

Graphing Slope-Intercept

OVERVIEW:

Prerequisite Skills:

- Knowledge of linear equations in slope-intercept form $y = mx + b$
 - Vocabulary: linear equations, graphing on a coordinate plane, slope, y-intercept
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Learning Goal:

Students will be able to:

- Sketch how the graph of a line changes as the coefficient and constant vary.
 - Identify the effect of slope and y-intercept on the location of a graph of the linear equation
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Common Core Standards:

CCSS.MATH.CONTENT.8.F.A.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

Materials:

- [Graphing Slope-Intercept PhET simulation](#)
 - Device
 - Activity Sheet
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Estimated Time: 45 minutes

Warmup:

Teacher Will	Students Will	Time
Introduce Lesson: Students will watch video on their device: https://www.youtube.com/watch?v=zihsQC0IUd8 Take attendance / take care of other housekeeping details	<ul style="list-style-type: none">• Open link and watch video to activate background knowledge	5-7 minutes

Simulation Introduction: Open play / Exploration

Teacher Will	Students Will	Time
<p>Circulate around classroom listening in on conversations, asking clarifying questions.</p> <ul style="list-style-type: none"> ● What happens as the “m” (slope) value changes? ● How does a positive number for slope impact the graph of the line? ● How does a negative number for slope impact the graph of the line? ● Be sure to experiment with how the change in “b” value impacts the location of the graph of a line on the coordinate plane, ● What does the blue point on the graph represent? How does moving it affect the graph of the line? ● What does the purple point represent? How does the change of its location impact the graph? 	<ul style="list-style-type: none"> ● Open the Graphing Slope-Intercept PhET simulation ● Explore simulation ● Record observations in journal ● Share out findings with the class 	<p>10-15 minutes</p>

Guided Exploration:

Teacher Will	Students Will	Time
<ul style="list-style-type: none"> ● Circulate throughout the classroom, asking 	<ul style="list-style-type: none"> ● Use activity sheet to provide structured 	<p>10-15 minutes</p>

<p>students for clarification / explanation of work.</p> <ul style="list-style-type: none"> ● Ask students to pause once they finish question #7 & 8 on the activity sheet. ● Compare your graphs with your elbow partner. What do you notice when comparing your graphs? How are the lines the same? How are they different? ● Explain why you think they are similar or different ● Ask for volunteers to share observations (use random name picker app) ● Record student observations on board 	<p>descriptions (p.4-6)</p> <ul style="list-style-type: none"> ● Complete questions 1 & 2 from the activity sheet. ● Turn to your table partner and share your thinking. ● What do you notice when comparing your graphs? ● Prove to your partner why you are correct. ● Make predictions based on exploration ● Record notes in your personal journal 	
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Discussion and Summary:

Teacher Will	Students Will	Time
<ul style="list-style-type: none"> ● Facilitate discussion with a new group. ● Purpose: gather information from new table group - share out with the class. ● What is something your partner found that was not discussed with the class? 	<ul style="list-style-type: none"> ● Switch tables - discuss answers with new table group. ● Protocol: each student has 1 minute to share thinking - all others listen without responding. ● Record observations ● After all students have a chance to share, ask clarifying questions for 1 minute 	5-10 minutes

Informal Assessment / Exit Ticket:

Teacher Will	Students Will	Time
<ul style="list-style-type: none">• Post questions• Provide notecards for students to record thoughts• Collect exit ticket	Write 3 questions in your journal that you have about today's lesson. What would you like to know? What worked well? What did you struggle with? What was the most challenging part of your work today?	5 minutes

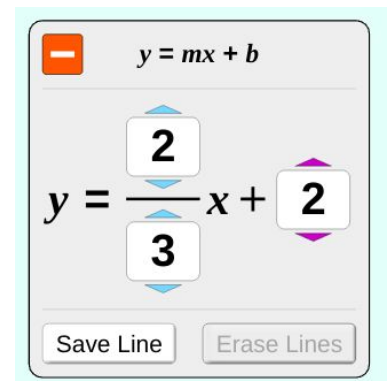
Visit the Slope-Intercept Simulation at the following URL:
https://phet.colorado.edu/sims/html/graphing-slope-intercept/latest/graphing-slope-intercept_en.html?screens=1

Take 10-15 minutes to explore and play with features of the Slope-Intercept Simulation.

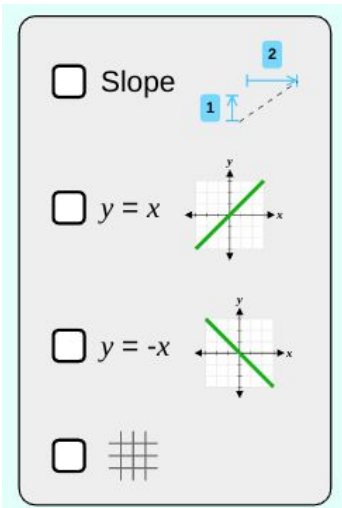
Be sure to learn about the following features:

*The SLOPE: the fractional coefficient that precedes the “x” variable.
 Notice the blue arrows that control the numerator and denominator.
 Try dragging the blue point on the graph. What happens?

*The INTERCEPT: the integer value at the end of the equation.
 Notice the purple arrows that allow you to increase/decrease the value.
 Try dragging the purple point on the graph. What happens?



*The “check boxes” at the bottom right of the screen.



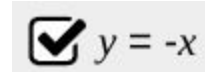
What happens when you check this box?



What happens when you check this box?



What happens when you check this box?




What happens when you check this box?



Click and Drag the “ordered pair” labelers onto the graph.
 What causes the box to change to black?



*What happens when you click on the  ?

Once you explore the sim, follow the link below and experiment with the line game:

https://phet.colorado.edu/sims/html/graphing-slope-intercept/latest/graphing-slope-intercept_en.html

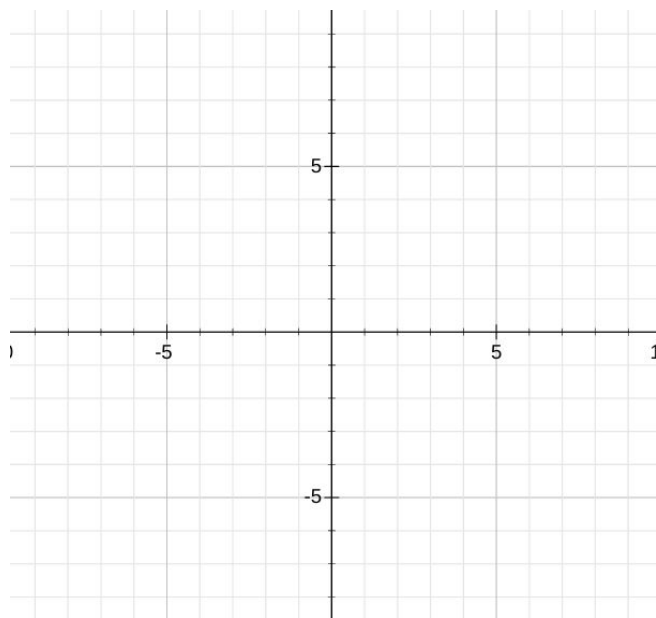
Name _____ Date _____ Class _____

Exploring Linear Equations: Slope-Intercept

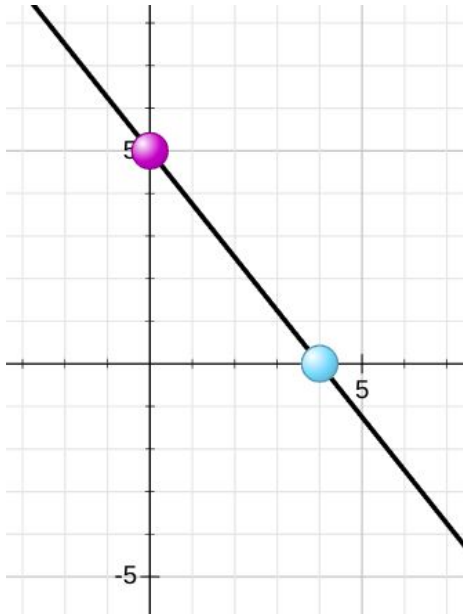
PhET Activity Sheet

Use the Slope-Intercept Simulation to complete the following:

1. Graph a line with a positive slope and a negative y-intercept.



2. Determine the slope and the y-intercept for the line on the graph below.



Now complete the following questions.

3. Write the equations for 3 horizontal lines. Compare with your partner. What do they all have in common?

4. Write the equations for 3 vertical lines. Compare with your partner. What do they all have in common?

5. Write the equations for two lines that are parallel. What do they have in common?

6. Write the equation for a line that goes through $(0, -3)$. Compare with your partner. What do they have in common?

7. Write an equation for a line that passes through the origin and the point $(-3,5)$.

8. Write an equation for a line that connects the points $(0,7)$ and $(2,-5)$.

9. Write an equation for a line that passes through the points $(-5,3)$ and $(1,6)$.

HINT: Find the y -intercept by graphing. You may need to estimate its value.