

## Coordinate Geometry

1/8

## Match the formula to its description

1.  $\frac{y_2 - y_1}{x_2 - x_1}$

A. Distance Formula

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

B. Midpoint Formula

3.  $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

C. Slope Formula

## Fill in the blank

4. Parallel lines have \_\_\_\_\_ slopes.

5. Perpendicular lines form \_\_\_\_\_.

6. Perpendicular lines have \_\_\_\_\_ slopes.

7. If the slope of a line is  $\frac{2}{3}$ , then the slope of line:

$$3. \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

C. Slope Formula

Fill in the blank

4. Parallel lines have equal slopes.

5. Perpendicular lines form right  $\angle$ s.

6. Perpendicular lines have opposite reciprocal slopes.

7. If the slope of a line is  $\frac{2}{3}$ , then the slope of line:

a) parallel to it is  $\frac{2}{3}$  b) perpendicular to it is  $-\frac{3}{2}$

opposite reciprocal  
 ↓ ↓  
 minus (-) flip

opp. ↓  
 flip of  $\frac{2}{3}$  ↙  
 $-\frac{3}{2}$

	To show or calculate the following:	This formula would be needed:
8.	The sides of a quadrilateral are parallel	a. slope    b. midpoint    c. distance
9.	The length of a segment	a. slope    b. midpoint    c. distance
10.	Diagonals bisect each other	a. slope    b. midpoint    c. distance

6. Perpendicular lines have \_\_\_\_\_ slopes.

7. If the slope of a line is  $\frac{2}{3}$ , then the slope of line:

a) parallel to it is \_\_\_\_\_ b) perpendicular to it is \_\_\_\_\_

	To show or calculate the following:	This formula would be needed:
8.	The sides of a quadrilateral are parallel	a. slope b. midpoint c. distance
9.	The length of a segment	a. slope b. midpoint c. distance
10.	Diagonals bisect each other	a. slope b. midpoint c. distance
11.	A right angle	a. slope b. midpoint c. distance
12.	Sides of a quadrilateral are congruent	a. slope b. midpoint c. distance
13.	Diagonals are perpendicular	a. slope b. midpoint c. distance

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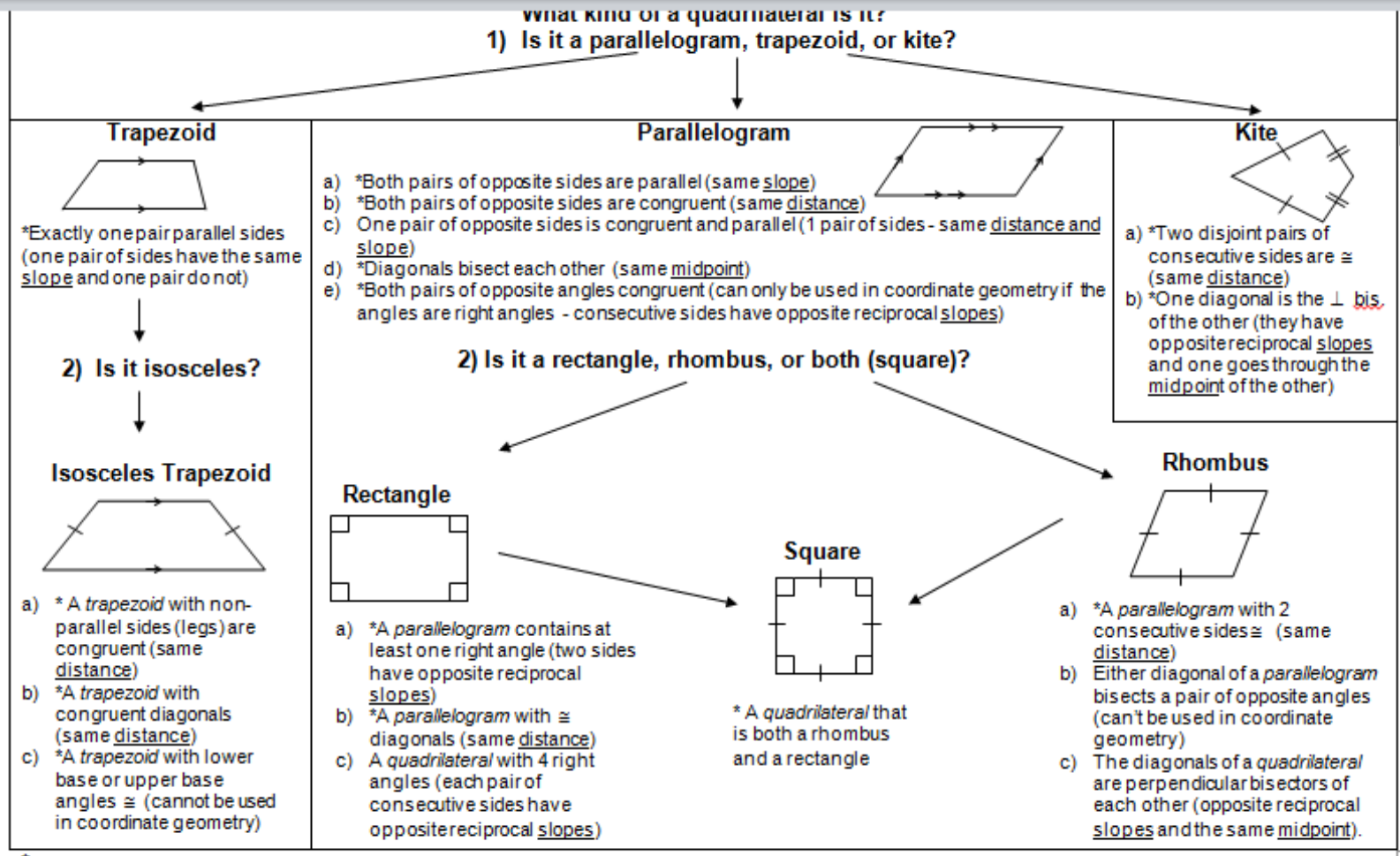
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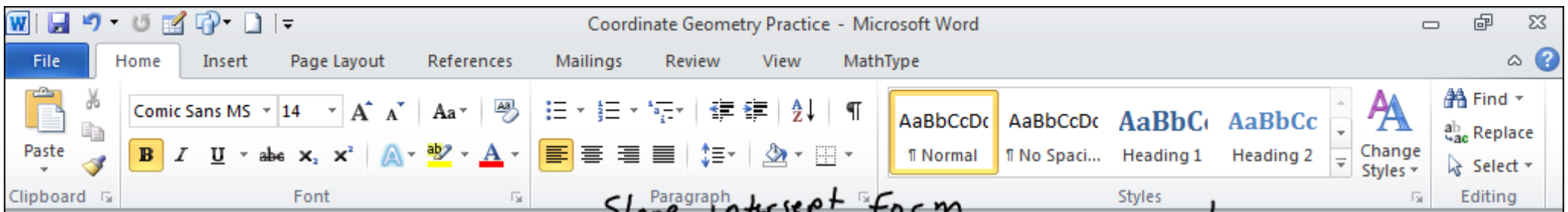
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\* Denote methods that are the converse of a definition or property.  
*Italics* indicate that you must first show a shape to be in a particular category before you get more specific.

Underlining indicates whether you will use the midpoint formula  $\left( M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \right)$ , distance formula  $\left( d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \right)$ , or the slope formula  $\left( m = \frac{y_2 - y_1}{x_2 - x_1} \right)$ .



## Coordinate Geometry Examples

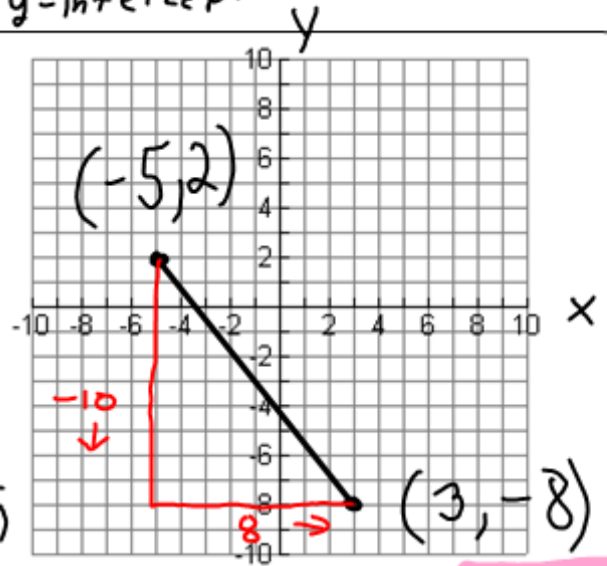
Slope intercept form

$$y = mx + b$$

$\downarrow$  slope                       $\downarrow$  y-intercept

DATE: 1/8

1. Find the following:  $(-5, 2)$   $(3, -8)$
- Midpoint of the segment
  - Distance of the segment
  - Slope of the segment



a.

$$\text{midpt} = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$= \left( \frac{-5 + 3}{2}, \frac{2 + (-8)}{2} \right)$$

$$= \left( \frac{-2}{2}, \frac{-6}{2} \right)$$

$$= (-1, -3)$$

c.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-8 - 2}{3 - (-5)}$$

$$= \frac{-10}{8} \div 2$$

$$= -\frac{5}{4}$$

$(-10)^2 = 100$   
 $- (10^2) = -100$

RISE  $\uparrow$  or  $\downarrow$   
 RUN  $\rightarrow$  or  $\leftarrow$   
 $-\frac{10}{8} = -\frac{5}{4}$

b.

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

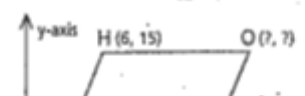
$$= \sqrt{(3 - (-5))^2 + (-8 - 2)^2}$$

$$= \sqrt{(8)^2 + (-10)^2}$$

$$= \sqrt{64 + 100}$$

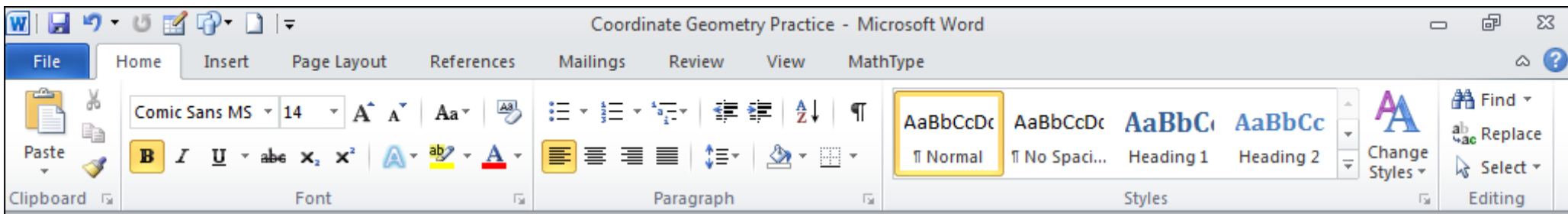
$$= \sqrt{164} \approx 12.8$$

2. RHOM is a rhombus.
- Find the coordinates of point O.
  - Find the slopes of  $\vec{HM}$  and  $\vec{RO}$ .



3. Show that PQRS is a parallelogram.





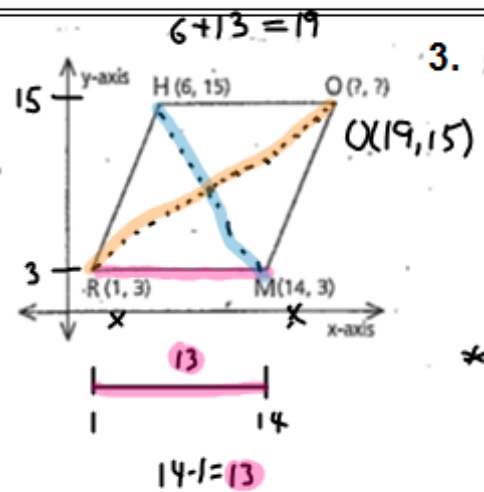
2. RHOM is a rhombus.
- a Find the coordinates of point O.
  - b Find the slopes of  $\overleftrightarrow{HM}$  and  $\overleftrightarrow{RO}$ .
  - c What does the result in part b verify?

a.  $O(19, 15)$

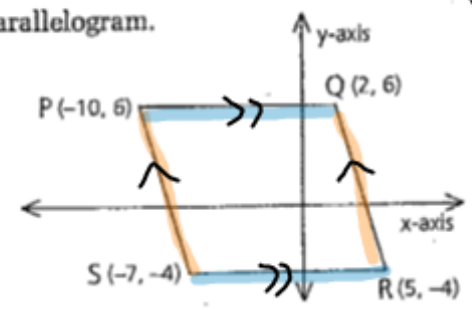
b.  $m_{\overleftrightarrow{HM}} = \frac{3-15}{14-6} = \frac{-12}{8} = -\frac{3}{2}$

$m_{\overleftrightarrow{RO}} = \frac{15-3}{19-1} = \frac{12}{18} = \frac{2}{3}$

c. It verifies that diagonals are  $\perp$  because  $\frac{2}{3}$  is opp. rec. of  $-\frac{3}{2}$ .



3. Show that PQRS is a parallelogram.



\* Answers may vary.

Show  $m_{\overleftrightarrow{PS}} \parallel m_{\overleftrightarrow{QR}}$  and  $m_{\overleftrightarrow{PQ}} \parallel m_{\overleftrightarrow{SR}}$

$m_{\overleftrightarrow{PS}} = \frac{-4-6}{-7-(-10)} = \frac{-10}{3}$

$m_{\overleftrightarrow{QR}} = \frac{-4-6}{5-2} = \frac{-10}{3}$

$m_{\overleftrightarrow{PQ}} = \frac{6-6}{2-(-10)} = \frac{0}{12} = 0$

$m_{\overleftrightarrow{SR}} = \frac{-4-(-4)}{5-(-7)} = \frac{0}{12} = 0$

Since slopes of  $\overleftrightarrow{PS}$  and  $\overleftrightarrow{QR}$  equal,  $\overleftrightarrow{PS} \parallel \overleftrightarrow{QR}$

Since slopes of  $\overleftrightarrow{PQ}$  and  $\overleftrightarrow{SR}$  equal,  $\overleftrightarrow{PQ} \parallel \overleftrightarrow{SR}$

Both pairs opp sides  $\parallel \Rightarrow \square$ .

Coordinate Geometry Practice - Microsoft Word

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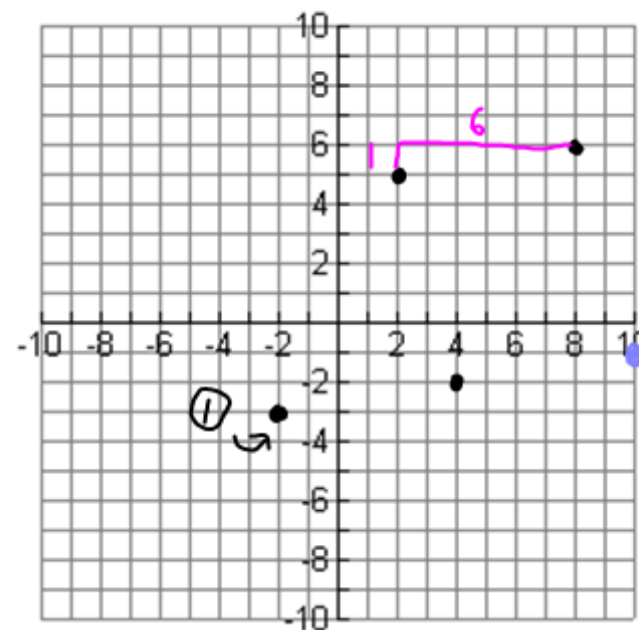
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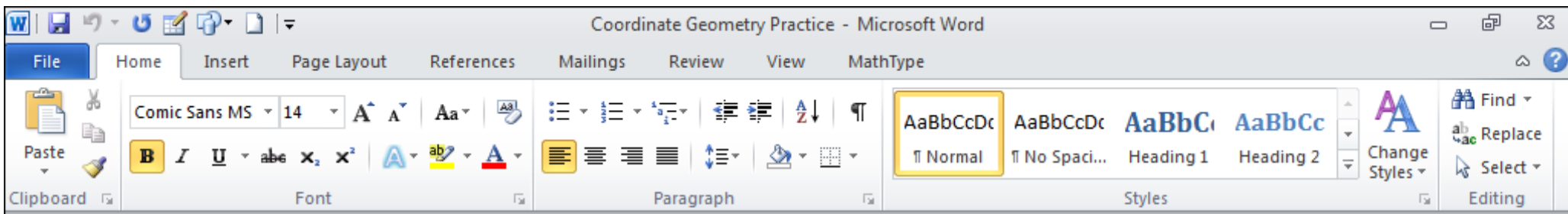
4. Three vertices of parallelogram ABCD are A(8, 6), B(2, 5), and C(4, -2). Find the fourth vertex. Express your answer as an ordered pair.

① (-2, -3)

② (10, -1)

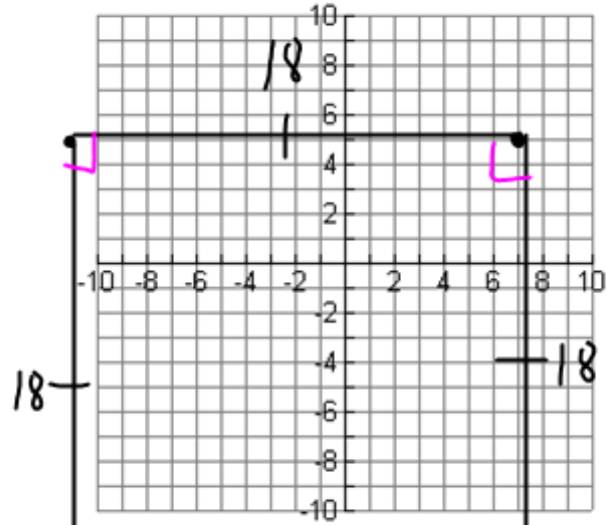


5. What is the most descriptive name for a quadrilateral with vertices  $(-11, 5)$ ,  $(7, 5)$ ,  $(7, -13)$ , and  $(-11, -13)$ ?
6. What is the most descriptive name for a quadrilateral with vertices  $(-7, 2)$ ,  $(2, 8)$ ,  $(6, 2)$ , and  $(-3, -4)$ ? Justify your conclusion.



5. What is the most descriptive name for a quadrilateral with vertices  $(-11, 5)$ ,  $(7, 5)$ ,  $(7, -13)$ , and  $(-11, -13)$ ?

Square. To show, prove  $4 \cong$  sides and  $4$  rt.  $\angle$ s.



7. What is the most descriptive name for the quadrilateral with vertices  $(3, 2)$ ,  $(9, 1)$ ,  $(7, 6)$ , and  $(2, 7)$ ?

You try it!

6. What is the most descriptive name for a quadrilateral with vertices  $(-7, 2)$ ,  $(2, 8)$ ,  $(6, 2)$ , and  $(-3, -4)$ ? Justify your conclusion.

slopes for opp.  $\Rightarrow$  opp. sides  $\Rightarrow$  . Now sides equal are  $\parallel$

Slopes are opp. reciprocals  $\Rightarrow$  at least 1 right  $\angle$ .

So and at least 1 rt.  $\angle \Rightarrow$  rectangle

