

# lesson nineteen - student resource sheet

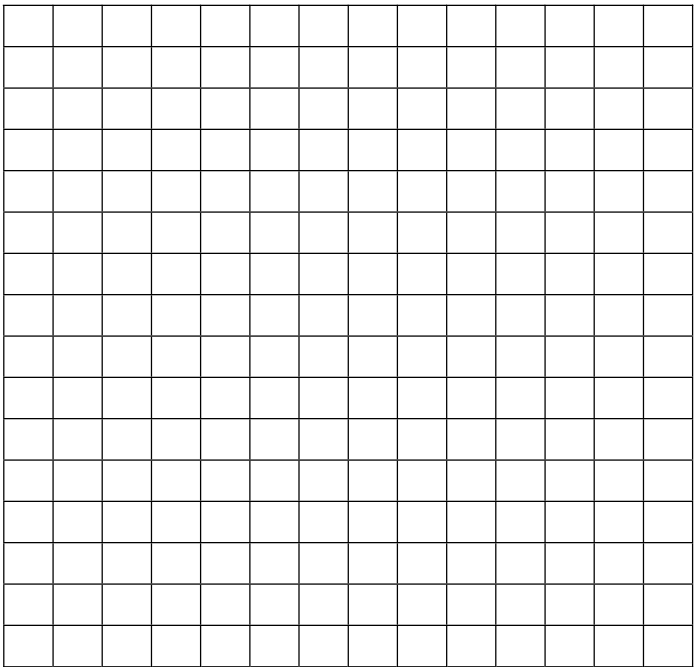
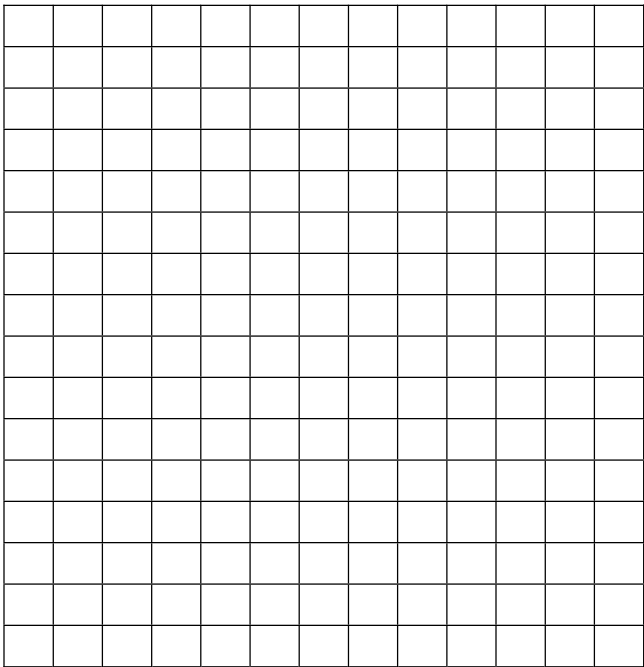
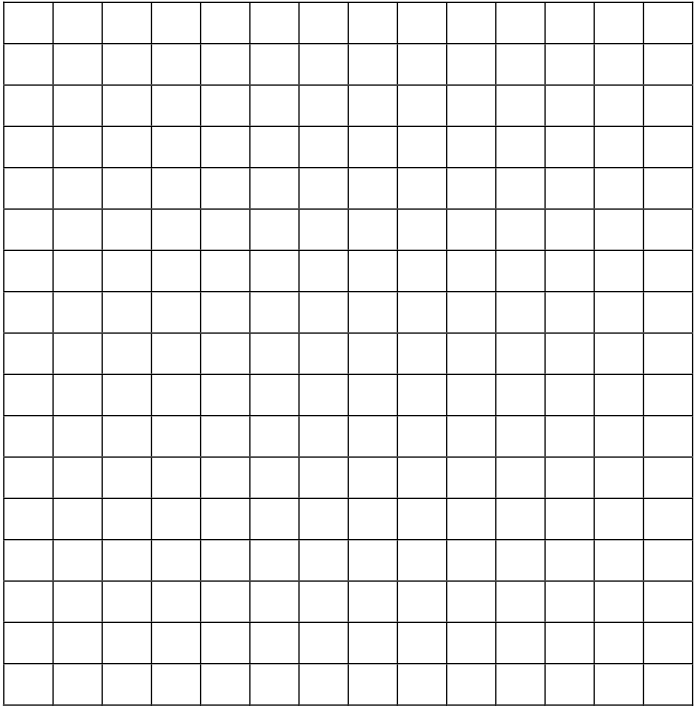
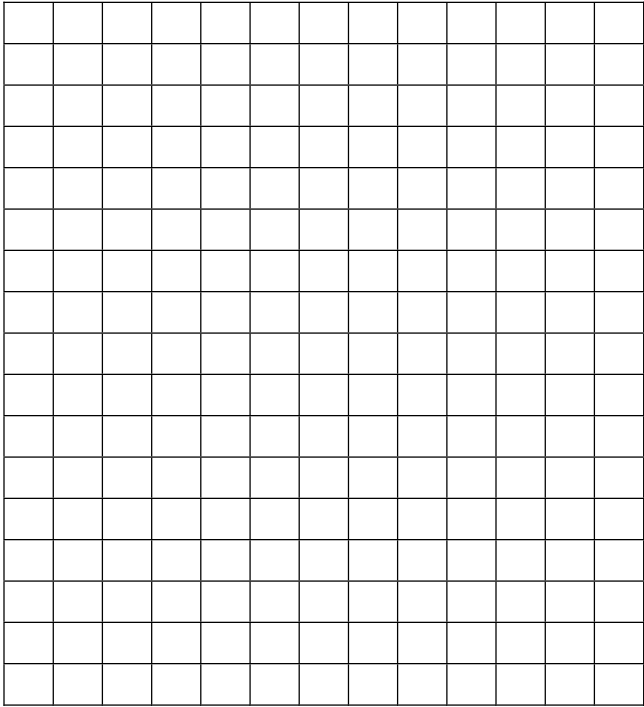
**Lesson Objective:** Determine the relationship between linear equations and linear functions. Solve equations for  $y$  and use functional notation  $f(x)$ . Evaluate a linear function for given values of the variable.

## Vocabulary Box

**linear equation** – An equation whose graph is a line. Examples:  $y = \frac{3}{4}x + 2$ ;  $3x - 4y = 6$ .

**linear function** – A function whose graph is a line. Examples:  $f(x) = 5x - 7$ ;  $g(x) = -2x$ .

**function notation** – The use of " $f(x)$ " instead of  $y$  in an equation; " $f(x)$ " is read "f of x." Example:  $y = 2x + 3$  can also be written as  $f(x) = 2x + 3$ .



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## Guided Practice

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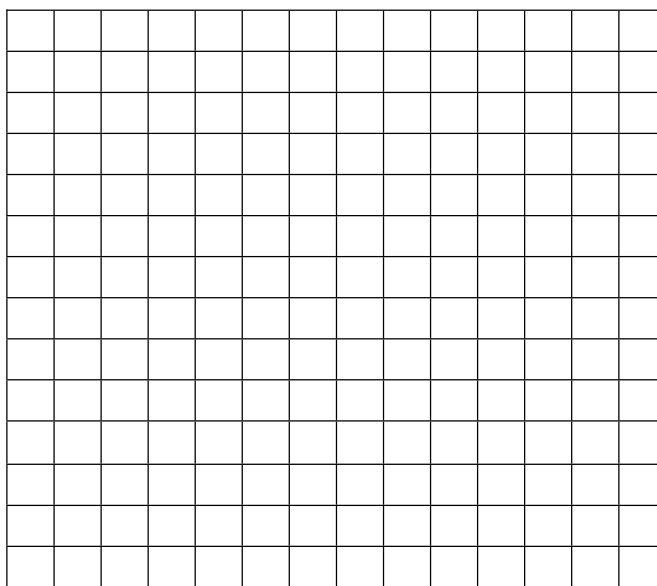
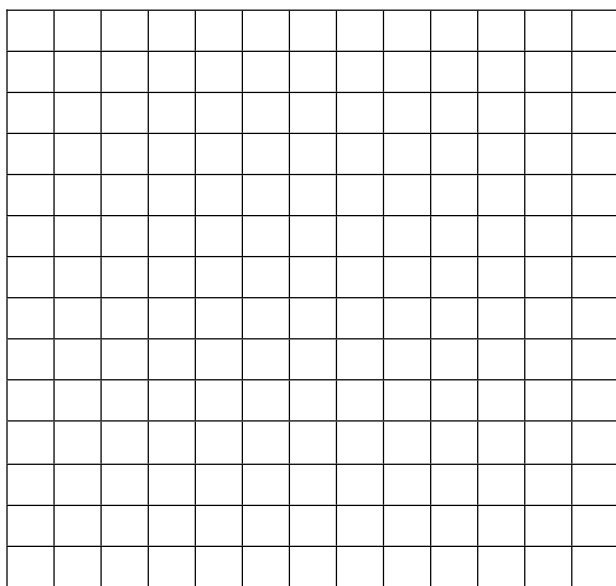
You will complete the following practice problems with your partner. Then your teacher will review the answers.

Directions: Answer the following questions about the linear equation  $y = \frac{5}{2}x + 3$ .

1. Create a table of values for the equation, using at least four different values of  $x$ .
2. Write and graph, on the next page, ordered pairs from your table of values.
3. Graph the line that contains the ordered pairs.
4. Rewrite the equation using function notation.
5. Find  $f(-4)$ ,  $f(-10)$ ,  $f(0)$ ,  $f(6)$ ,  $f(\frac{2}{5})$ , and  $f(1)$ .

Directions: Answer the following questions about the linear equation  $6x - 3y = 18$ .

1. Solve this equation for  $y$ .
2. Create a table of values for the equation, using at least four different values of  $x$ .
3. Write and graph ordered pairs from your table of values.
4. Graph the line that contains the ordered pairs.
5. Rewrite the equation using function notation.
6. Find  $f(-5)$ ,  $f(-11)$ ,  $f(10)$ ,  $f(0)$ , and  $f(6.25)$ .



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## Summary/Closure

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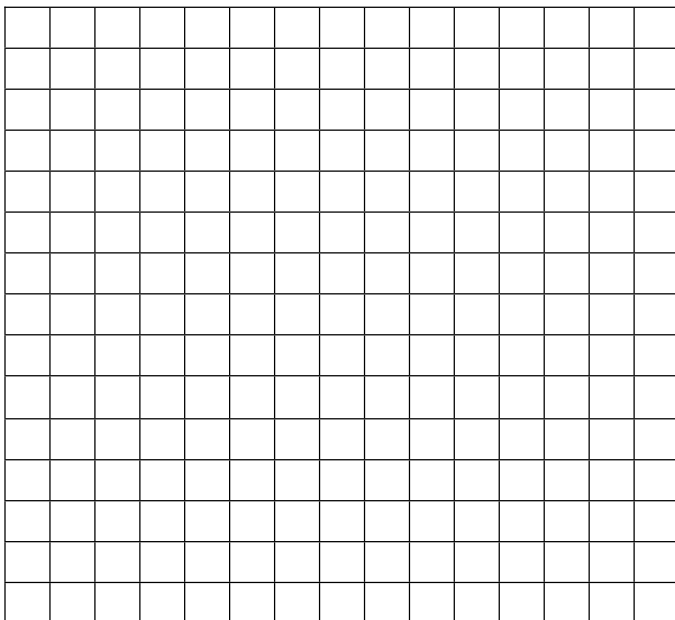
### A. Vocabulary Words

Directions: Reorder the words to make a correct definition.

1. A line is a linear graph whose equation is an equation.
2. A linear line is a function whose graph is a function.
3. The use of equation notation instead of an  $f(x)$  is  $y$  in function.

### B. Summarize What We Learned Today

Directions: Write an example of a linear function, using function notation. Create a table of values for this linear function. Use these values to make ordered pairs, and graph the ordered pairs. Then draw the line that contains these points. You will use this explanation as a personal reference sheet.





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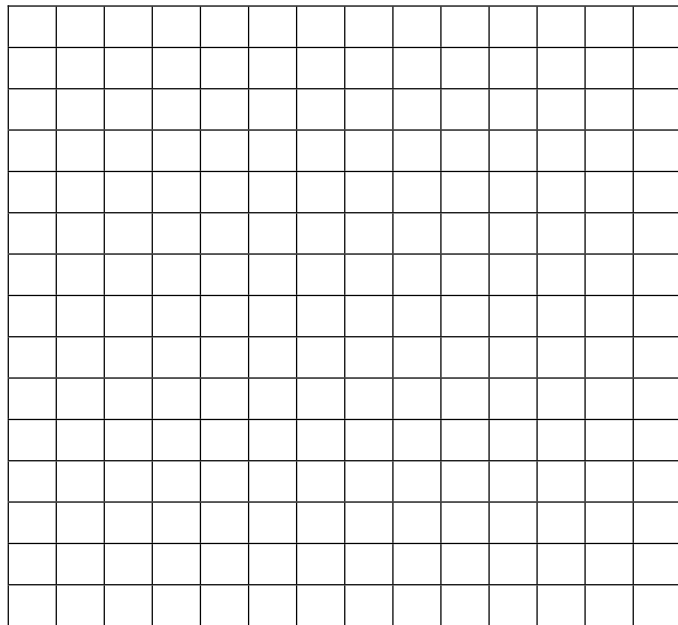
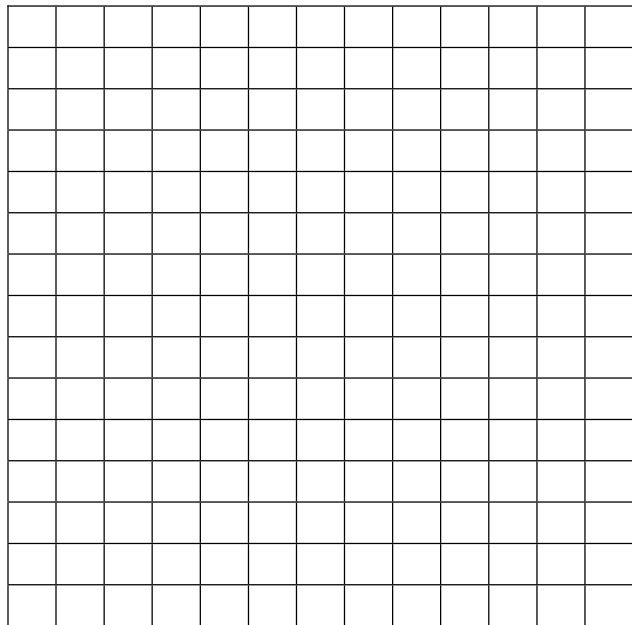
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## Vocabulary Box

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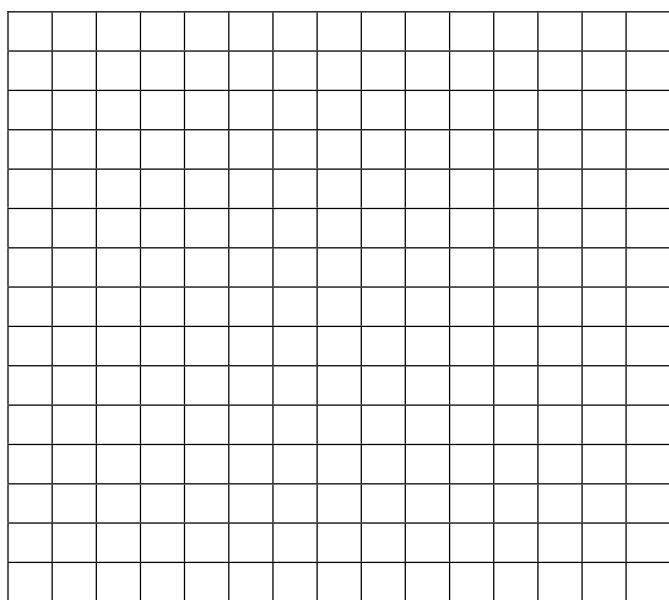
## Independent Practice

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Please complete the following practice problems on your own. Your teacher will review the answers.

Directions: Answer the following questions about the linear equation  $y = -x + 7$ .

1. Write and graph five ordered pairs that satisfy this linear equation.
2. Graph the line that includes these ordered pairs.



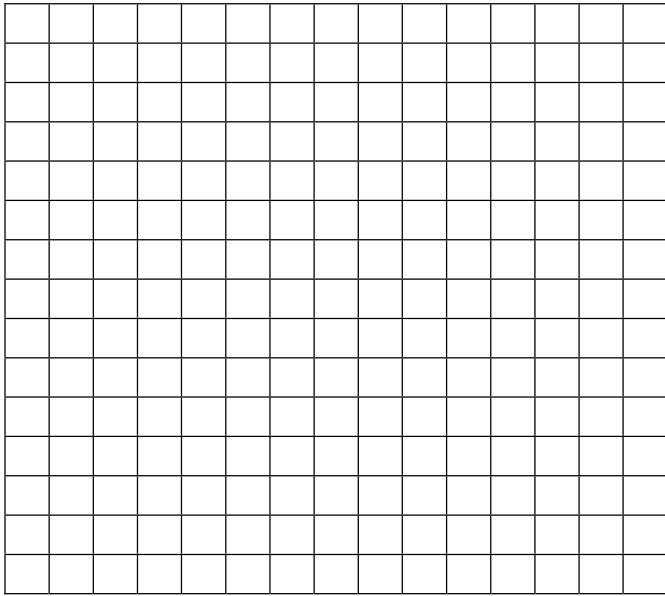
Directions: Answer the following questions about the linear equation  $5y + 10 = 15x$ .

3. Solve this equation for  $y$ .
4. Write and graph five ordered pairs that satisfy this linear equation.



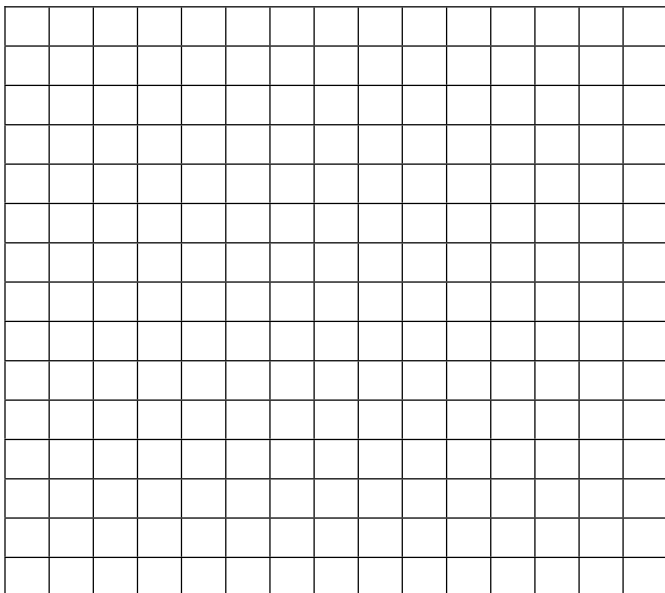
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5. Graph the line that includes these ordered pairs.



Directions: Answer the following questions about the linear equation  $3x + 4y = 20$ .

6. Solve this equation for  $y$ .
7. Write and graph five ordered pairs that satisfy this linear equation.
8. Graph the line that includes these ordered pairs.



Directions: For each function, find  $f(4)$ ,  $f(-6)$ ,  $f(0)$ , and  $f(\frac{7}{2})$ .

9.  $f(x) = x + 9$

10.  $f(x) = -12x$

11.  $f(x) = 8x - 5$

12.  $f(x) = -\frac{1}{4}x + 6$

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Directions: For each function, find  $f(-2)$ ,  $f(-1)$ ,  $f(0)$ ,  $f(1)$ ,  $f(2)$ , and  $f(3)$ . Then tell whether the graph is a linear function or another type of function.

A.  $f(x) = x^2 + 4x - 12$

B.  $f(x) = |3x - 7|$

C.  $f(x) = -3(4x - 5)$

## Problem Solving

### Maintain Your Composure

When we evaluate one function and then another function based on the value of the first function, these functions are called composite functions.

#### Examples:

Find the following for  $f(x) = x + 5$  and  $g(x) = -3x$ .

a.  $f(g(4)) = f(-3 \cdot 4)$       First, evaluate the function inside parentheses for 4.  
     $= f(-12)$   
     $= -12 + 5$       Then, evaluate the function outside parentheses for  $g(4)$ ,  
     $= -7$               which you just found to be  $-12$ .

b.  $g(f(-10)) = g(-10 + 5)$   
     $= g(-5)$   
     $= -3 \cdot -5$   
     $= 15$

c.  $f(f(-7)) = f(-7 + 5)$   
     $= f(-2)$   
     $= -2 + 5$   
     $= 3$

#### Your Turn:

1. Find  $g(g(6))$  for the above example.
2. Find  $f(g(f(-3)))$  for the above example.

For each of the following composite functions, find the value of  $x$  that will make the equation true.

3.  $f(x) = x + 2$   
     $g(x) = 7x$   
     $f(g(x)) = 37$

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4.  $f(x) = x + 2$   
 $g(x) = 7x$   
 $g(f(x)) = -21$

5.  $f(x) = 2x - 9$   
 $g(x) = x - 4$   
 $f(g(x)) = -1$

6.  $f(x) = 2x - 9$   
 $g(x) = x - 4$   
 $g(f(x)) = -1$

7.  $f(x) = 12 - 5x$   
 $f(f(x)) = 52$

8.  $f(x) = 2x^3$   
 $g(x) = -x + 7$   
 $f(g(x)) = -54$



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Directions: Answer the following questions for the linear equation  $2x - y = 5$ .

1. Solve the equation for  $y$ . Then rewrite it using function notation.

2. For this function, find  $f(-3)$ ,  $f(0)$ ,  $f(2)$ , and  $f(6)$ .

3. Evaluate the function  $f(x) = \frac{1}{2}x - 1$  for  $f(12)$ ,  $f(-6)$ , and  $f(\frac{1}{2})$ .

# Lesson twenty-one - student resource sheet

**Lesson Objective:** Develop the concept of slope as a rate of change, and determine slope by using either two points on a line or the graph of a line. Describe lines that have slopes that are positive, negative, zero, or undefined.

## Vocabulary Box

**slope** – The steepness of a line expressed as a ratio. Example: In  $y = -\frac{3}{4}x - 5$ ,  $-\frac{3}{4}$  is the slope.



## Guided Practice

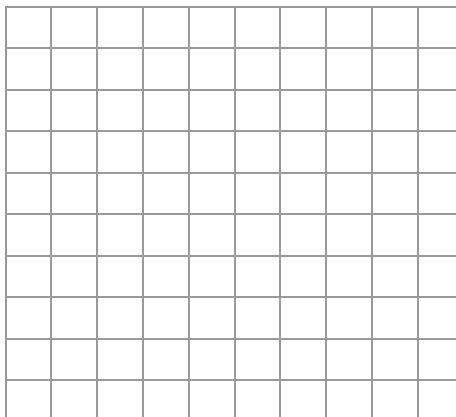
Complete the following practice problems with your partner. Then your teacher will review the answers. Make sure that you show all important work.

Directions: Find the slope of the line that contains each pair of points.

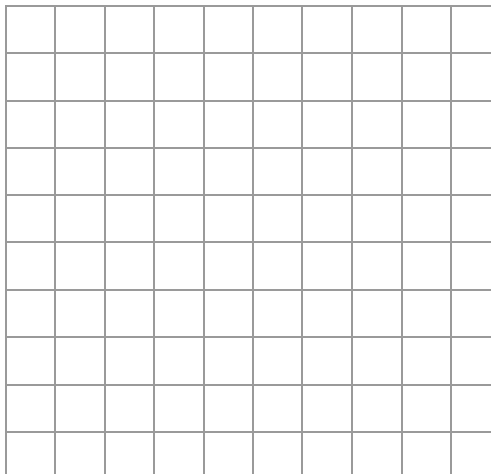
1.  $(7, -2)$  and  $(5, 6)$
2.  $(2, -5)$  and  $(-3, -5)$

Directions: On the graph paper below, graph the following lines, find their slopes, and describe the direction of the slopes.

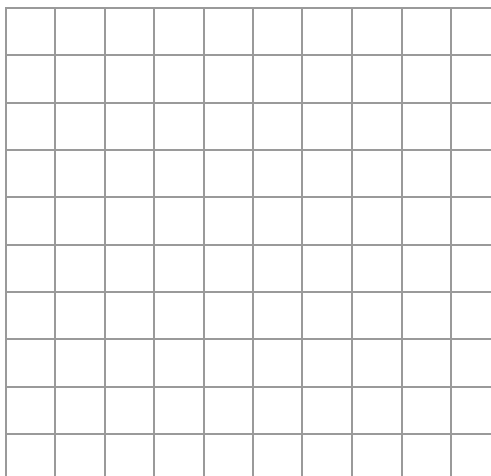
1. A line with the equation  $y = -\frac{4}{3}x$ .



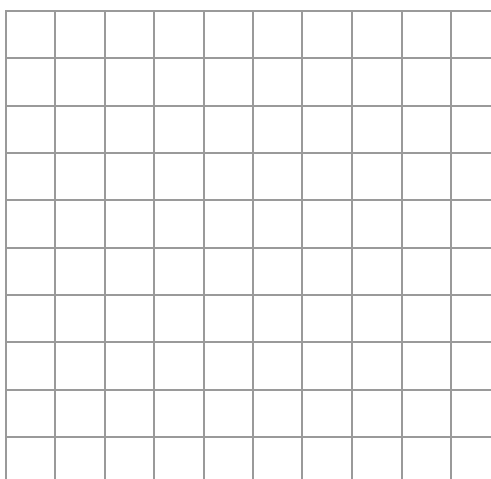
2. A line with the equation  $y = x$ .



3. A line through the points  $(-1, 2)$ ,  $(0, 2)$ , and  $(3, 2)$ .



4. A line through the points  $(-4, 3)$ ,  $(-4, -3)$ , and  $(-4, -5)$ .





# Lesson twenty-one - student resource sheet



## Summary/Closure

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### A. Vocabulary Words

Directions: Write each of the four directions that lines can travel. To the right of each, write a possible slope for a line with that direction.

### B. Summarize What We Learned Today

Directions: Graph four lines as we learned today, each line in a different direction. List at least three ordered pairs on each line. Then find the slope of each line. You will use this explanation as a personal reminder.

