Chapter 7 – Graphing Equations of Lines and Linear Models; Rates of Change
Section 3 – Using Slope to Graph Equations of Lines and Linear Models

Objectives
1. Use the slope and the y-intercept of a line to sketch the line.
2. Describe the meaning of m for an equation of the form y = *m*x + *b*.
3. Graph an equation of the form y = *m*x + *b* by using the line's slope and y-intercept.
4. Find an equation of a line from its graph.
5. Graph an equation of a linear model by using the model's slope and vertical intercept.
6. Use a linear model's slope and vertical intercept to find its equation.

Vocabulary
1. slope-intercept form

Lesson/Activity

OBJECTIVE 1 – Use the slope and the y-intercept of a line to sketch the line.

Sketch the line that has the given slope and y-intercept.

1. m = 2/5, (0, -3)
2. m = -3/2, (0, 4)
3. m = -2, (0, -1)

OBJECTIVE 2 – Describe the meaning of *m* for an equation of the form y = *m*x + *b*.

4. a. Use the method discussed in Section 7.1 to graph y = 2x + 1.
   b. What is the slope of the line y = 2x + 1?
   c. Compare the slope with the number multiplied times x in the equation y = 2x + 1.

Finding the Slope and y-Intercept from a Linear Equation

For a linear equation of the form y = *m*x + *b*,

- the slope of the line is *m* and
- the y-intercept of the line is (0, *b*).

We say this equation is in **slope-intercept** form.

The graph of the equation y = -3x + 8 is a line with slope -3 and y-intercept (0, 8).

OBJECTIVE 3 – Graph an equation of the form y = *m*x + *b* by using the line's slope and y-intercept.

Sketch the graph of the equation by hand.

5. y = 3/5x – 1
6. y = -4/3x + 5
7. y = -2x – 3

Graphing an Equation in Slope-Intercept Form

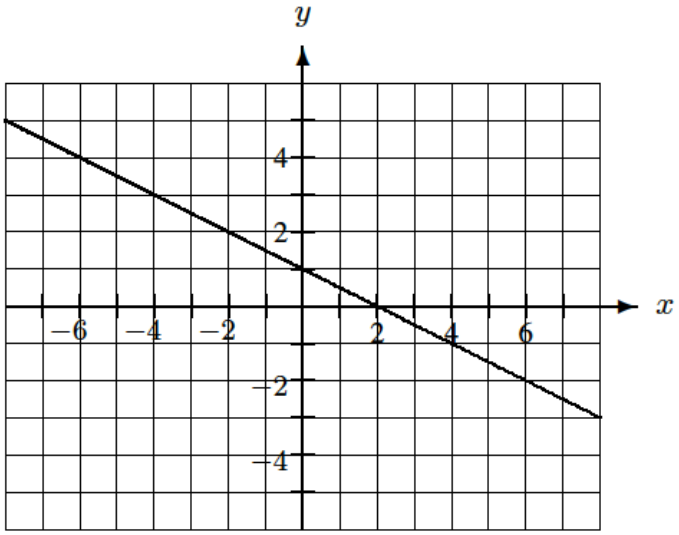
To graph an equation of the form y = *m*x + *b*,

1. Plot the y-intercept (0, *b*).
2. Use m = rise/run to plot a second point.
3. Sketch the line that passes through the two plotted points.

OBJECTIVE 4 – Find an equation of a line from its graph.

8. Find an equation of a line that has slope -5/7 and y-intercept (0, 2).

9. Find an equation of the line sketched below.



Finding an Equation of a Line from a Graph

To find an equation of a line from a graph.

1. Determine the slope *m* and the y-intercept (0, *b*) from the graph.
2. Substitute your values for *m* and *b* into the equation y = *m*x + *b*.

OBJECTIVE 5 – Graph an equation of a linear model by using the model's slope and vertical intercept.

10. Let **p** be the percentage of Americans who watch a greater number of TV programs on channels' websites (rather than on TV) at **t** years since 2005 (see the following table). A reasonable model of the situation is p = 3.7t – 0.8.

Year	Amount of Money (in billions of dollars)
2008	10
2009	14
2010	17
2011	21
2012	27
2013	27

Source: GfK

a. Graph the model by hand.

b. Predict in which year 36% of Americans will watch a greater number of TV programs on channels' websites. Did you perform interpolation or extrapolation? Do you have much faith in the prediction? Explain.

OBJECTIVE 6 – Use a linear model's slope and vertical intercept to find its equation.

11. A person earns a starting salary of $30 thousand at a company. Each year, she receives a $2 thousand raise. Let **s** be the person's salary (in thousands of dollars) after she has worked at the company for **t** years.
    a. Is there an exact linear association between **t** and **s**? Explain.
    b. Find the **s**-intercept of a linear model. What does it mean in this situation?
    c. Find the slope of the linear model. What does it mean in this situation?
    d. Find an equation of a linear model.

12. Let **T** be the total one-semester cost (in dollars) of tuition plus parking fee for **u** units (credits or hours) of classes at your college.
    a. Is there an exact linear association between **u** and **T**? If so, find the slope.
    b. Find an equation of the model.
    c. Graph the model.
    d. Select a total one-semester cost and predict the corresponding number of units.

13. Let **s** be U.S. retail sales (in billions of dollars) of vitamins and dietary supplements at **t** years since 2000 (see the following table). A reasonable model is s = 1.23t + 8.33.

Year	U.S. Retail Sales of Vitamins and Dietary Supplements (billions of dollars)
2007	17.1
2008	17.9
2009	19.3
2010	20.7
2011	22.1
2012	22.9

Source: Euromonitor International

    a. Use technology to draw a scatterplot and the model in the same viewing window. Check whether the line comes close to the data points.
    b. What is the slope of the model? What does it mean in this situation?
    c. Find the rates of change in the number of retails sales from one year in the table to the next one listed. Compare the rates of change with the result you found in Part (b).
    d. What is the **s**-intercept? What does it mean in this situation?
    e. Use the model to estimate the retail sales in 2012. Did you perform interpolation or extrapolation? Compute the error.

Homework/Assessment

1, 3, 7, 11, 19, 29, 41, 43, 51, 55, 63, 65, 69, 73, 77, 81, 85, 97