

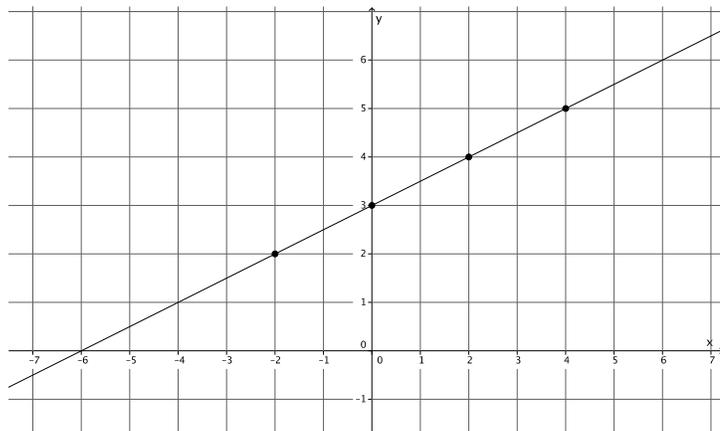
Lesson 18: There Is Only One Line Passing Through a Given Point with a Given Slope

Classwork

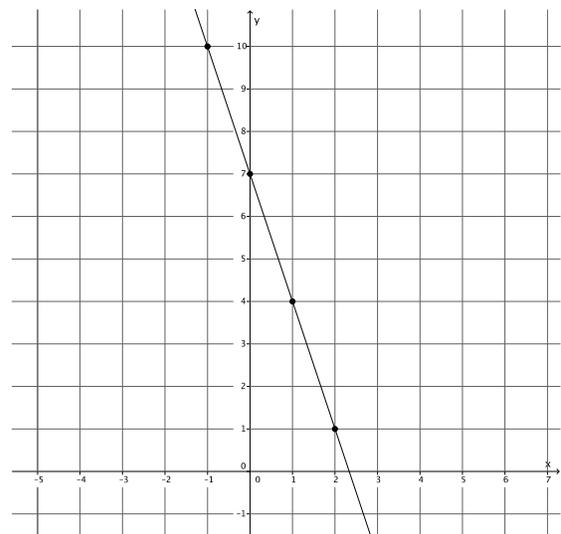
Opening Exercise

Examine each of the graphs and their equations. Identify the coordinates of the point where the line intersects the y -axis. Describe the relationship between the point and the equation $y = mx + b$.

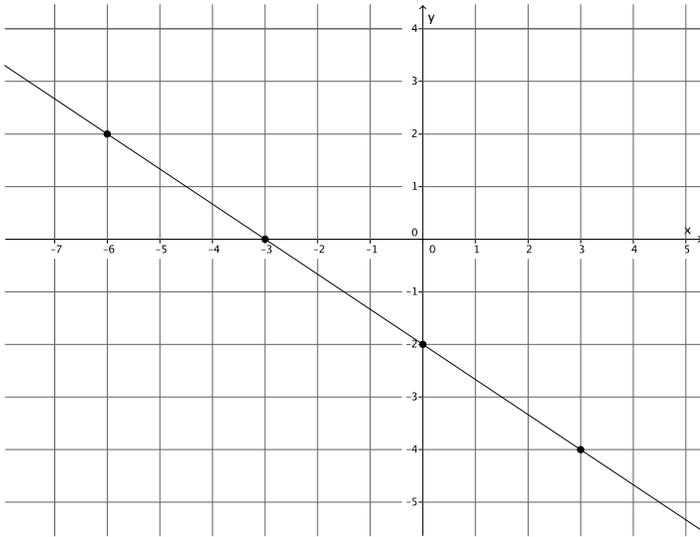
a. $y = \frac{1}{2}x + 3$



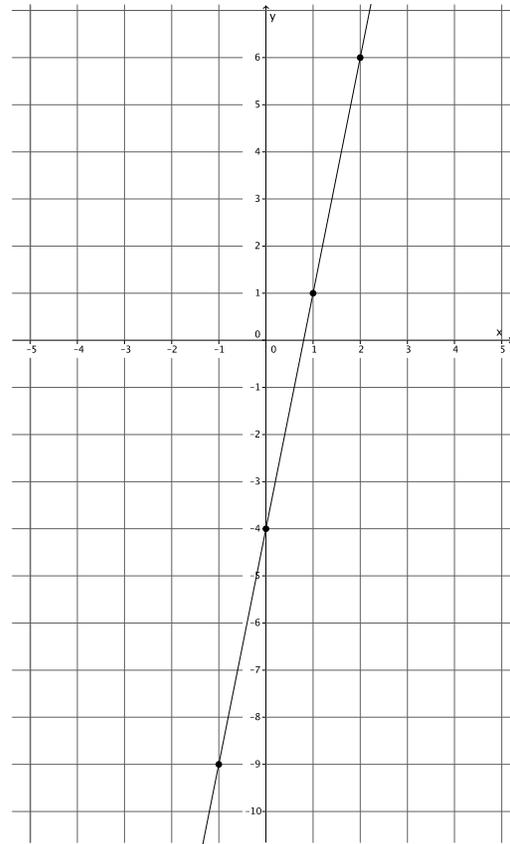
b. $y = -3x + 7$



c. $y = -\frac{2}{3}x - 2$

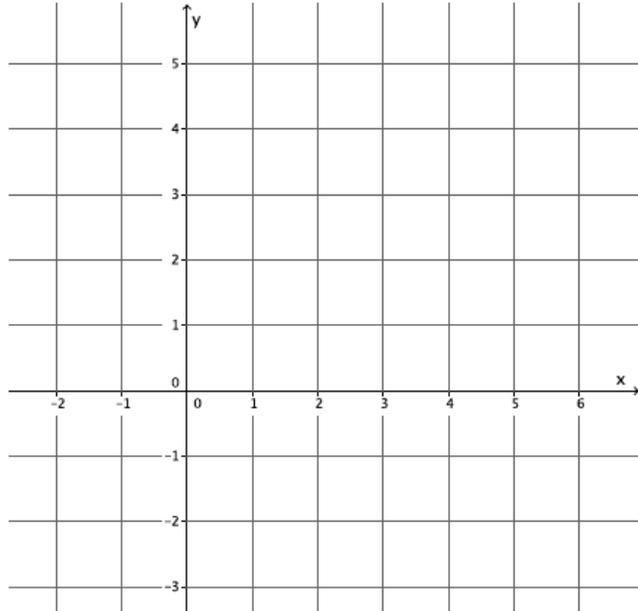


d. $y = 5x - 4$

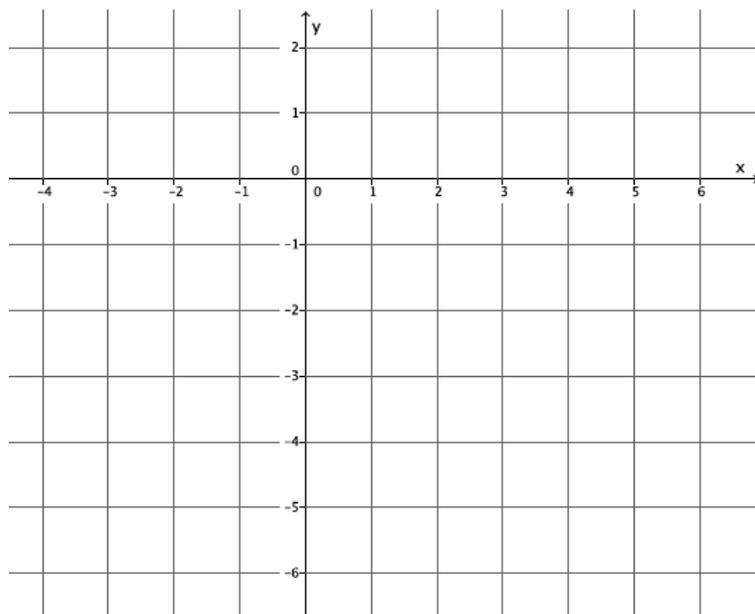


Example 1

Graph the equation $y = \frac{2}{3}x + 1$. Name the slope and y -intercept point.

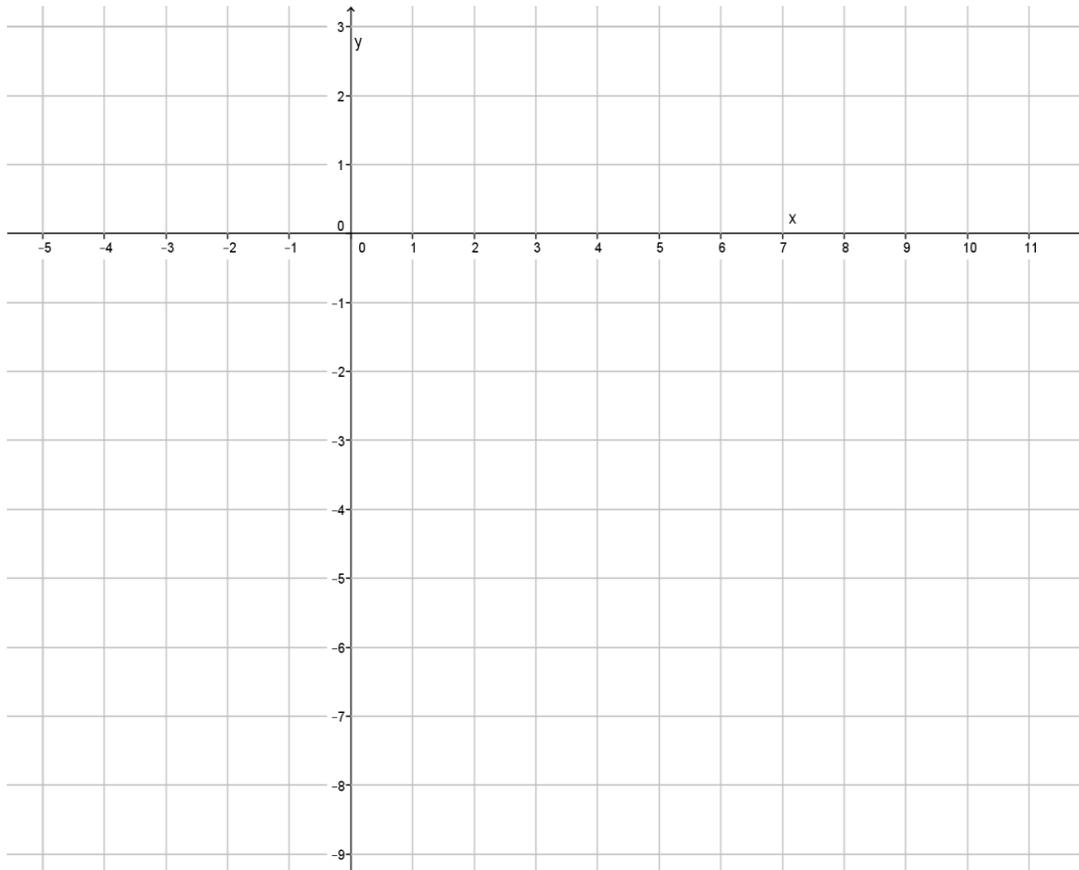
**Example 2**

Graph the equation $y = -\frac{3}{4}x - 2$. Name the slope and y -intercept point.



Example 3

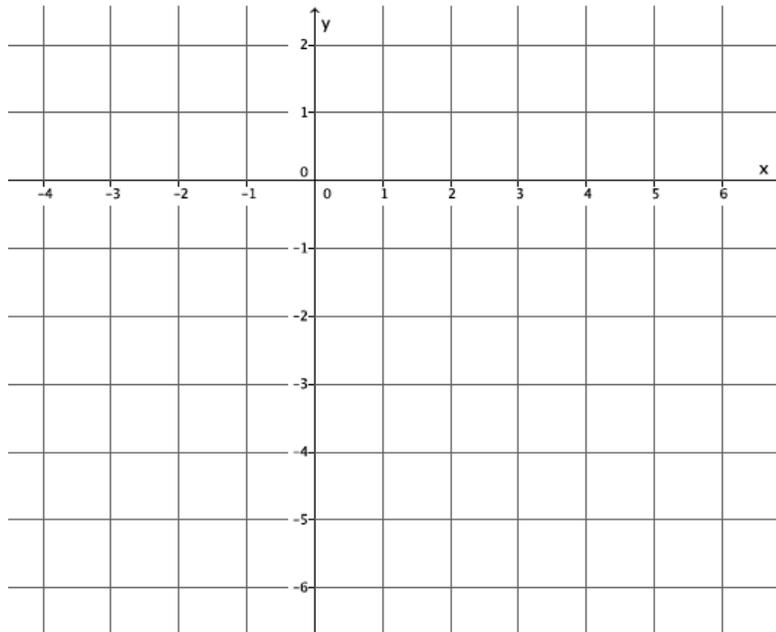
Graph the equation $y = 4x - 7$. Name the slope and y -intercept point.



Exercises

1. Graph the equation $y = \frac{5}{2}x - 4$.
 - a. Name the slope and the y -intercept point.

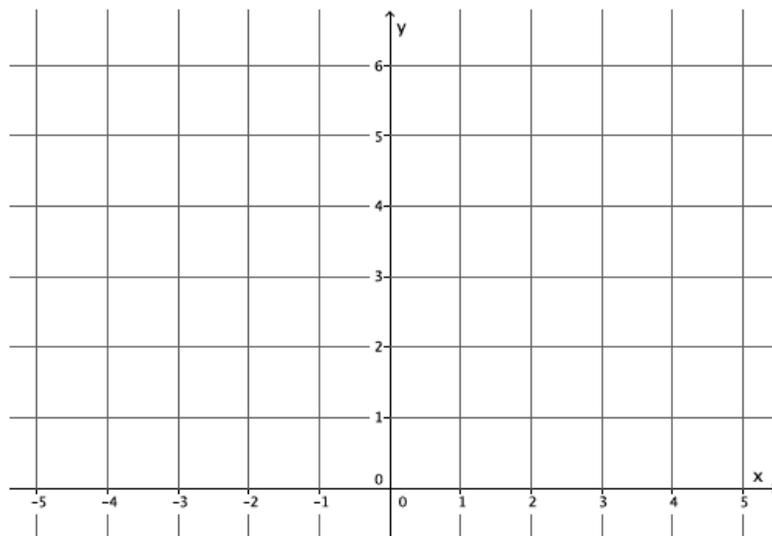
- b. Graph the known point, and then use the slope to find a second point before drawing the line.



2. Graph the equation $y = -3x + 6$.

- a. Name the slope and the y -intercept point.

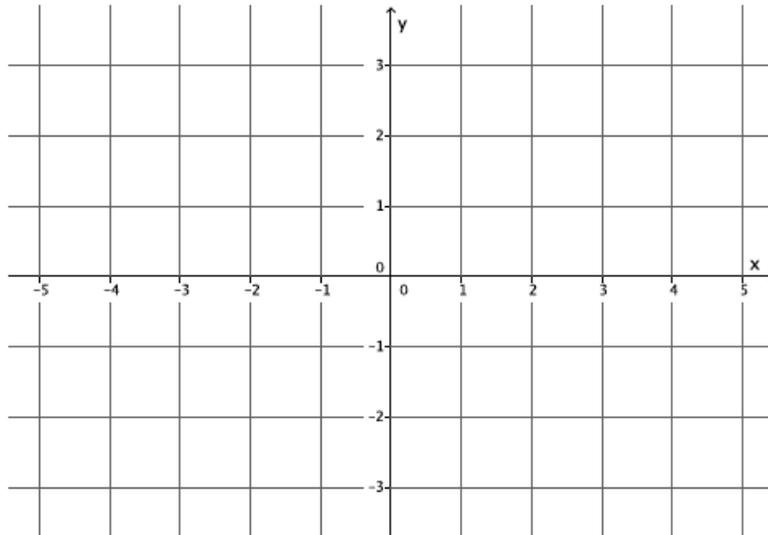
- b. Graph the known point, and then use the slope to find a second point before drawing the line.



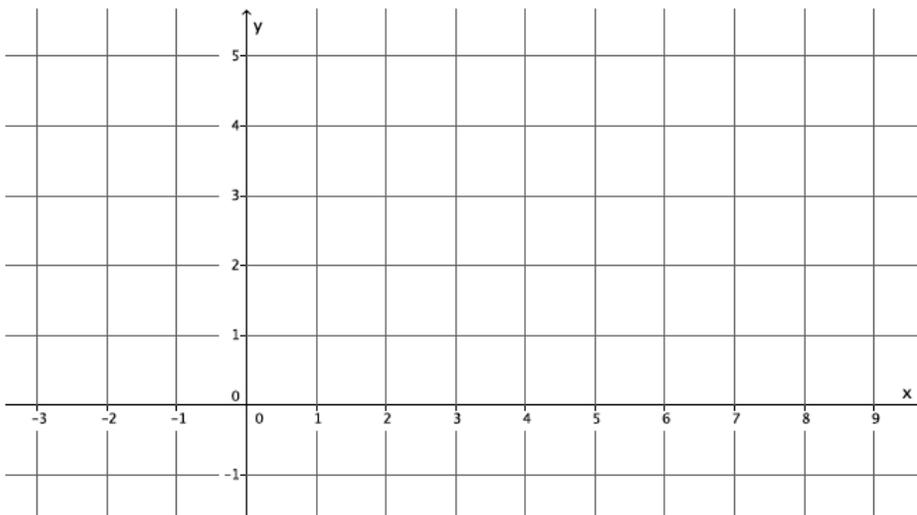
3. The equation $y = 1x + 0$ can be simplified to $y = x$. Graph the equation $y = x$.

a. Name the slope and the y -intercept point.

b. Graph the known point, and then use the slope to find a second point before drawing the line.



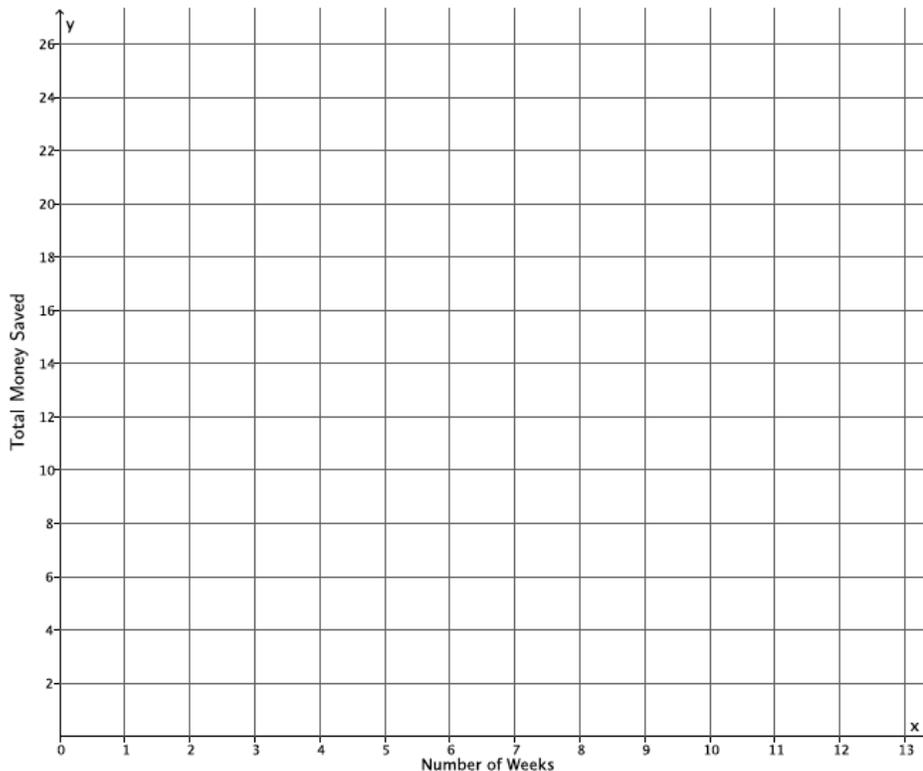
4. Graph the point $(0, 2)$.



a. Find another point on the graph using the slope, $m = \frac{2}{7}$.

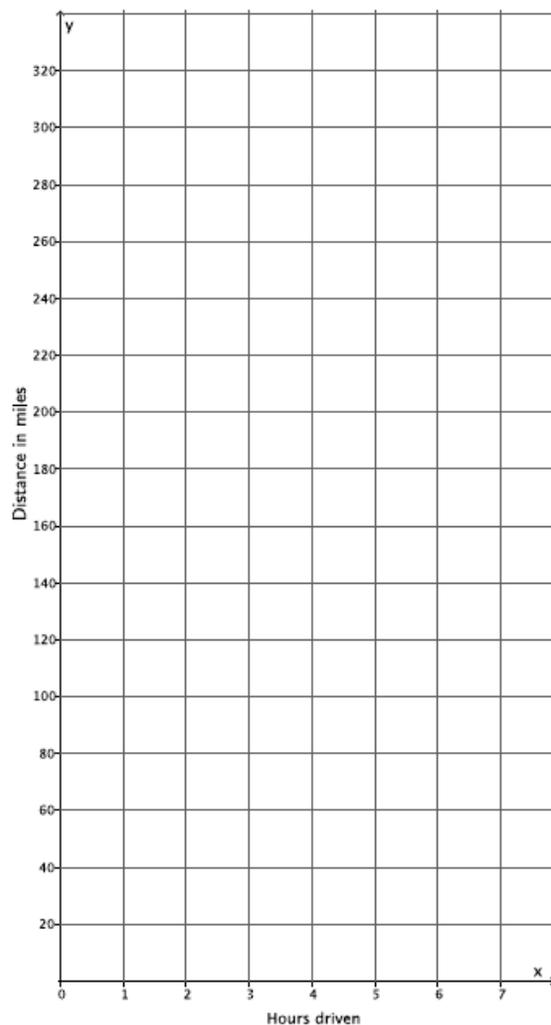
b. Connect the points to make the line.

- c. Draw a different line that goes through the point $(0, 2)$ with slope $m = \frac{2}{7}$. What do you notice?
5. A bank put \$10 into a savings account when you opened the account. Eight weeks later, you have a total of \$24. Assume you saved the same amount every week.
- a. If y is the total amount of money in the savings account and x represents the number of weeks, write an equation in the form $y = mx + b$ that describes the situation.
- b. Identify the slope and the y -intercept point. What do these numbers represent?
- c. Graph the equation on a coordinate plane.



- d. Could any other line represent this situation? For example, could a line through point $(0,10)$ with slope $\frac{7}{5}$ represent the amount of money you save each week? Explain.
6. A group of friends are on a road trip. After 120 miles, they stop to eat lunch. They continue their trip and drive at a constant rate of 50 miles per hour.
- a. Let y represent the total distance traveled, and let x represent the number of hours driven after lunch. Write an equation to represent the total number of miles driven that day.

- b. Identify the slope and the y -intercept point. What do these numbers represent?
- c. Graph the equation on a coordinate plane.
- d. Could any other line represent this situation? For example, could a line through point $(0, 120)$ with slope 75 represent the total distance the friends drive? Explain.



Lesson Summary

The equation $y = mx + b$ is in slope-intercept form. The number m represents the slope of the graph, and the point $(0, b)$ is the location where the graph of the line intersects the y -axis.

To graph a line from the slope-intercept form of a linear equation, begin with the known point, $(0, b)$, and then use the slope to find a second point. Connect the points to graph the equation.

There is only one line passing through a given point with a given slope.

Problem Set

Graph each equation on a separate pair of x - and y -axes.

- Graph the equation $y = \frac{4}{5}x - 5$.
 - Name the slope and the y -intercept point.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Graph the equation $y = x + 3$.
 - Name the slope and the y -intercept point.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Graph the equation $y = -\frac{4}{3}x + 4$.
 - Name the slope and the y -intercept point.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Graph the equation $y = \frac{5}{2}x$.
 - Name the slope and the y -intercept point.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Graph the equation $y = 2x - 6$.
 - Name the slope and the y -intercept point.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Graph the equation $y = -5x + 9$.
 - Name the slope and the y -intercept point.
 - Graph the known point, and then use the slope to find a second point before drawing the line.

7. Graph the equation $y = \frac{1}{3}x + 1$.
- Name the slope and the y -intercept point.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
8. Graph the equation $5x + 4y = 8$. (Hint: Transform the equation so that it is of the form $y = mx + b$.)
- Name the slope and the y -intercept point.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
9. Graph the equation $-2x + 5y = 30$.
- Name the slope and the y -intercept point.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
10. Let l and l' be two lines with the same slope m passing through the same point P . Show that there is only one line with a slope m , where $m < 0$, passing through the given point P . Draw a diagram if needed.