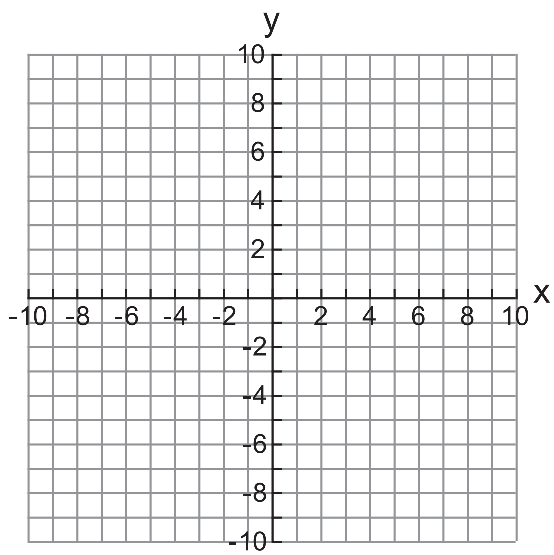
Investigating Intercepts

1. Can more than one line have the same slope? If more than one line has the same slope, what makes the lines different?

   a. Graph the following set of equations on the same set of axes. Label each graph.

      i. $y = x$
      ii. $y = x - 6$
      iii. $y = x + \frac{1}{2}$
      iv. $y = x + 3$
      v. $y = x - \frac{1}{2}$



   b. What observations can you make about the lines?

   c. What is the slope of all the lines?

   d. How does addition or subtraction of a "*b*" value change the line?

   e. What is the name of "*b*?"

   f. Predict the graph of $y = x + 7$. Sketch your prediction on the above graph. Use the graphing calculator to verify your prediction.

   g. Complete the sentence: Lines with the same slope are ________________.

Investigating Intercepts

Finding Intercepts

In a function an intercept is the point at which a line crosses an axis. If it crosses the *y*-axis, it is called the ___________ and the point is (0, *y*). If it crosses the *x*-axis, it is called the ___________ and the point is (*x*, 0).

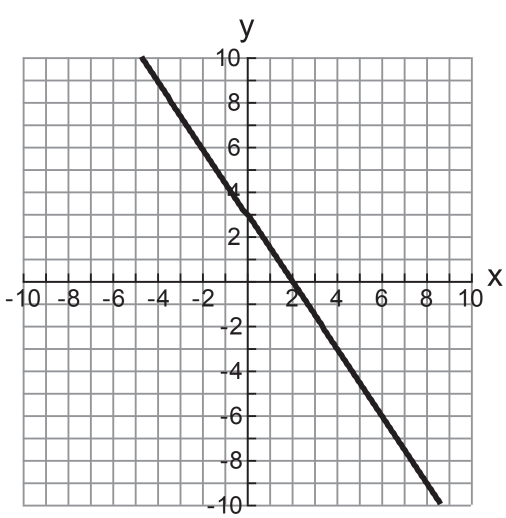
The *x*-intercepts are also known as the ___________________, because the *x*-intercepts are where the value of the function is zero.

Finding intercepts from a graph

2. Study the graphs of the lines below.

Examples:

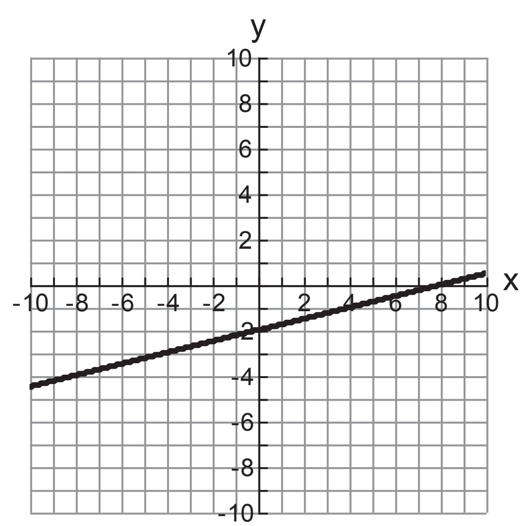
a.



x-intercept: __________

y-intercept: __________

b.



x-intercept: __________

y-intercept: __________

Investigating Intercepts

Finding intercepts from a table

***y*-intercept** **(0, *y*)**	
0	*y*

***x*-intercept** **zero of function** **(*x*, 0)**	
x	0

Use patterns to complete the tables and find intercepts.

3.

x	*y*
-1	3
0	2
1	1
2	0
3	-1

a. Determine the slope

b. Circle the *x*-intercept (zero of function)

c. Write the coordinates of the *x*-intercept.

d. Circle the *y*-intercept

e. Write the coordinates of the *y*-intercept

4.

x	*y*
-3	-14
-1	-10
1	-6
3	-2
5	2

a. Determine the slope

b. Complete the pattern to find where *y* = 0.

c. Circle the *x*-intercept (zero of function)

d. Write the coordinates of the *x*-intercept

e. Complete the pattern to find where *x* = 0.

f. Circle the *y*-intercept

g. Write the coordinates of the *y*-intercept

Investigating Intercepts

Finding intercepts from an equation

One form of linear equations is called the ________________________________ form. Any linear function can be written in this form in order to determine the slope and y-intercept.

$$y = mx + b \quad \text{or} \quad f(x) = mx + b$$

m represents ________________________________.

b represents ________________________________.

Use algebraic manipulation to transform the following equation to the slope-intercept form. Determine the slope and y-intercept form of the function.

$6x - 3y = 9$

- Solve for y.

5. Find the slope and y-intercept for each function.

a. $y = -\frac{5}{4}x + 7$

b. $f(x) = 12x - 35$

c. $y = 60 - 6x$

d. $3x + 2y = 5$

e. $4y - x = 16$

Special Cases: Find the slope and y-intercept.

6. $y = -10$

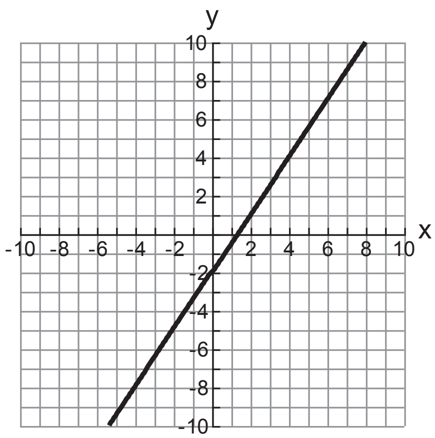
7. $x = 6$

Investigating Intercepts

Practice Problems

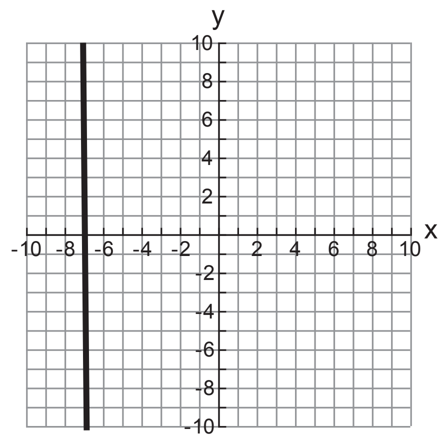
1. Find the slope and the *x*- intercept and *y*-intercept of the following graphs of lines.

a.



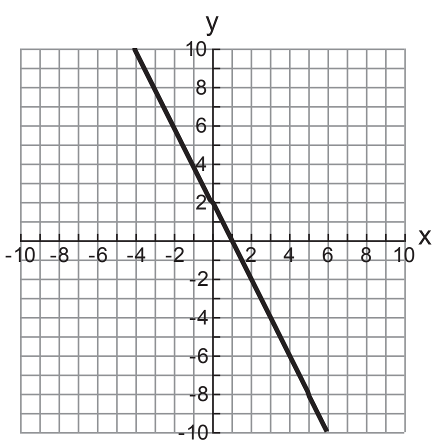
slope ______
x-intercept (zero of function) ______
y-intercept ______

b.



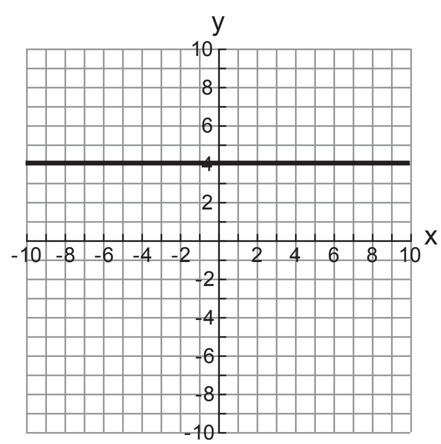
slope ______
x-intercept (zero of function) ______
y-intercept ______

c.



slope ______
x-intercept (zero of function) ______
y-intercept ______

d.



slope ______
x-intercept (zero of function) ______
y-intercept ______

Investigating Intercepts

Find the slope and intercepts from the data in the tables.

2.

x	*y*
-2	6
0	4
2	2
4	0
6	-2

slope ______
x-intercept (zero of function) ______
y-intercept ______

3.

x	*y*
-1	-20
1	-12
3	-4
5	4
7	12

slope ______
x-intercept (zero of function) ______
y-intercept ______

Find the slope and *y*-intercept of each equation.

4. $y = 2.5x$

5. $y = -\frac{3}{7}x - 42$

6. $f(x) = \frac{4}{3}x + 2$

7. $4x + 3y = 12$

8. $y = -1$

9. $x = 4$

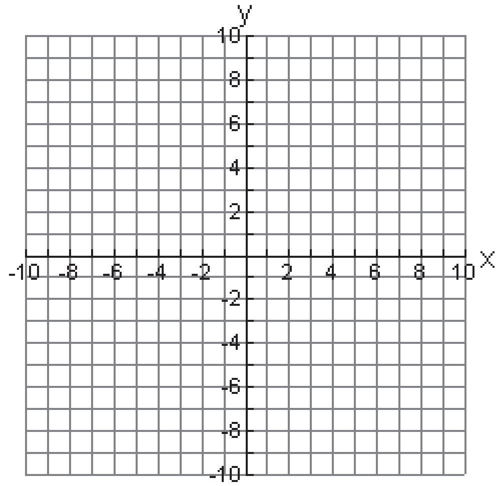
10. $2x - 5y = 15$

11. $6y = 2x - 18$

12. $5y + 2x = -8$

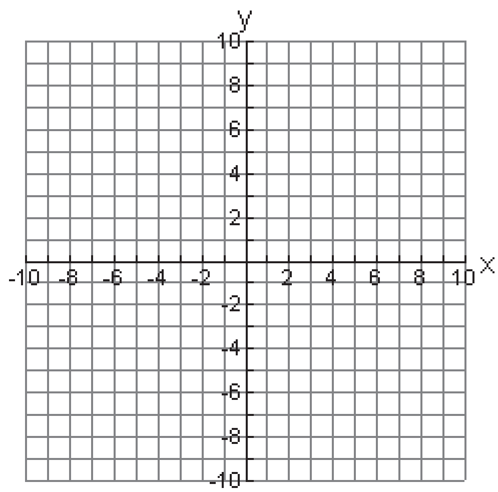
Investigating Intercepts

13. A line contains the points (-6, -5) and (3, 1).
    a. Sketch a graph of the line.



    b. What is the slope of the original line?
    c. If the slope is multiplied by 3 and the *y*-intercept stays the same, sketch a transformed graph on the same coordinate plane of the resulting line.
    d. What is the slope of the transformed line?

14. A line with a slope of one-half, contains the point (-4, -5).
    a. Sketch a graph of the line.



    b. What is the *y*-intercept of the original line?
    c. If the slope remains the same and the *y*-intercept increased by 3 units, sketch a transformed graph on the same coordinate plane of the resulting line.
    d. What is the *y*-intercept of the transformed line?
    e. How would you describe the relationship between the two lines? Explain.