Lines, Lines, Lines!!!
Horizontal and Vertical Lines
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Lesson Plan

I.   Topic: Horizontal and Vertical Lines

II.   Goals and Objectives:
        A. The students will understand the difference between horizontal and vertical lines.
        B. The students will graph the different type of lines.
        C. The students will find the equation of horizontal and vertical lines.

III.   Massachusetts Learning Standards:

        1.   8.P.3
                Demonstrate an understanding of the identity $(-x)(-y) = xy$. Using this identity to simplify algebraic expressions.

        2.   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.

        3.   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.

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

        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.

IV.   Materials:
        A. Whiteboard with dry-erase markers (Blackboard with chalk could also be used.)
        B. Ruler.
        C. Pencils.
        D. Calculator.
        E. Graphing Paper.
        F. Horizontal and Vertical Lines Worksheets (Practice Worksheet, Quiz Worksheet).

V.   Presentation Outline:
        A.   Introduction. "Understanding the Nature of Horizontal and Vertical Lines."
                    I. Formulas
                    II. Definitions

        B.   Write an equation for a Horizontal Line.
                    Examples

        C.   Write an equation for a Vertical Line.
                    Examples

        D.   Graph the given Horizontal and Vertical Lines
                    Examples

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

VII.   Independent Practice: Horizontal and Vertical Lines Worksheet
        A. Class work: #1 - 9 Odds

        B. Homework: # 2 - 10 Even

        C. Due the next day.

VIII.   Topic Assessment: Horizontal and Vertical Lines 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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Equations For
Horizontal and Vertical Lines

Introduction

Horizontal and Vertical lines are by far the easiest to graph. Also their equations are easy to write. With a very basic understanding of points and the coordinate plane, anyone can graph these lines. Remember that every time we talked about Horizontal lines we looked at the horizon; we looked at the line the sun dives into. Horizontal lines go indefinitely from left to right.

Vertical lines are the exact opposite of horizontal lines.   You don't stand horizontally; you stand vertically. Vertical lines go indefinitely from top to bottom or from bottom up.

Definitions and Formula

Horizontal lines have the following characteristics:
- They have Zero Slope.
- They are drawn from left to right through the y-axis.
- The equation only has one constant to determine where it will be drawn. Such as ($y = 5$, $y = -3$, $y = 17$, etc.)
- And the points of such equations have the same value for the 'y' on the given points such as {(-2, 4), (9, 4)}, {(3, -7), (-4, -7), (8, -7)}

Vertical lines have the following characteristics:
- They have an Undefined Slope.
- They are drawn from top to bottom through the x-axis.
- The equation only has one constant to determine where it will be drawn. Such as ($x = 1$, $y = 4$, $y = -11$, etc.)
- And the points of such equations have the same value for the 'x' on the given points such as {(6, -1), (6, 7)}, {(1, 2), (1, -6), (1, 17), (1, 0)}

Key Concepts

The following are some of the graphs we have seen and their equations.

A. If the line going from left to right is rising, then we say the slope is a Positive Slope.
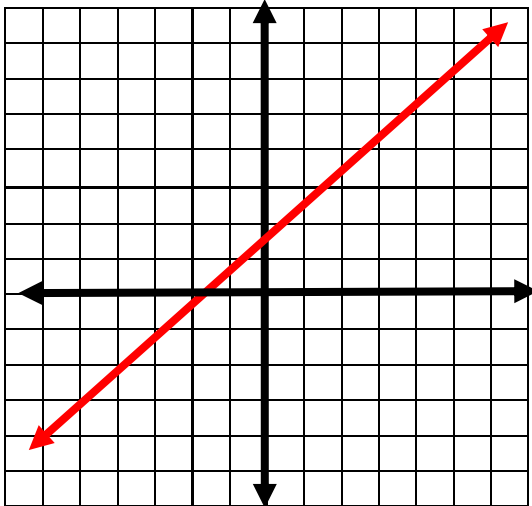
Equations:
$$y = mx + b$$
$$y - y_1 = m(x - x_1)$$
$$Ax + By = C$$

B. If the Line is horizontal, then the slope is Zero.
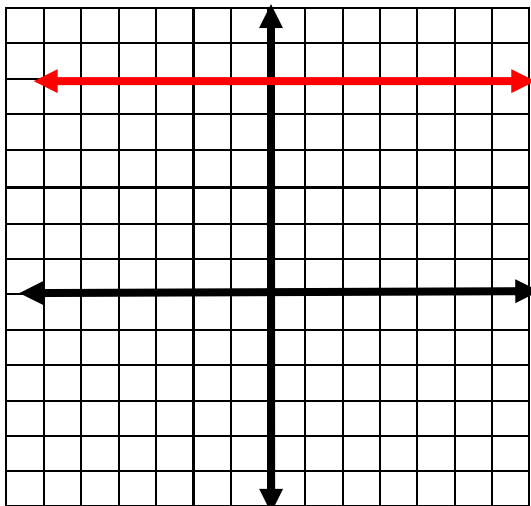
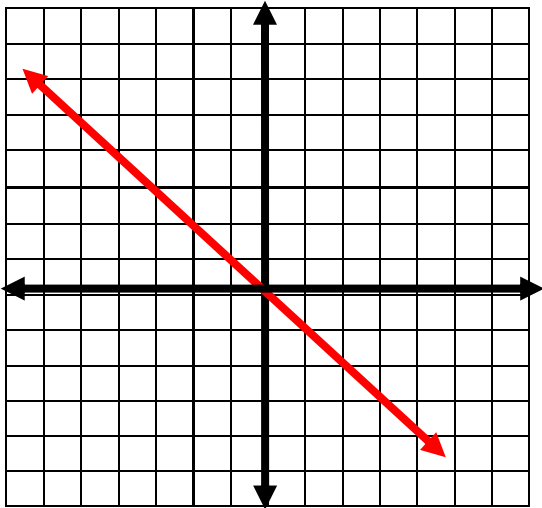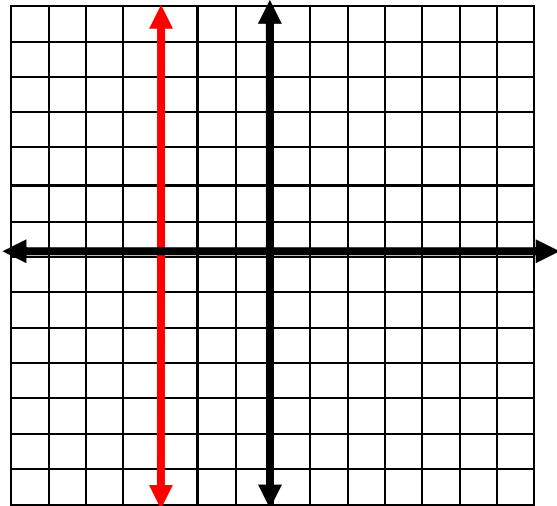

Equation:
$$y = b$$
(b is the y-intercept and a constant)

The equation for this graph would be:
$$y = 6$$
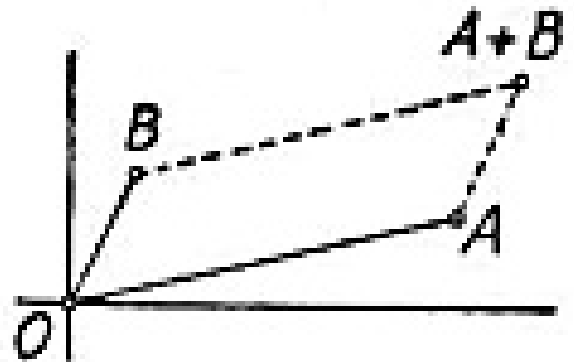
C.   If the line going from left to right is falling, then we say the slope is Negative.

Equations:
$$y = mx + b$$
$$y - y_1 = m(x - x_1)$$
$$Ax + By = C$$

D.   If the line is a vertical line, then the slope is Undefined.

Equation:
    x = b
(b is the x-intercept and a constant)

The equation for this graph would be:
    x = -3

Let's write equations for the given points and also learn how to graph them.

1. Write an equation for a horizontal line and graph.

Remember:

Horizontal lines have Zero Slope. Why?

When the Slope formula is used to find the slope to two points which lie in a horizontal position from each other, the result will be $m = \frac{0}{\#}$ which equals zero. (# represents any number) Therefore we say that horizontal lines have Zero Slope.

A. Write an equation of the line which passes through (6, 3), (-5, 3).
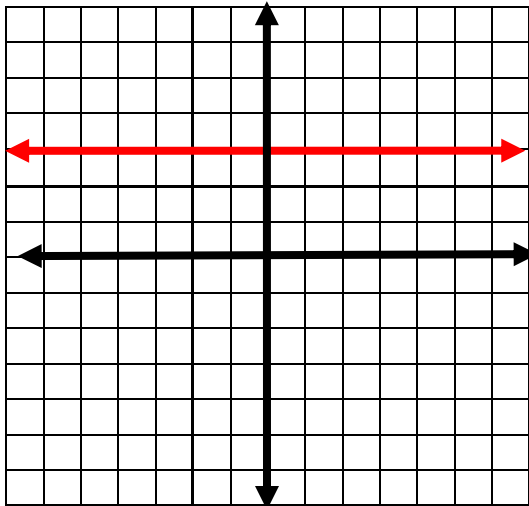
i. Points (6, 3), (-5, 3)

ii. m = 0

iii. y = 3

B. Write an equation of the line which passes through (1, -4), (7, -4).
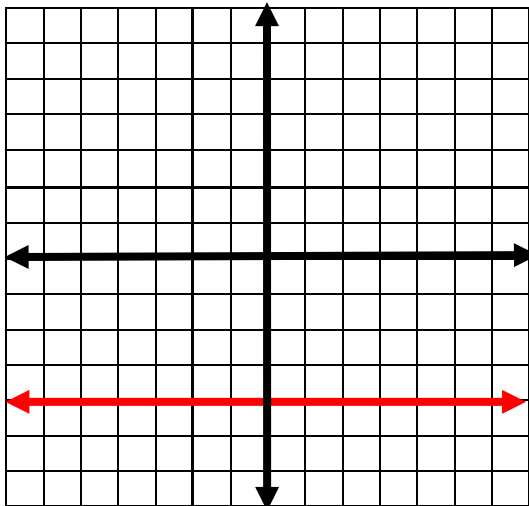
i. Points (1, -4), (7, -4)

ii. m = 0

iii. y = -4

C.   Write an equation of the line which passes through (0, 4), (10, 4).
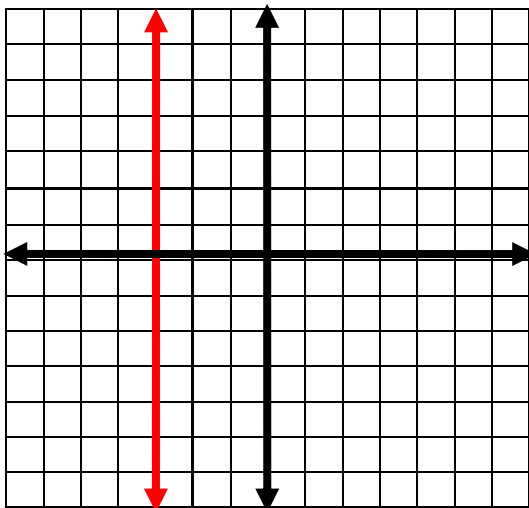
i. Points (0, 4), (10, 4)

ii. m = 0

iii. y = 4

2. Write an equation for a Vertical Line and graph.

Remember:

Vertical Lines have an Undefined Slope. Why?

When the Slope formula is used to find the slope to two points which lie in vertical position to each other, the result will be $m = \frac{\#}{0}$. Because nothing can be divided by zero. We say the line has an Undefined Slope. (#represents any number) Therefore we say that vertical lines have an Undefined Slope. For example: $\frac{6}{3} = 2$ because $2 \cdot 3 = 6$ But $\frac{6}{0}$ =? What number multiplied by zero produces the answer of six? There isn't one. Hence, vertical lines have Undefined Slopes.

A.   Write an equation of the line which passes through (3, 6), (3, -5).
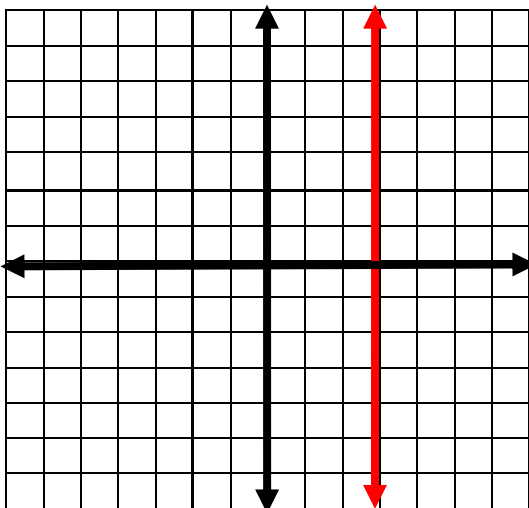
i. Points (3, 6), (3, -5)

ii. m = Undefined

iii. x = 3

B.   Write an equation of the line which passes through (-4, 1), (-4, 7).
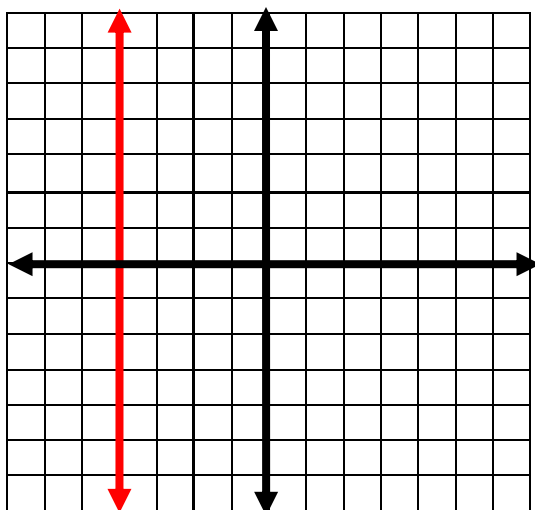
i. Points (-4, 1), (-4, 7)

ii. m = Undefined

iii. x = -4

C.   Write an equation of the line which passes through (4, 0), (4, 10).
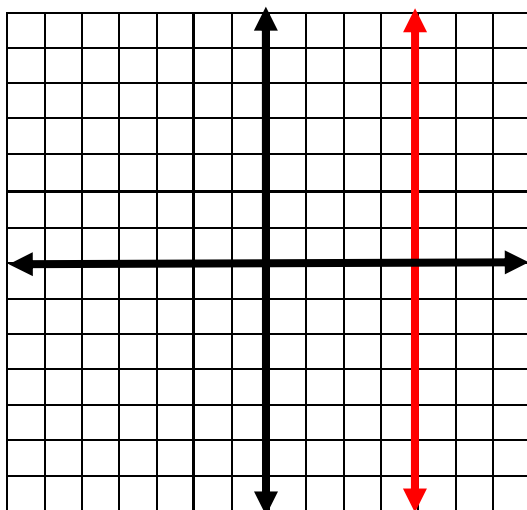
i. Points (4, 0), (4, 10)

ii. m = Undefined

iii. x = 4

Equations for Horizontal and Vertical Lines
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Student Practice Worksheet

Name_____Date_____Grade_____

If not given, state whether the line has a slope of Zero or Undefined. Also, state whether it is a Horizontal or a Vertical Line. Graph the line.

1. (7, 8), (1, 8)

3. (6, 2), m = 0
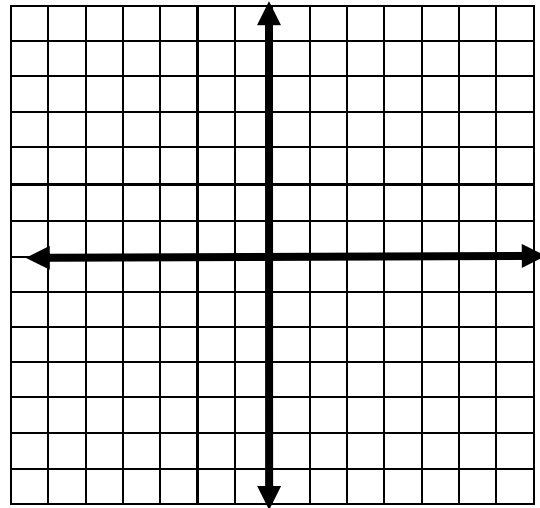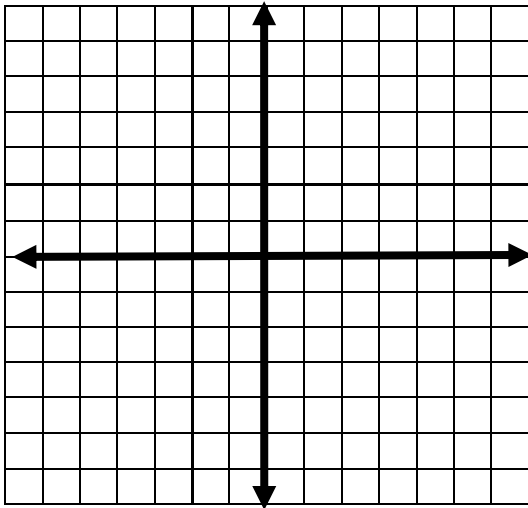
2. (4, -1.5), (4, 4.5)

4. (-2, -3), undefined
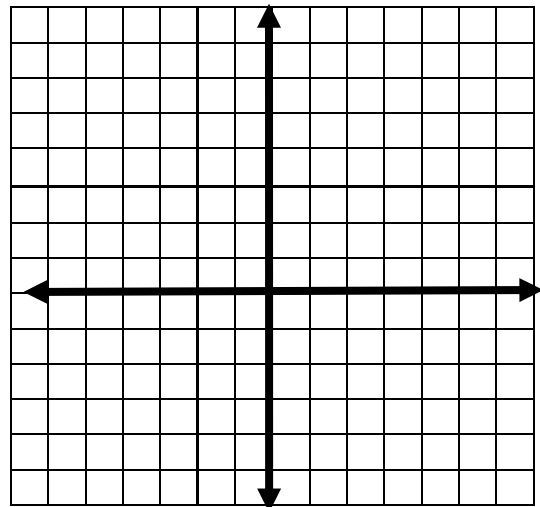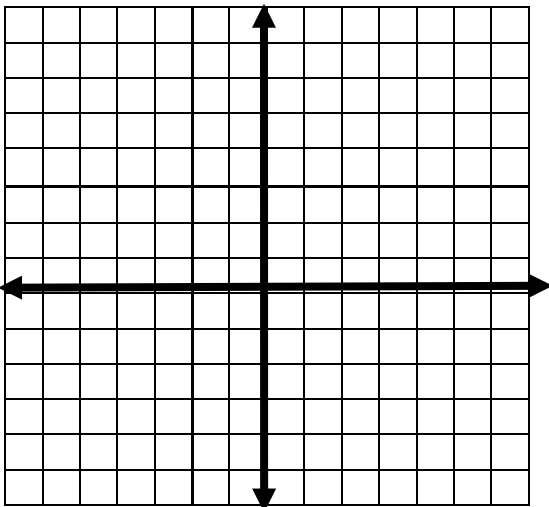
7. (-5, 6), (-5, -9)

5. (6, 4), (3, 4)
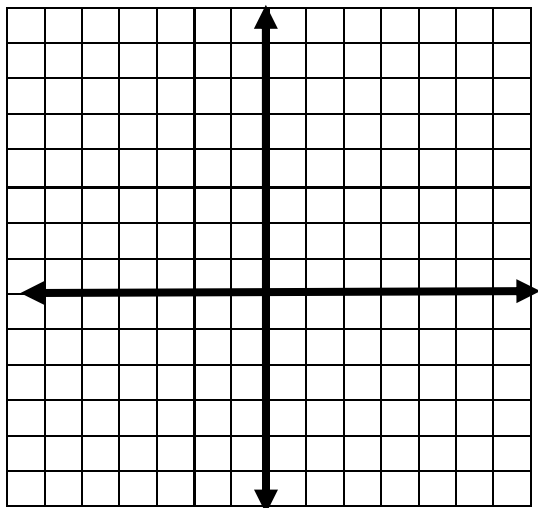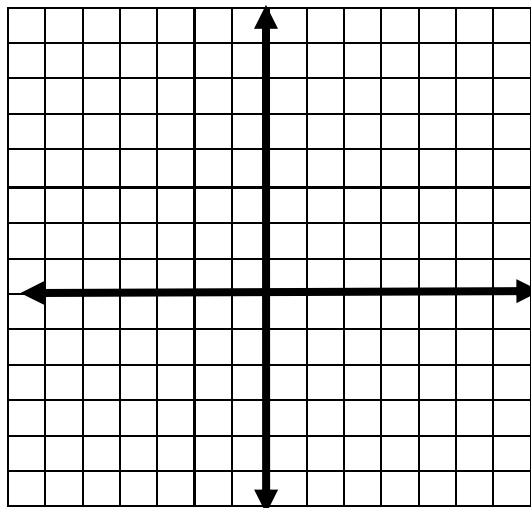
6. (-2, -5), slope = 0
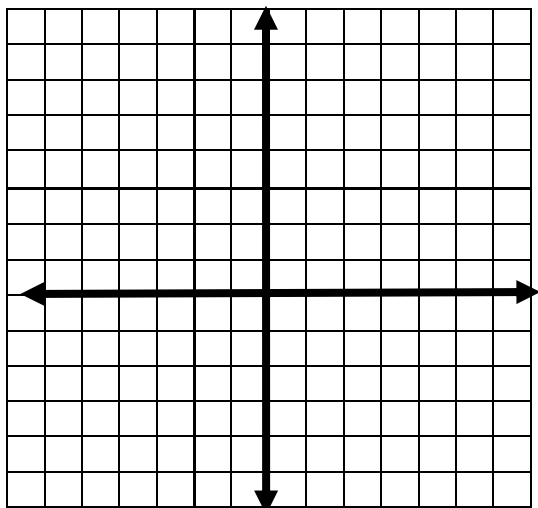
8. (-4, 5), (4, 5)
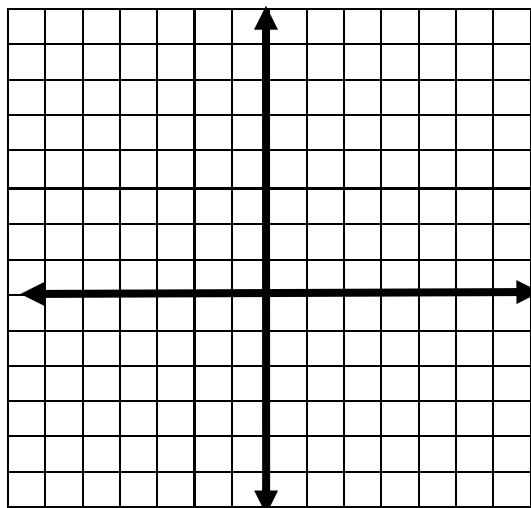
9. (2, 5), m = undefined

10. (2, 5), m = 0
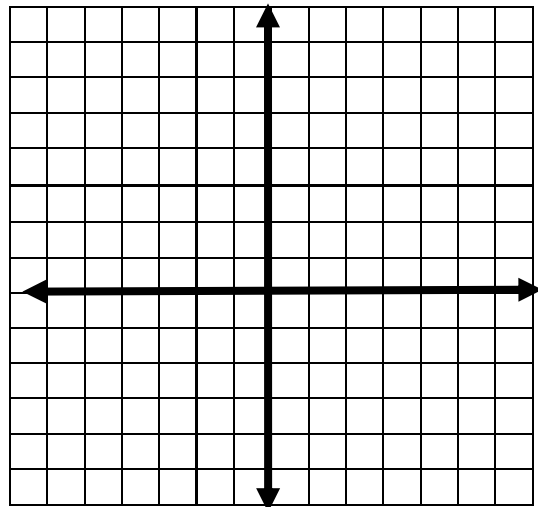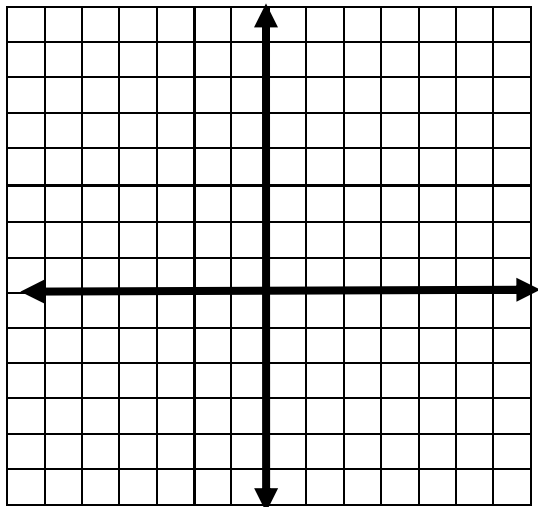
Equations for Horizontal and Vertical Lines
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Student Practice Worksheet
Answer Key

Name_____ Date_____ Grade_____

If not given, state whether the line has a slope of Zero or Undefined. Also, state whether it is a Horizontal or a Vertical Line. Graph the line.

1. (7, 8), (1, 8)

Slope = 0, Horizontal Line
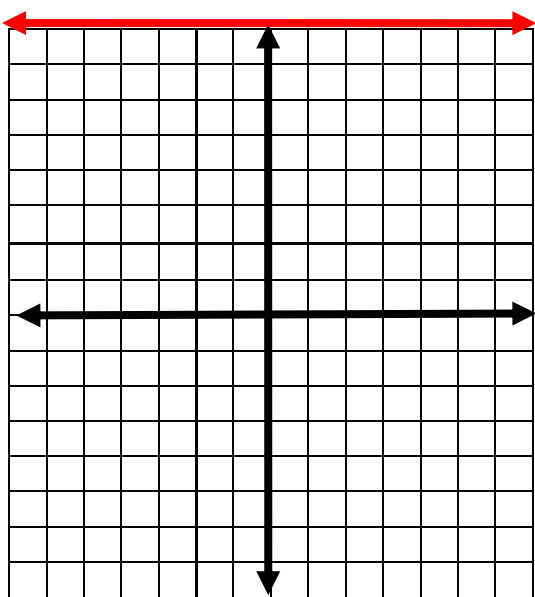
3. (6, 2), m = 0

Horizontal Line
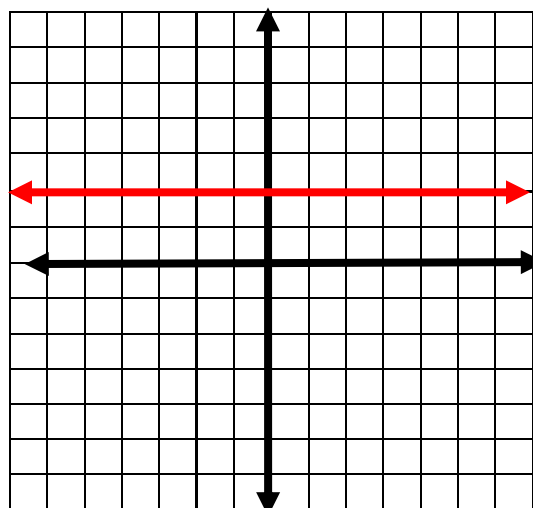
2. (4, -1.5), (4, 4.5)

Slope = undefined, Vertical Line
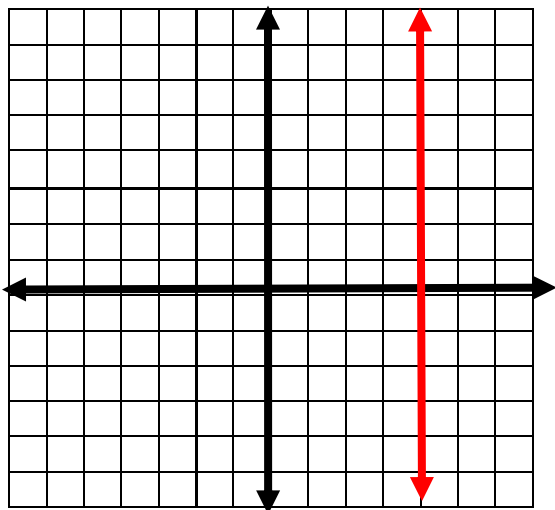
4. (-2, -3), undefined
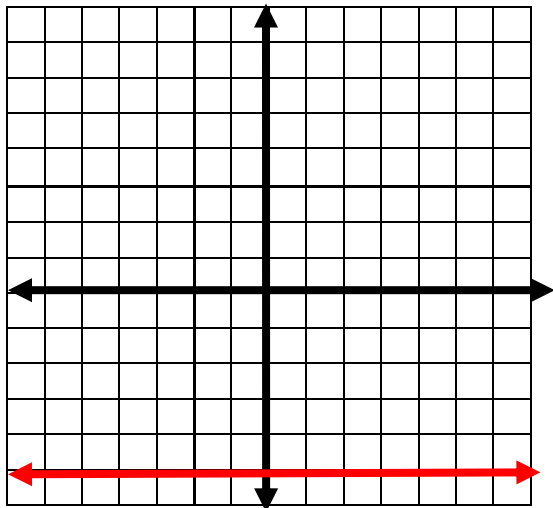
Vertical Line
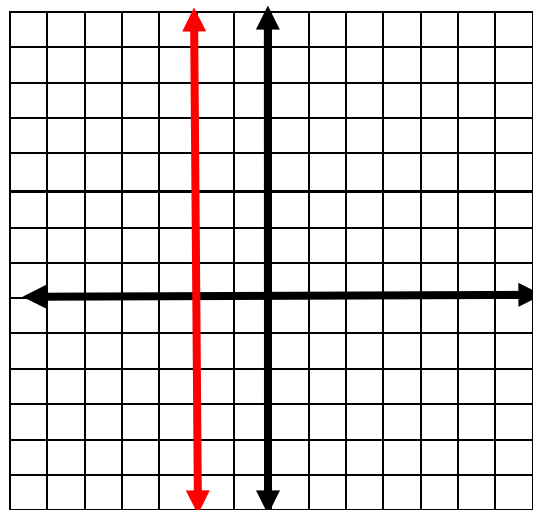
5. (6, 4), (3, 4)

   Slope = Zero, Horizontal Line
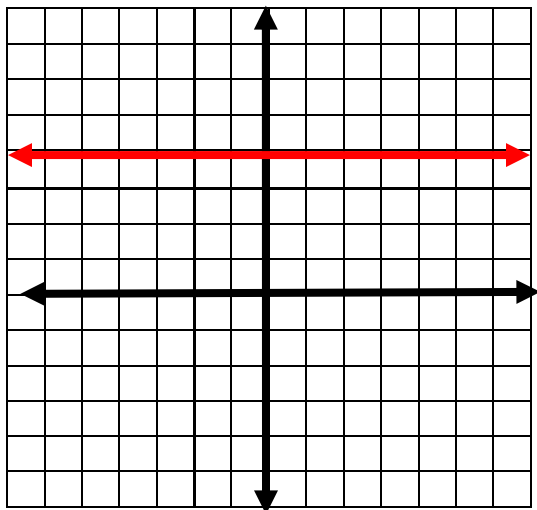
7. (-5, 6), (-5, -9)

   Slope = Undefined, Horizontal Line
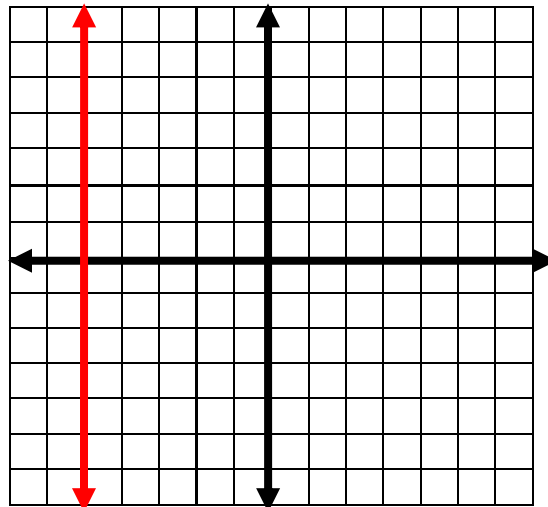
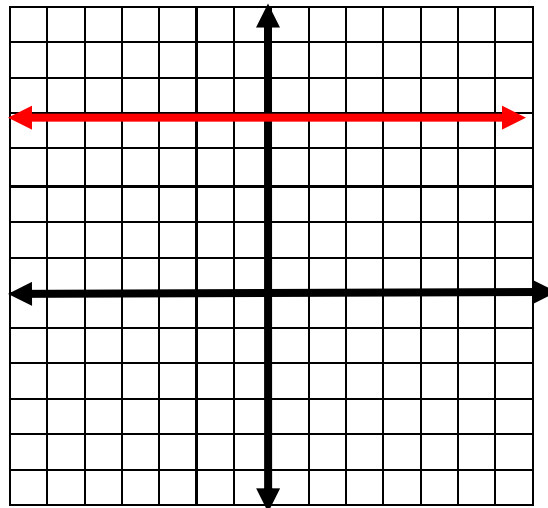6. (-2, -5), slope = 0

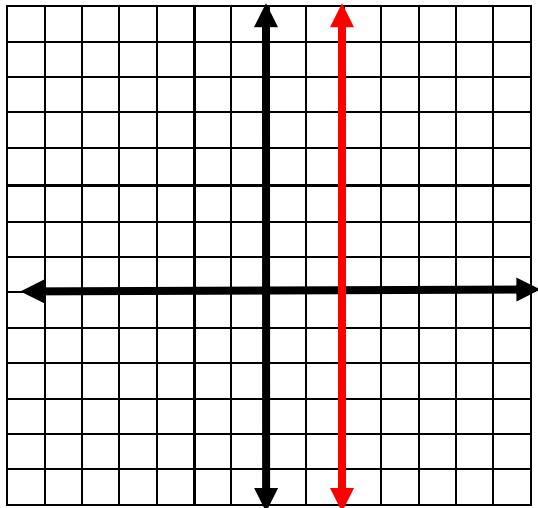   Horizontal Line
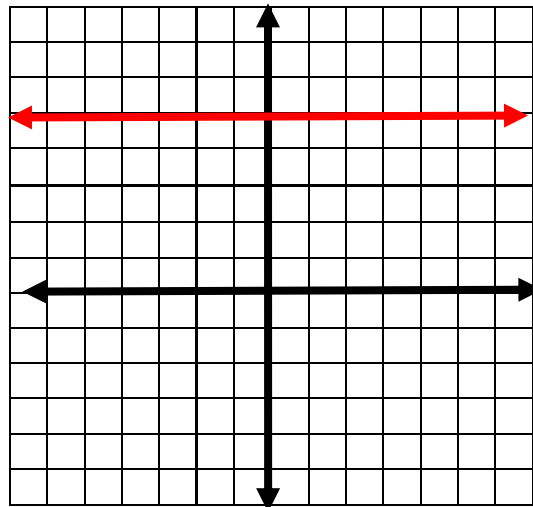

8. (-4, 5), (4, 5)

   Slope = Zero, Horizontal Line

9. (2, 5), m = undefined

10. (2, 5), m = 0

Vertical Line

Horizontal Line

Equations for Horizontal and Vertical Lines
~
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

Quiz Grading Rubric:

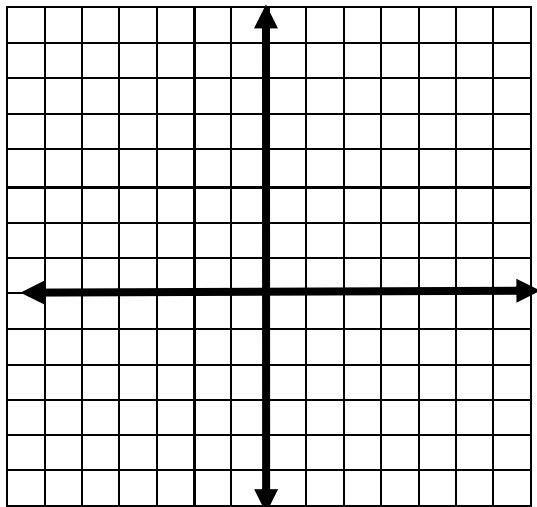| Problem	Total points of Correct Answer		Problem	Total points of Correct Answer	
1.			11.		
2.			12.		
3.			13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Equations for Horizontal and Vertical Lines
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Quiz
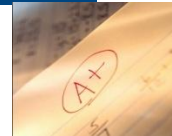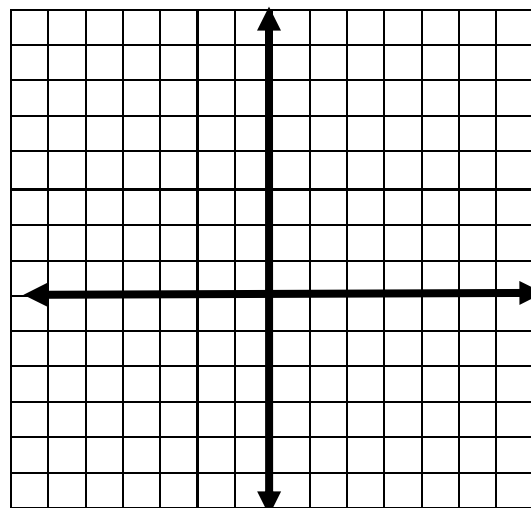
Name_____Date_____Grade_____

If not given, state whether the line has a slope of Zero or Undefined. Also, state whether it is a Horizontal or a Vertical Line. Graph the line.
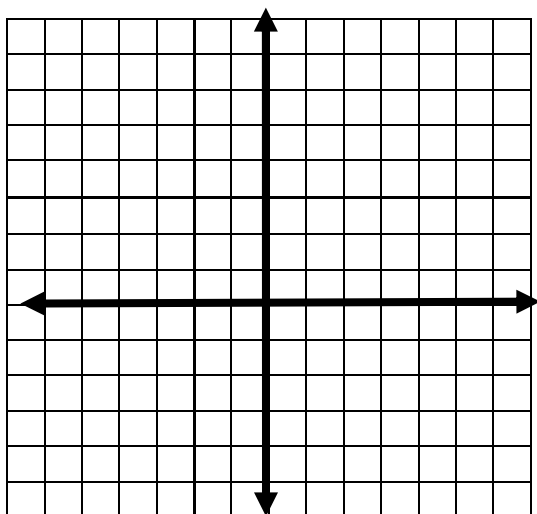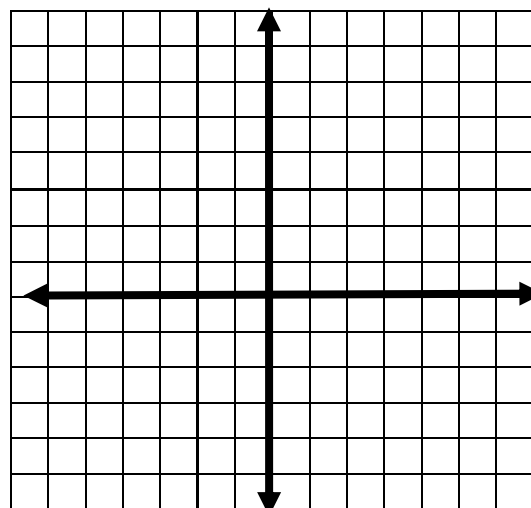
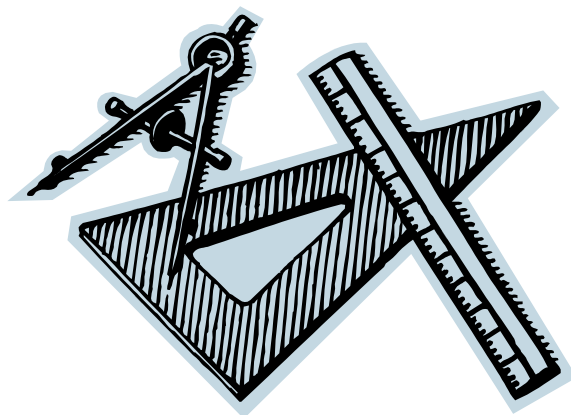1. (3, -1), (3, -4)

3. (5, -3), Slope = Zero

2. (5, 8), (-2, 8)

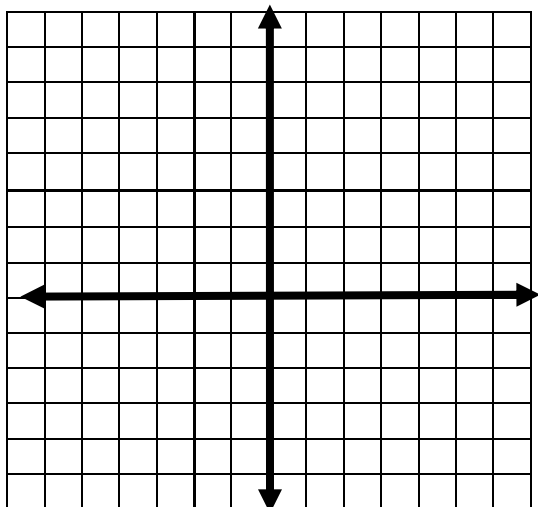4. (-6, -6), Undefined

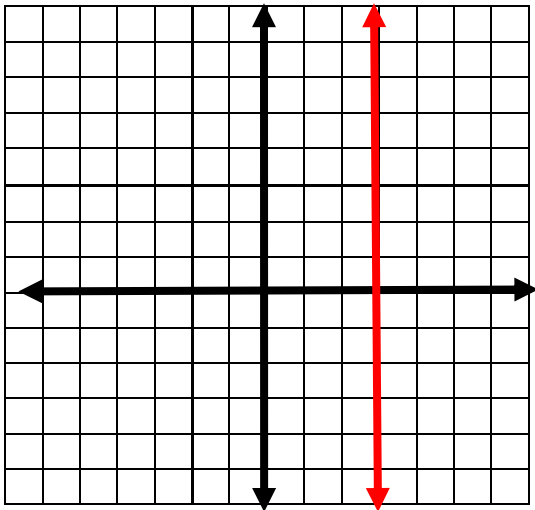5. (2, -6), (2, 5)

Equations for Horizontal and Vertical Lines
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Quiz
Answer Key

Name_____Date_____Grade_____

If not given, state whether the line has a slope of Zero or Undefined. Also, state whether it is a Horizontal or a Vertical Line. Graph the line.
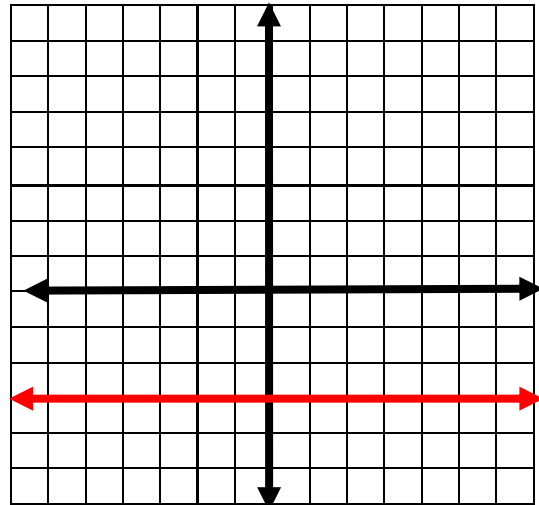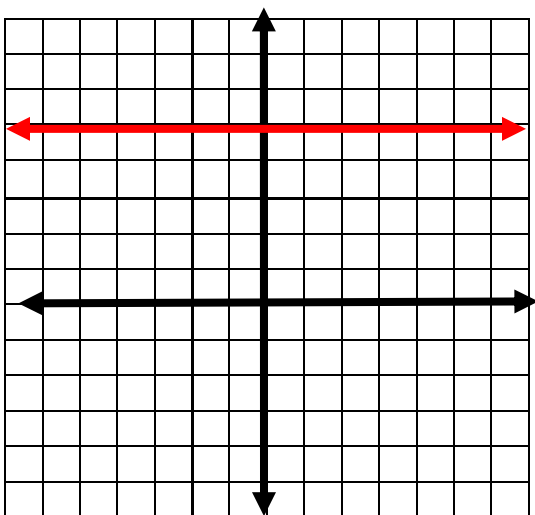
1. (3, -1), (3, -4)

Slope = Undefined, Vertical Line
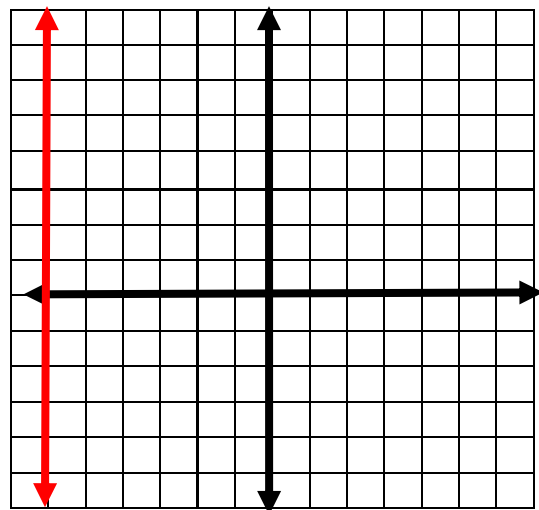

3. (5, -3), Slope = Zero

Horizontal Line

2. (5, 5), (-2, 5)
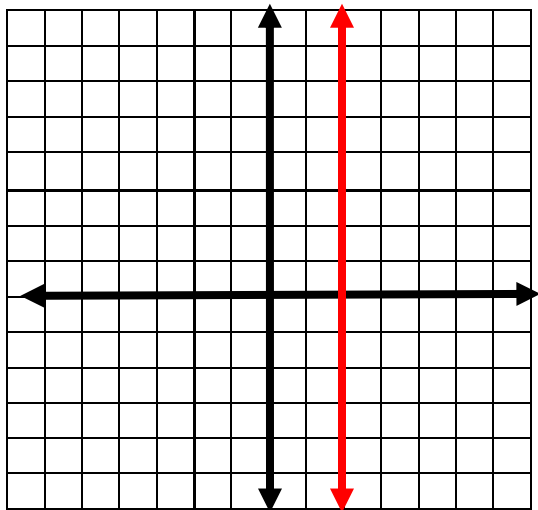
Slope = Zero, Horizontal Line

4. (-6, -6), Undefined

Vertical Line

5. (2, -6), (2, 5)

Slope = Undefined, Vertical Line

Equations for Horizontal and Vertical Lines
~
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

Quiz Grading Rubric:

Problem	Total points of Correct Answer		Problem	Total points of Correct Answer	
1.			6.		
2.			7.		
3.			8.		
4.			9.		
5.			10.		