5.1: Write Linear Equations in Slope – Intercept Form

Goals: *Write an equation in slope – intercept form given slope and y – int.
*Write an equation in slope – intercept form given two points
*Write an equation in slope – intercept form given two function values

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Slope – intercept form:

$$y = mx + b$$

Situation 1: Write the equation of a line in slope – intercept form if given slope and the y – intercept

Since you are told the slope and y-intercept, simply replace m with the slope and b with the y-intercept. Simplify if necessary/possible.

Ex:
Slope: –2
y – intercept: 5

$y = -2x + 5$

Ex:
Slope: 8
y – intercept: –7

$y = 8x - 7$

Ex:
Slope: 4
y – intercept: –3

$y = 4x - 3$

Ex:
Slope: $\frac{3}{4}$
y – intercept: –3

$y = \frac{3}{4}x - 3$

Ex:
Slope: 0
y – intercept: 5

$y = 5$

Ex:
Slope: –1
y – intercept: 0

$y = -x$

Situation 2: Write the equation of a line in slope – intercept form if given two points on the line

1. Find the slope using the formula:
   $m = \frac{y_2 - y_1}{x_2 - x_1}$

   Ex: (0, –5) (3, –1)
   $m = \frac{4}{3}$

2. Recall that the y-intercept happens when x is 0
   (So in this case $b = -5$ since that is the value when $x = 0$)

   $b = -5$

3. Plug in m and b into $y = mx + b$

   $y = \frac{4}{3}x - 5$

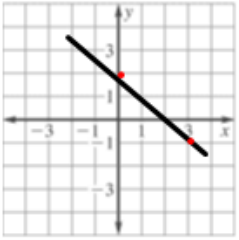
Ex: (0, 2) (4, –1)

$y = -\frac{3}{4}x + 2$

Ex: (0, 1) (4, –1)

$y = -½x + 1$

Ex:



$y = -x + 2$

Situation 3: Write an equation of a line given two function values

1. Create two ordered pairs
2. Find the slope using the formula
3. Identify the *y*-intercept
4. Plug in *m* and *b*

Ex: $f(0) = 5$ $f(4) = 17$

(0, 5) and (4, 17)

$m = 3$
$b = 5$

$y = 3x + 5$

Ex: $f(0) = -2$ $f(8) = 4$

(0, −2) and (8, 4)

$y = \frac{3}{4}x - 2$

Ex: $f(-3) = 6$ $f(0) = 5$

(−3, 6) and (0, 5)

$y = -\frac{1}{3}x + 5$

Ex: $f(0) = 7$ $f(3) = 1$

(0, 7) and (3, 1)

$y = -2x + 7$

Real – world connection: $y = mx + b$ *In the real world, m = constant rate of change and b = initial value

Imagine you are babysitting and getting paid $12 an hour, but the family also leaves $20 for a pizza for dinner. What does the 12 represent and what does the 20 represent?

The 12 is the slope because this is the same (*constant)* for every hour. The 20 is the *y*-intercept as this is the initial amount of money you receive.

Ex: A recording studio charges musicians an initial fee of $50 to record an album. Studio time costs an additional $35 per hour.

a) Write an equation that gives the total cost to record an album as a function of studio time needed.

$y = 35x + 50$

b) Find the total cost to make an album that takes 10 hours to record.

$y = 35(10) + 50$
$y = 400$

Ex: A dance studio charges $20 to use the facility and $25 per hour of instruction.

a) Write an equation that gives the total cost as a function of hours of dance instruction.

$y = 25x + 20$

b) Find the total cost for 2 hours of dance instruction.

$y = 25(2) + 20$
$y = 70$