<div align="center">

Lines, Lines, Lines!!!
Slope-Intercept Form
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Lesson Plan

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I.   Topic: Slope-Intercept Form

II.   Goals and Objectives:
A. The student will write an equation of a line given information about its graph.
B. The student will learn how to define the variables of the equation of the line.
C. The student will use the equation to solve problems.
D. The student will write an equation of a line given the slope and a point on the line.

III.   Massachusetts Learning Standards:

1.   8.P.5
Identify the slope of a line as a measure of its steepness and as a constant rate of change from its table of values, equation, or graph. Apply the concept of slope to the solution of problems.

2.   8.P.6
Identify the roles of variables within an equation, e.g., $y = mx + b$, expressing y as a function of x with parameters m and b.

3.   8.P.7
Set up and solve linear equations and inequalities with one or two variables, using algebraic methods, models, and/or graph.

4.   10.D.1
Select, create, and interpret an appropriate graphical representation for a set of data and use appropriate statistics to communicate information about the data.

5.   10.P.2
Demonstrate an understanding of the relationship between various representations of a line. Determine a line's slope and x- and y-intercepts from its graph or from a linear equation that represents the line. Find a linear equation describing a line from a graph or geometric description of the line, e.g, by using the "point-slope" or "slope y-intercept" formulas. Explain the significance of a positive, negative, zero, or undefined slope.

6.   10.P.8
Solve everyday problems that can be modeled using systems of linear equations or inequalities. Apply algebraic and graphical methods to the solution. Use technology when appropriate. Include mixture, rate, and work problems.

IV.   Materials:
        A. Whiteboard with dry-erase markers (Blackboard with Chalk could also be used.)
        B. Ruler.
        C. Pencils.
        D. Calculator.
        E. Slope-Intercept Form Worksheets. (Practice Worksheet, Quiz Worksheet.)

V.   Presentation Outline:
        A.   Introduction. "Slope Intercept Form. What does it mean?"

        B.   Write an equation given two points.
                    Example

        C.   Write an equation in slope-intercept form.
                    Example

        D.   Graph equations in slope-intercept form.
                    Example

VI.   Presentation:
        A. Presentation Notes
        B. Power Point Presentation

VII.   Independent Practice: Slope-Intercept Form Worksheet
        A. Class work: #1 - 25 Odds

        B. Homework: #s 2 - 26 Even

        C. Due 2 days from given day. Allow students to complete those questions which they were not
           able to complete in class.

VIII.   Topic Assessment: Slope-Intercept Form Quiz
        A. Answer questions from homework.

        B. 5-Question Quiz: 10 – 15 minutes

        C. 10-Question Quiz: 15 – 20 minutes.

Lines, Lines, Lines!!!

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Slope-Intercept Form
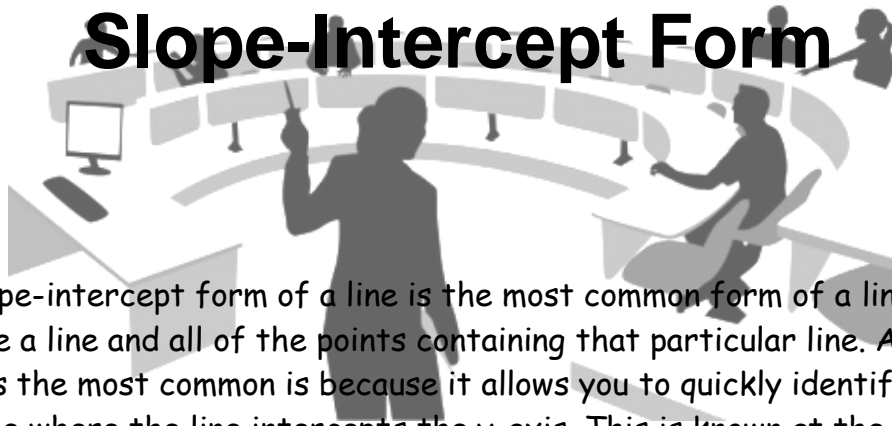
Introduction

The Slope-intercept form of a line is the most common form of a line. It is used to describe a line and all of the points containing that particular line. Another reason why it is the most common is because it allows you to quickly identify the slope and the place where the line intercepts the y-axis. This is known at the y-intercept.

Definitions and Formula

An equation which is in the form y = mx + b is said to be in the slope-intercept form. Each of the variables represents a number found on the line.

(x, y)   ←   x and y represent all of the points on the line.
                         Often refer to as (x_1, y_1) and (x_2, y_2).

'm' (lower case m) ←   is the symbol used to represent the slope.

Remember:

$$m = \frac{Change\ of\ y\ or\ \Delta y}{Change\ of\ x\ or\ \Delta x} = \frac{Rise}{Run} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{+\uparrow \quad -\downarrow}{+\rightarrow \quad -\leftarrow}$$

'b' (lower case b) ←   is the symbol used to represent the y-intercept.
                         We always look for this number on the y-axis to
                         begin our graph.

The letter 'm' and the letter 'b' are constants. In other words, these are numbers which never change. They are constants.

Key Concepts

It is important to learn how to recognize when an equation is in the slope-intercept form and when it is not.

The following lines are in Slope-Intercept Form:

      A. $y = -\frac{2}{3}x + 6$

      B. $y = 5x - 7$

      C. $y = \frac{6}{7}x$

      D. $y = -3$

The following lines are not in Slope-Intercept Form:

      A. $3y = -7x + 12$

      B. $x = 5y + 2$

      C. $7x + 3y = 4$

      D. $-y = -3$

The following lines are in the form of other equations which we will later learn:

A.	y = 5x – 7	←	Slope-Intercept Form
B.	y – 3 = -4(x – 9)	←	Point-Slope Form
C.	6x – 5y = 10	←	Standard Form
D.	y = #	←	Horizontal Line (Zero Slope)
E.	x = #	←	Vertical Line (Undefined Slope)

Let's see a few ways to use the equation for the Slope-Intercept Form.

1. Write an equation in Slope-Intercept Form given two points.
Note:
  (the following examples were used in the previous lesson on slopes)

A. Find the equation of the line that passes through (-1, 4) and (1, -2).

      1. Find the slope between the two points.

          I. Let (-1, 4) = (x_1, y_1) and (1, -2) = (x_2, y_2)

          II. Remember and re-write the slope formula. $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

          III. Substitute the values of the given question. $m = \dfrac{-2 - 4}{1 - (-1)}$

          IV. Simplify as much as possible. $m = \dfrac{-6}{2}$

          V. Divide whenever possible. $m = -3$

      2. Substitute the slope found into the equation. $y = -3x + b$

      3. Find the value of the y-intercept (b) by substituting
         the value of one of the points into the equation. $4 = -3(-1) + b$

Remember:
  This equation represents ALL points on that line; therefore it will not make a
  difference which of the two points is chosen.

      4. Simplify. $4 = 3 + b$

      5. solve for 'b'. $b = 1$

      6. Substitute the value of 'b' into the equation. $y = -3x + 1$
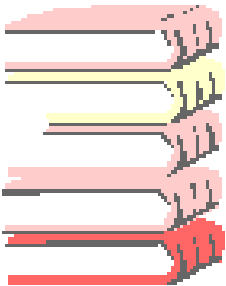
B. Find the equation of the line that passes through (5, -3) and (-4, 3).

   1. Find the slope between the two points.

      I. Let (5, -3) = (x_1, y_1) and (-4, 3) = (x_2, y_2)

      II. Remember and re-write the slope formula. $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

      III. Substitute the values of the given question. $m = \dfrac{3 - (-3)}{-4 - 5}$

      IV. Simplify as much as possible. $m = \dfrac{6}{-9}$

      V. Divide or reduce whenever possible. $m = -\dfrac{2}{3}$

   2. Substitute the slope found into the equation. $y = -\dfrac{2}{3}x + b$

   3. Find the value of the y-intercept (b) by substituting the value of one of the points into the equation. $-3 = -\dfrac{2}{3}(5) + b$

   4. Simplify. $-3 = -\dfrac{10}{3} + b$

   5. solve for 'b'. $b = \dfrac{1}{3}$

   6. Substitute the value of 'b' into the equation. $y = -\dfrac{2}{3}x + \dfrac{1}{3}$

C. Find the equation of the line that passes through (-1, 2) and (3, 4).

   1. Find the slope between the two points.

      I. Let (-1, 2) = (x_1, y_1) and (3, 4) = (x_2, y_2)

      II. Remember and re-write the slope formula. $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

      III. Substitute the values of the given question. $m = \dfrac{4 - 2}{3 - (-1)}$

IV. **Simplify** as much as possible. $\qquad m = \frac{2}{4}$

V. **Divide or reduce** whenever possible. $\qquad m = \frac{1}{2}$

2. Substitute the slope found into the equation. $\qquad y = \frac{1}{2}x + b$

3. Find the value of the y-intercept (b) by substituting
   the value of one of the points into the equation. $\qquad 2 = \frac{1}{2}(-1) + b$

4. Simplify. $\qquad 2 = -\frac{1}{2} + b$

5. Solve for 'b'. $\qquad b = \frac{5}{2}$

6. Substitute the value of 'b' into the equation. $\qquad y = \frac{1}{2}x + \frac{5}{2}$

2. Write the following equations in Slope-Intercept Form. $\dashrightarrow y = mx + b$

A. $\qquad -8y + 8x = -8$

       i. Original equation. $\qquad -8y + 8x = -8$

       ii. Subtract 'x' from both sides. $\qquad -8y + 8x - 8x = -8x - 8$

       iii. Simplify. $\qquad -8y = -8x - 8$

       iv. Divide -8 from both sides. $\qquad \frac{-8}{-8}y = \frac{-8}{-8}x - \frac{8}{-8}$

       v. Simplify. $\qquad y = x + 1$

B. $\qquad 9y - 6y = -9x + (-6)$

       i. Original equation $\qquad 9y - 6y = -9x + (-6)$

       ii. Simplify the equation, adding liked terms. $\quad 3y = -9x - 6$

       iii. Divide 3 from both sides. $\qquad \frac{3}{3}y = \frac{-9}{3}x - \frac{6}{3}$

       iv. Simplify. $\qquad y = -3x - 2$

C. $9y - 5x = -10$

   i. Original equation
   $9y - 5x = -10$

   ii. Add 'x' to both sides
   $9y - 5x + 5x = 5x - 10$

   iii. Simplify.
   $9y = 5x - 10$

   iv. Divide 9 from both sides.
   $\frac{9}{9}y = \frac{5}{9}x - \frac{10}{9}$

   v. Simplify.
   $y = \frac{5}{9}x - \frac{10}{9}$

D. $7x - (-6)x = -2y + 4$

   i. Original equation.
   $7x - (-6)x = -2y + 4$

   ii. Simplify and add liked terms.
   $13x = -2y + 4$

   iii. Subtract '4' from both sides.
   $13x - 4 = -2y + 4 - 4$

   iv. Simplify.
   $13x - 4 = -2y$

   v. Divide -2 from both sides.
   $\frac{13}{-2}x - \frac{4}{-2} = \frac{-2}{-2}y$

   vi. Simplify
   $-\frac{13}{2}x + 2 = y$

   vii. By the reflexive property we can flip it.
   $y = -\frac{13}{2}x + 2$

E. $-7y - (-7)x = 9$

   i. Original equation.
   $-7y - (-7)x = 9$

   ii. Simplify the equation.
   $-7y + 7x = 9$

   iii. Subtract 'x' from both sides.
   $-7y + 7x - 7x = -7x + 9$

   iv. Simplify.
   $-7y = -7x + 9$

   v. Divide -7 from both sides.
   $\frac{-7}{-7}y = \frac{-7}{-7}x + \frac{9}{-7}$

   vi. Simplify.
   $y = x - \frac{9}{7}$

3. Graph the following lines.

Remember:

Write all equations in the slope-intercept form $y = mx + b$.

m = slope.   b = y-intercept.

A. $y = 5x - 1$

(2, 9)

(1, 4)

(0, -1)
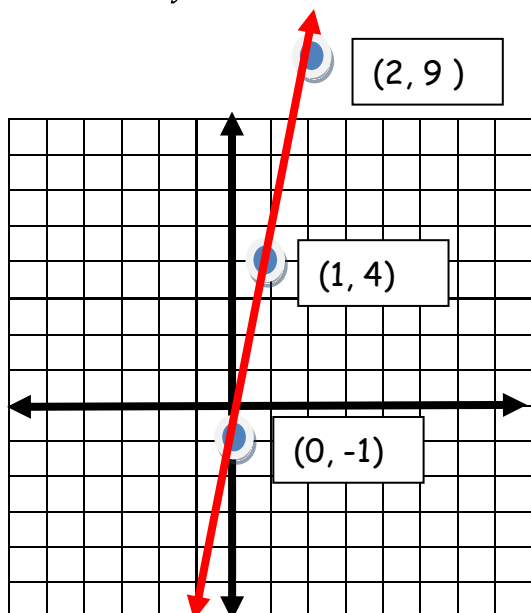
i. Make sure the equation is in slope-intercept form:
$$y = 5x - 1$$

ii. Identify and plot your starting point. Also known as the y-intercept.
$$b = -1$$
Plot the point at (0, -1).

iii. Identify your slope.
$$m = \frac{5}{1} = \frac{rise}{run}$$

iv. Plot the next two points.
   From the y-intercept ('b')
      1. Go up 5.   2. Go right 1.   3. Draw the line.

B. $y = -\frac{3}{2}x + 3$

(0, 3)

(2, 0)

(4, -3)
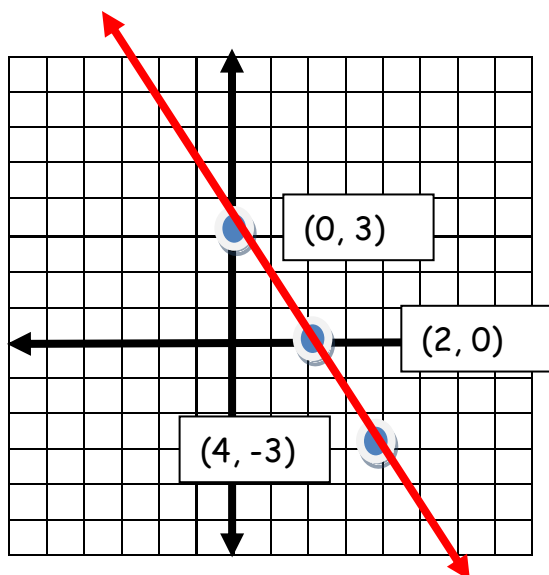
i. Make sure the equation is in Slope-intercept form:
$$y = -\frac{3}{2}x + 3$$

ii. Identify and plot your starting point. Also known as the y-intercept.
$$b = 3$$
Plot the point at (0, 3).

iii. Identify your slope.
$$m = -\frac{3}{2} = \frac{rise}{run}$$

iv. Plot the next two points.
   From the y-intercept ('b')
   1. Go down 3.   2. Go right 2.   3. Draw the line.

C. $3x - y = 6$
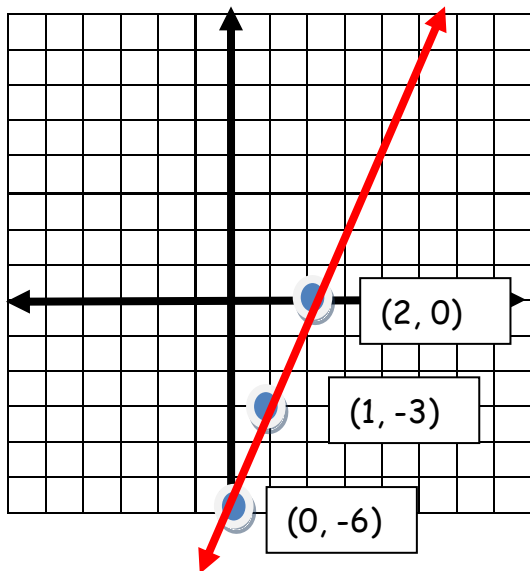
$3x - y = 6 \quad \rightarrow \quad -y = -3x + 6 \rightarrow y = 3x - 6$

i. Make sure the equation is in slope-intercept form:
$$y = 3x - 6$$

ii. Identify and plot your starting point. Also known as the y-intercept.
$$b = -6$$
Plot the point at (0, -6).

(2, 0)

(1, -3)

(0, -6)

iii. Identify your slope.
$$m = \frac{3}{1} = \frac{rise}{run}$$

iv. Plot the next two points.
From the y-intercept('b')
1. Go up. 3 2. Go right 1. 3. Draw the line.

D. $y = \frac{7}{4}x - 2$
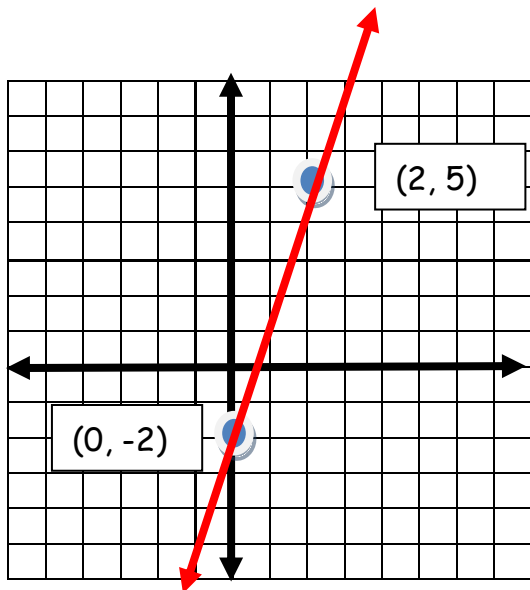
i. Make sure the equation is in slope-intercept form:
$$y = \frac{7}{4}x - 2$$

ii. Identify and plot your starting point. Also known as the y-intercept.
$$b = -2$$
Plot the point at (0, -2).

(2, 5)

(0, -2)

iii. Identify your slope.
$$m = \frac{7}{4} = \frac{rise}{run}$$

iv. Plot the next two points.
From the y-intercept('b')
1. Go down 7. 2. Go right 4. 3. Draw the line.

Slope-Intercept Form

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Student Practice Worksheet

Name_____Date_____Grade_____

Write the slope-intercept form of the equation of each line.

1. $3x - 2y = -16$

2. $13x - 11y = -12$
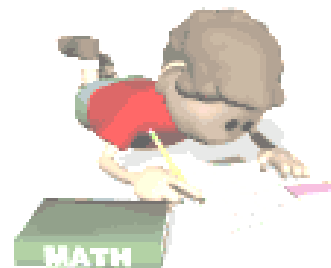
3. $9x - 7y = -7$

4. $x - 3y = 6$

5. $6x + 5y = -15$

6. $4x - y = 1$

7. $11x - 4y = 32$

8. $11x - 8y = -48$

9. $3x + 20 = -4y$

10. $x + 5y = -15$

(Student Practice Worksheet Continued)

11. $y = -4x - 1$ 12. $0 = 5y - x$

13. $-30 + 10y = -2x$ 14. $-x - 1 = y$

Write the equation of the line which passes through the following two points.

15.   (0, 3) and (5, 0)   16.   (2, 3) and (5, 7)

17.   (1.5, -1) and (3, 1.5)   18.   (-2, 4) and (0, 0)

19.   (-2, 3) and (3, -2)   20.   (1, 2) and (4, 5)

(Student Practice Worksheet Continued)

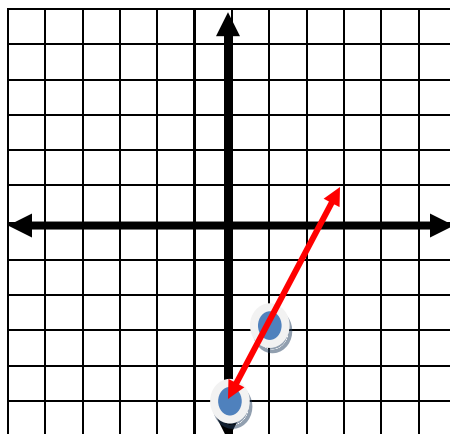Sketch the graph of each line.

21. $y = -\frac{1}{5}x - 2$
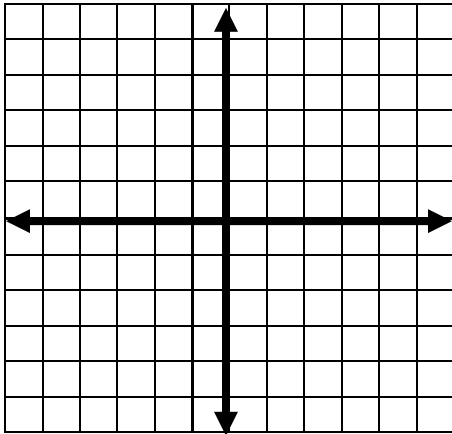
24. $y = -7x + 3$
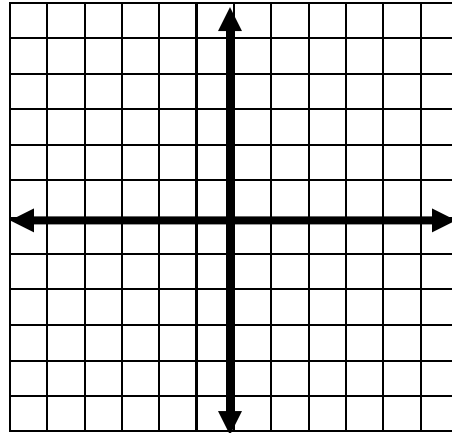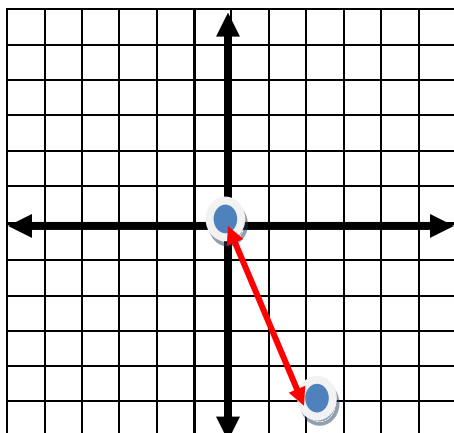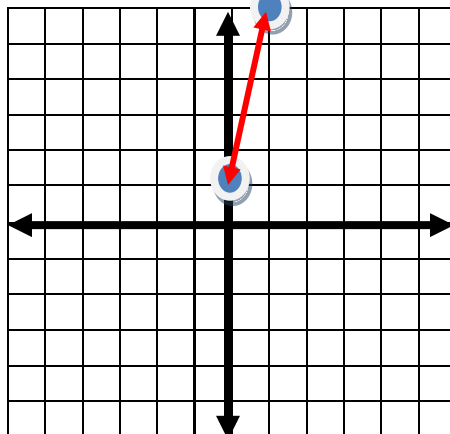
22. $y = -5x - 1$
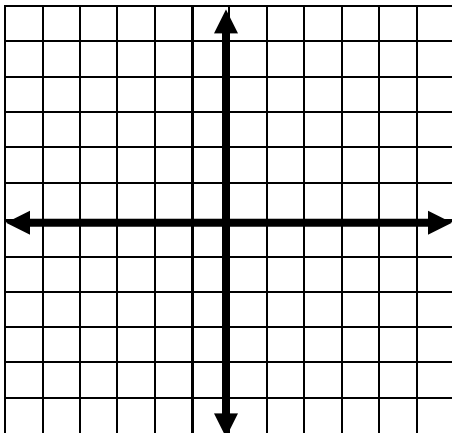
25. $y = 2x - 5$
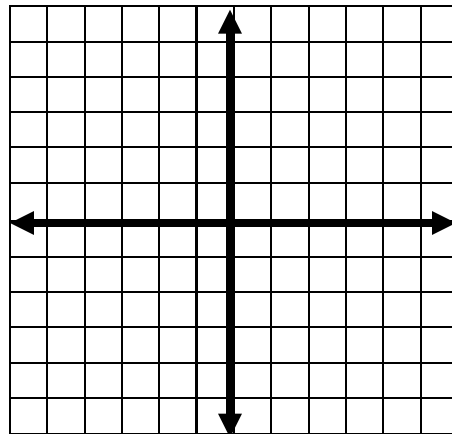
23. $y = -\frac{5}{2}x$
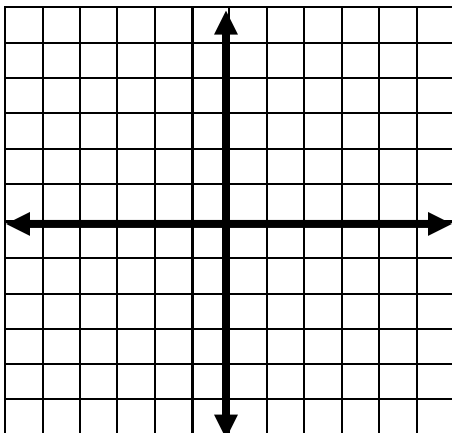
26. $y = 5x + 1$
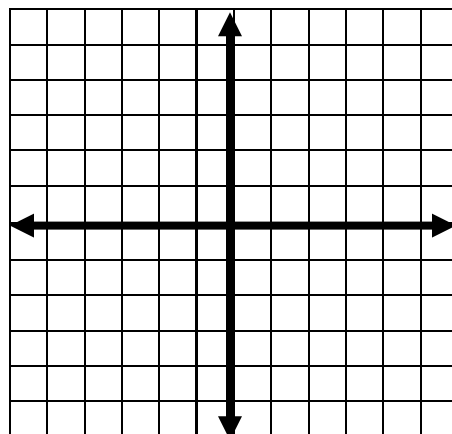
Slope-Intercept Form
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Student Practice Worksheet
Answer Key

Name_____ Date_____ Grade_____

Write the slope-intercept form of the equation of each line.

1. $3x - 2y = -16$

$y = \frac{3}{2}x + 8$

2. $13x - 11y = -12$

$y = \frac{13}{11}x + \frac{12}{11}$

3. $9x - 7y = -7$

$y = \frac{9}{7}x + 1$

4. $x - 3y = 6$

$y = \frac{1}{3}x - 2$

5. $6x + 5y = -15$

$y = -\frac{6}{5}x - 3$

6. $4x - y = 1$

$y = 4x - 1$

7. $11x - 4y = 32$

$y = \frac{11}{4}x - 8$

8. $11x - 8y = -48$

$y = \frac{11}{8}x + 6$

9. $3x + 20 = -4y$

$y = -\frac{3}{4}x - 5$

10. $x + 5y = -15$

$y = -\frac{1}{5}x - 3$

11. $y = -4x - 1$

$y = -4x - 1$

12. $0 = 5y - x$

$y = \frac{1}{5}x$

13. $-30 + 10y = -2x$

$y = -\frac{1}{5}x + 3$

14. $-x - 1 = y$

$y = -x - 1$

Write the equation of the line which passes through the following two points.

15.   (0, 3) and (5, 0)

$y = -\frac{3}{5}x + 3$

16.   (2, 3) and (5, 7)

$y = \frac{4}{3}x + \frac{1}{3}$

17.   (1.5, -1) and (3, 1.5)

$y = \frac{5}{3}x - 3.5$

18.   (-2, 4) and (0, 0)

$y = -2x$

19.   (-2, 3) and (3, -2)

$y = -x + 1$

20.   (1, 2) and (4, 5)

$y = x + 2$

(Student Practice Worksheet Continued) (Answer Key)

Sketch the graph of each line.

21. $y = -\frac{1}{5}x - 2$
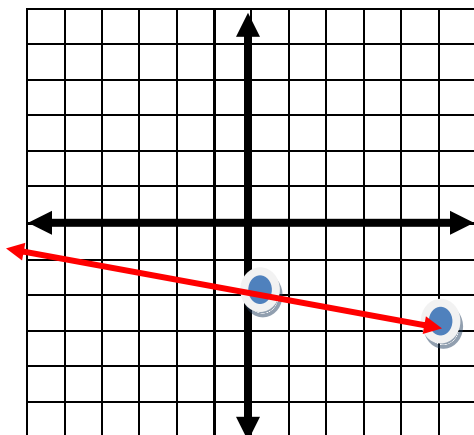
24. y = -7x + 3
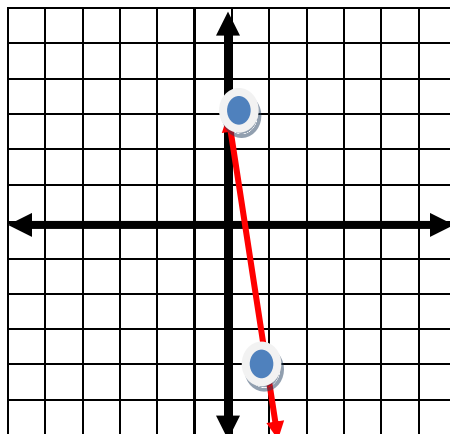
22. y = -5x − 1
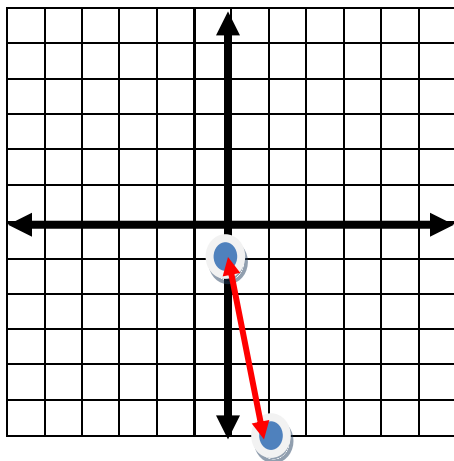
25. y = 2x − 5

23. $y = -\frac{5}{2}x$

26. y = 5x + 1

Slope-Intercept Form
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Student Practice Worksheet
Rubric

Criteria					
	4	3	2	1	0
Mechanics	No math errors	No major math errors or serious flaws in reasoning.	May be some serious math error or flaws in reasoning.	Major math errors or serious flaws in reasoning.	Blank answers

Criteria					
	4	3	2	1	0
Graphing	All criteria is evident: Accurate display of data in the line graph. Accurate label for both axes. Equivalent interval in both axes. Key is accurate	Three of the following are evident: Accurate display of data in the line graph. Accurate label for both axes. Equivalent interval in both axes. Key is accurate.	Two of the following are evident: Accurate display of data in the line graph. Accurate label for both axes. Equivalent interval in both axes. Key contains minor inaccuracies	Inaccurate display of data in the line graph. Inaccurate label for both axes. Different interval in both axes. Key is missing or inaccurate.	Blank Off-task, off topic. Illegible/ unreadable.

Quiz Grading Rubric:

Problem	Total points of Correct Answer		Problem	Total points of Correct Answer	
1.			14.		
2.			15.		
3.			16.		
4.			17.		
5.			18.		
6.			19.		
7.			20.		
8.			21.		
9.			22.		
10.			23.		
11.			24.		
12.			25.		
13.			26.		

Total_____

Slope-Intercept Form
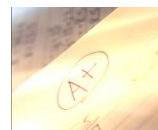
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Quiz

Name_____Date_____Grade_____

A. Find the Slope-Intercept Form of the following equation or set of points.
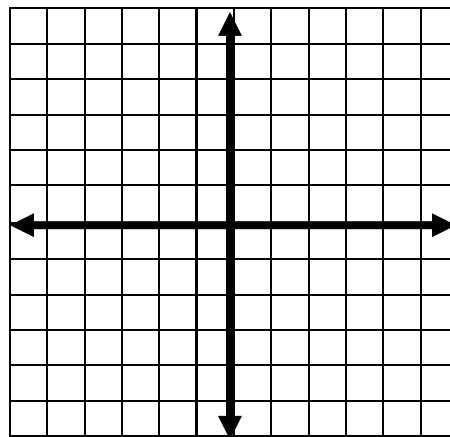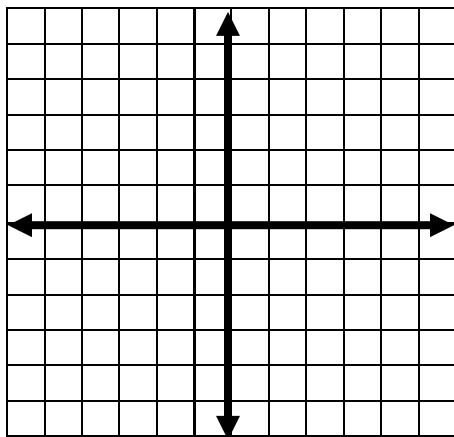B. Graph the equation of the given line in the graph provided.

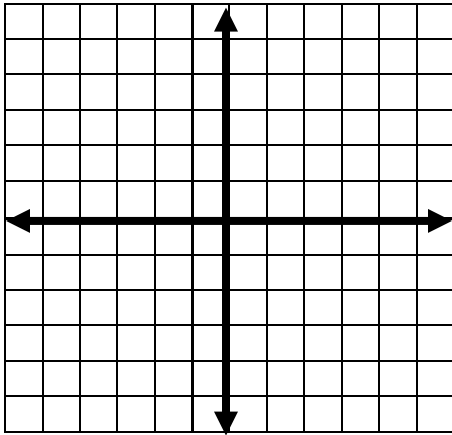1.   -4x + 9x = 3y + (-9)   3.   (0, -4) and (-2, 2)
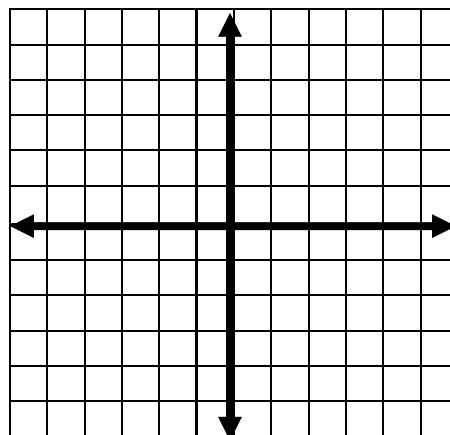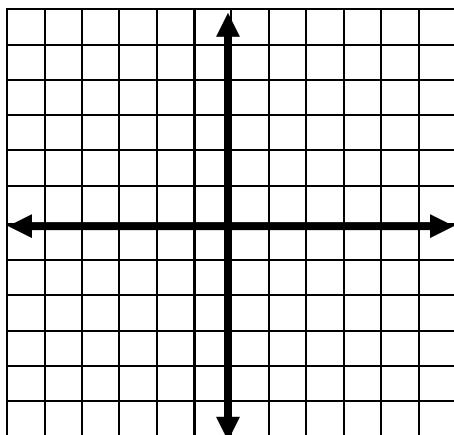
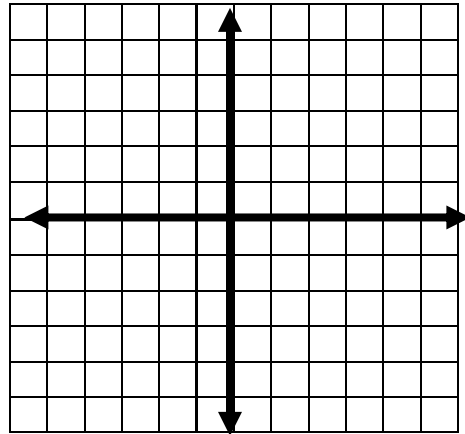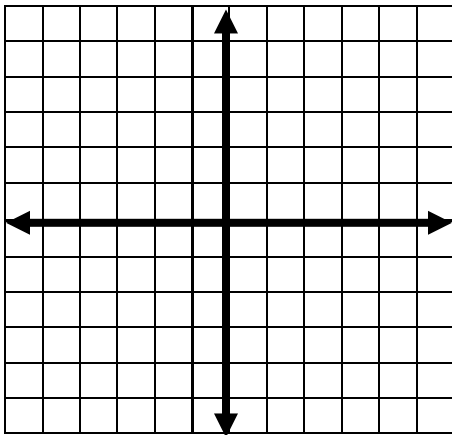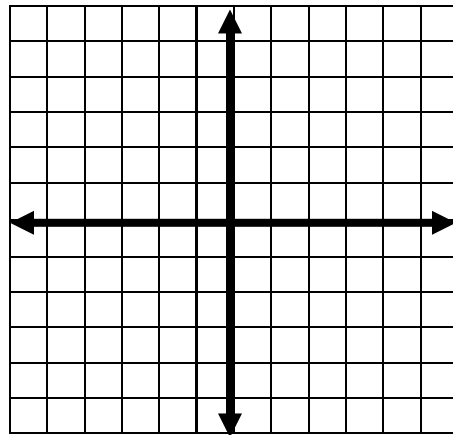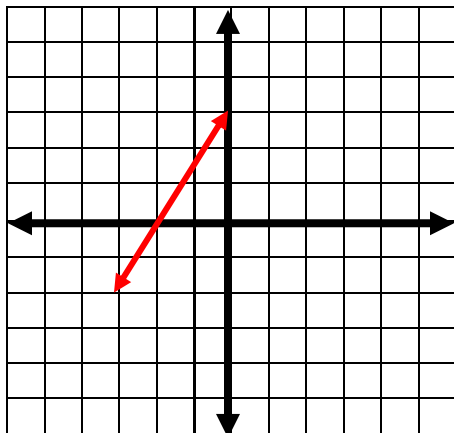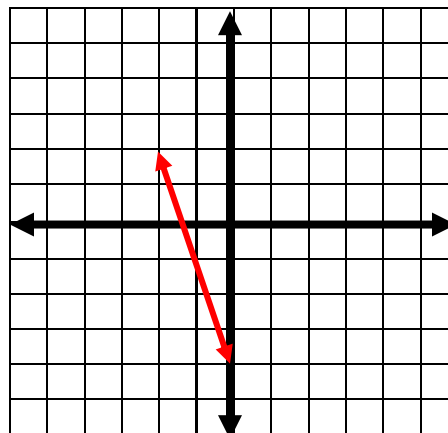2.   -5x - y = -5   4.   -6x – 5y = -5

5. $-10x - (-2)y = -4$

7. $10x + 5y - 5 = 0$

6. $(0, 4)$ and $(-2, -5)$

8. $(2, -4)$ and $(1, -1)$

9. $2x + 3y = 6$

10. $4x - 3y = 3$
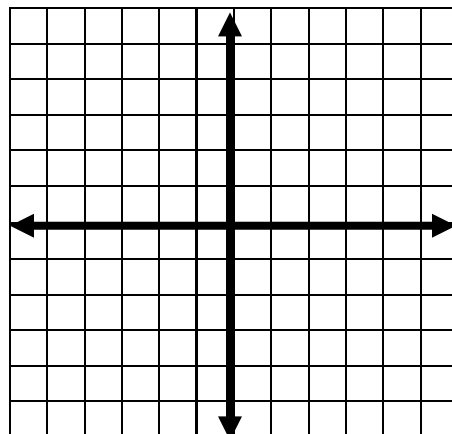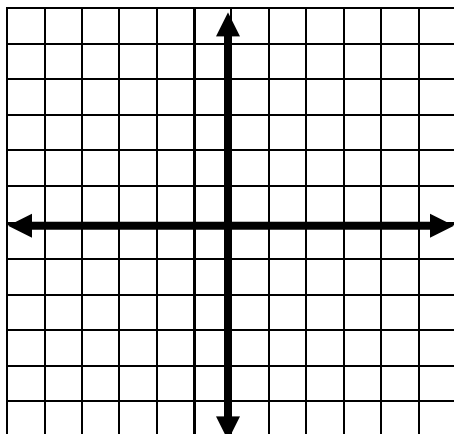
Slope-Intercept Form

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Quiz

Answer Key

Name_____Date_____Grade_____

A. Find the Slope-Intercept Form of the following equation or set of points.
B. Graph the equation of the given line in the graph provided.
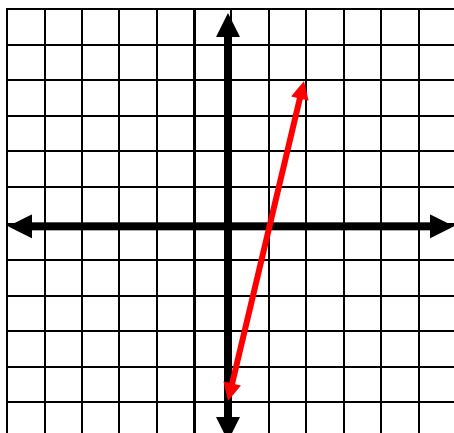
1. $-4x + 9x = 3y + (-9)$

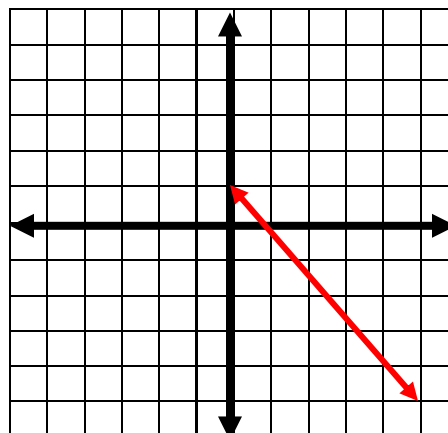$y = \dfrac{5}{3}x + 3$

3. $(0, -4)$ and $(-2, 2)$

$y = -3x - 4$

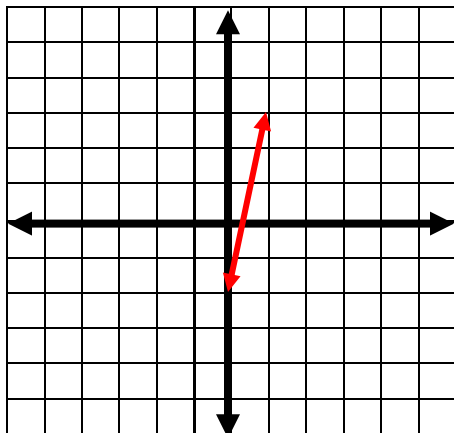2. $-5x - y = -5$

$y = 5x - 5$

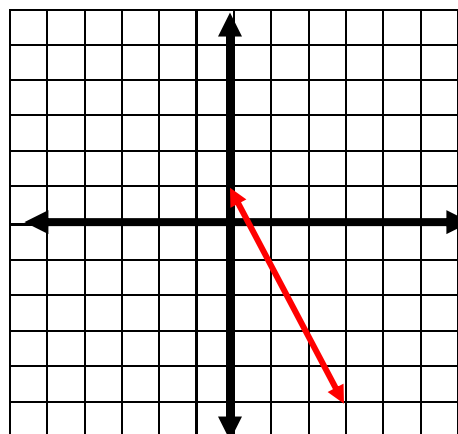4. $-6x - 5y = -5$

$y = -\dfrac{6}{5}x + 1$

5. $-10x - (-2)y = -4$
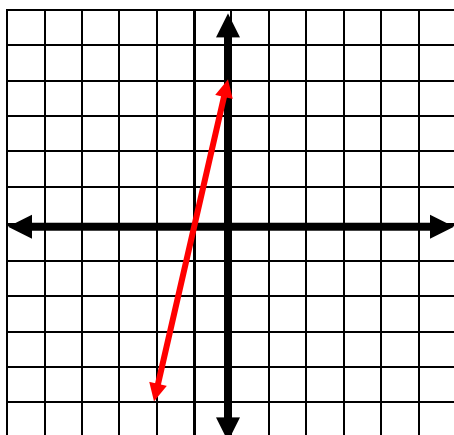
$y = 5x - 2$

7. $10x + 5y - 5 = 0$
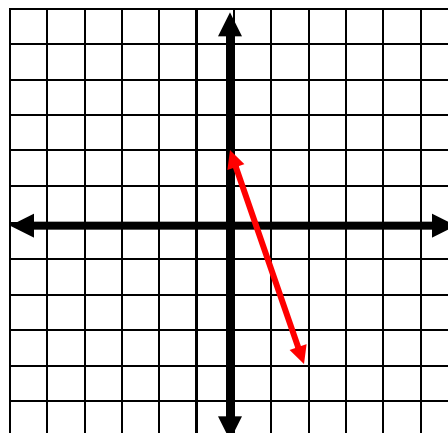
$y = -2x + 1$

6. $(0, 4)$ and $(-2, -5)$
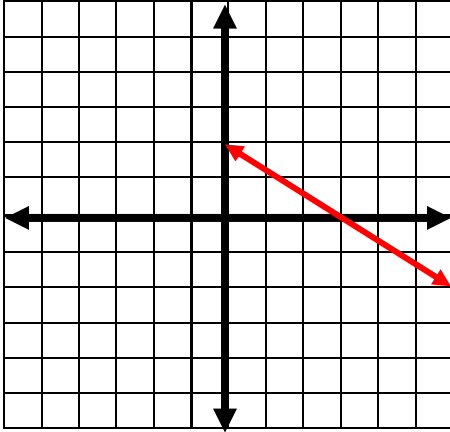
$y = \frac{9}{2}x + 4$

8. $(2, -4)$ and $(1, -1)$

$y = -3x + 2$
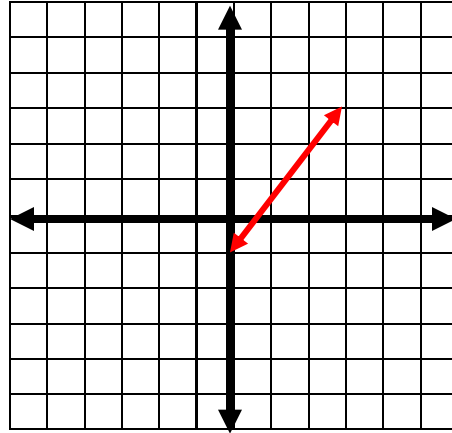
9. $2x + 3y = 6$

$$y = -\frac{2}{3}x + 2$$

10. $4x - 3y = 3$

$$y = \frac{4}{3}x - 1$$

Slope-Intercept Form
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Quiz
Rubric

Criteria					
	4	3	2	1	0
Mechanics	No math errors	No major math errors or serious flaws in reasoning.	May be some serious math error or flaws in reasoning.	Major math errors or serious flaws in reasoning.	Blank answers

Criteria					
	4	3	2	1	0
Graphing	All criteria is evident: Accurate display of data in the line graph. Accurate label for both axes. Equivalent interval in both axes. Key is accurate	Three of the following are evident: Accurate display of data in the line graph. Accurate label for both axes. Equivalent interval in both axes. Key is accurate.	Two of the following are evident: Accurate display of data in the line graph. Accurate label for both axes. Equivalent interval in both axes. Key contains minor inaccuracies	Inaccurate display of data in the line graph. Inaccurate label for both axes. Different interval in both axes. Key is missing or inaccurate.	Blank Off-task, off topic. Illegible/ unreadable.

Quiz Grading Rubric:

Problem	Total points of Correct Answer		Problem	Total points of Correct Answer	
1.			14.		
2.			15.		
3.			16.		
4.			17.		
5.			18.		
6.			19.		
7.			20.		
8.			21.		
9.			22.		
10.			23.		
11.			24.		
12.			25.		
13.			26.		

Total_____