# Math Review For Economics–Lines and Slopes

**Name:**

Suppose two variables $x$ and $y$ are linearly related. The slope-intercept form of the line is $y = mx+b$, where $m$ is the slope of the line and $b$ is the $y$-intercept.

**Practice problems:** Identify the slope and $y$-intercept of the following lines. Note: Sometimes it may first be necessary to rewrite the equation in the form $y = mx + b$.

1. $y = 12x + 1300$
2. $y = 28 - \frac{2}{3}x$
3. $10x - 40y = 400$
4. $ax + by = c$
5. $P = R - C$, where $R = 8x$ and $C = 1100 + 1.2x$
   In this example, $P$ is the dependent variable – it plays the role of $y$.

(Solutions: 1. $m = 12$, $b = 1300$. 2. $m = -\frac{2}{3}$, $b = 28$. 3. $m = \frac{1}{4}$, $b = -10$. 4. $m = -\frac{a}{b}$, $b = \frac{c}{b}$.

5. $m = 6.8$, $b = -1100$.)

When graphing a line, you'll need to decide which variable to put on each axis. The **independent variable** is placed on the horizontal axis and the **dependent variable** is placed on the vertical axis.

For instance, given the linear equation $q = 15 - 3p$, if you are told to graph it assuming $p$ is the dependent variable, then $p$ plays the role of $y$, and will be placed on the vertical axis. You need to rewrite the equation in the form $p = \ldots$ in order to see the slope. **Do this now.**

The slope of a line is the ratio of vertical change to horizontal change:

$$m = \frac{\text{change in y}}{\text{change in x}}$$

This is sometimes remembered as $\frac{\text{rise}}{\text{run}}$. If the slope is a positive number, the graph is increasing. If the slope is a negative number, the graph is decreasing.

**Practice problems:**

1. Graph the line $y = 2x + 1$.
2. Graph $q = 15 - 3p$, assuming $p$ is the dependent variable.
3. Graph $y = 28 - \frac{2}{3}x$.
4. Graph the lines $y = \frac{1}{2}x$ and $y = \frac{1}{3}x$. Which is steeper?
5. If the slope of a linear equation is given by $\frac{1}{A}$, where $A > 0$, what happens to the graph if $A$ becomes larger?
6. If the slope of a linear equation is given by $m = \frac{1}{10-A}$, where $0 \leq A \leq 9$, what are the possible values of $m$? What is the largest slope? Smallest?