

✚ *homework check:* FM10 p. 180 #1, 2, 3, 4, 7, 8, 10, 12

✚ *note:* Converting from Standard to  $y=mx+b$  Form

Linear equations come in two basic forms: either slope intercept form  $y = mx + b$  or standard form  $ax + by + c = 0$ . We can rewrite an equation in either form by rearranging. To put an equation in slope intercept form, we isolate the y variable. To put an equation into standard form, we rearrange so that everything is located on one side of the equal sign. In standard form, there can be no fractions and the value on x must be positive. For example,

a) write the given equation in standard form.

$y = -2x + 3$  since the value of x is negative, move the x term to the left to make it positive

$2x + y = 3$  now bring the constant to the left side as well

$$2x + y - 3 = 0$$

b) write the given equation in slope intercept form

$3x - 2y + 6 = 0$  bring the y term to the right side

$3x + 6 = 2y$  divide every term by the constant

$$\frac{3x}{2} + \frac{6}{2} = y \text{ reduce all terms possible}$$

$$y = \frac{3}{2}x + 3$$

c) write the given equation in standard form

$y = 3x + 5$  since the x term is already positive, bring the y term to the right leaving 0 on the left

$$0 = 3x - y + 5$$

d) identify the slope and y intercept of the given relation

$6x - 2y + 4 = 0$  to identify slope, we need  $y = mx + b$  form

$$6x + 4 = 2y$$

$$\frac{6x}{2} + \frac{4}{2} = y$$

$3x + 2 = y$  from this form, we can easily identify the slope and y intercept

y intercept  $(0, 2)$

slope  $m = 3$

**✚ homework assignment: FM10 p. 187 # 1 – 4 a, c, e, g, #5, 8, - 10**

## Key Concepts

- A linear equation can be represented in different ways.
- To write a linear equation in slope  $y$ -intercept form, rearrange the equation to isolate  $y$ .

### Discuss the Concepts

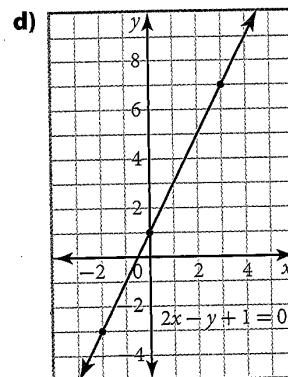
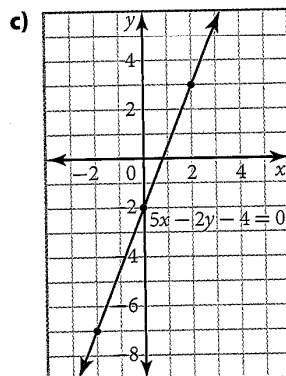
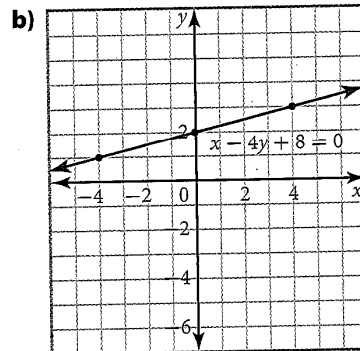
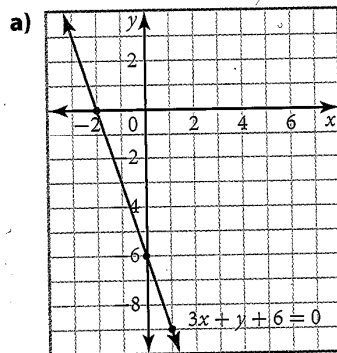
**D1.** Write an example of a linear equation in standard form, and an example of a linear equation in slope  $y$ -intercept form.

**D2.** Marc states that the equations  $y = -\frac{1}{3}x + 5$  and  $x + 3y - 15 = 0$  represent the same linear relation. Is he correct? Explain.

## Practise the Concepts

**A**

1. Find the slope and  $y$ -intercept of each linear relation, then write the equation for the relation in slope  $y$ -intercept form.



For help with question 2, refer to Example 1.

2. Rewrite each equation in slope  $y$ -intercept form.

a)  $2x + y - 1 = 0$

b)  $3x - y - 5 = 0$

c)  $2x + y - 4 = 0$

d)  $5x + y + 8 = 0$

e)  $x - y + 1 = 0$

f)  $2x - y - 3 = 0$

For help with question 3, refer to Example 2.

3. Rewrite each equation in slope  $y$ -intercept form, then state the slope and the  $y$ -intercept.

a)  $2x - y + 4 = 0$

b)  $3x + y - 2 = 0$

c)  $x - y + 4 = 0$

d)  $3x + y + 11 = 0$

e)  $8x - y - 5 = 0$

f)  $2x + y + 7 = 0$

4. Rewrite each equation in slope  $y$ -intercept form. State the slope and the  $y$ -intercept of each.

a)  $5x - 5y - 15 = 0$

b)  $2x - 3y + 12 = 0$

c)  $8x + 4y - 20 = 0$

d)  $x - 2y + 10 = 0$

e)  $x - 5y + 15 = 0$

f)  $3x - 4y + 12 = 0$

g)  $8x - 6y - 36 = 0$

h)  $3x + 6y + 18 = 0$

### Apply the Concepts

**B**

#### Math Connect

A 5-star sightseeing train will soon be running on the new Qinghai-Tibet railway in China. The transparent cars will allow views on all sides. Passengers will be able to shower on the train and enjoy dance performances and karaoke. A sightseeing holiday on this train will cost over \$1000 per day.

For help with question 5, refer to Example 3.

5. A sightseeing train runs tours at four different times on Saturdays.

An adult ticket is \$3 and a child's ticket is \$1. One Saturday, the total ticket revenue was \$750. On this day, 150 tickets were sold for the first tour, 95 for the second, 125 for the third, and 96 for the fourth.

a) Write an equation to model the total revenue for this Saturday.

b) Rearrange the equation to isolate the variable representing children's tickets.

c) Find the total number of children's tickets sold on this Saturday.



**Literacy Connect**

6. Describe the steps you would follow to rewrite the equation  $3x + 2y - 3 = 0$  in slope  $y$ -intercept form.
7. a) Make a table of values and graph the equation  $2x + 3y = 0$ .  
b) Find the slope and the  $y$ -intercept.  
c) Rewrite the equation in slope  $y$ -intercept form.  
d) Compared to standard form,  $Ax + By + C = 0$ , the equation  $2x + 3y = 0$  has  $C = 0$ . Interpret what this means.
8. The line  $3x + 4y + C = 0$  passes through  $(1, 2)$ . Find the value of  $C$ .
9. The line  $Ax + 2y - 5 = 0$  passes through  $(1, 0)$ . Find the value of  $A$ .
10. The line  $y = 4x + b$  passes through  $(8, -3)$ . Find the value of  $b$ .

**Chapter Problem****Math Connect**

Many event planners are graduates in business administration, marketing, or leisure and tourism management.

11. a) A banquet hall charges \$6675 for an event with 175 guests. If the cost per person is \$29, find the flat fee charged for the use of the hall.  
b) The same hall charges another organization \$11 875 for an event with 325 guests. If the cost for this event is \$31 per person, how much is the flat fee for this organization?  
c) What are some reasons why the same hall would have a different per-person charge and a different flat fee?

**Extend the Concepts****C**

12. a) Rearrange the general case of the standard form of a linear equation,  $Ax + By + C = 0$ , into slope  $y$ -intercept form.  
b) Use your result from part a) to find an expression for the slope and the  $y$ -intercept in terms of  $A$ ,  $B$ , and  $C$ .
13. Describe the graph of the standard form of a linear equation,  $Ax + By + C = 0$ , in each case. Include an example and a sketch of your example.
- |                                |                                   |
|--------------------------------|-----------------------------------|
| a) $A \neq 0, B = 0, C = 0$    | b) $A \neq 0, B \neq 0, C = 0$    |
| c) $A \neq 0, B = 0, C \neq 0$ | d) $A \neq 0, B \neq 0, C \neq 0$ |