

Slope-Intercept Form of a Line

Objectives

Students will:

- discover how slope effects the graph of a line.
- relate b to the y -intercept of a line.
- determine the equation of a line given m and b .

Prerequisite Knowledge

Students are able to:

- plot points on the coordinate plane.
- determine the slope between two points.

Resources

- This lesson assumes that your classroom has only one computer, from which you can lecture. If your classroom has enough computers for all your students, either working individually or in small groups, see the [lab version](#) of this lesson.
- Rulers, pencil, paper
- Access to <http://www.explorelearning.com/>
- Copies of the [worksheet](#) for each student (optional)

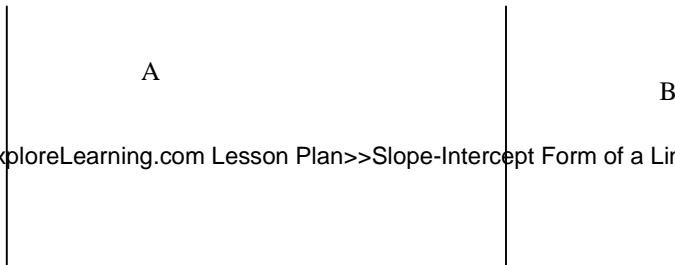
Lesson Preparation

Before conducting this lesson, be sure to read through it thoroughly, and familiarize yourself with the [Slope-intercept form of a line](#) activity at [ExploreLearning.com](#). You may want to bookmark the activity page for your students. If you like, make copies of the [worksheet](#) for each student.

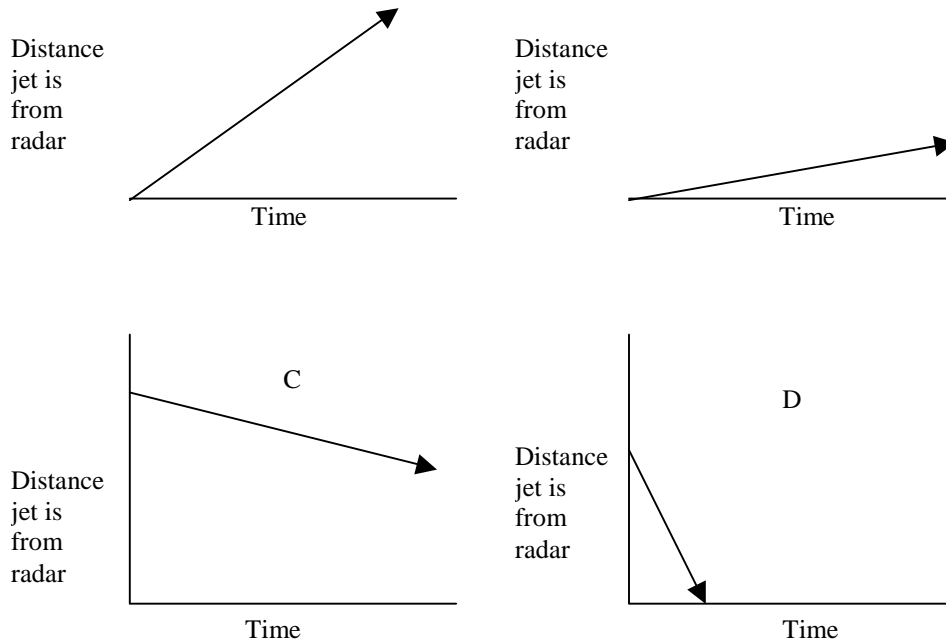
Lesson

Motivation:

Prepare the following graphs for the students before beginning the lesson. These graphs can be on a blackboard, on an overhead projector, or on a worksheet.



ExploreLearning



Summarize in your own words the following scenario.

Radar sends out a wave that bounces off an object then returns to the radar. The radar is able to determine the distance an object is away from it at a given time. The radar takes several readings at slightly different times to calculate the speed of an object. If these readings were graphed on a time-distance graph, they may look like these (display the four graphs).

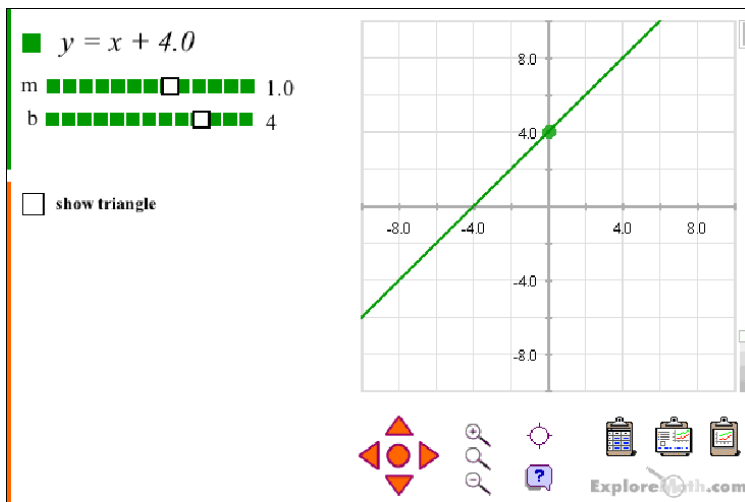
Now break students up into small groups of three or four. Ask the students which graphs show jets that are moving away from the radar. Have students explain why jet **D** is not the correct answer. Ask students which jet is going the fastest. Have students explain answers. Ask students which jet was the farthest away from the radar when the timing started. Try to lead students towards answers that involve the concept of slope and y-intercept. Have students draw a graph of a helicopter that is hovering **100** yards away from the radar. Discuss the various answers.

The slope-intercept activity

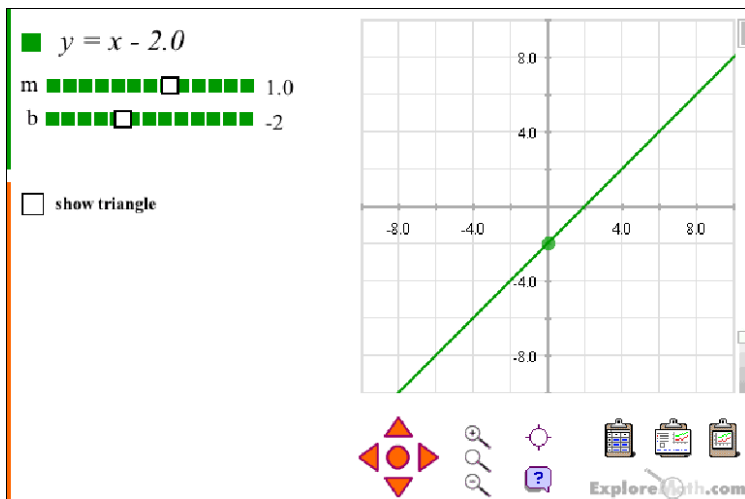
To show this activity in action, go to the [Slope-intercept form of a line](https://www.explorelearning.com) activity at [ExploreLearning.com](https://www.explorelearning.com). If you are using a worksheet, you can give it to your students now if you want them to follow along, or you can hand it out at the end of class for them to review later.

Finding the meaning of 'b'

On the y-axis of the graph is a green point. Drag the green point up the y-axis to the coordinates **(0, 4)**.



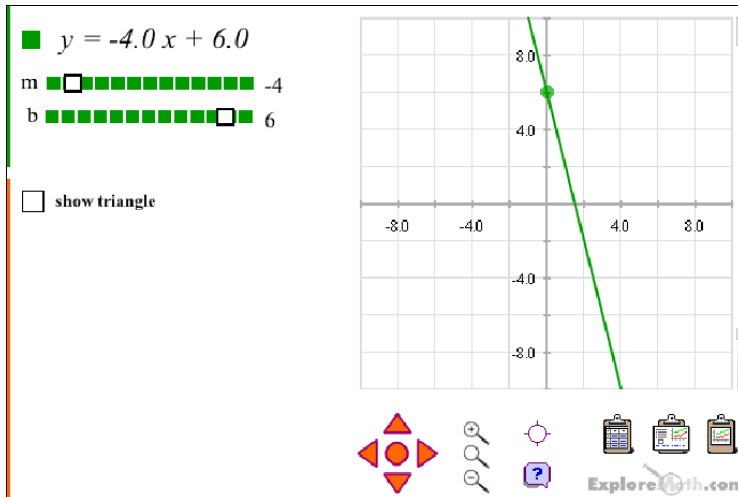
Ask students what the value of b is next to the b slide bar. Now move the green point to $(0, -2)$.



Ask the students to explain what happened to the value of b .

Now change the value of the slope using the slope slide bar. Ask students what happened to the value of b when this value was changed.

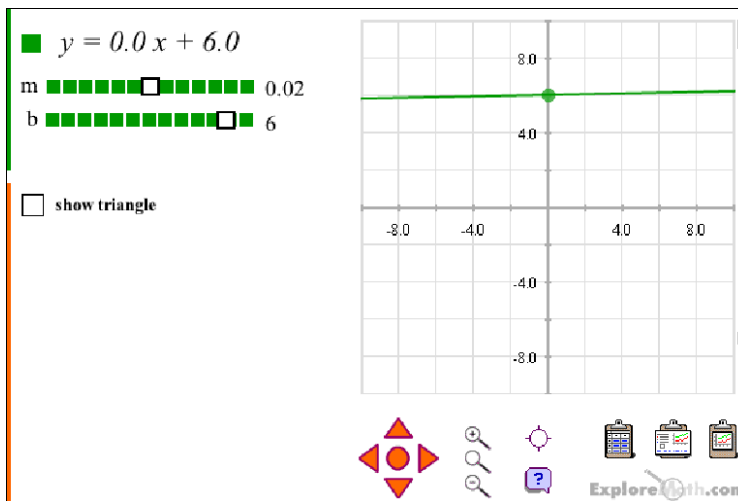
Ask students to predict the value of b for the line $y = -4x + 6$. Type in the equation for this line and have students check their answer.



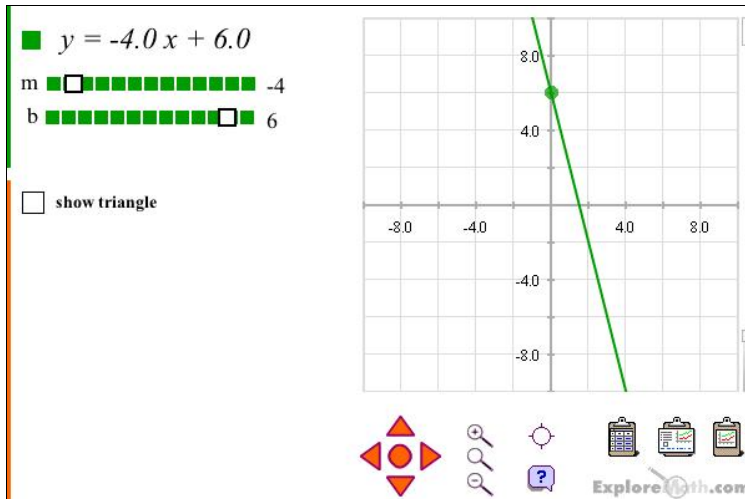
Have students make conjectures about the meaning of **b**. Students should be able to see that **b** represents the y-intercept of a line.

The meaning of m

To the right of the slope bar type in the following values for **m**: $\frac{1}{3}$, $\frac{1}{2}$, 1, 2, 4, 6. Ask students to describe the changes in the line, as the value of **m** gets larger. Now type in the numbers in reverse order. Ask students to describe the changes in the line, as **m** gets closer to zero.



Change the value of **m** from positive to negative.



Ask students how lines with positive slope differ from lines with negative slope.

Ask students to make conjectures about **m**. Students should see that **m** represents slope and should be able to describe how different values of **m** change the graph of a line.

Putting it all together

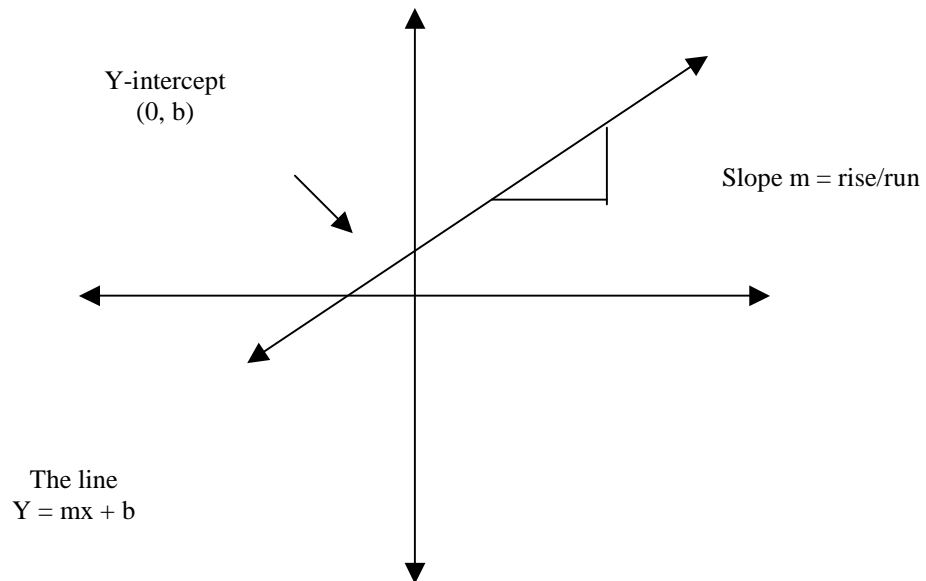
Give students the equations of several lines. Have them graph the lines on their own paper. Once students complete this task, type in the equation for each line and have students check their answer.

Now give students the graphs of several lines and have the students find the proper equations. (The clipboard feature allows you to copy and paste graphs into word processing documents.) Have students explain their answers for each graph.

Conclusion

Lines can be defined given **m** and **b**. The value of **b** determines where a line crosses the **y**-axis. The value of **m** determines the slope of the line. Both can be put together to make an equation for the line: $y = \mathbf{mx} + \mathbf{b}$. This form of a linear equation is called the slope-intercept form.

ExploreLearning



In subsequent activities, you will learn other methods of determining the equation for a line.