MPM2D Review Day 1 Name:_____

Evaluating Expressions and Solving Equations

1. Write each expression as a single power, then evaluate:

a) $5^3 \times 5^5 = 5^8 = 390{,}625$

b) $\frac{6^9}{6^3 \times 6^2} = \frac{6^9}{6^5} = 6^4 = 1{,}296$

c) $3^7 \times 9 \div 3^4 = 3^7 \cdot 3^2 \div 3^4$
$= 3^9 \div 3^4 = 3^5$
$= 243$

d) $(3^2)^3 \times (3^3)^0 = 3^6 \cdot 3^0$
$= 3^6(1)$
$= 729$

2. Expand and simplify each of the following:

a) $(16x^2 - 3x + 11) + (2 + x^2)$
$= 16x^2 + x^2 - 3x + 11 + 2$
$= 17x^2 - 3x + 13$

b) $(4m - 3m^2) - (7m^2 - m)$
$= 4m - 3m^2 - 7m^2 + m$
$= -10m^2 + 5m$

c) $3(x^2 + x) - 4(x^2 + 2x)$
$= 3x^2 + 3x - 4x^2 - 8x$
$= -x^2 - 5x$

3. Solve for the unknown variable:

a) $5x - 4 = 21$
$+4 \quad +4$
$5x = 25$ (divide by 5)
$x = 5$

b) $12 - 3y = 6 + 2y$
$-3y - 2y = 6 - 12$
$-5y = -6$
$y = \frac{6}{5}$

c) $\frac{x}{2} + \frac{1}{5} = 4x - \frac{1}{3}$ (multiply by 30)
$30(\frac{x}{2}) + 30(\frac{1}{5}) = 30(4x) - 30(\frac{1}{3})$
$15x + 6 = 120x - 10$
$15x - 120x = -10 - 6$
$-105x = -16 \Rightarrow x = \frac{16}{105}$

d) $\frac{1}{4}x + 3 = 2(2x + 1)$ multiply by 4
$4(\frac{1}{4}x) + 4(3) = 8(2x + 1)$
$x + 12 = 16x + 8$
$x - 16x = 8 - 12$
$-15x = -4 \Rightarrow x = \frac{4}{15}$

4. Evaluate each expression where $a = -2$.

a) $8 - 5a$
$= 8 - 5(-2)$
$= 8 + 10$
$= 18$

b) $-a^2 + a + 2$
$= -(-2)^2 + (-2) + 2$
$= -4 + (-2) + 2$
$= -4$

c) $\frac{3a-2}{a}$
$= \frac{3(-2) - 2}{-2}$
$= \frac{-6-2}{-2}$
$= \frac{-8}{-2} = 4$

5. Evaluate each expression where $c = -4$ *and* $d = -3$.

a) $-2cd$

$= -2(-4)(-3)$

$= -24$

b) $2c - 2d$

$= 2(-4) - 2(-3)$

$= -8 + 6$

$= -2$

c) $(c + 3d)^2$

$= (-4 + 3(-3))^2$

$= (-4 - 9)^2$

$= (-13)^2$

$= 169$

d) $2d^2 - 3c + 5$

$= 2(-3)^2 - 3(-4) + 5$

$= 2(9) + 12 + 5$

$= 18 + 12 + 5$

$= 35$

e) $(c - 2)(8 + d)$

$= (-4 - 2)(8 - 3)$

$= (-6)(5)$

$= -30$

6. Solve the following equations **algebraically.** Be sure to show all your work. Answers should be expressed as fractions in lowest terms, if necessary.

a) $6p + 5 = 23$

$-5 \quad -5$

$6p = 18$

$p = \frac{18}{6}$

$p = 3$

b) $5x + 14 - 3x = 4x + 20$

$2x + 14 = 4x + 20$

$2x - 4x = 20 - 14$

$-2x = 6$

$x = \frac{6}{-2}$

$x = -3$

c) $5(2x - 1) - 7 = 3(1 - 2x) + 17$

$10x - 5 - 7 = 3 - 6x + 17$

$10x - 12 = -6x + 20$

$10x + 6x = 20 + 12$

$16x = 32$

$x = 2$

d) $\frac{x-3}{2} = \frac{x+1}{4} + 3$ (multiply by 4)

$4\left(\frac{x-3}{2}\right) = 4\left(\frac{x+1}{4}\right) + 4(3)$

$2(x - 3) = x + 1 + 12$

$2x - 6 = x + 13$

$2x - x = 13 + 6$

$x = 19$

e) Verify your solution to question 6b. Show your work below.

LS	RS
$5x + 14 - 3x$	$4x + 20$
$5(-3) + 14 - 3(-3)$	$4(-3) + 20$
$-15 + 14 + 9$	$-12 + 20$
8	8

$LS = RS$

$\therefore x = -3$

Evaluating Algebraic Expressions

1. Find the value of each expression if $a = -2$ and $b = 3$.

a) $a + b$

$= -2 + 3$

$= 1$

b) $a - 2b$

$= -2 - 2(3)$

$= -2 - 6$

$= -8$

c) $\frac{1}{2}a - \frac{1}{3}b$

$= \frac{1}{2}(-2) - \frac{1}{3}(3)$

$= -1 - 1$

$= -2$

2. **Simplify.**

a) $(2x - 5) + (8x + 13)$

$= 2x + 8x - 5 + 13$

$= 10x + 8$

b) $(5a - 7ab) + (6b + 4a) - (9ab - 3a + 3b)$

$= 5a - 7ab + 6b + 4a - 9ab + 3a - 3b$

$= -16ab + 12a + 3b$

c) $-2(4x + 5y) + 4(8x - 7y)$

$= -8x - 10y + 32x - 28y$

$= 24x - 38y$

d) $-7(x^2 + 6x + 9) - 5(2x^2 - 3x + 4)$

$= -7x^2 - 42x - 63 - 10x^2 + 15x - 20$

$= -17x^2 - 27x - 83$

Solving Equations

3. **Solve.**

a) $3y + 5 = 11$

$-5 \quad -5$

$3y = 6$

$y = 2$

b) $4x - 3 = -11$

$+3 \quad +3$

$4x = -8$

$x = -2$

c) $17 = 4c - 3$

$+3 \quad +3$

$20 = 4c$

$c = \frac{20}{4} = 5$

d) $6x + 8 = 4x - 10$

$6x - 4x = -10 - 8$

$2x = -18$

$x = -9$

e) $9p - 10 = 6 + p$

$9p - p = 6 + 10$

$8p = 16$

$p = 2$

f) $2m + 6.1 = 16.5$

$2m = 16.5 - 6.1$

$2m = 10.4$

$m = 5.2$

g) $\frac{x}{2} = 4$

$x = 4(2)$

$= 8$

h) $\frac{3x}{5} = -9$

$3x = -45$

$x = -15$

i) $6 = \frac{m}{4}$

$m = (6)(4)$

$= 24$

j) $2\frac{x}{-7} = 6$

$2x = -42$

$x = \frac{-42}{2}$

$= -21$

k) $3 = \frac{3}{2}x - 3$

$+3 \quad +3$

$6 = \frac{3}{2}x$

$3x = 12$

$x = 4$

l) $\frac{1}{4}x - 3 = 5$

$+3 \quad +3$

$\frac{1}{4}x = 8$

$x = 32$

HOMEWORK: Page 4# 1, 2, 3, 4

10 Academic **Date:**

Day 2: Graphing Linear Relationships

A linear relationship can be written in the standard form **Ax + By + C = 0** and slope y-intercept form **y = mx + b**

Graph: 2x - y - 1 = 0

METHOD 1: SLOPE and Y-INTERCEPT

Step1: Rearrange the equation in slope y-intercept form as y = mx + b

$2x - y - 1 = 0$

$+y \quad +y$

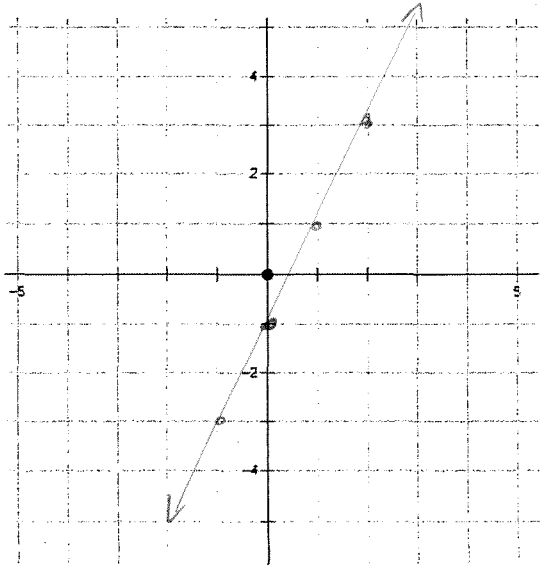
$y = 2x - 1$

Step2: Determine the slope (m) and y-intercept (b)

Slope (m) = 2 and y-intercept (b) = −1

$2 = \frac{2}{1}$ Right 2 up. OR 1 left 2 down

Step3: Plot the y-intercept first. From there, move right (always) as much as run, then move up if slope + or down if slope - to find a second point and connect with an extended line.



METHOD 2: USING X AND Y - INTERCEPTS

Step1: To find the x-intercept, let y = 0 and solve for x.

$2x - y - 1 = 0$ (sub $y = 0$)

$2x - 0 - 1 = 0$

$2x = 1$

$x = \frac{1}{2}$ ∴ x-int is $\frac{1}{2}$

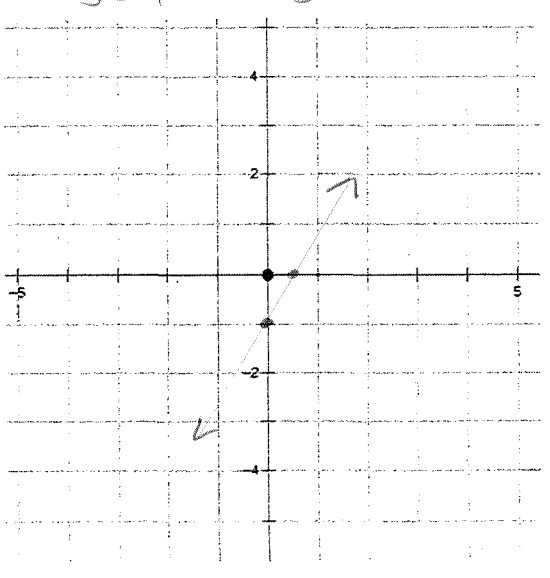
Step2: To find the y-intercept, let x = 0 and solve for y.

$2x - y - 1 = 0$ (sub $x = 0$)

$2(0) - y - 1 = 0$

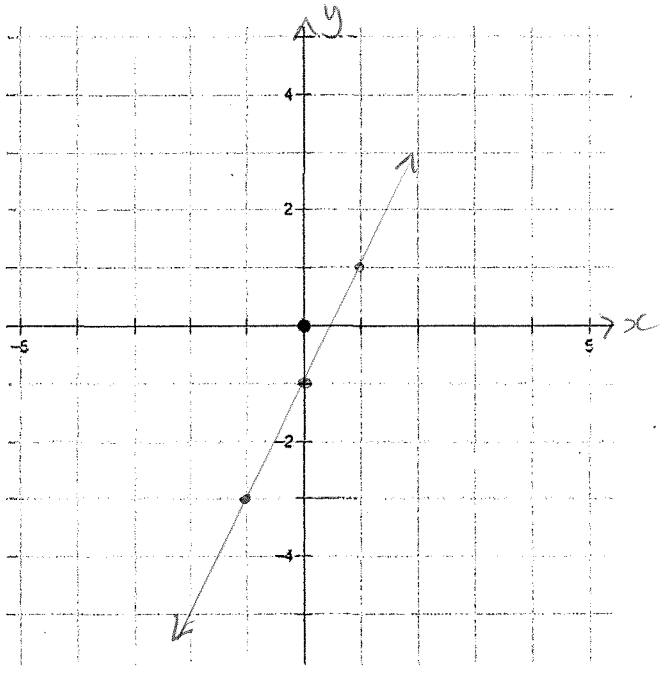
$-y - 1 = 0$

$y = -1$ ∴ y-int is −1.



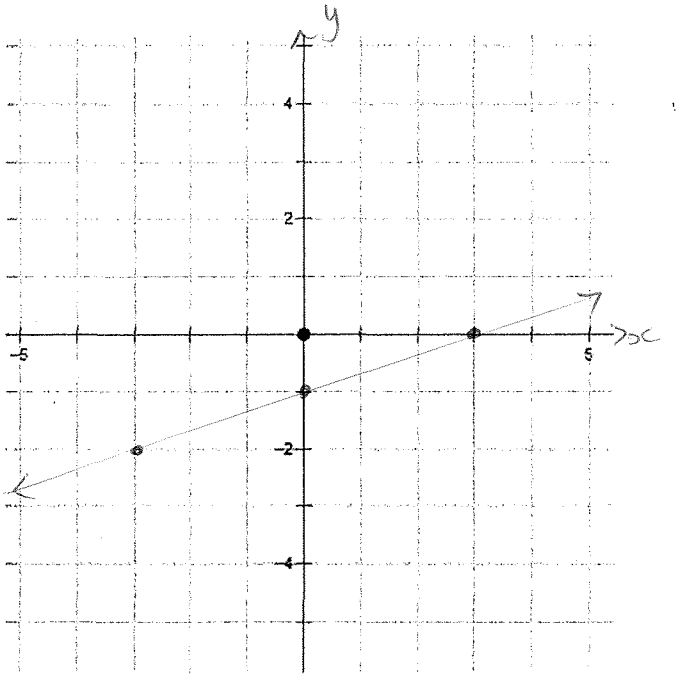
METHOD 3: TABLE OF VALUES (y=mx +b)

X	Y = 2x-1	POINTS
-1	= 2(-1) -1 = -2 -1 = -3	A(-1,-3)
0	=2(0) -1 = 0 -1 = -1	B(0,-1)
1	=2(1)-1 = 2-1 = 1	C(1,1)



Ex2. Graph $y = \frac{1}{3}x - 1$ using a table of values. (select x values that are multiple of 3)

x	y
-3	$\frac{1}{3}(-3)-1$ $=-1-1$ $=-2$
0	$\frac{1}{3}(0)-1$ $=0-1$ $=-1$
3	$\frac{1}{3}(3)-1$ $=1-1$ $=0$



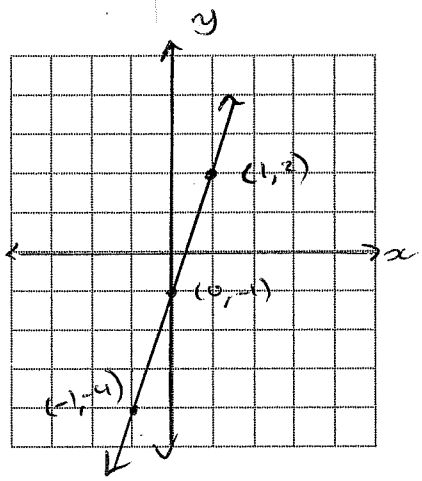
PRACTICE

Graphing

1. Graph each equation using a table of values

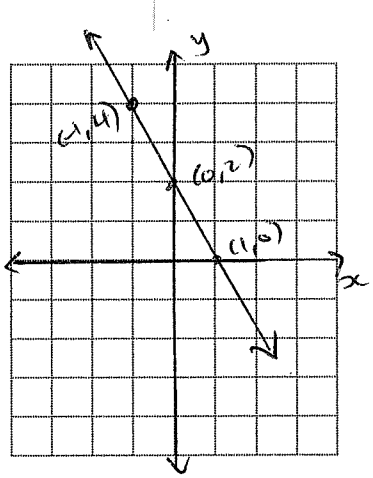
a) $y = 3x - 1$

x	y
-1	-4
0	-1
1	2



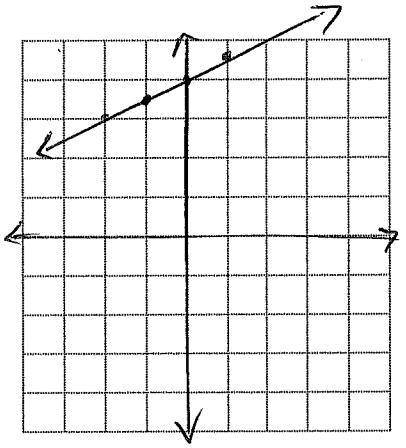
b) $y = -2x + 2$

x	y
-1	4
0	2
1	0



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

x	y
-1	3.5
0	4
1	4.5

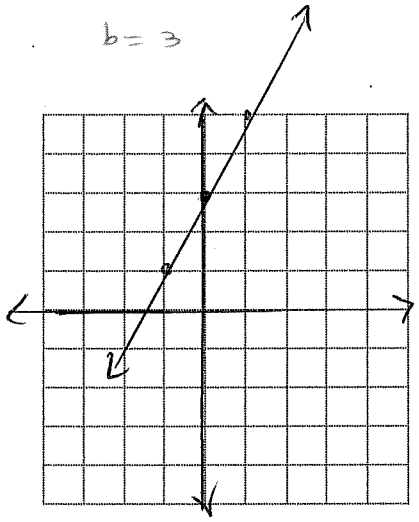


2. Graph each equation using the slope and y-intercept.

a) $y = 2x + 3$

$m = 2$

$b = 3$



$m = 2$

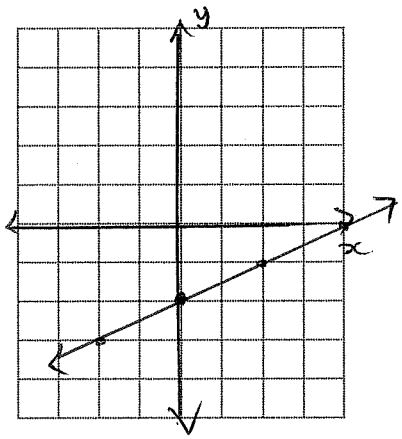
1R UP

OR 1L 2D

b) $y = \frac{1}{2}x - 2$

$m = \frac{1}{2}$

$b = -2$



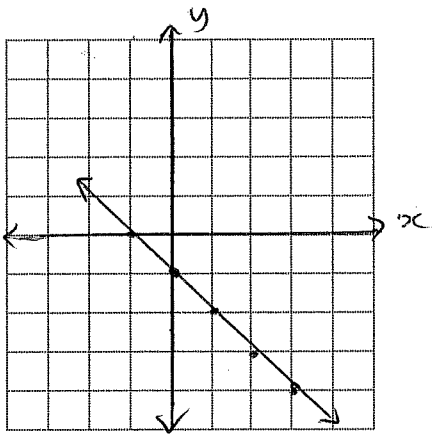
$m = \frac{1}{2}$

2R 1U

c) $x + y + 1 = 0 \Rightarrow y = -x - 1$

$m = -1$

$b = -1$



$m = \frac{-1}{1}$

∴ 1R 1D

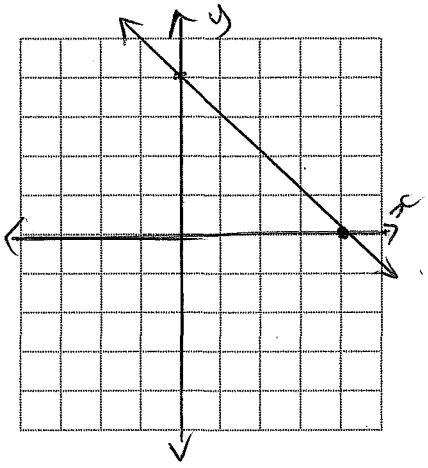
OR 1L 1U

3. Graph each equation by determining the intercepts.

a) $x + y = 4$

x-int: set $y=0$
$x = 4$

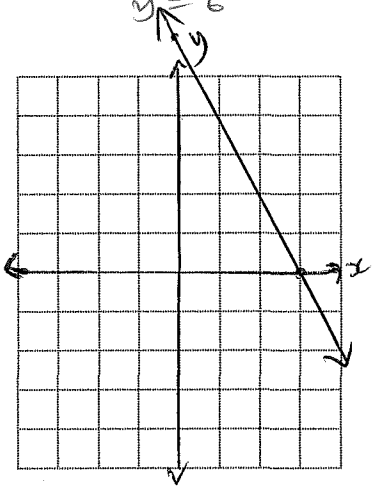
y-int: set $x=0$
$y = 4$



b) $2x + y = 6$

x-int: set $y=0$
$2x = 6$
$x = 3$

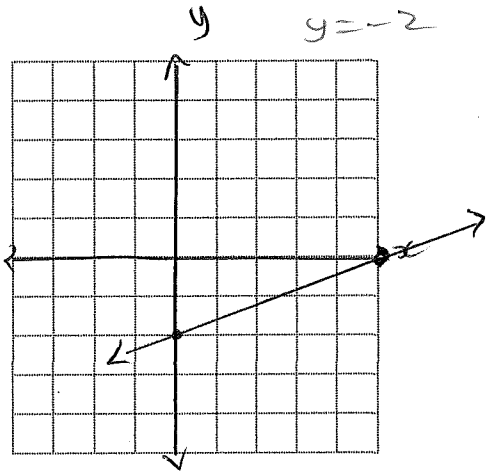
y-int: set $x=0$
$y = 6$



c) $2x - 5y = 10$

x-int: set $y=0$
$2x = 10$
$x = 5$

y-int: set $x=0$
$-5y = 10$
$y = -2$

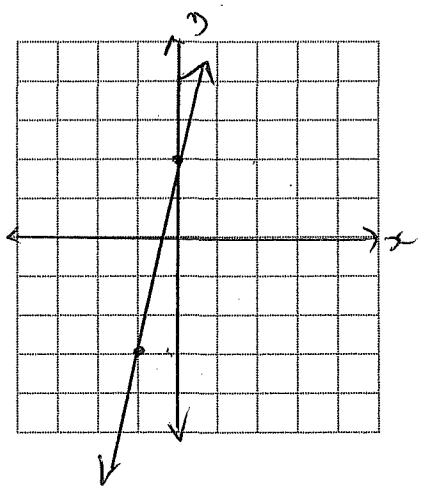


4. Graph each equation using the most suitable method.

a) $y = 5x + 2$

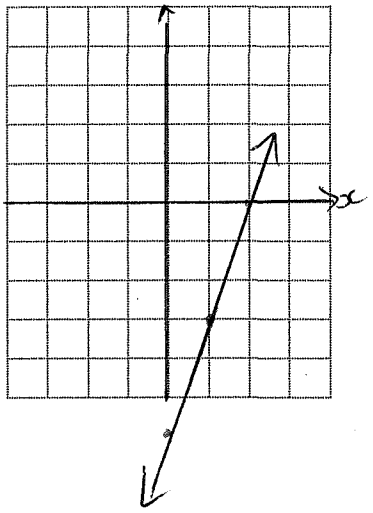
$m = 5$

$b = 2$



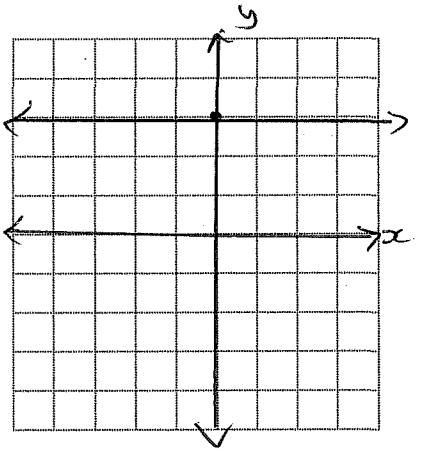
b) $3x - y = 6$

$y = 3x - 6$
$m = 3$
$b = -6$



c) $y = 3$

horizontal line



MPM2D-Day III Review: Writing Equations and Standard Form

$$slope = \frac{rise}{run};\ slope = \frac{y_2 - y_1}{x_2 - x_1};\quad slope = \frac{\Delta y}{\Delta x};\quad y-intercept = (0,b);\quad y = mx + b$$

1. Determine the equation of the line with a slope of $\frac{3}{2}$ and passes through the point $(-3,7)$.

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

$y = \frac{3}{2}(x+3) + 7$

$= \frac{3}{2}x + \frac{9}{2} + 7$

$= \frac{3}{2}x + \frac{9}{2} + \frac{14}{2}$

$\therefore y = \frac{3}{2}x + \frac{23}{2}$

2. Determine the equation of the line that passes through the points

a. $(4,-1)$ and $(7,8)$.

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8-(-1)}{7-4} = \frac{9}{3} = 3$

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

$y = 3(x-7) + 8$

$= 3x - 21 + 8$

$= 3x - 13$

b) $(-3,-5)$ and $(2,-3)$

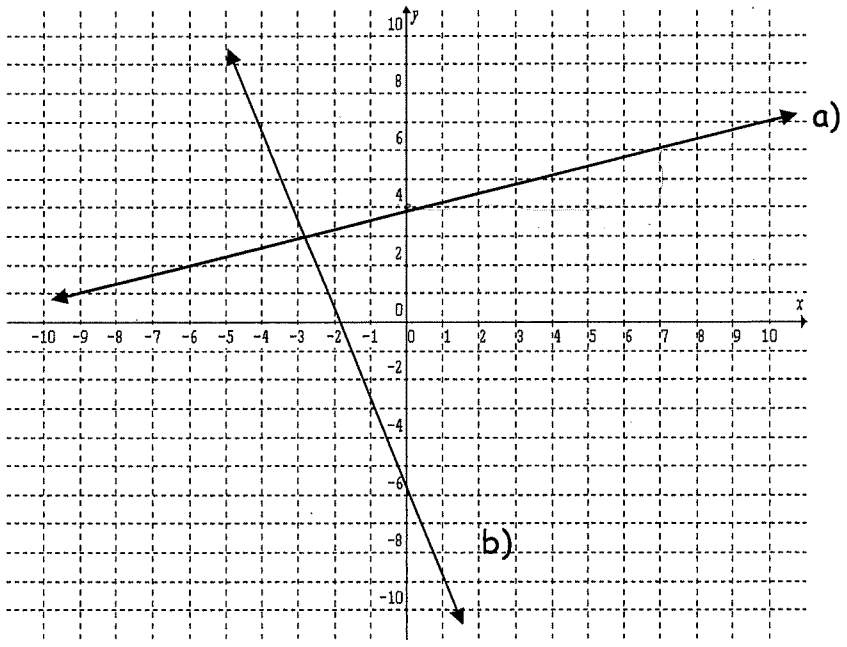
$m = \frac{-3-(-5)}{2-(-3)} = \frac{2}{5}$

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

$= \frac{2}{5}(x+3) - 5$

$= \frac{2}{5}x + \frac{6}{5} - 5 = \frac{2}{5}x - \frac{19}{5}$

3. Determine the equation of the following lines.



a) $m = \frac{2}{7}$

$b = 4$

$\therefore y = \frac{2}{7}x + 4$

b) $m = \frac{-3}{1}$

$b = -6$

$\therefore y = -3x - 6$

Rules for Standard Form **(Another way to write the equation of a line!)**

- Must be in the form $Ax + By + C = 0$ where A and B cannot both be zero.
- A must be a whole number (no leading negatives!)
- B, C must be integers.
- A, B, C must not have any factors common to all (can't all be divided by the same number)

Examples: Convert the following equations into standard form.

a. $y = -3x + 2$ $3x + y - 2 = 0$	*b.* $y = 2x + 1$ $-y \quad -y$ $2x - y + 1 = 0$
c. $y = \frac{3}{5}x - 5$ (multiply by 5) $5y = 3x - 25$ $3x - 5y - 25 = 0$	*d.* $-3y = 2.5x + 1$ (multiply by 2) $-6y = 5x + 2$ $5x + 6y + 2 = 0$
e. $y = \frac{1}{2}x - \frac{2}{3}$ (multiply by 6) $6y = 3x - 4$ $3x - 6y - 4 = 0$	*f.* $y = -5x + \frac{1}{3}$ (multiply by 3) $3y = -15x + 1$ $15x + 3y - 1 = 0$
g. $y + 3x = -5x + 7y - 1$ $y + 3x + 5x - 7y + 1 = 0$ $8x - 6y + 1 = 0$	*h.* $-3y = 6x + 18$ $+3y \quad +3y$ $6x + 3y + 18 = 0$ (Reduce, ÷ by 3) $2x + y + 6 = 0$

Extra Practice: Write the equation for the following (in standard form where possible):

a. slope of 4 and passing through (0, 7)

$y = 4x + 7$ ↓ y-int

b. horizontal and passing through the point (-5, 18)

horizontal line $\Rightarrow m = 0$

$\therefore y = \#$

$y = 18$ is the equation.

c. $m = \frac{9}{2}$ and passing through (-1, 4)

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

$= \frac{9}{2}(x+1) + 4$

$= \frac{9}{2}x + \frac{9}{2} + \frac{8}{2}$

$= \frac{9}{2}x + \frac{17}{2}$

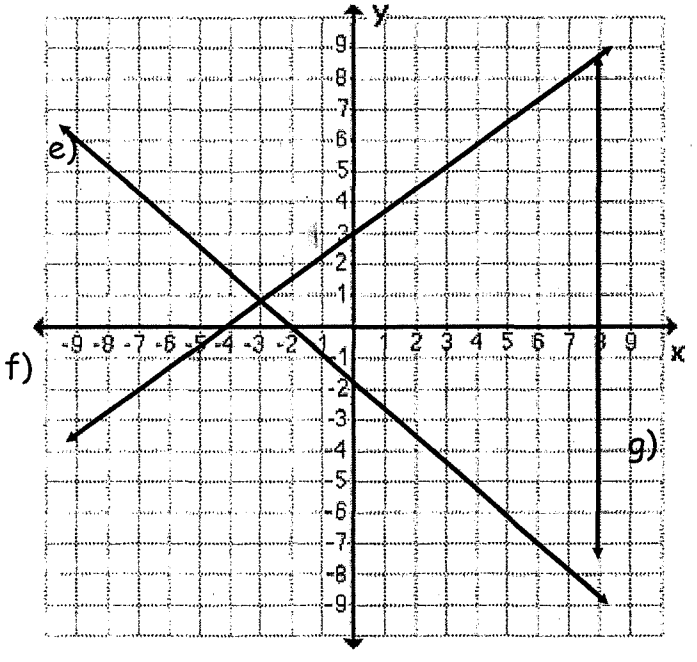
d. passing through the points (-3, 7) and (2,4)

$m = \frac{4-7}{2-(-3)} = \frac{-3}{5}$

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

$= -\frac{3}{5}(x-2) + 4$

$= -\frac{3}{5}x + \frac{6}{5} + 4 = -\frac{3}{5}x + \frac{26}{5}$



e) $y = -x - 2$

f) $y = \frac{2}{3}x + 3$

g) $x = 8$