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| **Exploring Point-Slope Form of a Line** |

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| PRE-PLANNING | PRIOR KNOWLEDGE | |
|  | * Know that the slope is calculated with two points on a given line and represents vertical change over horizontal change * Know that any two points define a line * Know that coordinate points have two components, x and y * Know that the equation of a line has an x and a y variable * Identify the equations of horizontal and vertical lines as having only an x *or* a y variable * Know how to graph horizontal and vertical lines given their equations * Know how to write the equation of horizontal and vertical lines given their graphs | |
|  | LEARNING GOALS | |
|  | * Given a graphed line, write the equation in point-slope form * Graph a line given an equation in point-slope form | |
|  | Common Core Standards | Common Core Practices |
|  | [CCSS.Math.Content.HSA.REI.D.10](http://www.corestandards.org/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.HSF.LE.A.2](http://www.corestandards.org/Math/Content/HSF/LE/A/2/) Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs | 1. Make sense of problems and persevere in solving them  2. Reason abstractly and quantitatively  5. Use appropriate tools strategically  7. Look for an make use of structure |
|  | MATERIALS | |
|  | * PhET *Graphing Lines* simulation:   <https://phet.colorado.edu/sims/html/graphing-lines/latest/graphing-lines_en.html>   * Computers/tablets for each student * Notecards for each student * “Exploring Point-Slope Form of a Line” Activity Sheet for each student (see below) | |
| LESSON CYCLE | **WARM-UP** *5 minutes* | |
|  | Activate prior knowledge by leading a discussion or having students journal about the following questions:   1. Find the slope of the two lines below. 2. What is different about their slopes? 3. What is similar?   Macintosh HD:Users:McGarry:Desktop:Screen Shot 2014-07-31 at 11.42.09 AM.png Macintosh HD:Users:McGarry:Desktop:Screen Shot 2014-07-31 at 11.42.23 AM.png | |
|  | **INTRO** *5 minutes* | |
|  | *Teacher will…* | *Students will…* |
|  | * Instruct students to open up sim, find the Point-Slope screen, and explore for 5 minutes. | **Explore** the Point-Slope screen of the sim. |
|  | **GUIDED EXPLORATION** *10 minutes* | |
|  | *Teacher will…* | *Students will…* |
|  | * Circulate the room to be available for questions and ask probing/pushing questions, such as:  1. What is the relationship between the numbers in the equation and the graph? 2. Why do you think this [pink point] is colored this way? 3. How is point-slope form similar to slope-intercept form? What information do they both give us? 4. How is point-slope form different from slope-intercept form? 5. Think of a time when the point-slope form of a line is useful.  * **#3-4 Pair-Share**: Prompt students to stop and compare their responses to #3-4. Note student responses and conversations. Facilitate a brief discussion about #3-4 with the sim and/or worksheet projected on the board and have a variety of students share aloud with the class. | Work on the entire activity sheet while interacting with the Point-Slope screen of the sim.  **Discuss** #3-4 with their partner and share responses aloud with the class. |
|  | **DISCUSSION** *15 minutes* | |
|  | *Teacher will…* | *Students will…* |
|  | * Facilitate a class discussion to bridge an understanding across representations. Remind students to close their laptops or turn around so that the sim does not distract them from listening. Use an established teaching strategy such as popcorn discussion (one student answers, calls on the next student to talk), think-pair-share (pose question, allow time to think, turn and talk to partner), or group discussions (print out questions and have groups talk to each other and write down consensus to share aloud with class). Sample questions include:  1. Why is this equation named “point-slope”? 2. What do lines with the same *m* look like? 3. What do lines with the same *(x1, y1)* look like? 4. What does the equation of a vertical line look like? How does this relate to point-slope form? 5. What does the equation of a horizontal line look like? How does this relate to point-slope form? | Share responses to teacher questions. |
|  | **ASSESSMENT** *25 minutes* | |
|  | If this is the third successive lesson for the simulation (or students have enough background information on slope-intercept form) direct students to the game screen of the sim.  Additionally, you can have students take screenshots of their completed levels and email them to you as evidence of their mastery:  Macintosh HD:Users:McGarry:Desktop:Screen Shot 2014-08-05 at 12.48.49 PM.png | |

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Class: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Exploring Point-Slope Form of a Line**

**Learning Goals**

* Write the equation of a line in point-slope form, given the graph
* Graph a line given an equation in point-slope form

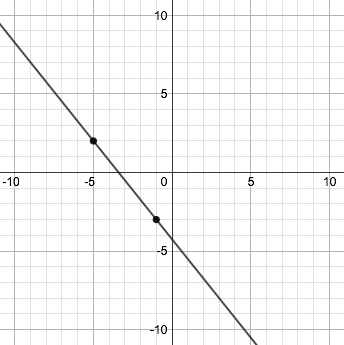
1. **Explore** the point-slope screen for 5 minutes.
2. Manipulate parts of the **equation** *or* **graph** and describe the effects of each action.

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| --- | --- | --- | --- |
| **Action** | **Action on…** | **How the equation is affected** | **How the graph is affected** |
| Drag the pink point | ☐ The equation   The graph |  |  |
|  | ☐ The equation  ☐ The graph |  |  |
|  | ☐ The equation  ☐ The graph |  |  |
|  | ☐ The equation  ☐ The graph |  |  |
|  | ☐ The equation  ☐ The graph |  |  |

1. Describe how ***m*** in the equation *y – y1 =* ***m****(x – x1)* relates to the graph.
2. Describe how ***x1*** and ***y1*** in the equation *y –* ***y1*** *= m(x –* ***x1****)* relate to the graph.
3. Complete the table below.

|  |  |  |
| --- | --- | --- |
| **How can you…** | **Explain what you changed** | **What other changes did you notice?** |
| Make a line steeper? |  |  |
| Transform a line without changing the slope? |  |  |

1. Write the equation (in point-slope form) of the line below. Explain how you found your answer.



1. Describe how you would graph a line with the equation and graph it on the grid provided.

