

Coordinate proof of a parallelogram

Name _____

Use Coordinate Geometry to prove that quadrilateral $ABCD$ is a parallelogram given the vertices $A(0, 0)$, $B(2, 6)$, $C(7, 7)$ and $D(5, 1)$.

Method 1

Show that opposite sides are parallel which means they have the same slope.

Formula for the slope $m = \frac{y_2 - y_1}{x_2 - x_1}$

Calculate the slopes of all the sides.

$$m_{\overline{AB}} =$$

$$m_{\overline{BC}} =$$

$$m_{\overline{CD}} =$$

$$m_{\overline{DA}} =$$

Explain why $ABCD$ is a parallelogram:

Method 2

Show that opposite sides are congruent which means they have the same length.

Find the lengths of all four sides

Distance Formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ or Pythagorean Theorem $a^2 + b^2 = c^2$

$$AB =$$

$$CD =$$

$$BC =$$

$$DA =$$

Explain why $ABCD$ is a parallelogram:

Method 3

Show that diagonals bisect each other which means they have the same midpoint.

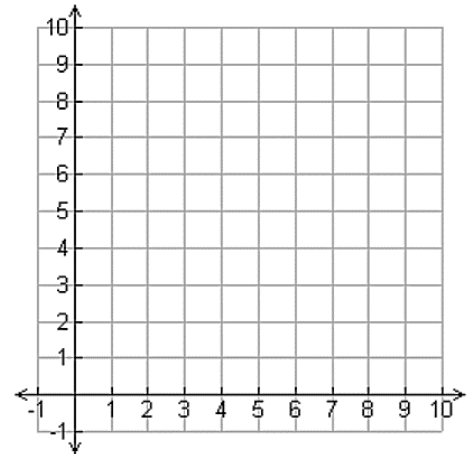
Find the midpoint of both diagonals.

Midpoint Formula $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

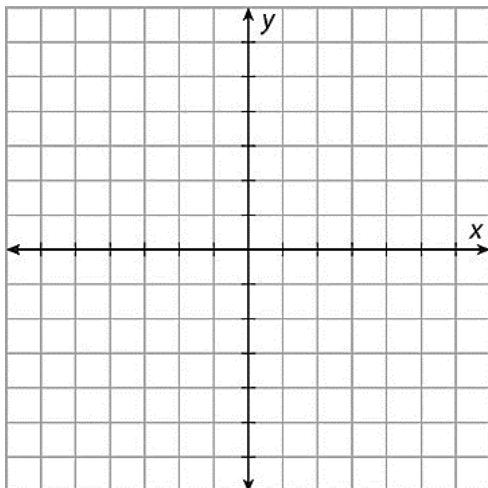
$$\text{midpoint of } AC =$$

$$\text{midpoint of } BD =$$

Explain why $ABCD$ is a parallelogram:



1. Prove that quadrilateral $A(2, -1) B(1, 3) C(6, 5) D(7, 1)$ is a parallelogram.

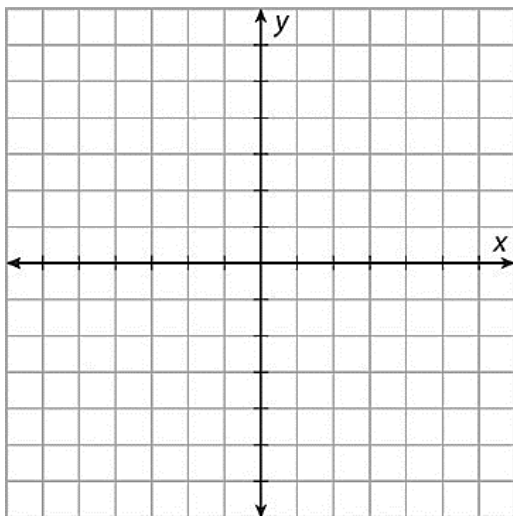


I know $ABCD$ is a parallelogram because _____

_____.

I know this since _____.

2. Prove that quadrilateral $W(-1, 5) X(-3, -3) Y(2, -5) Z(4, 3)$ is a parallelogram.



I know $WXYZ$ is a parallelogram because _____

_____.

I know this since _____.