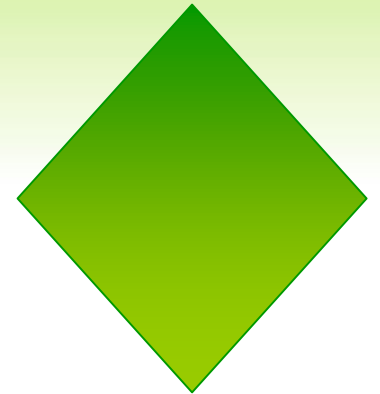
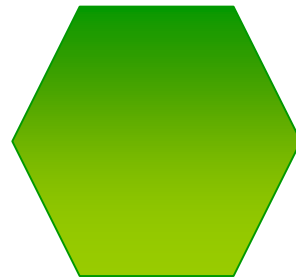
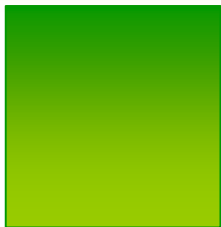
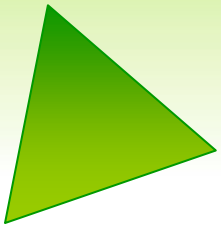
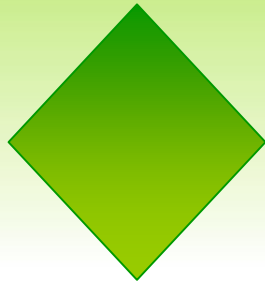


UNDERSTANDING POLYGONS AND QUADRILATERALS

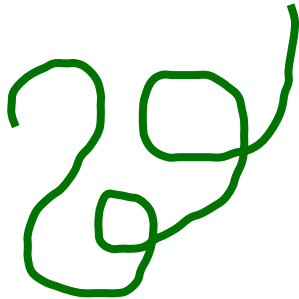
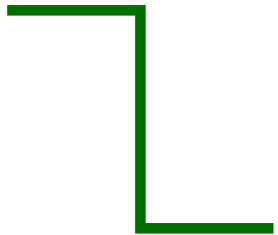


POLYGONS : *A simple closed curve made up of only line segments is called a **polygon**.*

* *Curves that are polygons :*



* *Curves that are not polygons :*

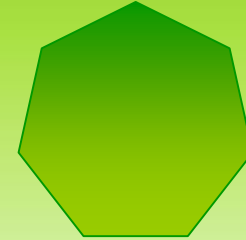


CLASSIFICATION OF POLYGONS

Triangle: 3 sides



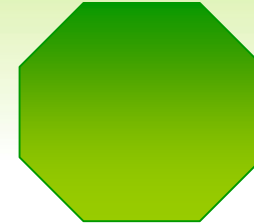
Heptagon: 7 sides



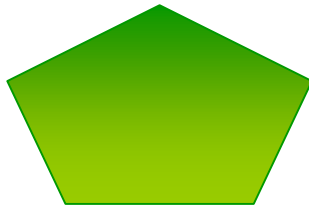
Quadrilateral: 4 sides



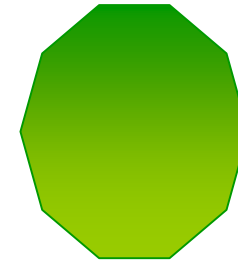
Octagon: 8 sides



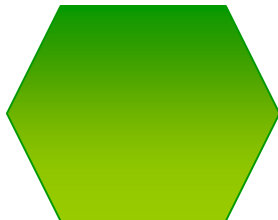
Pentagon: 5 sides



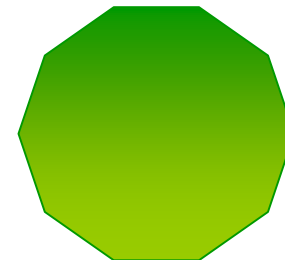
Nonagon: 9 sides



Hexagon: 6 sides

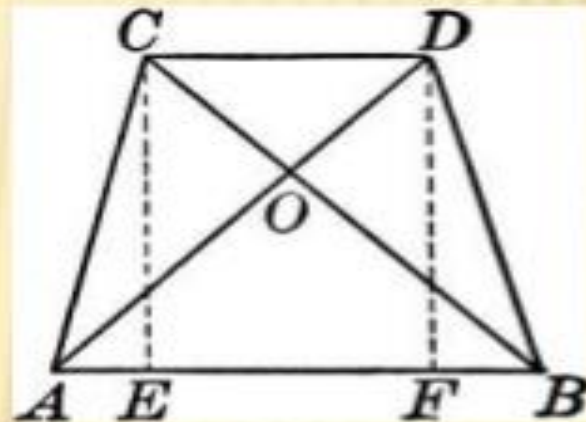
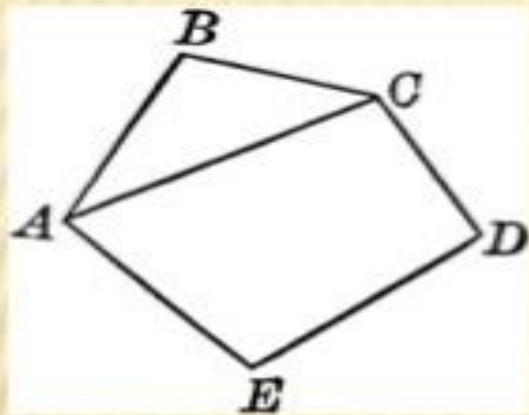


Decagon: 10 sides



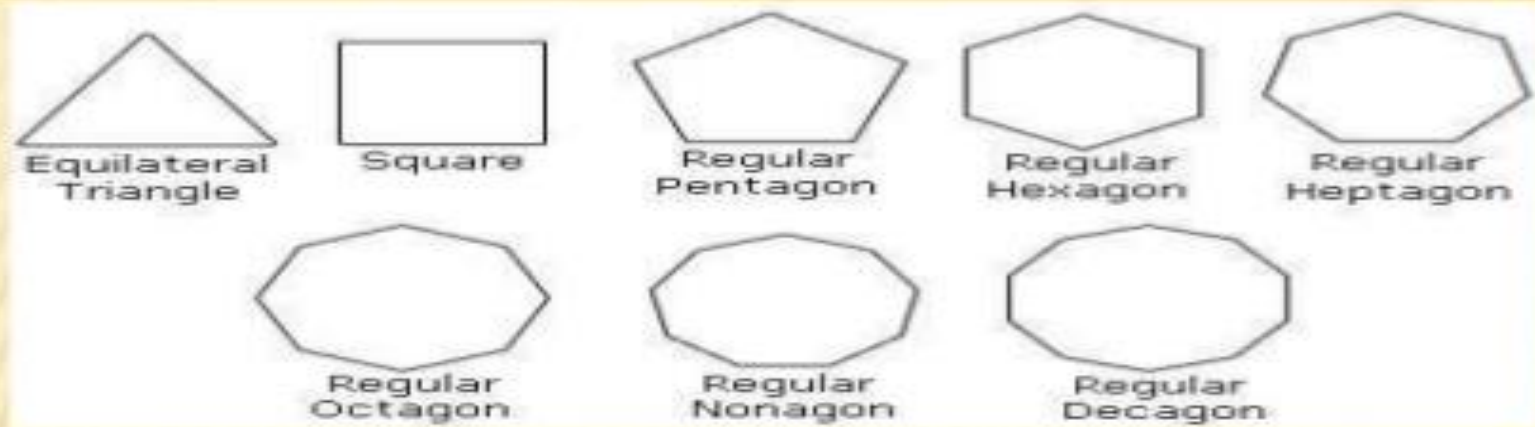
DIAGONALS

- ✖ A diagonal is a line segment connecting two non-consecutive vertices of a polygon.

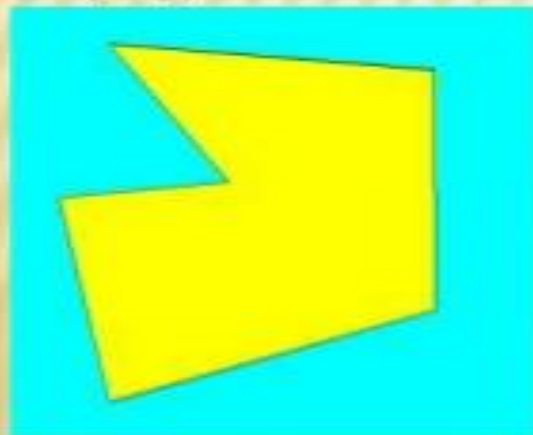


- ✖ In 1st figure you can see that AC is the diagonal, and in 2nd figure AD and BC.

- ✖ Regular Polygons:- A regular polygon has both equal sides and angles.



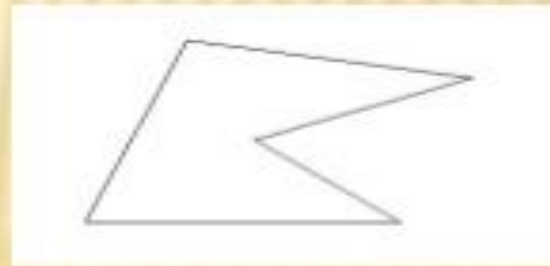
- ✖ Polygons that are not regular:-



- ✖ Convex Polygons:- Polygons that are convex have no portions of their diagonals in their exteriors.



- ✖ Concave Polygons:- Polygons that are concave have portions of their diagonals in their exterior.



ANGLE SUM PROPERTY

We all have used this property to find the angles of a polygon. In it we first have to see the number of sides of a polygon, then subtract 2 from it and multiply the result by 180 to find its total angle sum.

Here is an example:-

Take Triangle, we know that it has 3 sides.

So, subtract 2 from it, and we get 1. And after multiplying 1 with 180 we get 180 i.e. the exact sum of the angles of a triangle.

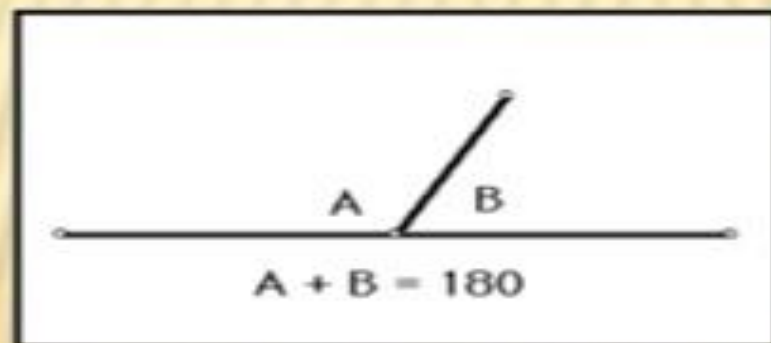


$$\angle A + \angle B + \angle C = 180$$

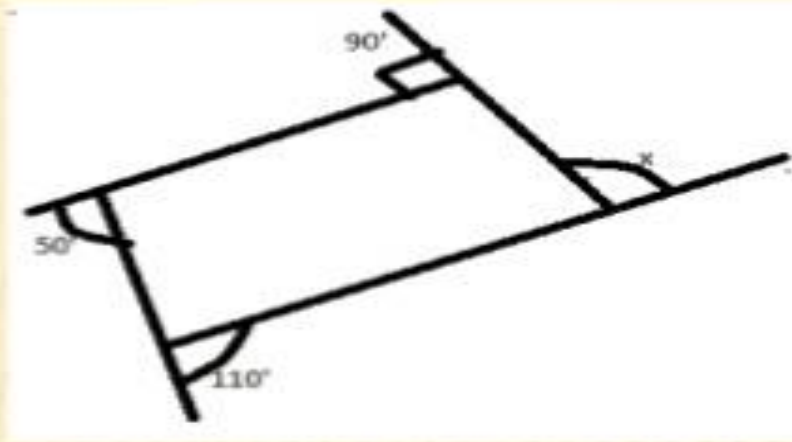
Now we will take Pentagon. It has 5 sides, so $5 - 2 = 3$. Then, $3 \times 180 = 540$.
So, sum of angles is equal to:-

No. of sides $\times$ 180

For regular polygon interior angle plus exterior angle is always equal to 180.



- ✖ Sum of the measures of the Exterior Angles of a Polygon is always equal to 360.



In this we have got angles 110, 50 & 90 and the fourth angle is unidentified. But we know that all exterior angles add up to 360. So,

$$110 + 50 + 90 + x = 360$$

$$250 + x = 360$$

$$x = 360 - 250 ; x = 110.$$

KINDS OF QUADRILATERALS

- > Square
- > Kite
- > Parallelogram
- > Rectangle
- > Trapezium
- > Rhombus

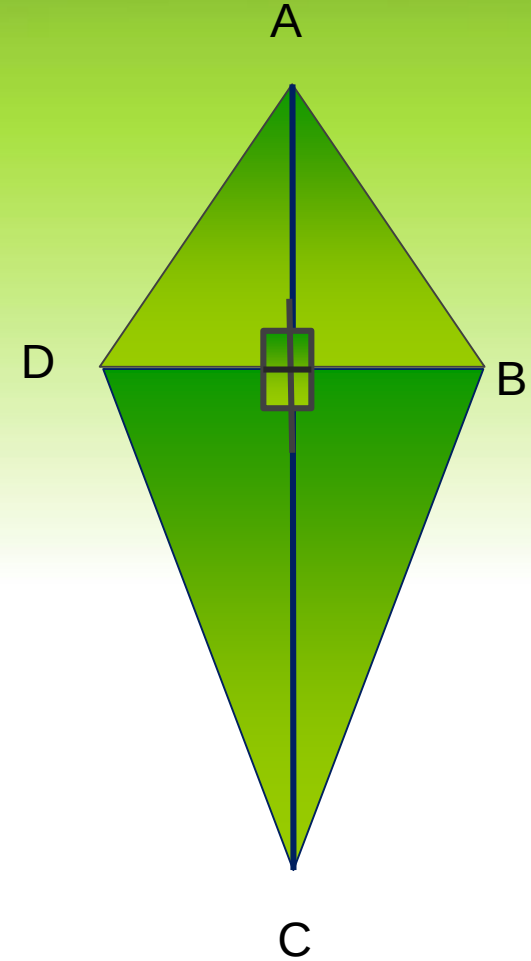


KITE : A quadrilateral with exactly two pairs of equal consecutive sides.

> One of the diagonal bisects the other.

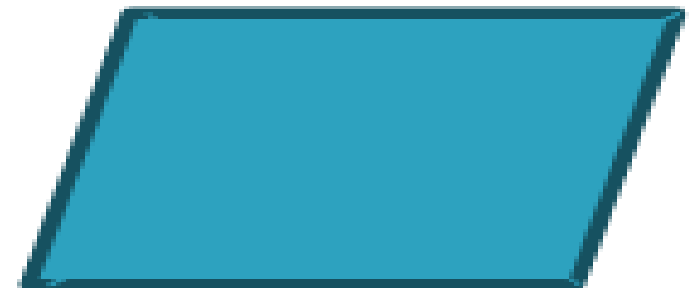
> The diagonals are perpendicular to one another.

> In given figure, angle B and D are equal but angle A and C are not.



PARALLELOGRAM

- ▶ It is a 4-sided polygon having opposite sides of equal length.
- ▶ Diagonals are equal and bisect each other.
- ▶ Angle-sum property is 360 degrees.



«Trapezium

- ▶ In this polygon, only one pair of opposite sides are equal.
- ▶ Diagonals are unequal

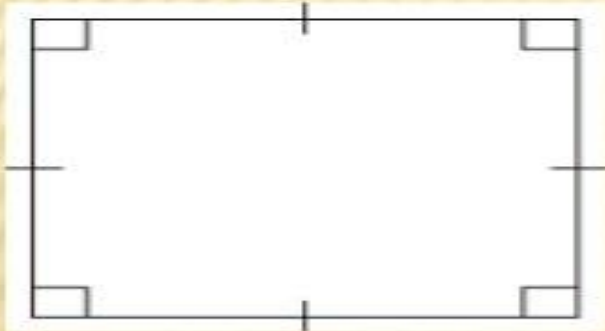


** Difference between a parallelogram and a trapezium is, trapezium has only one pair of unequal parallel lines.*

SPECIAL TYPES OF **PARALLELOGRAM**

- ✖ Square:- A square is rectangle with equal sides. This means a square has all the properties of a rectangle with an additional requirement that all sides have equal length.

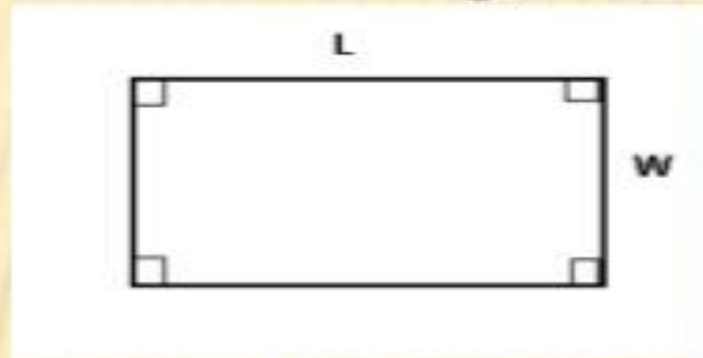
The square, like the rectangle, has diagonals of equal length. In square the diagonals:-



bisect one another;
are of equal length;
are perpendicular to one another.

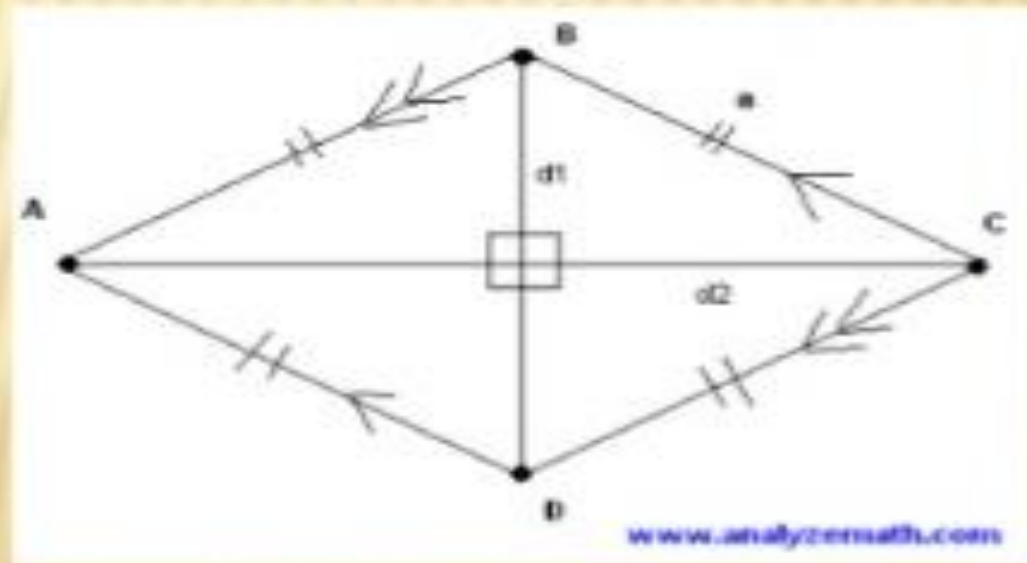
- ✖ Rectangle:- A rectangle is a parallelogram with equal angles. Being a parallelogram it has opposite sides of equal length and its diagonals bisect each other.

The diagonals of a rectangle are of equal length.



✖ Rhombus:- A rhombus is a quadrilateral with equal sides. It has all the properties of a parallelogram and also that of a kite.

The diagonals of a rhombus are perpendicular bisectors of one another.



Quadrilaterals Graphic Organizer

5.3 Kite and Trapezoid Properties, 5.5 Properties of Parallelograms, 5.6 Properties of Special Quads

Quadrilateral Name	Side Properties	Angle Properties	Diagonals Properties
Kite A quadrilateral with two distinct pairs of congruent consecutive sides.	In a kite there are two pair of congruent sides	- Non-vertex angles are congruent - Vertex angles are bisected by a diagonal	- Diagonals are $\perp$ - Diagonal connecting vertex angles is the $\perp$ bisector of the other diagonal
Trapezoid A quadrilateral with exactly one pair of parallel sides.	The two parallel sides of the trapezoid are called the bases	The consecutive angles between the bases of the trapezoid are supplementary	
Isosceles Trapezoid A trapezoid with two congruent legs.	In an isosceles trapezoid the non-parallel sides are congruent	The bases angles of an isosceles trapezoid are congruent	The diagonal of an isosceles trapezoid are congruent
Parallelogram A quadrilateral with two pairs of parallel sides.	Opposite sides are congruent	- Opposite angles are congruent - Consecutive angles are supplementary	The diagonals bisect each other
Rhombus An equilateral parallelogram.	All of the same properties of a parallelogram Opposite sides are congruent	All of the same properties of a parallelogram - Opposite angles are congruent - Consecutive angles are supplementary	All of the same properties of a parallelogram and... - The diagonals of a rhombus are $\perp$ bisectors of one another - The diagonals of a rhombus are angle bisectors
Rectangles An equiangular parallelogram.	All of the same properties of a parallelogram Opposite sides are congruent	All of the same properties of a parallelogram - Opposite angles are congruent - Consecutive angles are supplementary	All the same properties of a parallelogram and... - The diagonals of a rectangle are congruent - The diagonals of a rectangle bisect one another
Squares An equiangular and equilateral parallelogram. A regular quadrilateral.	All of the same properties of a parallelogram Opposite sides are congruent	All of the same properties of a parallelogram - Opposite angles are congruent - Consecutive angles are supplementary	All of the same properties of a parallelogram and... The diagonals of a square are congruent, $\perp$, bisect one another

THANK YOU