Quadrilaterals: Classification
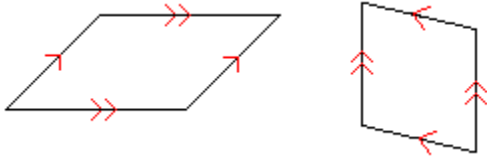
A **quadrilateral** is a polygon with four sides.

There are many special types of quadrilateral.

A **parallelogram** is a quadrilateral in which both pairs of opposite sides are parallel .

A parallelogram also has the following properties:

- o Opposite angles are congruent;

- o Opposite sides are congruent;

- o Adjacent angles are supplementary;

- o The diagonals bisect each other.

A **rectangle** is a parallelogram with four right angles, so all rectangles are also parallelograms and quadrilaterals. On the other hand, not all quadrilaterals and parallelograms are rectangles.
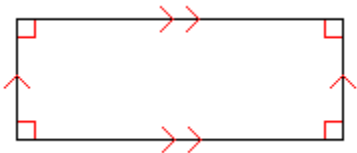
A rectangle has all the properties of a parallelogram, plus the following:

- o The diagonals are congruent.

A **rhombus** is a parallelogram with four congruent sides. The plural of rhombus is **rhombi**
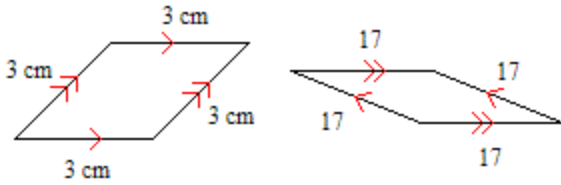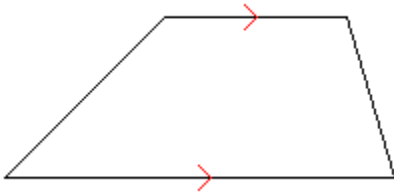
A rhombus has all the properties of a parallelogram, plus the following:

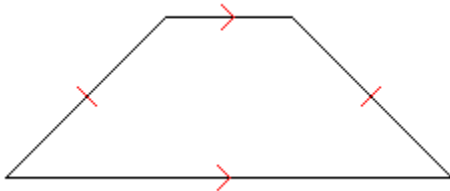 ○ The diagonals intersect at right angles.

A **square** can be defined as a rhombus which is also a rectangle – in other words, a parallelogram with four congruent sides and four right angles.
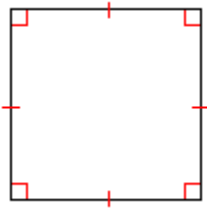

A **trapezoid** is a quadrilateral with exactly one pair of parallel sides.


An **isosceles trapezoid** is a trapezoid whose non-parallel sides are congruent.


A **kite** is a quadrilateral with exactly two pairs of adjacent congruent sides. (This definition excludes rhombi. Some textbooks say a kite has at least two pairs of adjacent congruent sides, so a rhombus is a special case of a kite.)
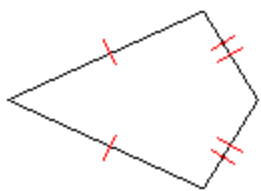
A **scalene** quadrilateral is a four-sided polygon that has no congruent sides. Three examples are shown below.
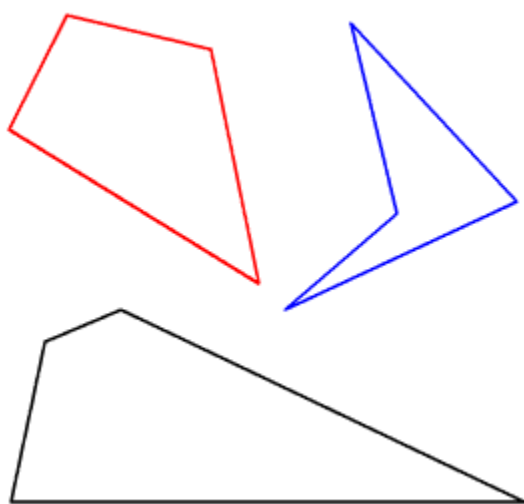
One special kind of polygons is called a parallelogram. It is a quadrilateral where both pairs of opposite sides are parallel.
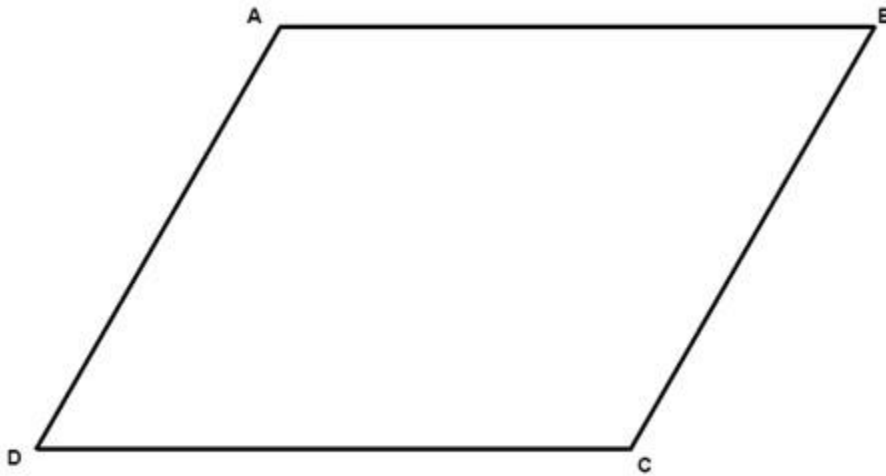
There are six important properties of parallelograms to know:

1. Opposite sides are congruent (AB = DC).
2. Opposite angels are congruent (D = B).
3. Consecutive angles are supplementary (A + D = 180°).
4. If one angle is right, then all angles are right.
5. The diagonals of a parallelogram bisect each other.
6. Each diagonal of a parallelogram separates it into two congruent triangles.
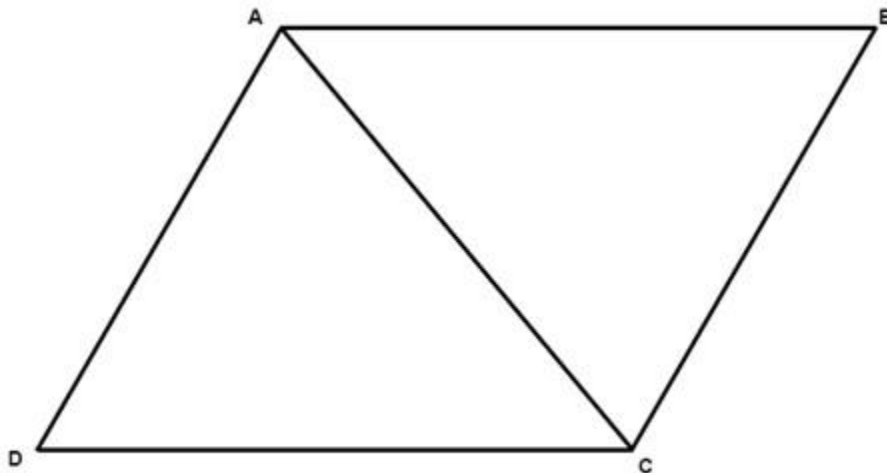

$$\triangle ACD \cong \triangle ABC$$

If we have a parallelogram where all sides are congruent then we have what is called a rhombus. The properties of parallelograms can be applied on rhombi.

If we have a quadrilateral where one pair and only one pair of sides are parallel then we have what is called a trapezoid. The parallel sides are called bases while the nonparallel sides are called legs. If the legs are congruent we have what is called an isosceles trapezoid.
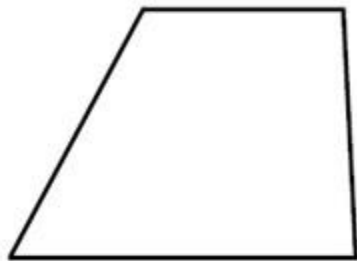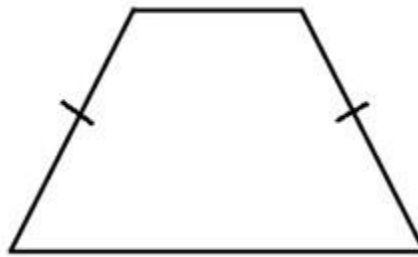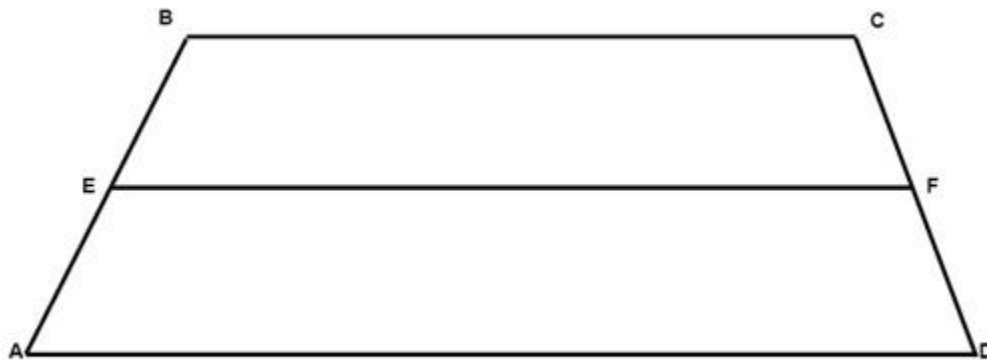
Trapezoid   Isosceles trapezoid

In an isosceles trapezoid the diagonals are always congruent. The median of a trapezoid is parallel to the bases and is one-half of the sum of measures of the bases.

EF = ½(BC + AD)

Quadrilaterals

Parallelograms

Rhombi   Squares   Rectangles

Trapezoids   Kites