

Area and Perimeter

CBSE Class 9 Maths · Knowledge organiser

KEY DEFINITIONS

Perimeter

The total length around the boundary of a shape.

Area

The amount of surface a flat shape covers, in square units.

Semi-perimeter

Half the perimeter, $s = (a + b + c)/2$, used in Heron's formula.

YOU SHOULD BE ABLE TO...

- Use Heron's formula, circle and arc formulas and the standard area formulas in one step.
- Find missing sides from a perimeter, an inradius from $\text{Area} = rs$, and areas of rhombuses and isosceles triangles.
- Find the area of a quadrilateral in two triangles and answer multi-part questions on tracks, sectors and signboards.
- Use Brahmagupta's formula, altitudes from areas, and composite shapes with circles.

COMMON MISTAKES

- ✗ Using the perimeter instead of the semi-perimeter s in Heron's formula.
- ✗ Forgetting the two radii in the perimeter of a sector or the diameter in the perimeter of a semicircle.
- ✗ Using Brahmagupta's formula for a quadrilateral that is not cyclic.
- ✗ Mixing units (cm and m) or writing an area in cm instead of cm^2 .

KEY FORMULAS

Arc; sector
(angle θ°)

$$l = \frac{\theta}{360} \cdot 2\pi r, \quad A = \frac{\theta}{360} \cdot \pi r^2$$

Heron, $s = \frac{a+b+c}{2}$

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

Inradius;
equilateral
triangle

$$A = rs; \quad A = \frac{\sqrt{3}}{4}a^2$$

Brahmagupta
(cyclic quad.,
 $s = \frac{a+b+c+d}{2}$)

$$A = \sqrt{(s-a)(s-b)(s-c)(s-d)}$$

Trapezium;
rhombus

$$\frac{1}{2}(a+b)h; \quad \frac{1}{2}d_1d_2$$

WORKED EXAMPLE

Find the area of a triangle with sides 13, 14 and 15 cm.

$$s = 21; \quad \text{area} = \sqrt{21 \times 8 \times 7 \times 6} = \sqrt{7056} = 84 \text{ cm}^2.$$