

# Line Graphing Example

Math 130 Kovitz

Consider the straight line L through the points  $(-7, -2)$  and  $(8, 10)$ .

1. Find an equation and both intercepts and sketch line L. Label the given points and both intercepts.
2. Find the coordinates of any point on the line where  $y = x$ . Plot that point and show that it reasonably fits into the picture.
3. Find and label with coordinates the points where: i.  $x = 5.5$ ; ii.  $y = 5.5$ .

## ANSWERS

1.  $\text{slope} = m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} =$

First find the slope of the given line L. Call it  $m$ .

$$\frac{10 - (-2)}{8 - (-7)} = \frac{10 + 2}{8 + 7} = \frac{12}{15} = \frac{4}{5} = 0.8.$$

$$y - 10 = 0.8(x - 8)$$

Put one of the points  $(x_1, y_1)$  and the slope  $m$  into the point-slope formula:

$$y - y_1 = m(x - x_1).$$

$$y = 10 + 0.8x - 6.4 = 0.8x + 3.6.$$

For ease in finding the intercepts, solve for  $y$ . That gives slope-intercept form.

The  $y$ -intercept is  $(0, 3.6)$ .

In the slope-intercept form  $y = mx + b$ , the  $y$ -intercept is  $(0, b)$ .

$$0 = 0.8x + 3.6$$

To find the  $x$ -intercept, set  $y$  to 0 and solve for  $x$ .

$$0.8x = -3.6$$

$$x = -3.6/0.8 = \frac{-3.6}{4/5} = -3.6 \times \frac{5}{4} = -4.5. \quad \text{The } x\text{-intercept is } (-4.5, 0).$$

2. Set  $x$  equal to  $y$ , using  $0.8x + 3.6$  for  $y$ .

That gives  $x = 0.8x + 3.6$ , and  $x - 0.8x = 0.2x = 3.6$ .

$$\text{Then } x = \frac{3.6}{0.2} = 18.$$

This point has coordinates  $(18, 18)$ .

3. When  $x = 5.5$ , then  $y = 0.8x + 3.6 = 0.8(5.5) + 3.6 = 4.4 + 3.6 = 8$ .

This point has coordinates  $(5.5, 8)$ .

Assuming that  $y = 5.5$ , the equation becomes  $5.5 = 0.8x + 3.6$ .

$$\text{Then } 1.9 = 0.8x \text{ and } x = \frac{1.9}{0.8} = \frac{1.9}{4/5} = \frac{1.9 \times 5}{4} = 2.375.$$

This point has coordinates  $(2.375, 5.5)$ , written in fractional form  $(2\frac{3}{8}, 5\frac{1}{2})$ .