POLYGONS

Sum of interior angles = $(n - 2) \times 180^\circ = (2n - 4) \times 90^\circ$ Sum of exterior angles = 360°

Number of diagonals $= {}^{n}C_{2} - n = \frac{n(n-3)}{2}$

Number of triangles which can be formed by the vertices = ${}^{n}C_{3}$

Regular Polygon:

If all sides and all angles are equal, it is a regular polygon.

All regular polygons can be inscribed in or circumscribed about a circle.

Area = 1/2 x Perimeter x Inradius {Inradius is the perpendicular from centre to any side}

Each Interior Angle= $\frac{(n-2)180^0}{n}$; Each Exterior angle =360°/n

Quadrilaterals:

Sum of the interior angles = Sum of the exterior angles = 360°

Area for a quadrilateral is given by $\frac{1}{2} d_1 d_2 \sin \theta$.

Cyclic Quadrilateral

If all vertices of a quadrilateral lie on the circumference of a circle, it is known as a cyclic quadrilateral. Opposite angles are supplementary

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

Where s is the semi perimeter. S= $\frac{a+b+c}{2}$

Parallelogram

Opposite sides are parallel and congruent.

Opposite angles are congruent and consecutive angles are supplementary.

Concept: A parallelogram inscribed in a circle is always a Rectangle. A parallelogram circumscribed about a circle is always a*Rhombus*.

Diagonals of a parallelogram bisect each other. Perimeter= 2(Sum of adjacent sides);

Area = Base \times Height = AD \times BE

Concept: Each diagonal divides a parallelogram in two triangles of equal area.

Concept:Sum of squares of diagonals = Sum of squares of four sides $\Rightarrow AC^2 + BD^2 = AB^2 + BC^2 + CD^2 + DA^2$

Concept: A Rectangle is formed by intersection of the four angle bisectors of a parallelogram.









A parallelogram with all sides equal is a Rhombus. Its diagonals bisect at 90°. Perimeter = 4a; Area = $\frac{1}{2} d_1 d_2$; Area = $d x \sqrt{a^2 - (\frac{d}{2})^2}$

Rectangle

A parallelogram with all angles equal (90°) is a Rectangle. Its diagonals are congruent.

Perimeter = 2(l+b); Area = lb

Square

A parallelogram with sides equal and all angles equal is a square. Its diagonals are congruent and bisect at 90°.

Diagonals = $\sqrt{2a}$ Perimeter = 4a; Area = a^2 ;

Concept: From all quadrilaterals with a given area, the square has the least perimeter. For all quadrilaterals with a given perimeter, the square has the greatest area.

Kite



Two pairs of adjacent sides are congruent.

The longer diagonal bisects the shorter diagonal at 90° . Area = Product of Diagonals / 2

Trapezium/Trapezoid



A quadrilateral with exactly one pair of sides parallel is known as a Trapezoid. The parallel sides are known as bases and the non-parallel sides are known as lateral sides.

Area = $\frac{1}{2} \times (Sum of parallel sides) \times Height$

Median, the line joining the midpoints of lateral sides, is half the sum of parallel sides.

Concept: Sum of the squares of the length of the diagonals

= Sum of squares of lateral sides + 2 Product of bases.

 $\Rightarrow AC^{2} + BD^{2} = AD^{2} + BC^{2} + 2 \times AB \times CD$

Isosceles Trapezium



The non-parallel sides (lateral sides) are equal in length. Angles made by each parallel side with the lateral sides are equal.

Concept: If a trapezium is inscribed in a circle, it has to be an isosceles trapezium. If a circle can be inscribed in a trapezium, Sum of parallel sides = Sum of lateral sides.

Hexagon (Regular)



Concept: A regular hexagon can be considered as a combination of six equilateral triangles. All regular polygons can be considered as a combination of 'n' isosceles triangles.