PLANE GEOMETRY

Plane geometry is all about shapes, like lines, circles and triangles that are drawn on same flat surface called plane.

TRIANGLE

When base, b and height, h is given:

\[ A_T = \frac{1}{2}bh \]

When two sides, a and b and an included angle \( \theta \) is given:

\[ A_T = \frac{1}{2}ab \sin \theta \]

When three sides, a, b and c is given: Hero's Formula:

\[ s = \frac{a+b+c}{2} \]

\[ A_T = \sqrt{s(s-a)(s-b)(s-c)} \]

When angles A, B and C and one side, a is given:

\[ A_T = \frac{a^2 \sin B \sin C}{2 \sin A} \]

RECTANGLE

Area: \( A = ab \)

Perimeter: \( P = 2(a+b) \)

Diagonal: \( d = \sqrt{a^2 + b^2} \)

SQUARE

Area: \( A = a^2 \)

Perimeter: \( P = 4a \)

Diagonal: \( d = a\sqrt{2} \)

GENERAL QUADRILATERAL

When diagonal, \( d_1 \) and \( d_2 \) and included angle, \( \theta \) are given:

\[ A = \frac{1}{2}d_1d_2 \sin \theta \]

When four sides, a, b, c and d and included angle, \( \theta \) are given:

\[ A = \sqrt{(s-a)(s-b)(s-c)(s-d) - abcd \cos^2 \theta} \]

Where:

\( \theta = \frac{1}{2} \) (sum of two opposite angles)

Cyclic Quadrilateral

Radius of circumscribed circle:

\[ r = \frac{\sqrt{(ab+cd)(ac+bd)(ad+bc)}}{4A} \]

REGULAR POLYGONS

Equilateral polygons are polygons with equal sides

Equiangular polygons are polygons with equal interior angles

Regular polygons are polygons that are both equilateral and equiangular.

Exterior angle: \( \theta = \frac{360^\circ}{n} \)

Area: \( A = \frac{1}{2}nr^2 \sin \theta \)

Perimeter: \( P = (n)r \)

Interior angles: \( \frac{n-2}{n} \times 180^\circ \)