# Section 5.6 The Standard Form of a Linear Equation

The Standard Form of the linear equation is Ax + By = C where A and B must be integers. When working word problems we often end up writing equations in Standard Form. This section teaches how to manipulate an equation algebraically to put it in Standard Form.

**Example 1**: Write the linear equation in standard form with integer coefficients.

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|---|---|
| $y = \frac{2}{3}x + 7$ | we want: Ax + By = C |
| $y - \frac{2}{3}x = \frac{2}{3}x + 7 - \frac{2}{3}x$ | subtract 2x/3 from both sides to get the x on the same side as the y |
| $-\frac{2}{3}x + y = 7$ | Now we have the x and y on the same side but the coefficient of x is a fraction. |
| $3\left(-\frac{2}{3}x + y\right) = 3(7)$ | Multiply both sides of the equation by 3 to get rid of the fraction. |
| $-2x + 3y = 21$ | Ax + By = C |

**Example 2**: Write the standard form of an equation of the line passing through (5,2) with a slope of ½.

| | |
|---|---|
| $y-y_1 = m(x-x_1)$ | start with point slope form |
| $y - 2 = \frac{1}{2}(x - 5)$ | substitute x, y, and m into the equation |
| $2y - 4 = x - 5$ | Multiply by 2 to get rid of the fractions. |
| $2y - 4 - x + 4 = x - 5 - x + 4$ | Subtract x from both sides.<br>Add 4 to both sides. |
| $-x + 2y = -1$ | Rearrange the left side to get the x-term first. |

We have now learned 5 forms of linear equations so it would be a good time to review all of those forms. The table below summarizes these forms.

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|---|---|
| Slope Intercept Form | y = mx + b |
| Point Slope Form | $y-y_1 = m(x-x_1)$ |
| Vertical Lines | x = a |
| Horizontal Lines | y = b |
| Standard Form | Ax + By = c where A and B are whole numbers |