

Name: _____ Date: _____

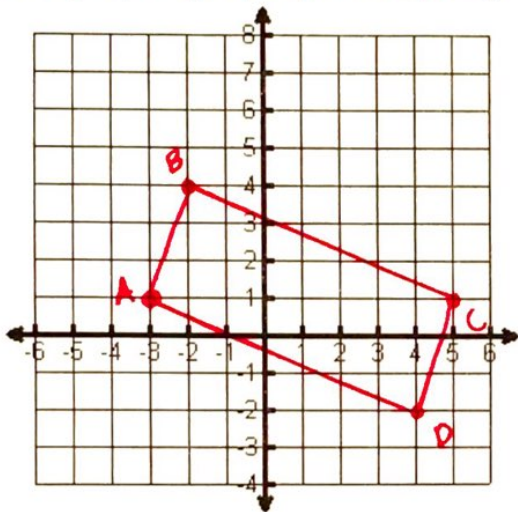
Key

Connecting Algebra & Geometry through Coordinates

Example 1:

Plot and label each point.

A(-3, 1), B(-2, 4), C(5, 1), and D(4, -2)



1a: A parallelogram has opposite sides parallel.

Using the definition above, prove ABCD is a parallelogram.

$$mAB = \frac{3}{1} = 3 \quad mBC = -\frac{3}{7}$$

$$mDC = \frac{3}{1} = 3 \quad mAD = -\frac{3}{7}$$

$$AB \parallel DC \text{ and } BC \parallel AD$$

1b: A parallelogram has opposite sides congruent.

Using the definition above, prove that ABCD is a parallelogram.

$$AB = 3^2 + 1^2 = c^2 = 3.16 \quad BC = 3^2 + 7^2 = 7.62$$

$$DC = 3.16 \quad AD = 7.62$$

$$AB \cong DC \text{ and } BC \cong AD$$

Is ABCD a parallelogram?

YES

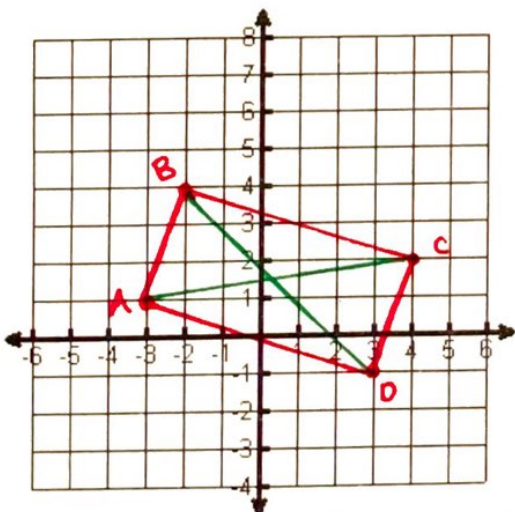
NO

$AB \parallel DC$ and $BC \parallel AD$ and
 $AB \cong DC$ and $BC \cong AD$

Example 2:

Plot and label each point.

A(-3, 1), B(-2, 4), C(4, 2), and D(3, -1)



2a: A rectangle has four right angles.

Using the definition above, prove ABCD is a rectangle.

$$mAB = \frac{3}{1} = 3 \quad mCD = 3$$

$$mBC = -\frac{2}{6} = -\frac{1}{3} \quad mDA = -\frac{1}{3}$$

$AB \perp BC$; $BC \perp CD$; $CD \perp DA$; $DA \perp AB$

2b: A rectangle has congruent diagonals.

Using the definition above, prove ABCD is a rectangle.

$$BD = 5^2 + 5^2 = c^2 = 7.1$$

$$AC = 7^2 + 1^2 = c^2 = 7.1 \quad BD \cong AC$$

Is ABCD a rectangle?

YES

NO

ABCD has four right angles and congruent diagonals

Decide whether Point A is INSIDE, OUTSIDE or ON the circle.

	LENGTH OF CP (RADIUS)	LENGTH OF CA	IN/OUT/ON
P(-6,2) C(4,-3) A(-3,2)	$CP = \sqrt{(-6-4)^2 + (2-(-3))^2}$ $CP = \sqrt{-10^2 + 5^2}$ $CP = \sqrt{125}$ $= 5\sqrt{5} \approx 11.18$	$CA = \sqrt{(-3-4)^2 + (2-(-3))^2}$ $CA = \sqrt{(-7)^2 + 5^2}$ $CA = \sqrt{74} \approx 8.6$	A is inside $8.6 < 11.18$
P(6,3) C(3,-1) A(-1,-4)	$CP = \sqrt{(6-3)^2 + (3-(-1))^2}$ $CP = \sqrt{3^2 + 4^2}$ $CP = 5$	$CA = \sqrt{(-1-3)^2 + (-4-(-1))^2}$ $CA = \sqrt{(-4)^2 + (-3)^2}$ $= \sqrt{25}$ $CA = 5$	A is ON $5 = 5$
P(-3,4) C(-5,7) A(-6,1)	$CP = \sqrt{(-3-(-5))^2 + (4-7)^2}$ $= \sqrt{2^2 + 3^2}$ $= \sqrt{13}$ $CP \approx 3.61$	$CA = \sqrt{(-6-(-5))^2 + (1-7)^2}$ $= \sqrt{-1^2 + -6^2}$ $= \sqrt{37} \approx 6.08$	A is outside $3.61 < 6.08$
P(-3,0) C(2,3) A(3,-4)	$CP = \sqrt{(2-(-3))^2 + (3-0)^2}$ $= \sqrt{5^2 + 3^2}$ $= \sqrt{34} \approx 5.83$	$CA = \sqrt{(3-2)^2 + (-4-3)^2}$ $= \sqrt{1^2 + 7^2}$ $= 5\sqrt{2} \approx 7.07$	A is outside $5.83 < 7.07$
P(-2,-1) C(-5,2) A(-9,6)	$CP = \sqrt{(-2-(-5))^2 + (2-(-1))^2}$ $= \sqrt{3^2 + 3^2}$ $= \sqrt{18} \approx 4.24$	$CA = \sqrt{(-9-(-5))^2 + (6-2)^2}$ $= \sqrt{-4^2 + 4^2}$ $= \sqrt{32} \approx 5.66$	A is outside $4.24 < 5.66$