

# Mensuration

Perimeter of an equilateral triangle =  $3 \times$  length of a side

Perimeter of a square =  $4 \times$  length of a side

In general, perimeter of a regular closed polygon = Number of sides of the polygon  $\times$  length of each side

## Example:

**If a farmer wants to fence a square field of length 50 m with 5 rounds of wire then what is the length of the wire required?**

## Solution:

$$\begin{aligned}\text{Length of wire required} &= 5 \times (\text{perimeter of square field}) \\ &= 5 \times (4 \times \text{side}) \\ &= 5 \times [(4 \times 50) \text{ m}] \\ &= 1000 \text{ m}\end{aligned}$$

- Perimeter of a rectangle =  $2 (\text{length} + \text{breadth})$

## Example:

What is the perimeter of a rectangular field whose length and breadth are 15 m and 8 m respectively?

## Solution:

$$\text{Perimeter of rectangular field} = 2 (15 \text{ m} + 8 \text{ m}) = (2 \times 23) \text{ m} = 46 \text{ m}$$

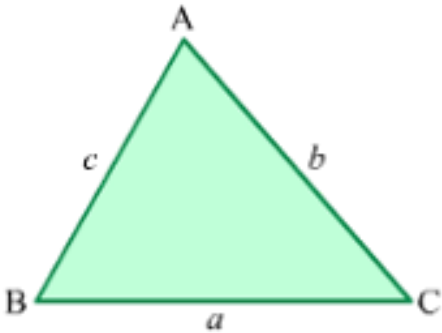
- The distance around a circular region is known as its circumference.

- The circumference of a circle =  $\pi \times \text{Diameter} = 2\pi \times \text{Radius}$

The value of pi ( $\pi$ ) is  $\frac{22}{7}$  or 3.14.

- **Perimeter** is the length of the boundary of a closed figure.
- The perimeter of a polygon is the sum of the lengths of all its sides.

In case of a triangle ABC, with sides of lengths  $a$ ,  $b$  and  $c$  units:



Perimeter of ABC = AB + BC + AC =  $a + b + c$

- The **semi-perimeter** of a triangle is half the perimeter of the triangle.

The semi-perimeter ( $s$ ) of a triangle with sides  $a$ ,  $b$  and  $c$  is  $\frac{a+b+c}{2}$ .

- The semi-perimeter of a triangle is used for calculating its area when the length of altitude is not known.
- Area of a rectangle is given by the formula:

**Area of a rectangle = length  $\times$  breadth**

**Example:** How much carpet is required to cover a rectangular floor of length 25 m and breadth 18 m?

**Solution:** Area of the carpet required = Area of rectangular floor

$$= 25 \text{ m} \times 18 \text{ m} = 450 \text{ m}^2$$

- Area of a square is given by the formula:

**Area of a square = side  $\times$  side**

**Example:** What is the area of a square park of side 10 m 20 cm?

**Solution:** Length of park = 10 m 20 cm = 10.2 m

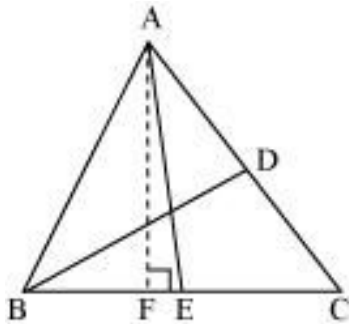
Area of park = 10.2 m × 10.2 m = 104.04 m<sup>2</sup>

• Area of a triangle:

○ Area of a triangle =  $\frac{1}{2} \times \text{Base} \times \text{Altitude}$

○ All the congruent triangles are equal in area, but the triangles having equal areas may or may not be congruent.

**Example:**  $\triangle ABC$  is isosceles with  $AC = BC = 6$  cm.  $AE$  and  $BD$  are the medians and  $AF = 4$  cm. What is the area of  $\triangle ABD$ ?



**Solution:** In  $\triangle ABE$  and  $\triangle BAD$ , we have

$BE = AD$  [ $AC = BC \Rightarrow \frac{1}{2}AC = \frac{1}{2}BC$ ]

$\angle ABE = \angle BAD$  [Angles opposite to equal sides]

$AB = AB$  [Common]

$\Rightarrow \triangle ABE \cong \triangle BAD$  [By SAS congruency criterion]

Area ( $\triangle ABE$ ) = Area ( $\triangle BAD$ )

Now, Area  $\triangle ABE = \frac{1}{2} \times \text{Base} \times \text{Altitude}$

$$= \frac{1}{2} \times BE \times AF$$

$$= \frac{1}{2} \times \left( \frac{6 \text{ cm}}{2} \right) \times 4 \text{ cm}$$

$$= 6 \text{ cm}^2$$

$$\Rightarrow \text{Area } \triangle ABD = 6 \text{ cm}^2$$

• Area of a circle =  $\pi \times (\text{Radius})^2$

**Example:** What is the area of a circle whose circumference is 44 cm?  $\left( \pi = \frac{22}{7} \right)$

**Solution:**

$$\text{Circumference} = 2\pi r = 44 \text{ cm}$$

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

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

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