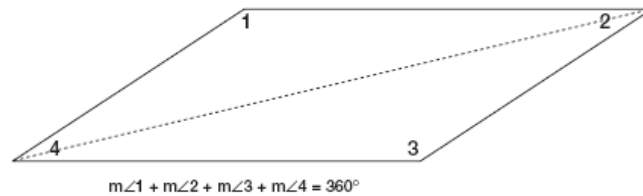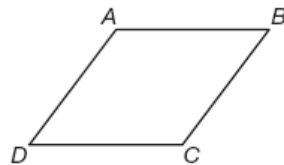# Quadrilaterals

A **quadrilateral** is a four-sided polygon. Any quadrilateral can be divided by a diagonal into two triangles, which means the sum of a quadrilateral's angles is 180° + 180° = 360°.

$$m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 = 360°$$

A **parallelogram** is a quadrilateral with two pairs of parallel sides.

In the figure above, $\overline{AB} \parallel \overline{DC}$ and $\overline{AD} \parallel \overline{BC}$.

Parallelograms have the following attributes:

opposite sides that are equal

$$\overline{AD} = \overline{BC} \qquad \overline{AB} = \overline{DC}$$

opposite angles that are equal

$$m\angle A = m\angle C \qquad m\angle B = m\angle D$$

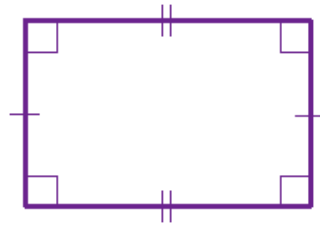consecutive angles that are supplementary

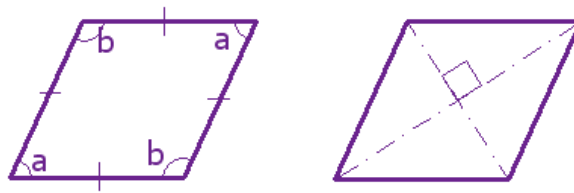$$m\angle A + m\angle B = 180°$$

$$m\angle B + m\angle C = 180°$$

$$m\angle C + m\angle D = 180°$$
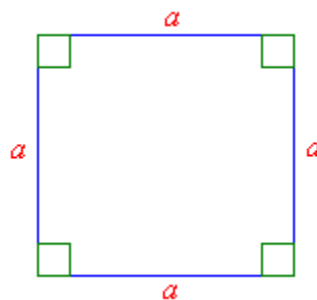
$$m\angle D + m\angle A = 180°$$

A **rectangle** is a parallelogram with four right angles.

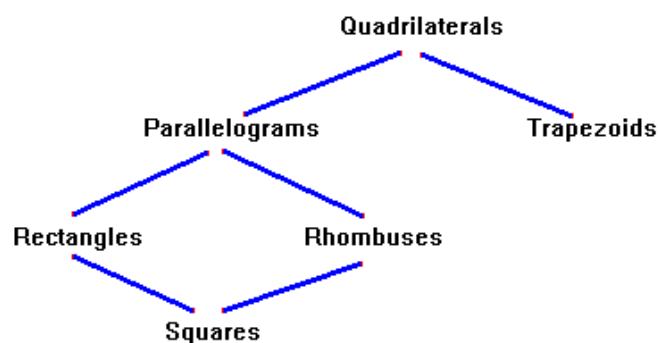A **rhombus** is a parallelogram with four equal sides.

A **square** is a parallelogram with four equal sides and four right angles.

You have seen that quadrilaterals are related to one another by use of Venn diagram.
The relation between quadrilaterals can also be shown by another type of diagram.

The diagram shows the following:
All the figures are quadrilaterals.
All rectangles are parallelograms.
All rhombuses are parallelograms.
All squares are rectangles.
All squares are rhombuses.
A trapezoid is neither parallelogram nor rectangle, rhombus or square.

Examples:

A- Write True or False.
1) All figures that have 4 sides are quadrilateral. **True**

2) All parallelograms are rectangles.   **False**

3) All squares are rectangles.   **False**

4) All rhombuses are parallelograms.   **True**

5) All square are rhombuses.   **True**