

## Precalculus Worksheet 1 - Lines

Paul L. Bailey

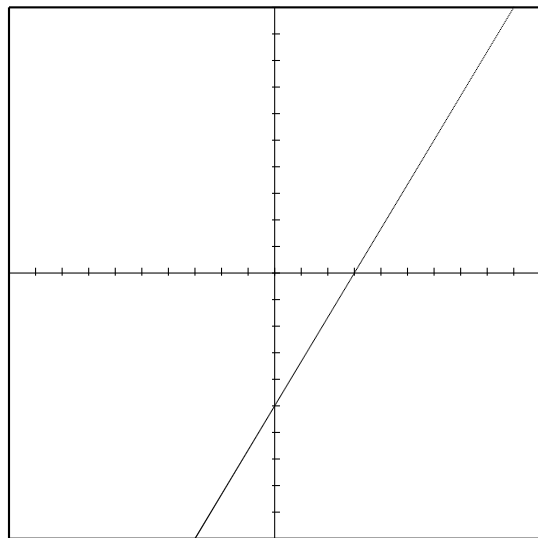
September 11, 2006

Every vertical line can be expressed by a unique equation of the form  $x = c$ , where  $c$  is a constant. Such lines have undefined slope (or, one may say that the slope is  $\infty$ ).

Every other line has can be expressed by a unique equation of the form  $y = mx + b$ . This is called *slope-intercept form*, where  $m$  is the slope and  $b$  is the  $y$ -value of the  $y$  intercept.

**Example 1.** Consider the graph of a line. Find the standard form ( $y = mx + b$ ) of the line, and identify the numbers  $m$  and  $b$ . Find the slope, the  $y$ -intercept, and the  $x$ -intercept (if any) of the line.

*Solution.* By examining the graph, we see that the  $y$ -intercept of the line is  $(0, -5)$  and that the  $x$ -intercept is  $(3, 0)$ . The slope is the change in  $y$  divided by the change in  $x$ , which is  $\frac{5}{3}$ . Thus  $m = \frac{5}{3}$  and  $b = -5$ .  $\square$



**Standard Form:**  $y = \frac{5}{3}x - 5$

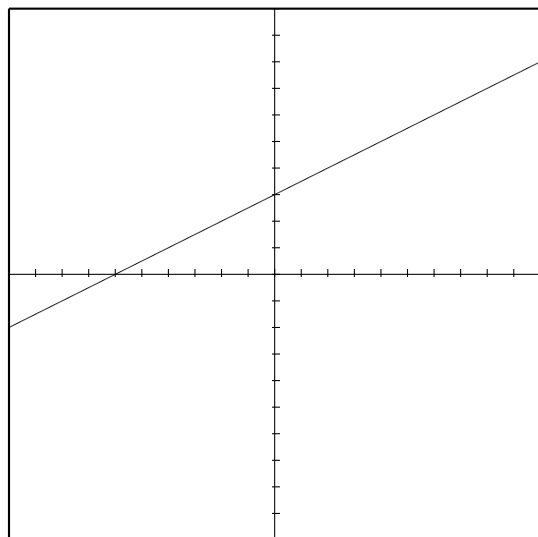
**m:**  $\frac{5}{3}$       **b:**  $-5$

**Slope:**  $\frac{5}{3}$

**$y$ -intercept:**  $(0, -5)$

**$x$ -intercept:**  $(3, 0)$

**Exercise 1.** Consider the graph of a line. Find the standard form ( $y = mx + b$ ) of the line, and identify the numbers  $m$  and  $b$ . Find the slope, the  $y$ -intercept, and the  $x$ -intercept (if any) of the line.



**Standard Form:**

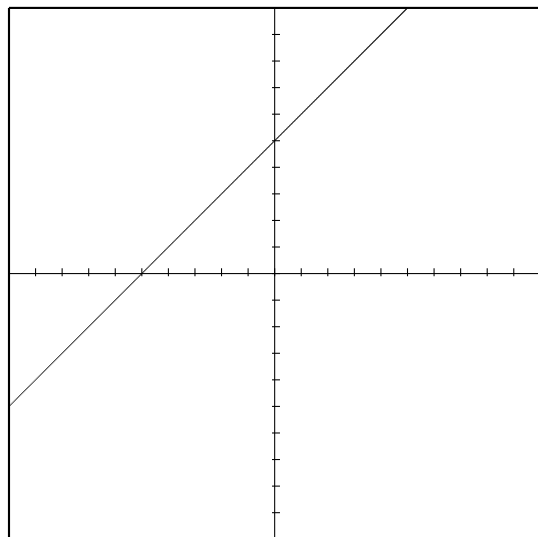
**m:**      **b:**

**Slope:**

**$y$ -intercept:**

**$x$ -intercept:**

**Exercise 2.** Consider the graph of a line. Find the standard form ( $y = mx + b$ ) of the line, and identify the numbers  $m$  and  $b$ . Find the slope, the  $y$ -intercept, and the  $x$ -intercept (if any) of the line.



**Standard Form:**

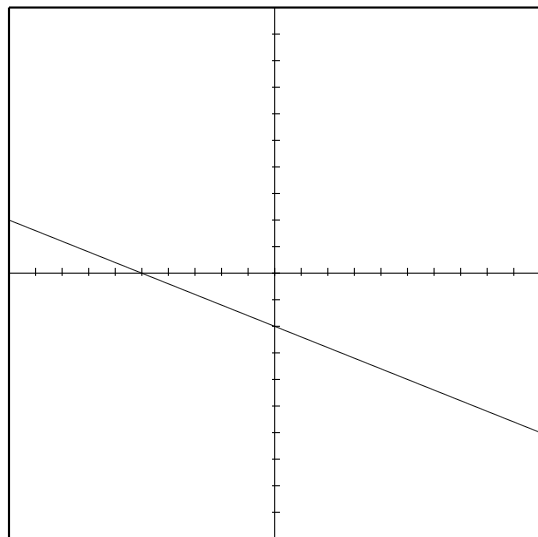
**m:**      **b:**

**Slope:**

**$y$ -intercept:**

**$x$ -intercept:**

**Exercise 3.** Consider the graph of a line. Find the standard form ( $y = mx + b$ ) of the line, and identify the numbers  $m$  and  $b$ . Find the slope, the  $y$ -intercept, and the  $x$ -intercept (if any) of the line.



**Standard Form:**

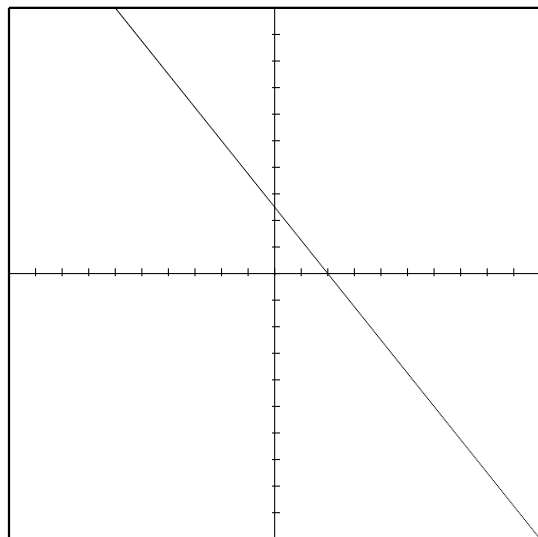
**m:**      **b:**

**Slope:**

**$y$ -intercept:**

**$x$ -intercept:**

**Exercise 4.** Consider the graph of a line. Find the standard form ( $y = mx + b$ ) of the line, and identify the numbers  $m$  and  $b$ . Find the slope, the  $y$ -intercept, and the  $x$ -intercept (if any) of the line.



**Standard Form:**

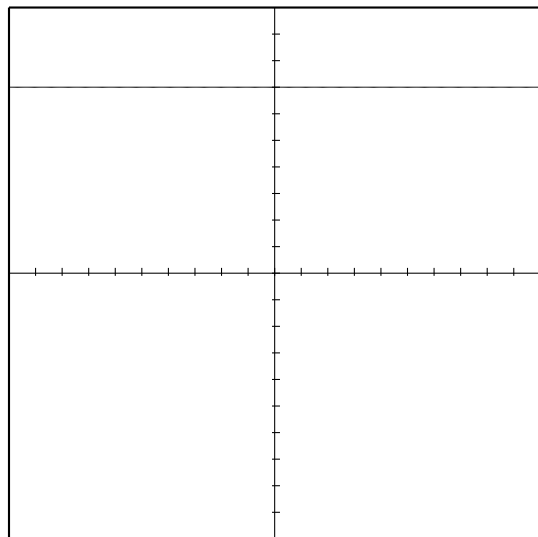
**m:**      **b:**

**Slope:**

**$y$ -intercept:**

**$x$ -intercept:**

**Exercise 5.** Consider the graph of a line. Find the standard form ( $y = mx + b$ ) of the line, and identify the numbers  $m$  and  $b$ . Find the slope, the  $y$ -intercept, and the  $x$ -intercept (if any) of the line.



**Standard Form:**

**m:**      **b:**

**Slope:**

**$y$ -intercept:**

**$x$ -intercept:**

**Example 2.** Consider the linear equation  $3x + 6y = 9$ . Find the standard form  $y = mx + b$  of the line, and identify the numbers  $m$  and  $b$ . Find the slope, the  $y$ -intercept, and the  $x$ -intercept (if any) of the line. Graph the line and label these points.

*Solution.* First we must solve for  $y$ . Subtract  $3x$  from both sides to get  $6y = -3x + 9$ . Divide by 6 to get

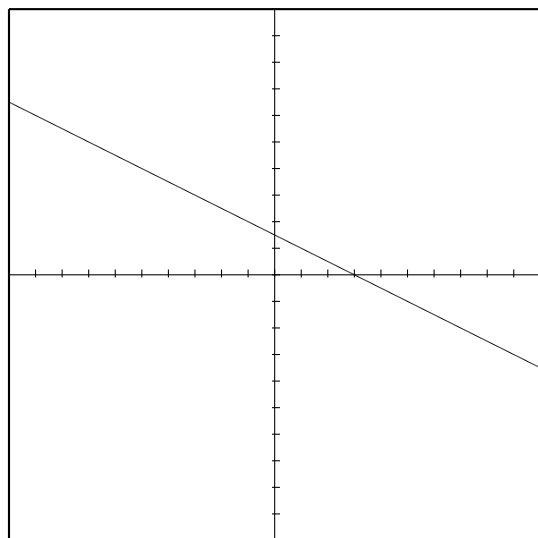
$$y = -\frac{1}{2}x + \frac{3}{2}.$$

Thus  $m = -\frac{1}{2}$  and  $b = \frac{3}{2}$ .

The slope is the number in front of the  $x$  when the equation is in slope-intercept form (that is, the slope is  $m$ ). In this case, the slope is  $-\frac{1}{2}$ . This is negative, so the graph goes down.

The  $y$ -intercept is the point where the line intersects the  $y$ -axis. This is obtained by plugging in 0 for  $x$ , and solving for  $y$ . In this case, we obtain  $y = \frac{3}{2}$ . The  $y$ -intercept is the point  $(0, \frac{3}{2})$ .

The  $x$ -intercept is the point where the line intersects the  $x$ -axis. This is obtained by plugging in 0 for  $y$  and solving for  $x$ . In this case, we obtain  $x = 3$ . Thus the  $x$ -intercept is the point  $(3, 0)$ .  $\square$



**Equation:**  $3x + 6y = 9$

**Standard Form:**  $y = -\frac{1}{2}x + \frac{3}{2}$

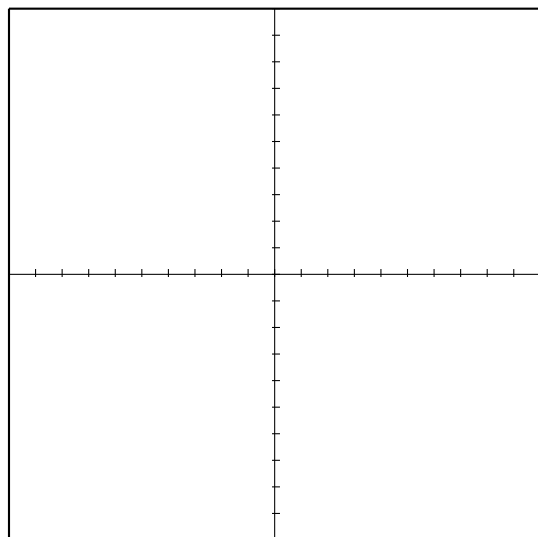
**m:**  $-\frac{1}{2}$  **b:**  $\frac{3}{2}$

**Slope:**  $-\frac{1}{2}$

**$y$ -intercept:**  $(0, \frac{3}{2})$

**$x$ -intercept:**  $(3, 0)$

**Exercise 6.** Consider the linear equation  $y = 3x - 6$ . Find the standard form  $y = mx + b$  of the line, and identify the numbers  $m$  and  $b$ . Find the slope, the  $y$ -intercept, and the  $x$ -intercept (if any) of the line. Graph the line and label these points.



**Equation:**  $y = 3x - 6$

**Standard Form:**

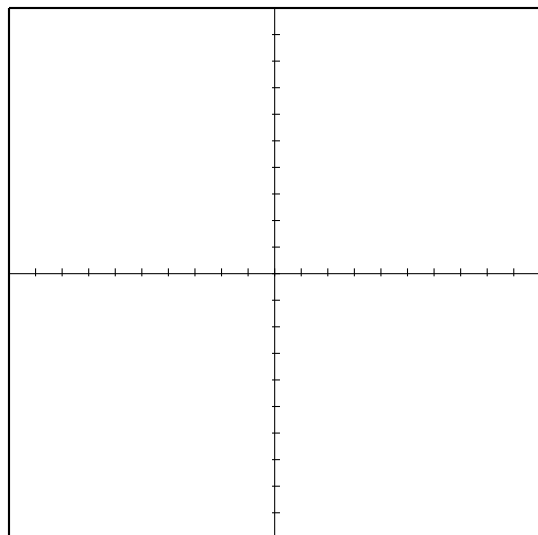
**m:** **b:**

**Slope:**

**$y$ -intercept:**

**$x$ -intercept:**

**Exercise 7.** Consider the linear equation  $3x - 5y = 15$ . Find the standard form  $y = mx + b$  of the line, and identify the numbers  $m$  and  $b$ . Find the slope, the  $y$ -intercept, and the  $x$ -intercept (if any) of the line. Graph the line and label these points.



**Equation:**  $3x - 5y = 15$

**Standard Form:**

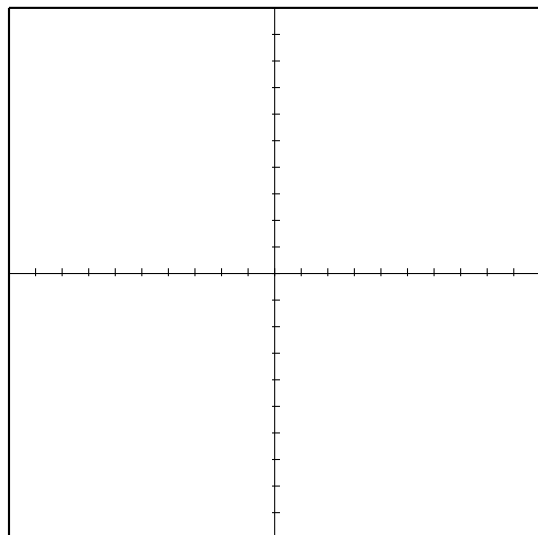
**m:**      **b:**

**Slope:**

**$y$ -intercept:**

**$x$ -intercept:**

**Exercise 8.** Consider the linear equation  $y = -3$ . Find the standard form  $y = mx + b$  of the line, and identify the numbers  $m$  and  $b$ . Find the slope, the  $y$ -intercept, and the  $x$ -intercept (if any) of the line. Graph the line and label these points.



**Equation:**  $y = -3$

**Standard Form:**

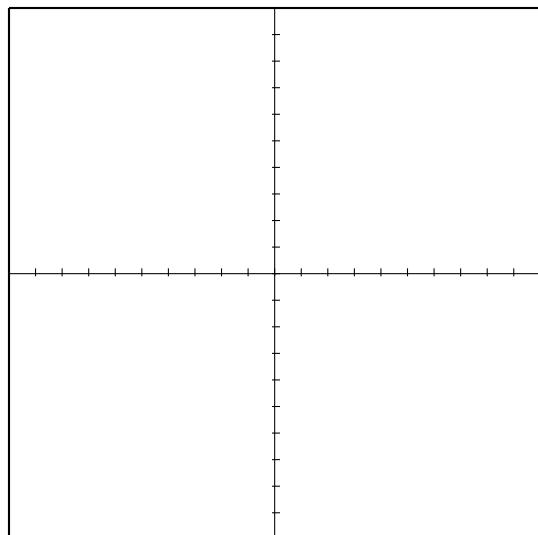
**m:**      **b:**

**Slope:**

**$y$ -intercept:**

**$x$ -intercept:**

**Exercise 9.** Consider the linear equation  $-7y = 49 - 14x$ . Find the standard form  $y = mx + b$  of the line, and identify the numbers  $m$  and  $b$ . Find the slope, the  $y$ -intercept, and the  $x$ -intercept (if any) of the line. Graph the line and label these points.



**Equation:**  $-7y = 49 - 14x$

**Standard Form:**

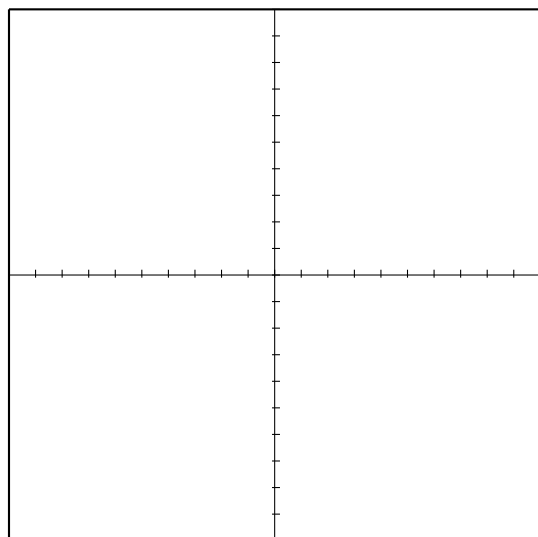
**m:**      **b:**

**Slope:**

**$y$ -intercept:**

**$x$ -intercept:**

**Exercise 10.** Consider the linear equation  $\frac{2x}{y} = 5$ . Find the standard form  $y = mx + b$  of the line, and identify the numbers  $m$  and  $b$ . Find the slope, the  $y$ -intercept, and the  $x$ -intercept (if any) of the line. Graph the line and label these points.



**Equation:**  $\frac{2x}{y} = 5$

**Standard Form:**

**m:**      **b:**

**Slope:**

**$y$ -intercept:**

**$x$ -intercept:**