

## 5.5: Standard Form of a Linear Equation

Many textbooks use the standard form of a linear equation almost exclusively. Note that standard form contains only integer coefficients, and the x-coefficient should be positive.

When you only need to graph a line, there is a shortcut for finding the slope and y-intercept directly from standard form. This shortcut can be derived by putting the standard form into slope-intercept form.

$$\begin{array}{l} \text{Add } -Ax \text{ to both sides:} \\ \text{Divide out the B:} \end{array} \quad \begin{array}{l} Ax + By = C \\ By = -Ax + C \\ y = -\frac{A}{B}x + \frac{C}{B} \end{array}$$

Therefore, when an equation is in standard form, its slope is  $-\frac{A}{B}$  and its y-intercept is  $\frac{C}{B}$ .

$$\begin{array}{l} \text{Example: } x - 2y = 6 \quad A = 1, B = -2, C = 6 \\ \text{Thus, } m = -\left(\frac{1}{-2}\right) = \frac{1}{2} \text{ and } b = \frac{6}{-2} = -3. \end{array}$$

Study Examples 1-4 very carefully.

Usually, when you are given information about a line and asked to write a linear equation in standard form, you will first have to write the equation in slope-intercept form and then convert it to standard form.

For example: Write the equation of a line through (-3, 3) and (6, 7) in standard form.

$$\text{Step 1: Find } m. \quad m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 3}{6 - (-3)} = \frac{4}{9}$$

$$\text{Step 2: Find } b. \quad \text{You may use either point. This example uses } (6, 7). \\ y = mx + b$$

$$7 = \frac{4}{9}(6) + b$$

$$7 = \frac{8}{3} + b$$

$$\frac{13}{3} = b$$

$$\text{Step 3: Put in slope-intercept form.} \quad y = \frac{4}{9}x + \frac{13}{3}$$

Step 4: Convert to standard form. First, move the x-term to the left side.

$$-\frac{4}{9}x + y = \frac{13}{3}$$

Finally, multiply both sides by -9 (9 is the least common

denominator) to clear the fractions and to make the coefficient on the x-term positive.

$$\left(-\frac{4}{9}x + y\right)(-9) = \left(\frac{13}{3}\right)(-9)$$
$$4x - 9y = -39$$

**Assignment 5.5: #7,9,11,15,17,19,21,25,27,29,31**

### **5.6: Point-Slope Form of the Equation of a Line**

This section provides another useful form for writing a linear equation given the slope and a point on the line. You should **never** leave a linear equation in point-slope form. Always convert to slope-intercept or standard form. Study Examples 1-3 carefully, and take a few moments to review the summary of linear equations in the blue box on page 272.

**Assignment 5.6: #9-19 odd**

### **5.7: Problem Solving Using Linear Models**

Study Examples 1-3 very carefully. Continue to use the problem-solving steps that you have been developing since Chapter 1.

**Assignment 5.7: #7-12 all, 17, 19-22 all**

**Even Solutions:**

- 8. \$1500
- 10. 0.15; Rate of earning based on value of meals served.
- 12. \$8333.33
- 20.  $y = -2x + 84$
- 22. Plot points from #21 and connect them to form the line.

*There are optional lab activities for this chapter at the end of the syllabus.*

**Quiz #5 should be taken at the completion of Chapter 5.**