Area and Perimeter of Plane Figures

Introduction

1. The perimeter of a plane figure is the length of its boundary.
   The unit of perimeter is the same as the unit of length, i.e. cm, m, mm, etc.
2. The area of a plane figure is the measure of the surface enclosed by its boundary.
   The unit of area is cm^2, m^2, mm^2, etc.

Area and Perimeter of Triangles

Area of a triangle $= \dfrac{1}{2} \times Base \times Height$

Perimeter $=$ Sum of three sides of a triangle

Equilateral Triangle

$Area = \dfrac{\sqrt{3}}{4} \times (Side)^2$

Isosceles Triangle

$Area = \dfrac{1}{4} \times b \times \sqrt{4a^2 - b^2}$, where $a =$ length of each equal side, $b =$ length of base

Heron's Formula for area of any Triangle

$Area = \sqrt{s(s-a)(s-b)(s-c)}$, where a, b, c = three sides of a triangle

And, semi-perimeter, $s = \dfrac{a+b+c}{2}$

Area and Perimeter of Quadrilaterals

Case 1: When one diagonal and perpendiculars to this diagonal from the remaining vertices are given

$Area = \dfrac{1}{2} \times One\ diagonal \times Sum\ of\ lengths\ of\ the\ perpendiculars\ drawn\ on\ it$

from the remaining vertices

Case 2: When two diagonals of a quadrilateral cut each other at right angles

$$\text{Area} = \frac{1}{2} \times \text{Product of diagonals}$$

Rectangle

$$\text{Area} = \text{Length} \times \text{Breadth} = l \times b$$
$$\text{Perimeter} = 2(\text{Length} + \text{Breadth}) = 2(l + b)$$
$$\text{Length of diagonal, } d = \sqrt{l^2 + b^2}$$

Square

$$\text{Area} = (\text{Side})^2 = a^2$$
$$\text{Perimeter} = 4 \times \text{Side} = 4a$$
$$\text{Length of diagonal, } d = \sqrt{a^2 + a^2} = \sqrt{2} \times a$$

Parallelogram

$$\text{Area} = \text{Base} \times \text{Height}$$

Rhombus

$$\text{Area} = \frac{1}{2} \times \text{Product of diagonals}$$

Trapezium

$$\text{Area} = \frac{1}{2} \times \text{Sum of parallel sides} \times \text{Distance between parallel sides}$$

Area and Circumference of a Circle

$$\text{Area} = \pi r^2 \quad (r = \text{radius})$$
$$\text{Circumference} = 2\pi r$$
$$\text{Area of semi-circle} = \frac{1}{2} \times \pi r^2$$
$$\text{Diameter} = 2 \times \text{radius}$$