

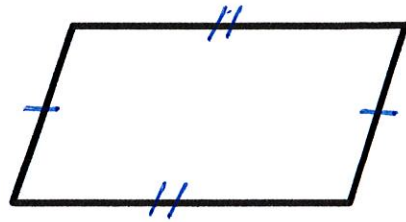
Day 1 – Properties of Parallelograms and Rectangles

Today, we will discuss two particular types of quadrilaterals: Parallelograms and Rectangles. A **quadrilateral** is a polygon with four edges (or sides) and four vertices or corners. The angles of a quadrilateral add up to be 360°. To name a quadrilateral, we list the vertices in order. A **parallelogram** is a type of quadrilateral that has **two pairs of opposite sides that are parallel**. Parallelograms are denoted by the symbol \square . If a quadrilateral has two pairs of parallel, opposite sides, then it can be classified as a parallelogram.

There are 5 theorems associated with PARALLELOGRAMS:

If a quadrilateral is a parallelogram,

then its **opposite sides are congruent**.

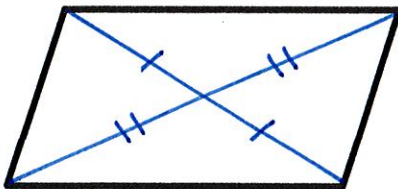
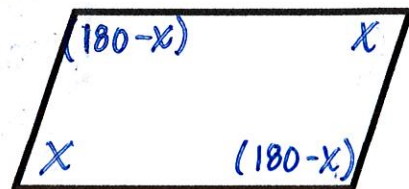


If a quadrilateral is a parallelogram,

then its **opposite angles are congruent**.

If a quadrilateral is a parallelogram,

then its **consecutive angles are supplementary**.

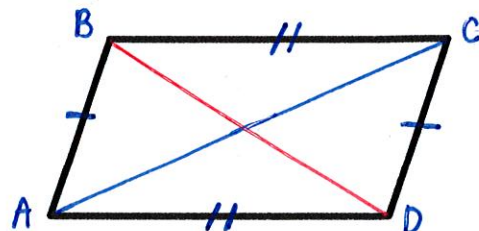


If a quadrilateral is a parallelogram, then its **diagonals bisect each other**. This bisects each diagonal into two congruent segments.

If a quadrilateral is a parallelogram,

then its **diagonals form two congruent triangles**.

$$\begin{aligned} \triangle ABC &\cong \triangle CDA \\ \triangle BAD &\cong \triangle DCB \end{aligned}$$



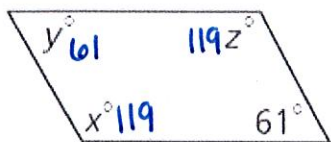
Rectangles

A **rectangle** is a quadrilateral with four right angles. Rectangles have all the properties of parallelograms in addition to TWO special properties:

- Diagonals are congruent
- Rectangles have four right angles

Practice:

1. Solve for x, y, and z.



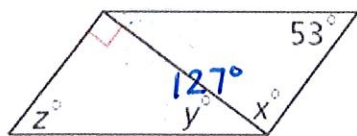
$$y = 61^\circ$$

$$\begin{aligned} z + 6x &= 180 \\ -61 &- 61 \\ \hline z &= 119^\circ \end{aligned}$$

$$x = 119^\circ$$

Relationship: opposite \angle s are \cong
consecutive \angle s are supplementary

2. Solve for x, y, and z.

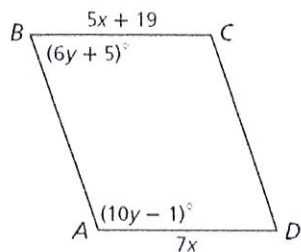


$$\begin{aligned} z &= 53^\circ \\ x &= 90^\circ \end{aligned}$$

$$\begin{aligned} x + y &= 180 - 53 \\ x + y &= 127 \\ 90 + y &= 127 \\ -90 &- 90 \\ \hline y &= 37^\circ \end{aligned}$$

Relationship: opposite \angle s are \cong
consec. \angle s are supp.
alt. int. \angle s are \cong

3. Find the value of x. Then find the length of BC.



$$\begin{aligned} 5x + 19 &= 7x \\ -5x &- 5x \\ \hline 19 &= 2x \\ \frac{19}{2} &= \frac{2x}{2} \\ 9.5 &= x \\ \hline x &= 9.5 \end{aligned}$$

$$\begin{aligned} 6y + 5 + 10y - 1 &= 180 \\ 16y + 4 &= 180 \\ -4 &- 4 \\ \hline 16y &= 176 \\ \frac{16y}{16} &= \frac{176}{16} \\ y &= 11 \end{aligned}$$

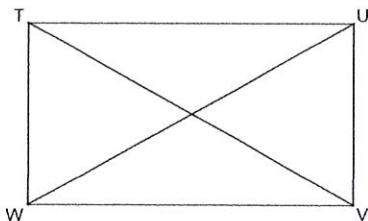
Relationship: opposite sides are \cong
consec. \angle s are supp.

$$\begin{aligned} \overline{BC} &= 5x + 19 \\ \overline{BC} &= 5(9.5) + 19 \\ \overline{BC} &= 47.5 + 19 \\ \hline \overline{BC} &= 66.5 \end{aligned}$$

4. In rectangle TUVW below, it is know that $TV = 19 - 2x$

Relationship: diagonals are \cong

and $WU = 10 + x$. Find the value of x.



$$\begin{aligned} 19 - 2x &= 10 + x \\ -x &- x \\ \hline 19 - 3x &= 10 \\ -19 &- 19 \\ \hline -3x &= -9 \\ \frac{-3x}{-3} &= \frac{-9}{-3} \\ \hline x &= 3 \end{aligned}$$