

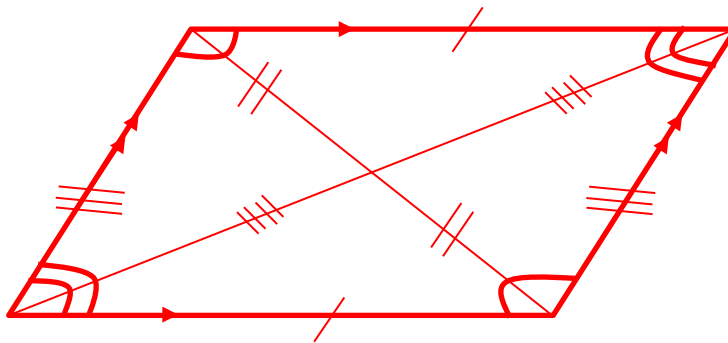
Parallelogram Definition: a quadrilateral with both pairs of opposite sides parallel

The quadrilateral on the screen meets the parallelogram definition above.

1. What should you measure to confirm that the quadrilateral is in fact a parallelogram based on the definition?  
Write down those measurements below.

Slopes of opposite sides should be equal.

2. Using the other measurements on the diagram, list observations about additional properties of parallelograms.



Parallelograms have:

1. Both pairs of opposite sides parallel
2. Both pairs of opposite sides congruent
3. Both pairs of opposite angles congruent
4. Consecutive pairs of angles supplementary
5. Both diagonals bisect the other/diagonals bisect each other

**Tools for Working with Coordinate Shapes:**

<p><b>Slope:</b></p> $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$ <p>What can slope tell us?</p> <p>Same slopes <math>\rightarrow</math> parallel</p> <p>Opp/reciprocal slopes <math>\rightarrow \perp</math></p>	<p><b>Distance Formula/Pythagorean Thm:</b></p> $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $a^2 + b^2 = c^2$ <p>What can distance/Pythagorean Thm tell us?</p> <p>Lengths of segments and whether they are congruent or not</p>
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**Using what you've learned:**

- Does the quadrilateral formed by the following points fit the properties that we found to be true for parallelograms today? Show mathematical evidence to support your answer.

The vertices of ABCD are A(-5, -3), B(5, 3), C(7, 9), and D(-3, 3).

$$m_{AB} = \frac{3 - (-3)}{5 - (-5)} = \frac{6}{10} = \frac{3}{5}$$

$$m_{CD} = \frac{3 - 9}{-3 - 7} = \frac{-6}{-10} = \frac{3}{5}$$

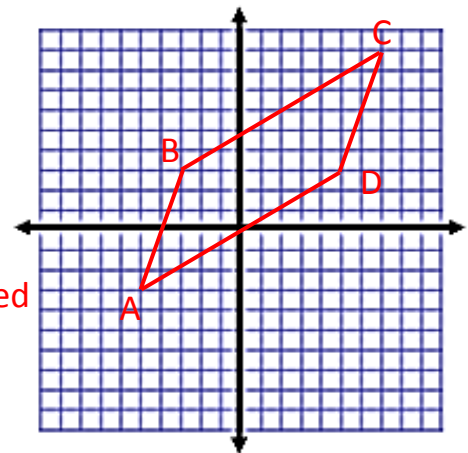
$$m_{BC} = \frac{9 - 3}{7 - 5} = \frac{6}{2} = 3$$

$$m_{AD} = \frac{3 - (-3)}{-3 - (-5)} = \frac{6}{2} = 3$$

AB  $\parallel$  CD

BC  $\parallel$  AD

Yes, def of  
llgram fulfilled



- A parallelogram is formed by the vertices A(1, 1), B(6, 2) and C(2, 4). Find the possible coordinates for the fourth vertex D based on the definition of a parallelogram.

D(7,5) or D(5, -1) or D(-3,3)

\*Keep AC parallel to BD  
by keeping the slopes the  
Same.

