

Writing Linear Equations (Slope-Intercept and Point-Slope Form) Using “Graphing Lines” PhET Simulation

Designed for a 8th Grade-Algebra 1

(Could be used for 7th grade for Mastering/Extension of linear equations)

Pre-Planning:

Students will come into this lesson with prior knowledge of graphing linear equations from a set of ordered pairs; how to find and use slope of a line.

Materials:

- Each student will need a Chromebook to access https://phet.colorado.edu/sims/html/graphing-lines/latest/graphing-lines_en.html
- [Student Handout](#) for each student
- Optional - colored pencils

Learning Goals:

Students should be able to...

- Identify the slope, y-intercept and other points from a linear equation.
- Write equations of a line in either Slope-Intercept or Point-Slope Form.
- Graph linear equations using Slope-Intercept or Point-Slope Form.

Standards (from <http://www.corestandards.org/Math/>)

Equations for Linear Relationships.

CCSS.MATH.CONTENT.8.EE.B.6

Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .

Curriculum Alignment

- Exploration of writing and graphing linear equations using Slope-Intercept and Point-Slope Form.
- Extends 7th Grade CMP3 book “Moving Straight Ahead”.
- Extends 8th Grade CMP3 book “Thinking With Math Models”.
- Reviews linear graphing in Algebra 1.

Writing Linear Equations (Slope-Intercept and Point-Slope Form)
Using “Graphing Lines” PhET Simulation

Lesson Flow

Estimated Time: 50 minutes (1 class period)

Teacher will...	Student will...	
<p>Warm-Up (Q1): (5 min)</p>	<ul style="list-style-type: none"> • Direct students to Graphing Lines PhET Simulation. • Distribute Student Handout • As students are exploring “Graphing Lines” ask them: <ul style="list-style-type: none"> ○ <i>What does the purple dot represent in the graph and the equation?</i> ○ <i>How is the blue dot helpful? What does it help you find?</i> ○ <i>Can the blue dot be to the left of the purple dot? What does it do?</i> ○ <i>What do the 2 grey boxes do for you?</i> ○ <i>Why is the equation on the line sometimes different than the equation in the box on the right?</i> 	<ul style="list-style-type: none"> • Explore PhEt simulation “Graphing Lines” using the “Slope Intercept” and “Point Slope” Tabs • Answer Question 1 on Student Handout with observations and questions.
<p>Activity (Q2): (10 - 15 min)</p>	<ul style="list-style-type: none"> • Lead a short debrief of student’s observations of simulation and answers to Question 2. <ul style="list-style-type: none"> ○ Ask students to share any observations about the simulation. ○ Pick students to share out their answers from Question 2. ○ Make sure that students understand that they must use two points on the graph to find the slope of the line. ○ <i>Can you write a linear equation using only one point? Why or why not?</i> ○ <i>Can you move the purple off of the y-axis?</i> ○ <i>What happens to the slope when the blue dot is below the purple dot?</i> ○ <i>Why is the value for m in the two equations sometimes different?</i> ○ <i>Can you find other points on the line?</i> ○ <i>What did you use to find those other points?</i> • Make sure that students are reducing their fractions for slope. <ul style="list-style-type: none"> ○ <i>Why don’t we use decimals for slope when graphing?</i> • Lead debrief of how Slope-Intercept Form is a shortcut for graphing linear equations rather than making a table of values. <ul style="list-style-type: none"> ○ Do 1-2 class examples as a quick check in to make sure everyone understands. $y=2/3x+1$ and $y=5-3x$ 	<ul style="list-style-type: none"> • Use “Slope Intercept” Tab to complete Question 2 • Participate in class discussion
<p>Activity (Q3): (10 - 15 min)</p>	<ul style="list-style-type: none"> • Support students in using PhET sim to answer Question 3. <ul style="list-style-type: none"> ○ <i>Does it matter which point is used in the equation?</i> ○ <i>How did you calculate the slope from two points?</i> ○ <i>Does the blue dot move when moving the purple dot?</i> ○ <i>Does the purple dot move when moving the blue dot?</i> 	<ul style="list-style-type: none"> • Use the “Point Slope” Tab to complete Question 3 • Participate in class discussion

	<ul style="list-style-type: none"> ○ <i>How does the slope change when moving the blue dot around?</i> ○ <i>Can you find other points on the line?</i> ○ <i>What did you use to find those other points?</i> ○ <i>Why/When would you use this instead of Slope-Intercept Form?</i> ● Lead debrief of strategies and answers to Question 3. <ul style="list-style-type: none"> ○ Do 1-2 class examples as a quick check in to make sure everyone understands. $y-2=3(x+1)$ and $y+1=-1/3(x-4)$ ○ Emphasize that the signs of x_1 and y_1 are the opposite of what they see in the equation. ○ <i>Why is the sign opposite?</i> 	
<p>Exit Ticket/ Summary (Q4): (20 min)</p>	<ul style="list-style-type: none"> ● Support students in playing the “Line Game”. Reminding them of what different parts of the equations mean as necessary. 	<ul style="list-style-type: none"> ● Play the “Line Game” and record score on Student Handout.