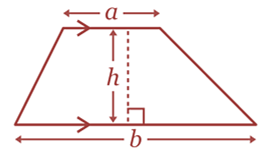


Area of a Trapezium

Understanding of Area of a Trapezium

- A trapezium is a quadrilateral with exactly one pair of parallel sides.
- The parallel sides are called bases of the trapezium.
- The distance between the two parallel sides is called the height of the trapezium.
- The area of a trapezium can be calculated using a special formula.

$$A = \frac{1}{2} (a + b)h$$



- **Formula for Area of a trapezium:** $\text{Area} = \frac{1}{2} \times (\text{sum of parallel sides}) \times \text{height}$
- Parallel sides are usually denoted as a and b .
- Always use the same units for all measurements.
- The result should be written with proper units like cm^2 , m^2 , etc.

Examples with Solutions

Example: Direct Application

- Find the area of a trapezium with parallel sides 8 cm and 5 cm, and height 4 cm.

$$\begin{aligned}\text{Solution: Area} &= \frac{1}{2} \times (8 + 5) \times 4 \\ &= \frac{1}{2} \times 13 \times 4 \\ &= 26 \text{ cm}^2\end{aligned}$$

Example: Finding Area with Larger Numbers

- Find the area of a trapezium whose parallel sides are 20 m and 30 m and the height is 10 m.

$$\begin{aligned}\text{Solution: Area} &= \frac{1}{2} \times (20 + 30) \times 10 \\ &= \frac{1}{2} \times 50 \times 10 \\ &= 25 \times 10 = 250 \text{ m}^2\end{aligned}$$



Example: Area with Fractions

- Find the area of a trapezium with parallel sides $\frac{7}{2}$ m and $\frac{5}{2}$ m and height 3 m.

$$\begin{aligned}\text{Solution: Area} &= \frac{1}{2} \times \left(\frac{7}{2} + \frac{5}{2} \right) \times 3 \\ &= \frac{1}{2} \times \left(\frac{12}{2} \right) \times 3 \\ &= \frac{1}{2} \times 6 \times 3 = 9 \text{ m}^2\end{aligned}$$

Example: Finding Height When Area is Given

- The area of a trapezium is 120 cm^2 . The parallel sides are 15 cm and 25 cm. Find the height.

$$\text{Solution: Area} = \frac{1}{2} \times (a + b) \times \text{height}$$

$$120 = \frac{1}{2} \times (15 + 25) \times \text{height}$$

$$120 = \frac{1}{2} \times 40 \times \text{height}$$

$$120 = 20 \times \text{height}$$

$$\text{Height} = 120 \div 20 = 6 \text{ cm}$$

Example: Area when One Side is Zero (Special Case of Triangle)

- Find the area if one parallel side is 0, another is 6 cm and height is 5 cm.

$$\begin{aligned}\text{Solution: Area} &= \frac{1}{2} \times (0 + 6) \times 5 \\ &= \frac{1}{2} \times 6 \times 5 \\ &= 3 \times 5 = 15 \text{ cm}^2\end{aligned}$$

Summary Points

- Area of trapezium = $\frac{1}{2} \times (\text{sum of parallel sides}) \times \text{height}$.
- Add the lengths of the two parallel sides first.
- Multiply the sum by height and then by $\frac{1}{2}$.
- Area is always expressed in square units.
- If one side is zero, trapezium behaves like a triangle.