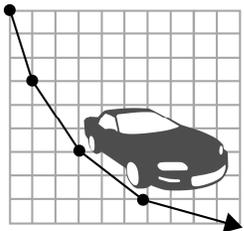


## Section 3.2

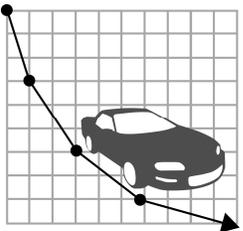
### Graphing Linear Equations Using Intercepts



***It's all downhill from here!!!!***

It seems that the value of a new car drops drastically the moment that you drive it off the lot!

This section of your textbook contains exercises that use mathematical models to explore the depreciation of automobiles.



#### First Steps:

- Take comprehensive notes** from your instructor's lecture and insert your notes into this section of the *Learning Guide*. Be sure to write down all examples, definitions, and other key concepts. Additional learning resources include the *Lecture Series on DVD*, the *PowerPoints*, and Section 3.2 of your textbook which begins on page 223.
- Complete the *Concept and Vocabulary Check* on page 231 of the textbook.

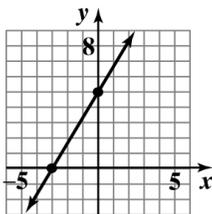
#### Guided Practice:

- Review each of the following *Solved Problems* and complete each *Pencil Problem*.

**Objective #1:** Use a graph to identify intercepts.

#### ✓ *Solved Problem #1*

1a. Identify the  $x$ - and  $y$ - intercepts:

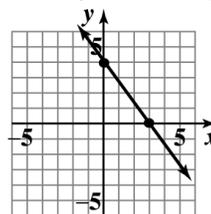


The graph crosses the  $x$ -axis at  $(-3, 0)$ .  
Thus, the  $x$ -intercept is  $-3$ .

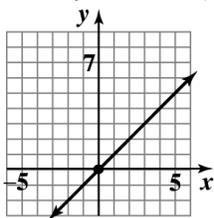
The graph crosses the  $y$ -axis at  $(0, 5)$ .  
Thus, the  $y$ -intercept is  $5$ .

#### ✎ *Pencil Problem #1* ✎

1a. Identify the  $x$ - and  $y$ - intercepts:



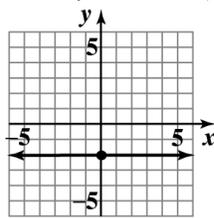
1b. Identify the  $x$ - and  $y$ - intercepts:



The graph crosses the  $x$ -axis at  $(0,0)$ .  
Thus, the  $x$ -intercept is 0.

The graph crosses the  $y$ -axis at  $(0,0)$ .  
Thus, the  $y$ -intercept is 0.

1b. Identify the  $x$ - and  $y$ - intercepts:



**Objective #2:** Graph a linear equation in two variables using intercepts.

**✓ Solved Problem #2**

2a. Find the  $x$ -intercept of the graph of  $4x - 3y = 12$ .

To find the  $x$ -intercept, let  $y = 0$  and solve for  $x$ .

$$\begin{aligned} 4x - 3y &= 12 \\ 4x - 3(0) &= 12 \\ 4x &= 12 \\ x &= 3 \end{aligned}$$

The  $x$ -intercept is 3.

**✎ Pencil Problem #2**

2a. Find the  $x$ -intercept of the graph of  $2x + 5y = 20$ .

2b. Find the  $y$ -intercept of the graph of  $4x - 3y = 12$ .

To find the  $y$ -intercept, let  $x = 0$  and solve for  $y$ .

$$\begin{aligned} 4x - 3y &= 12 \\ 4(0) - 3y &= 12 \\ -3y &= 12 \\ y &= -4 \end{aligned}$$

The  $y$ -intercept is  $-4$ .

2b. Find the  $y$ -intercept of the graph of  $2x + 5y = 20$ .

**2c.** Use intercepts to graph  $2x + 3y = 6$ .

Find the  $x$ -intercept.

Let  $y = 0$  and solve for  $x$ .

$$2x + 3y = 6$$

$$2x + 3(0) = 6$$

$$2x = 6$$

$$x = 3$$

The  $x$ -intercept is 3.

Find the  $y$ -intercept.

Let  $x = 0$  and solve for  $y$ .

$$2x + 3y = 6$$

$$2(0) + 3y = 6$$

$$3y = 6$$

$$y = 2$$

The  $y$ -intercept is 2.

Find a checkpoint.

For example, let  $x = 1$  and solve for  $y$ .

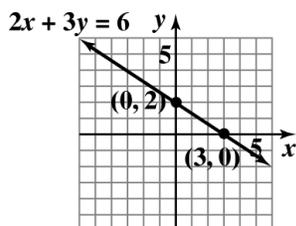
$$2x + 3y = 6$$

$$2(1) + 3y = 6$$

$$2 + 3y = 6$$

$$3y = 4$$

$$y = \frac{4}{3} \text{ or } 1\frac{1}{3}$$



**2c.** Use intercepts to graph  $6x - 9y = 18$ .

**2d.** Graph:  $x + 3y = 0$

Because the constant on the right is 0, the graph passes through the origin. The  $x$ - and  $y$ -intercepts are both 0. Thus, we will need to find two more points.

Let  $y = -1$  and solve for  $x$ .

$$x + 3y = 0$$

$$x + 3(-1) = 0$$

$$x - 3 = 0$$

$$x = 3$$

Let  $y = 1$  and solve for  $x$ .

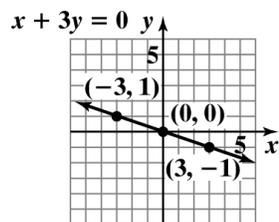
$$x + 3y = 0$$

$$x + 3(1) = 0$$

$$x + 3 = 0$$

$$x = -3$$

Use these three solutions of  $(0,0)$ ,  $(3,-1)$ , and  $(-3,1)$ .



**2d.** Graph:  $x + 2y = 0$

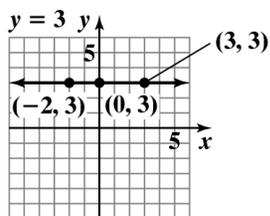
**Objective #3:** Graph horizontal or vertical lines.

 **Solved Problem #3**
**3a.** Graph:  $y = 3$ 

As demonstrated in the table below, all ordered pairs that are solutions of  $y = 3$  have a value of  $y$  that is always 3.

$x$	$y = 3$	$(x, y)$
-2	3	$(-2, 3)$
0	3	$(0, 3)$
1	3	$(1, 3)$

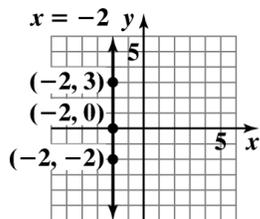
Thus the line is horizontal.


 **Pencil Problem #3**
**3a.** Graph:  $y = -2$ 
**3b.** Graph:  $x = -2$ 

As demonstrated in the table below, all ordered pairs that are solutions of  $x = -2$  have a value of  $x$  that is always  $-2$ .

$x = -2$	$y$	$(x, y)$
-2	3	$(-2, 3)$
-2	0	$(-2, 0)$
-2	-2	$(-2, -2)$

Thus the line is vertical.


**3b.** Graph:  $x = 2$

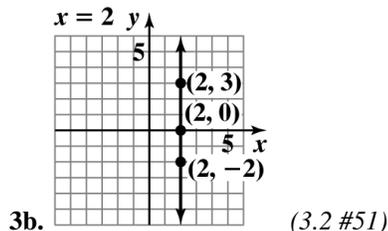
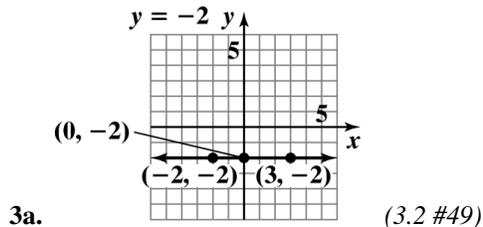
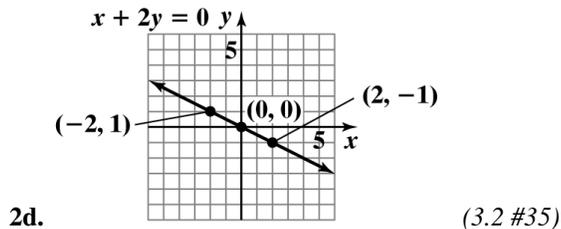
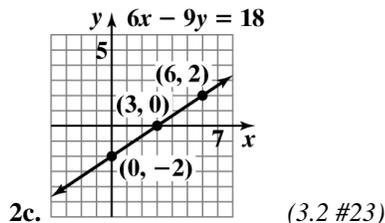
**Answers for Pencil Problems** (*Textbook Exercise references in parentheses*):

1a. x-intercept is 3 and y-intercept is 4 (3.2 #1)

1b. no x-intercept and y-intercept is -2 (3.2 #7)

2a. x-intercept is 10 (3.2 #9)

2b. y-intercept is 4 (3.2 #9)



**Homework:**

- Review the Section 3.2 summary which begins on page 272 of the textbook.
- Insert your homework into this section of the *Learning Guide*. Show all work neatly and check your answers. Strive to work through difficulties when possible, making note of any exercises where you need additional help. Remember, even if your instructor assigns homework through *MyMathLab*, you should still write out your work.