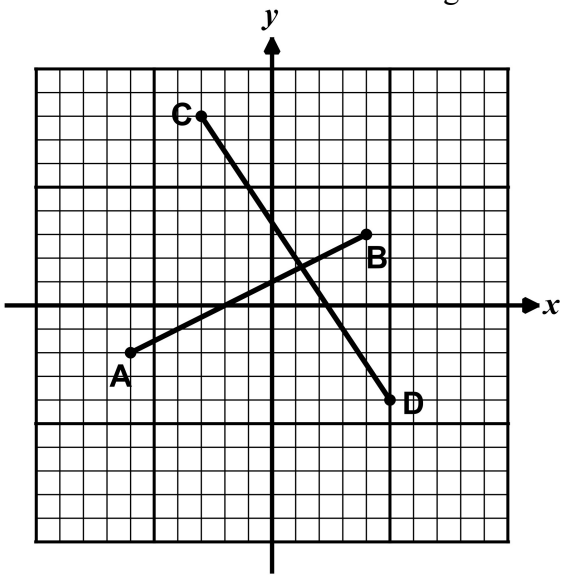
Name: _____ Date: _____

SLOPE AND PARALLELISM
COMMON CORE GEOMETRY

Geometry is the study of physical space, both two dimensional (plane geometry) and three dimensional. So far, we have concentrated on understanding plane geometry using transformations (Unit #2) and Euclidean reasoning (Unit #3). In this unit, we will learn how to use **coordinate geometry** to explore space as well. We start with reviewing the slope of a line.

***Exercise* #1:** Two line segments, $\overline{AB}$ and $\overline{CD}$, are shown graphed below. Determine the slope of both lines graphically. Recall that slope is the ratio of the rise of the line to the run of the line as we move from right to left along the *x*-axis.



Slope of $\overline{AB}$:

rise $= \Delta y =$

run $= \Delta x =$

slope $= m = \dfrac{\Delta y}{\Delta x} =$

Slope of $\overline{CD}$:

rise $= \Delta y =$

run $= \Delta x =$

slope $= m = \dfrac{\Delta y}{\Delta x} =$

In Common Core Algebra I, you worked extensively with slope and **average rate of change**. Many times, you made this calculation without the use of a graph. Recall the following:

SLOPE FORMULA

If (x_1, y_1) and (x_2, y_2) represent the endpoints of a line segment (or any two points on a line), then:

$$\text{slope} = m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} \text{ or } \frac{y_1 - y_2}{x_1 - x_2}$$

***Exercise* #2:** Using the slope formula only, find the slope of the line segment that has the following endpoints. Write your slope in simplest form.

(a) $A(-2, 4)$ and $B(8, 10)$ (b) $C(-10, 3)$ and $D(11, -9)$ (c) $E(2, 11)$ and $F(-2, 3)$

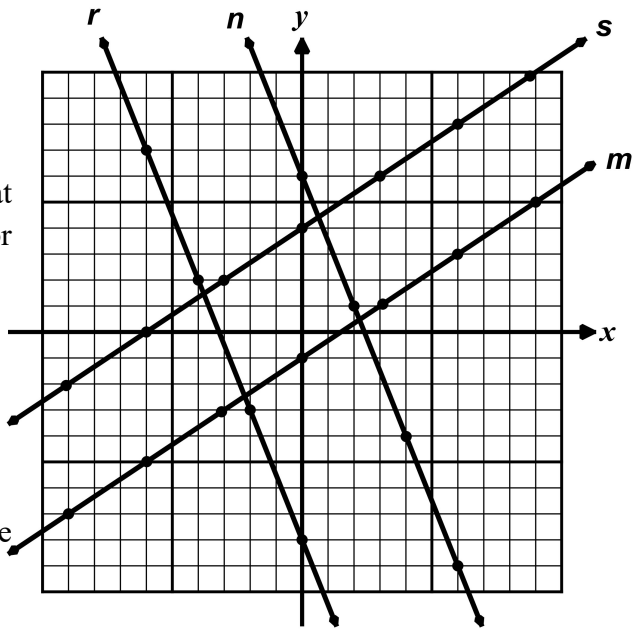
We studied **parallel lines** in Units #2 and #3 extensively. As we know, parallel lines are lines that do not intersect. They have a remarkable property when it comes to their slope.

***Exercise* #3:** In the diagram below, two pairs of parallel lines are shown.

(a) Name the parallel line pairs.

(b) For each pair, determine the slopes of the two lines that make up the pair. You can do this graphically or algebraically.

(c) From this exercise, what seems true about two lines that are parallel?



SLOPE AND PARALLELISM

Two non-vertical lines will be **parallel** if and only if they have **slopes that are equal**.

***Exercise* #4:** Given the points $A(-2,1), B(6,7), C(-4,-3)$ and $D(8,6)$ do the following.

(a) Is $\overline{AB} \parallel \overline{CD}$? Give evidence to support your answer.

(b) Is $\overline{AC} \parallel \overline{BD}$? Give evidence to support your answer.

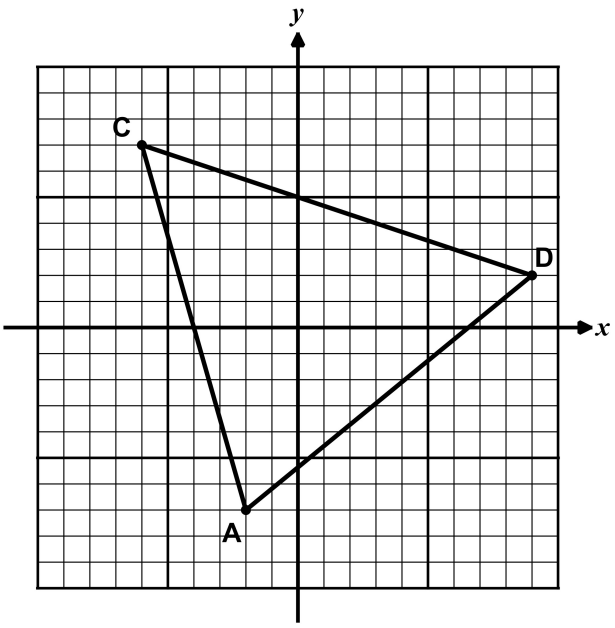
(c) If point *E* exists such that its *x*-coordinate is 12 and $\overline{ED}$ is parallel to $\overline{AC}$, then what is the *y*-coordinate of point *E*? Show how you arrived at your answer.

Name: _____ Date: _____

SLOPE AND PARALLELISM
COMMON CORE GEOMETRY HOMEWORK

MEASUREMENT AND CONSTRUCTION

1. Graphically determine the slopes of the line segments that create ΔACD shown below. Write your final slopes in simplest form.

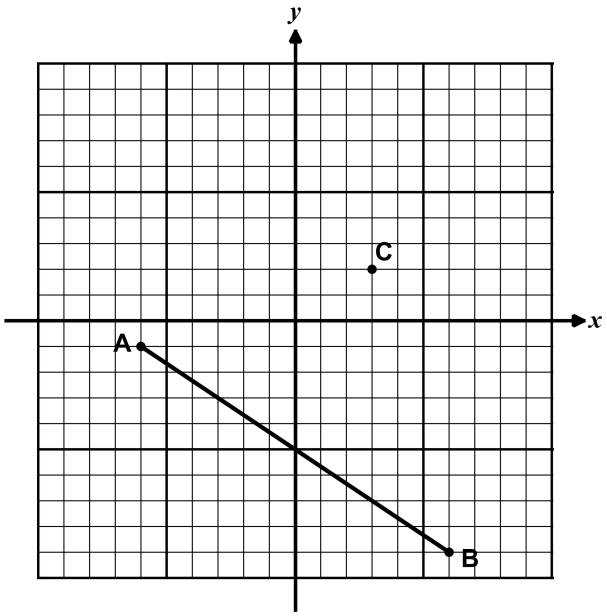


(a) $\overline{AD}$

(b) $\overline{CD}$

(c) $\overline{AC}$

2. On the diagram below, draw a line that passes through point C and is parallel to $\overline{AB}$. Explain how you created your line.



3. If the line you drew in #2 was extended, would it eventually pass through the point $E(18,-8)$? Explain how you determined your yes/no answer.

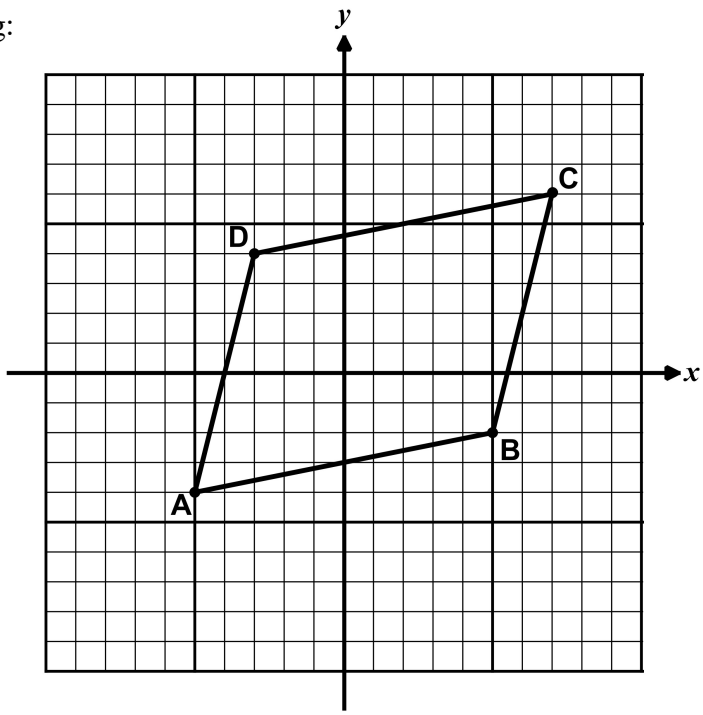
PROBLEM SOLVING

4. Given the four points $A(-3,5), B(1,13), C(4,2)$ and $D(10,5)$ are $\overline{AB}$ and $\overline{CD}$ parallel? Justify.

5. Given the four points $E(2,5), F(7,1), G(2,-3)$ and $H(-8,5)$ is $\overline{EF} \parallel \overline{GH}$? Show how you determined your answer.

REASONING

6. Given quadrilateral *ABCD* shown, answer the following:



(a) Determine the slope of all four sides either algebraically or graphically. Label all slopes.

(b) State all pairs of parallel sides based on (a).

(c) What type of figure does this represent?