Equations of Lines

There are four forms of an equation of a line:

Point-Slope Form: $y - y_1 = m(x - x_1)$,
where m is the slope and $(x_1,\ y_1)$ is a point on the line.

Slope-Intercept Form: $y = mx + b$,
where m is the slope and b is the y-intercept of the line.

Standard Form: $Ax + By = C$,
where A, B, and C real numbers and are written as integers whenever possible*, and A and B cannot both be equal to zero.

General Form: $Ax + By + C = 0$,
where A, B, and C are real numbers and are written as integers whenever possible*, and A and B cannot both be equal to zero.

*Notes about standard and general form: Standard form and general form are to be written such that A, B, and C are integers *whenever possible*. In this course, you will be given problems where it is always possible to change the equation so that A, B, and C are integers. There are cases where it is not possible to change the coefficients to integers, such as the equation $\sqrt{2}\,x + \pi y = \sqrt{7}$, but such examples will not be used in this course.

The equations for standard and general form are not unique, as seen in the example below. However, textbooks often display standard and general form so that $A > 0$, and so that A, B, and C are relatively prime.

Example 3: Change each of the following equations to slope-intercept form, standard form, and general form.

A. $y - 4 = -\frac{5}{7}(x - 6)$ B. $-2x - 6 = 8y$ C. $\frac{4}{9}y - \frac{5}{12}x = \frac{7}{6}$

Solution:

A. To change to slope-intercept form, $y = mx + b$, we want to distribute the $-\frac{5}{7}$ and then solve for y.

$y - 4 = -\frac{5}{7}(x - 6)$, so $y - 4 = -\frac{5}{7}x + \frac{30}{7}$