



**Objective:** Writing the Equation of a Line

**Homework FN5** – NYA p.339 #10, 11, 13, 16, 20, 22, 24, 32, 33, 36

**Do Now:** Solve for y (get it in the form y = everything else).

1.  $2y + 5 + 8x = 5$

2.  $60x - 5y = 0$

3.  $-3y + 1 = x$

**State Test Prep:** Which does not belong?

a) Constant of Variation

b) Concavity

c) Slope

d) Rate of change

**What We Know**

- Slope, m, is the steepness of a graph.  $m = \frac{\Delta y}{\Delta x}$
- Rate of change is the linear relationship between the dependent and the independent variable. Rate of change is equal to slope.

Slope-Intercept Form of a Line:  $y = mx + b$   
 m = slope (indicated by a red arrow pointing to m)  
 b = y-intercept (indicated by a blue arrow pointing to b)

**Working with Equations**

Find the slope and y-intercept:

a)  $y = 3x - 5$

b)  $y = \frac{7}{6}x + \frac{3}{4}$

c)  $y = -\frac{4}{5}x$

Write the equation of the line:

a)  $m = \frac{2}{3}, b = -5$

b)  $m = -\frac{1}{2}, b = 0$

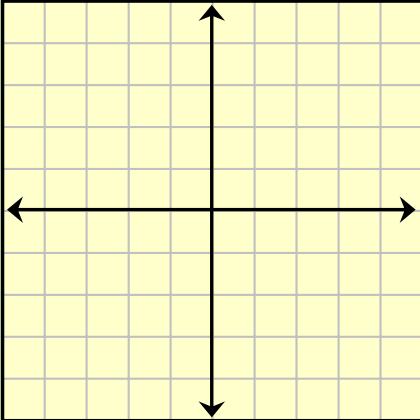
c)  $m = 0, b = -2$

**Practice: Write the equation**

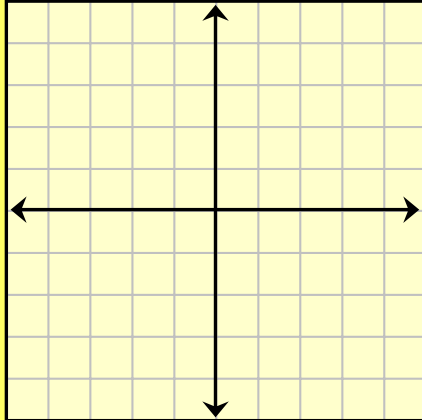
<p>y =</p>	<p>y =</p>	<p>y =</p>
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Practice: Graph the line

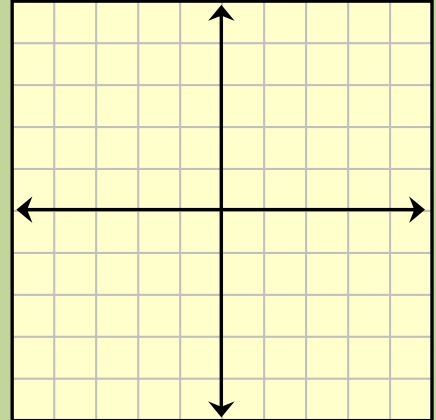
$$y = 3x - 1$$



$$y = -\frac{1}{4}x + 2$$



$$y = -x - \frac{5}{2}$$



Using Substitution with Points and Linear Equations

1. Is  $(8, 4)$  on the line  $y = \frac{3}{4}x - 2$ ?

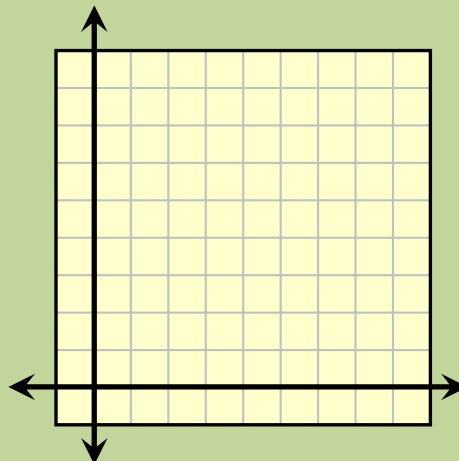
2. Is  $(-3, 1)$  on the line  $y = 2x + 5$ ?

Practice

A Music store is selling CDs for \$8 each. Today, there is a coupon for \$2 off an order total. Write a function  $y$  for buying  $x$  CDs and graph it.

$y =$

How much are 4 CDs?





**The Doctor Says: So... are you ready for some more pain?**  
**The following "optional" exercise will help you become less of a tool of ignorance. Prepare yor puny brain...**

## POINT - SLOPE FORM

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

## SLOPE-INTERCEPT FORM

$$y = mx + b$$

### Making Connections: New and Old

We have learned the slope-intercept form of the equation of a line:  $y = mx + b$

- $m$  is slope of the line and  $b$  is the y-intercept

Another form of a linear equation is the point-slope form:  $y - y_1 = m(x - x_1)$

- $m$  is the slope and  $(x_1, y_1)$  is a point on the line

Knowing this, we can write the equation of a line given:

- Slope and y-intercept
- Slope and a point
- Two points

### Situation A: Slope and y-intercept

$m = \frac{1}{3}$	Use: $y = mx + b$
$b = -14$	Simply substitute: $y = \frac{1}{3}x - 14$

Practice	
1. $m = 5, b = -2$	$y =$
2. $m = -\frac{1}{4}, b = 10$	$y =$

### Situation B: Slope and a point

SLOPE - INTERCEPT	
$m = 2, (3, 4)$ as $(x, y)$	
Use:	$y = mx + b$
	$4 = 2(3) + b$
	$4 = 6 + b$
	$-6 \quad -6$
	$-2 = b$
Substitute $m$ & $b$ : $y = 2x - 2$	

OR

### Situation B: Slope and a point


POINT - SLOPE	
$m = 2, (3, 4)$ as $(x_1, y_1)$	
$y - y_1 =$	$m(x - x_1)$
$y - 4 =$	$2(x - 3)$
$y - 4 =$	$2x - 6$
$+4$	$+4$
Solved: $y = 2x - 2$	

← SAME →

**Situation B: Practice (Use whichever method you want)**

1. $m = -3, (0, 0)$	2. $m = \frac{1}{2}, (6, 4)$

**Situation C: Two Points**



1. Find  $m$ , the slope between the two points
2. Use  $m$  and ONE of the points with slope-intercept or point-slope, as in Situation B.

**C. (1, -1) (2, 6)**

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - (-1)}{2 - 1} = 7$$

**Situation B: Slope and any point**  
 $m = 7, (2, 6)$

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

$$y - 6 = 7(x - 2)$$

$$y - 6 = 7x - 14$$

$$+6 \quad +6$$

**Therefore:  $y = 7x - 8$**

**Practice**

1. (4, 10) (-5, -5)
2. (-1, 0) (-3, 4)

**Extra Practice**

$m = \frac{2}{3}$ and (6, 2)	$m = 4$ and (-4, -6)	$m = 0$ and (1, 6)
(4, -5) and (13, 4)	(8, 0) and (0, 4)	(-5, 3) and (10, 15)