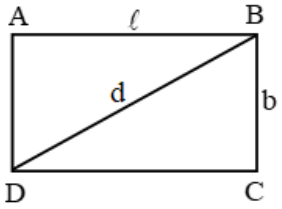
MENSURATION

AREA OF RECTANGLE AND SQUARE

AREA: A figure made up of straight line segments is called a rectilinear figure.

AREA OF RECTANGLE AND SQUARE

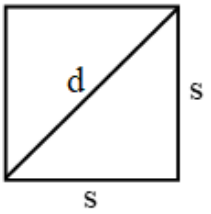


Rectangle:

Area = length × breadth or $A = \lambda \times b$

Perimeter = 2 (length + breadth) or

$P = 2(\lambda + b)$



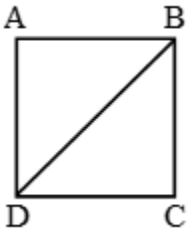
Square :

Area = $(\text{side})^2$ or $A = s^2$

Perimeter = 4 × side or $P = 4s$

Ex.1 Show that area of a square $= \frac{1}{2} \times (\text{diagonal})^2$. Find the area of a square whose diagonal = 2.5 cm.

Sol. In right triangle BCD



$(\text{diagonal})^2 = DC^2 + CB^2 = s^2 + s^2 = 2s^2$

But area of square $= s^2$

$\therefore \quad (\text{diagonal})^2 = 2 \times \text{area}$

or area $= \frac{1}{2} \times (\text{diagonal})^2$

If diagonal = 2.5 cm

area $= \frac{1}{2} \times (2.5)^2 \text{ cm}^2 = \frac{6.25}{2} \text{cm}^2 = 3.125 \text{ cm}^2$.

Ex.2 The area of a square is 42.25 m^2. Find the side of the square. If tiles measuring 13 cm × 13 cm area paved on the square area. Find how many such tiles are used for paving it.

Sol. The area of the square = 42.25 m^2 = 422500 cm^2

The side of the square = $\sqrt{\text{area}}$

= $\sqrt{42250}$cm = 650 cm

The area of 1 tile = 13 cm × 13 cm = 169 cm^2

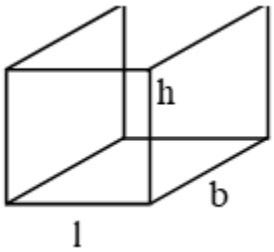
Number of tiles required

= 422500 ÷ 169 = 2500

Ex.3 A room is 5 metres long. 4 metres broad and 3 metres high. Find the area of the four walls. Also find the area of the ceiling and the area of the floor. If it costs ₹ 0.30 to whitewash 1 dm^3 of wall, find the cost of whitewashing the four walls and the ceiling.

Sol. Area of four walls = λh + bh + λh + bh = 2h(λ+b)

= 6 × 9 m^2 = 54 m^2



Area of ceiling = Area of floor = 20 m^2

Since 1 m^2 = 100 dm^2,

∴ 54 m^2 = 5400 dm^2 and 20 m^2 = 2000 dm^2

Cost of whitewashing the four walls at the rate of ₹ 0.30 per dm^2

= ₹ (5400 × 0.30) = ₹1620

Cost of whitewashing the ceiling at the rate of ₹ 0.30 per dm^2

= ₹ (2000 × 0.30) = ₹ 600

Total cost of white washing

= ₹ 1620 + ₹ 600 = ₹ 2220

Ex.4 The length and breadth of a rectangular field is in the ratio 4 : 3. If the area is 3072 m^2, find the cost of fencing the field at the rate of ₹ 4 per meter.

Sol. Let the length and breadth of the field be 4x and 3x meters respectively. The area of the field

$= 4x \times 3x = 12x^2 = 3072\ m^2$

Hence $x^2 = 3072 \div 12 = 256$

or $x = \sqrt{256} = 16$

Length $= 4x = 64$ m; Breadth $= 3x = 48$ m

Length of fencing = Perimeter of the field

$= 2\ (64 + 48)$ m $= 224$ m

Cost of fencing at ₹ 4 per meter

$=$ ₹ $(224 \times 4) =$ ₹ 896