Chapter 9 – Finding Equations of Linear Models
Section 1 – Using Two Points to Find an Equation of a Line

Objectives
1. Find an equation of a line by using the slope-intercept form of a linear equation.
2. Find an equation of a line by using the point-slope form of a linear equation.

Vocabulary
1. point-slope form

Lesson/Activity
OBJECTIVE 1 – Find an equation of a line by using the slope-intercept form of a linear equation.

Recall that an equation of a line can be put in slope-intercept form y = mx + b (Section 7.1).

Finding an Equation of a Line by Using the Slope, a Point, and the Slope-Intercept Form
To find an equation of a line by using the slope and a point,
1. Substitute the given value of the slope **m** into the equation y = **m**x + **b**.
2. Substitute the coordinates of the given point into the equation you found in step 1 and solve for **b**.
3. Substitute the value of **b** you found in step 2 into the equation you found in step 1.
4. Check that the graph of your equation contains the given point.

Use the slope-intercept form to find an equation of the line that has the given slope and contains the given point.
1. m = 3, (-4, 5)   2. m = -2, (-3, -6)   3. m = 2/5, (-3, 4)

4. m = -4/3, (5, -2)   5. m = 0, (-3, 2)   6. m is undefined, (-5, 1)

Finding an Equation of a Line by Using Two Points and the Slope-Intercept Form
To find an equation of the line that passes through two given points whose x-coordinates are different,
1. Use the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$ to find the slope of the line containing the two points.
2. Substitute the **m** value you found in step 1 into the equation y = **m**x + **b**.
3. Substitute the coordinates of one of the given points into the equation you found in step 2 and solve for **b**.
4. Substitute the **b** value you found in step 3 into your equation you found in step 2.
5. Check that the graph of your equation contains the two given points.

Use the slope-intercept form to find an equation of the line that contains the two given points.

7. (2, 3) and (4, 7)   8. (-3, 4) and (2, -6)

9. (-5, -3) and (2, 1)   10. (-6, -2) and (-3, -7)

11. Find an approximate equation of the line that contains the points (-3.25, 8.11) and (2.67, -1.39). Round the slope and the constant term to two decimal places.

12. Find an equation of the line that contains the given points.
    a. (4, -3) and (4, 2)   b.   (-5, -2) and (3, -2)

OBJECTIVE 2 – Find an equation of a line by using the point-slope form of a linear equation.

Let (x_1, y_1) and (x, y) be two distinct points on a line with slope m. Derive the point-slope form.

Point-Slope Form
If a nonvertical line has slope **m** and contains the point (x_1, y_1),
then an equation of the line is
$$y - y_1 = m(x - x_1)$$

Use the point-slope form to find an equation of the line that has the given slope and contains the given point or contains the two points. Check that the graph of your equation contains the given point(s).

13.   m = 3, (2, 5)   14.   m = -5, (2, 0)   15.   m = 3/2, (-4, -6)

16.   m = -1/2, (-8, 2)   17.   m = 0, (-7, -1)   18.   m is undefined, (-4, 5)

19.   (-2, 4) and (2, -2)   20.   (-3, -11) and (2, -1)   21.   (-2, -8) and (2, -6)

Homework/Assessment
1, 3, 7, 15, 19, 25, 29, 43, 47, 51, 55, 57, 63, 69, 73