



Writing Equations of Lines

To write a linear equation you need one of the following criteria:

1. **The slope of the line and the y-intercept**

(Remember... when a coordinate reads (0, #), the # is the y-intercept)

- a. slope = m
- b. y-intercept = b
- c. plug the m and b values into $y = mx + b$

2. **The slope of the line and a point that lies on the line**

- a. slope = m
- b. sub the point (x, y) in for x and y in the equation $y = mx + b$ and solve for b .
- c. plug the m and b values into $y = mx + b$

OR

- a. slope = m
- b. sub the slope and the point (x, y) in for x_1 and y_1 in the equation $y - y_1 = m(x - x_1)$
- c. solve the equation for y .

3. **2 points that lie on the line**

- a. Using the slope formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$, find the slope.
- b. sub the slope and either point (x, y) in for x_1 and y_1 in the equation $y - y_1 = m(x - x_1)$
- c. solve the equation for y .

Fact:

- Parallel lines have equal slopes

For example) A line parallel to $2x - 3y = 8$ will have a slope of $\frac{2}{3}$ (see work below for getting the slope)

$$\begin{array}{r}
 2x - 3y = 8 \\
 -2x \quad -2x \\
 \hline
 -3y = -2x + 8 \\
 -3 \quad -3 \\
 \hline
 y = \frac{2}{3}x - \frac{8}{3}
 \end{array}$$

- Perpendicular lines have slopes that are negative reciprocals

For example) If a line has a slope of $\frac{2}{3}$, a perpendicular line has a slope of $-\frac{3}{2}$

Problems to practice:

1. Find the equation of a line that has a slope of $\frac{-2}{3}$ and a y-intercept of 4. _____

2. Find the equation of a line that has a slope of 3 and goes through the point (0, -5). _____

3. Find the equation of a line that goes through the points (-2, 0) and (0, -4). _____

4. Find the equation of a line that goes through the points (-1, 6) and (3, 2). _____

5. Find the equation of a line that goes through the points (-8, 5) and (-6, 4). _____

6. Find the equation of a line that is parallel to the x -axis and goes through the point (-4, -7). _____

7. Find the equation of a line that is perpendicular to the x -axis and goes through the point (4, 8). _____

8. Find the equation of a line that is parallel to $2x - 4y = 7$ and has a y-intercept of 4. _____

9. Find the equation of a line that is perpendicular to $6y - 3x - 2 = 0$ and goes through the point (4, -3). _____