In Exercises 1 and 2, state which theorem you can use to show that the quadrilateral is a parallelogram.

1. 

2. 

In Exercises 3 and 4, find the value of $x$ that makes the quadrilateral a parallelogram.

3. 

4. 

In Exercises 5 and 6, graph the quadrilateral with the given vertices in a coordinate plane. Then show that the quadrilateral is a parallelogram.

5. $A(-4, -2), B(-2, 1), C(4, 1), D(2, -2)$

6. $E(-4, 1), F(-1, 5), G(11, 0), H(8, -4)$

7. Use the diagram to write a two-column proof.

Given: $\angle A \cong \angle ABE$

$AE \cong CD, BC \cong DE$

Prove: $BCDE$ is a parallelogram.

8. In the diagram of the handrail for a staircase shown, $m\angle A = 145^\circ$ and $\overline{AB} \cong \overline{CD}$.

- a. Explain how to show that $ABDC$ is a parallelogram.
- b. Describe how to prove that $CDFE$ is a parallelogram.
- c. Can you prove that $EFHG$ is a parallelogram? Explain.
- d. Find $m\angle ACD$, $m\angle DCE$, $m\angle CEF$, and $m\angle EFD$. 

242 Geometry
Resources by Chapter
In Exercises 1 and 2, state which theorem you can use to show that the quadrilateral is a parallelogram.

1. 

2. 

In Exercises 3 and 4, find the value of \( x \) that makes the quadrilateral a parallelogram.

3. 

4. 

In Exercises 5 and 6, graph the quadrilateral with the given vertices in a coordinate plane. Then show that the quadrilateral is a parallelogram.

5. \( W(-3, -1), X(-3, 4), Y(3, 2), Z(3, -3) \)

6. \( A(-4, 0), B(2, 2), C(5, -1), D(-1, -3) \)

7. Use the diagram to write a two-column proof.
   
   Given: \( \angle A \cong \angle FDE \)
   
   \( F \) is the midpoint of \( AD \).
   
   \( D \) is the midpoint of \( CE \).
   
   Prove: \( ABCD \) is a parallelogram.

8. A quadrilateral has two pairs of congruent angles. Can you determine whether the quadrilateral is a parallelogram? Explain your reasoning.

9. An octagon star is shown in the figure on the right.
   
   a. Find \( m \angle FCG, m \angle BCF, \) and \( m \angle D \).
   
   b. State which theorem you can use to show that the quadrilateral is a parallelogram.
   
   c. The length of \( AB \) is three times the length of \( AD \). Write an expression for the perimeter of parallelogram \( ABCD \) in terms of the variable \( x \).