Lesson Title: Points, Intercepts and Slopes, Oh My!   **Date:_____**

Subject: Pre-Algebra, Algebra I, or Algebra II   **Topic:** Graphing Lines Using Intercepts and
Grade: 7, 8, or 10   Graphing Lines From Point Slope Form
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Stage 1 – Desired Results

Lesson Overview: This activity will show students how to graph lines using the x- and y-intercepts of various equations, as well as show students how to graph a line when given a linear equation in point-slope form. Students will be walked through how to find x- and y-intercepts as well as how to graph the ordered pairs. Afterwards, students will be walked through how to identify an ordered pair from a linear equation in point-slope form and to subsequently graph the line using this point. This activity is intended for pre-algebra or algebra I students who are learning to graph lines for the first time, or algebra II students who are reviewing how to graph lines or need extra help with the subject. By the end of the activity, students will be able to identify x- and y-intercepts of a line using the equation and graph a line by connecting the x- and y-intercepts, identify the important ordered pair given in an equation in point-slope form, and to graph a linear equation given in point-slope form.

Standards Addressed:

CCSS.Math.Content.HSA-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

CCSS.Math.Content.HSA-REI.D.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

CCSS.Math.Content.8.F.B.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (*x, y*) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Enduring Understanding:	**Essential Questions**:
There are many different ways to graph a linear relationship. One way of graphing is using the x- and y-intercepts of a line. This method of graphing can be used no matter what form the equation of a given line is presented in. When a linear equation is presented in point-slope form, there is a given point hidden within this	How does the equation of a line affect its graphical representation? What do the x- and y-intercepts represent on a given line? How can we use a graphical representation of a linear relationship in order to help understand real life situations?

equation that can be used along with the slope in order to help graph a line. The most important piece of information to be gained from this activity is that there is more than one way to graph a line, and although each way is different, they are all used easily in various situations.	
Students will need to know: At this point, students are expected to understand how to graph ordered pairs, how to graph a line given in slope-intercept form, and how to solve equations containing a single variable.	**Students will be able to**: • Solve for the x- and y-intercepts of a given line. • Graph a linear equation using the x- and y-intercepts of the line. • Identify the important ordered pair inside of a linear equation in point-slope form. • Graph a line given an initial point and a particular slope. • Analyze a real life situation using a linear equation and graph.

Stage 2 – Assessment Evidence

Performance Tasks: In this activity: • Asking students to identify the x- and y-intercept given an equation of a line in various forms. • Asking students to graph a line using the x- and y- intercepts given the equation of a line. • Asking students to identify the important point given in the equation of a line in point-slope form. Asking students to graph a line with the equation given in point-slope form. • Asking students to analyze the meaning of a real life linear relationship by answering a series of questions about the graph of a given linear relationship.	**Other Evidence**: • To be decided by the teacher.

Stage 3 – Learning Plan

Lesson Procedure:	Required Materials:

<u>Many Days Before</u>: Students will be introduced to the concept of a linear relationship between two variables. Students will learn about the concept of slope and how it relates to the linear relationship between two variables. Students will also learn about slope-intercept form of a linear equation ($y = mx + b$) and how to graph a line in slope-intercept form. <u>Day Of</u>: Students will go to the computer lab in order to complete this activity. For the duration of the activity, the teacher will monitor student progress to ensure that students complete the activity properly and do not simply click to complete. The activity will not take all class period, so the remainder of the class period will be at the discretion of the classroom teacher.	• Computers for each student. • Pencil and paper for calculating the x- and y-intercepts of various lines.
Possible Discussion Questions for Students: • In this activity you looked at a problem about painting a house which represented a linear relationship of two variables that directly affect one another. Can you think of any other real life linear relationships we could have discussed? • For most of the lines you looked at in this activity you used all four quadrants, however in the house painting problem only one quadrant was used. Why do you think that is? • The linear equation that represents your cell phone plan is y=20+0.5x where x is the number of minutes spent talking on the phone and y is the total cost of your cell phone plan in a given month. What do the x- and y-intercepts represent in the situation?	**Sample Answers to Discussion Questions**: • Answers may vary. It is likely that most students would come up with a monetary situation given that the example was based on money. For example, a student may say that a cell phone plan is a linear relationship because you pay a certain amount per minute on the phone. • It doesn't make sense to work for negative hours or to spend a negative amount of money. That is why the graph omits negative values for the house painting problem. • The x-intercept represents how many minutes you would have to talk on your phone for in order to pay nothing. The y-intercept represents how much money you are spending if you talk on the phone for zero minutes.