Exploring
Parallelograms With GSP

Part A: Constructing a parallelogram
1. Construct ∠BAC using segments
2. Construct a line parallel to $\overline{AB}$ through point C
3. Construct a line parallel to $\overline{AC}$ through point B
4. Construct point D at the intersection of these two parallel lines.
5. Hide the parallel lines by selecting them and going to [Display]→[Hide Lines]
6. Construct sides $\overline{BD}$ and $\overline{CD}$
7. You should now have a parallelogram. Move each point one at a time to make sure it remains a parallelogram.

Part B: Parallelogram Sides and Angles
1. Measure the length of each side of the parallelogram.
    Use your observation to complete this theorem:

    The opposite sides of a parallelogram are _____
    Now move the vertices to see if this is always true.
2. Measure all the angles of the parallelogram.
    Use your observations to complete the following theorems:

    The opposite angles of a parallelogram are _____
    Now move the vertices to see if this is always true.

    Consecutive angles of a parallelogram are _____
    Now move the vertices to see if this is always true.

Part C: Diagonals of a parallelogram
A **diagonal** of a polygon is a segment that connects two *non-consecutive* vertices.
1. Construct the two diagonals of your parallelogram.
2. Construct the point M at the intersection of the diagonals.
3. Measure the distances $AM, MD, BM,$ and MC
    How do these lengths relate to each other?

    Complete the theorem based on your observations:

    The diagonals of a parallelogram _____ each other.