} \times \frac{3}{\cancel{4}_{\cancel{2}}}$

$= 1.57 \times 3 = 4.71\ m$

The cost of 1 m lace=₹ 15

Total cost of the lace=₹15×4.71=₹70.65

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



Sol: Diameter (d) = 10cm, Radius(r)=5 cm

The perimeter of the figure

$= Circumference\ of\ semi\ circle + diameter$

$= \pi r + d = \frac{22}{7} \times 5 + 10 = \frac{110}{7} + 10 = 15.7 + 10 = 25.7\ cm$

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: Diameter $= 1.6\ m$, radius $= \frac{1.6}{2} = 0.8 m$

Area of the table top $= \pi r^2 = 3.14 \times 0.8 \times 0.8 = 2.0096\ m^2$

The cost of 1 m² polishing= ₹15×2.0096=₹30.14

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?

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

Sol: Length of wire=44 cm

Circumference of the circle=44 cm

$2\pi r = 44$

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

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

Area of the circle $= \pi r^2 = \frac{22}{\cancel{7}} \times \cancel{7} \times 7 = 22 \times 7 = 154\ cm^2$

Perimeter of the square=44 cm

$4 \times \text{side} = 44$

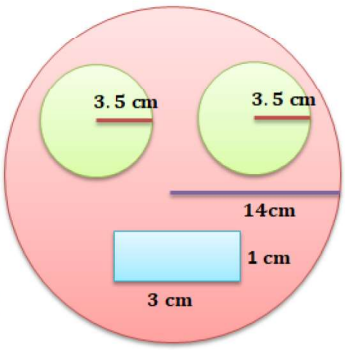
$\text{Side} = \frac{44}{4} = 11\text{cm}$

Area of the square $=$ side $\times$ side $= 11 \times 11 = 121\text{cm}^2$

Area of the circle $= 154\ \text{cm}^2$ and Area of the square $= 121\text{cm}^2$

The area of circle is greater than that of square.

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



Sol: Radius of circular sheet (R) =14 cm

$$\text{Area of circular sheet} = \pi R^2 = \frac{22}{7} \times 14 \times 14 = 616\ cm^2$$

Radius of small circle (r)=3.5cm

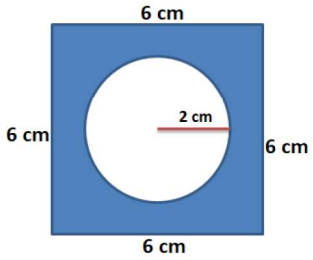
$$\text{Area of small circle} = \pi r^2 = \frac{22}{\cancel{7}} \times \cancel{3.5}^{0.5} \times 3.5$$
$$= 38.5\ cm^2$$

Area of rectangle $= 3\ cm \times 1\ cm = 3cm^2$

Area of the remaining sheet = Area of circular sheet $-$ (2 $\times$ Area of small circle + Area of rectangle)

$= 616 - (2 \times 38.5 + 3) = 616 - 80 = 536\ cm^2$

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 $\pi = 3.14$)**



Sol: Area of circle $= \pi r^2 = 3.14 \times 2 \times 2 = 12.56\ \text{cm}^2$

Area of square sheet $=$ side $\times$ side $= 6 \times 6 = 36\text{cm}^2$

The area of the left over aluminium sheet

$= 36 - 12.56 = 23.44\ \text{cm}^2$

12. **The circumference of a circle is 31.4 cm. Find the radius and the area of the circle? (Take $\pi = 3.14$)**

Sol: The circumference of a circle = 31.4 cm

$2\pi r = 31.4$

$2 \times 3.14 \times r = 31.4$

$$r = \frac{31.4}{2 \times 3.14} = \frac{10}{2} = 5\ cm$$

Radius=5 cm

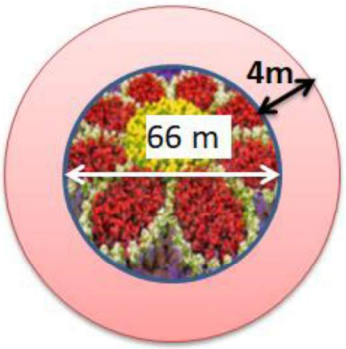
The area of the circle $= \pi r^2 = 3.14 \times 5 \times 5 = 78.5\ cm^2$

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: Diameter of flower bed (d)=66 m, radius(r)=33m

Area of the smaller circle $= \pi r^2$

$= 3.14 \times 33 \times 33 = 3419.46\ m^2$



Width of path (w)=4 m

Radius of bigger circle(R) =33+4=37 m

Area of the bigger circle $= \pi R^2$

$= 3.14 \times 37 \times 37 = 4298.66\ m^2$

Area of the path

= Area of bigger circle − Area of smaller circle

$= 4298.66 - 3419.46 = 879.20\ m^2$

(OR)Radius of smaller circle(r)=33 m, Radius of bigger circle(R)=33+4=37m

Area of the path = Area of bigger circle − Area of smaller circle

$= \pi R^2 - \pi r^2 = \pi(R^2 - r^2) = \pi(R + r)(R - r) = 3.14(37 + 33)(37 - 33)$

$= 3.14 \times 70 \times 4 = 879.20\ m^2$

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: Area covered by the sprinkler $= \pi r^2 = 3.14 \times 12 \times 12 = 452.16\ m^2$

Area of the circular flower garden=314 m^2

Area of circular flower garden is smaller than area covered by the sprinkler.

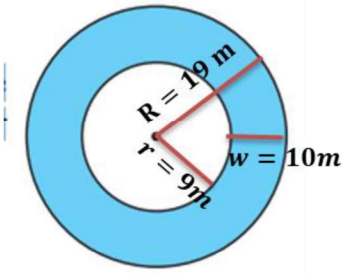
So, the sprinkler will water the entire garden.

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

Sol: Radius of the outer circle(R)=19 m

Circumference of outer circle $= 2\pi R = 2 \times 3.14 \times 19$

$= 119.32$ m



Radius of the inner circle(r) = 19 − 10 = 9 m

Circumference of inner circle $= 2\pi r = 2 \times 3.14 \times 9 = 56.52$ m

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

Sol: Radius of wheel(r)=28 cm

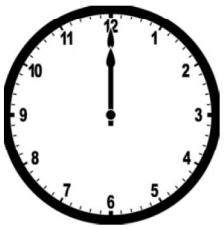
Circumference of the wheel $= 2\pi r$

$= 2 \times \frac{22}{\cancel{7}} \times \cancel{28}^{4} = 176$ cm

Distance=352 m=35200 cm

$$\text{Number of times wheel should rotate} = \frac{\text{Distance}}{\text{Circumference of the wheel}} = \frac{35200}{176} = 200$$

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: Length of minute hand(r)=15 cm

Circumference of circular clock $= 2\pi r = 2 \times 3.14 \times 15 = 94.2\ cm$

The tip of the minute hand move in 1 hour=94.2 cm