Section 2.2– Equations of Lines

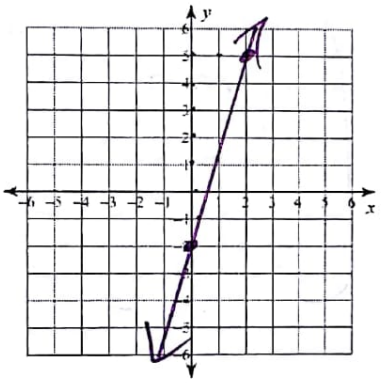
Slope-Intercept Form

$y = mx + b$

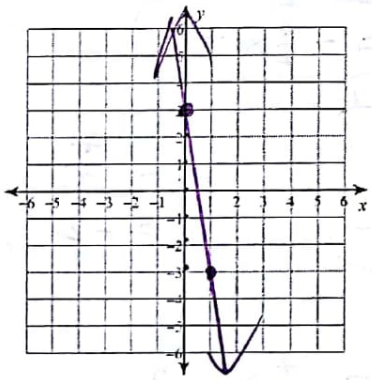
m = SLOPE (RATE OF CHANGE) b = Y-INT (INITIAL VALUE)

Example - Graph each of the following lines.

1) $y = \frac{7}{2}x - 2$ $m = \frac{7}{2}$ $b = -2$

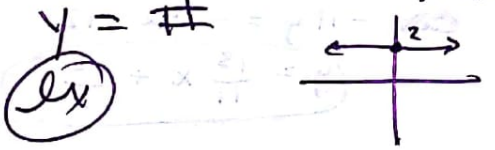
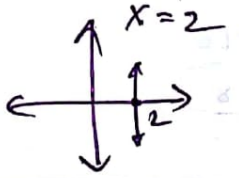


2) $y = -6x + 3$ $m = \frac{-6}{1}$ $b = 3$



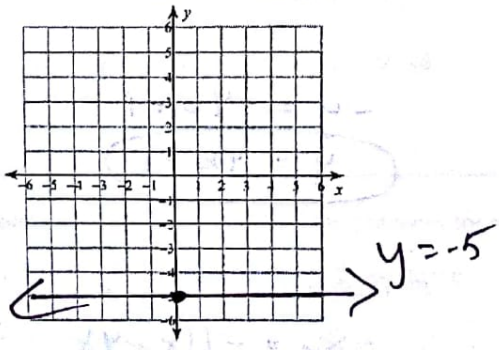
Special Lines

HOY ~~VERTICAL~~ VUX

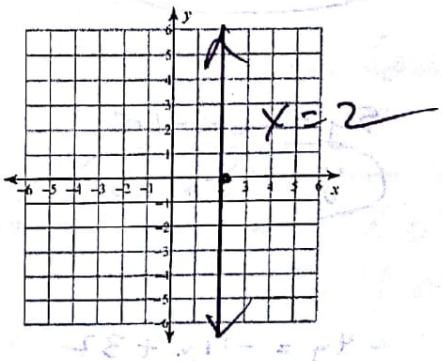
Horizontal Lines	Vertical Lines
$m = 0$  $y = \#$	m UNDEFINED.  $x = \#$

Example – Graph each of the following lines.

3) y = -5



4) x = 2



Writing Linear Equations in Slope-Intercept Form

$y = mx + b$

Examples – Write each of the following in Slope-Intercept Form.

5) $2x + 4y = 8$

$-2x \quad -2x$

$\frac{4y}{4} = \frac{8}{4} - \frac{2x}{4}$

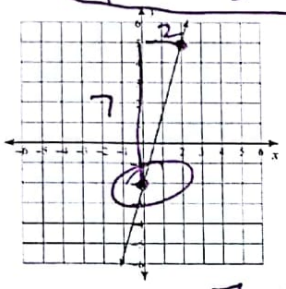
$y = 2 - \frac{1}{2}x$

6) $4y - x = 16$

$\frac{4y}{4} = \frac{x}{4} + \frac{16}{4}$

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

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

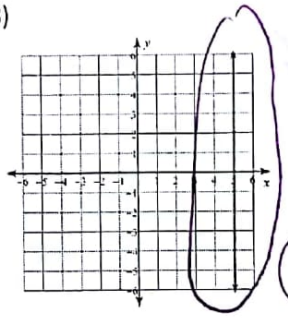


$m = \frac{7}{2}$

$b = -2$

$y = \frac{7}{2}x - 2$

8)



$m =$

$b =$

$x = 5$

Applications – Write each of the following in Slope-Intercept Form. Show work.

1) $3x - 2y = -16$

$-2y = -3x - 16$

$y = \frac{3}{2}x + 8$

2) $13x - 11y = -12$

$-11y = -13x - 12$

$y = \frac{13}{11}x + \frac{12}{11}$

3) $9x - 7y = -7$

$-7y = -9x - 7$

$y = \frac{9}{7}x + 1$

4) $x - 3y = 6$

$-3y = -x + 6$

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

5) $6x + 5y = -15$

$5y = -6x - 15$

$y = -\frac{6}{5}x - 3$

6) $4x - y = 1$

$-y = -4x + 1$

$y = 4x - 1$

7) $11x - 4y = 32$

$-4y = -11x + 32$

$y = \frac{11}{4}x - 8$

8) $11x - 8y = -48$

$-8y = -11x - 48$

$y = \frac{11}{8}x + 6$

Standard Form

$Ax + By = C$

Slope = $-\frac{A}{B}$ y-intercept = $\frac{C}{B}$

$3x + 2y = 4$

$m = -\frac{3}{2}$ $b = \frac{4}{2} = 2$

Examples – Write each of the following in Standard Form.

9) $y = 5x + 2$

$-2 \quad -2$

$5x - y = -2$

$-2 + y = 5x$

$-y \quad -y$

10) $y = -2x - 40$

$+2x \quad +2x$

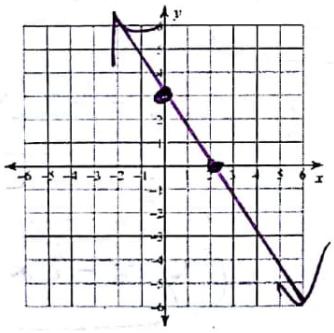
$2x + y = -40$

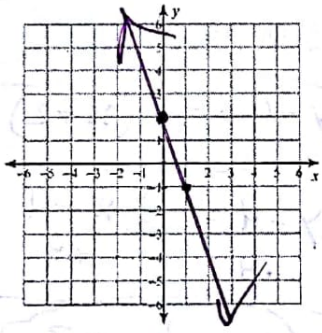
Examples – For each of the following equations, find the x-intercept and the y-intercept.

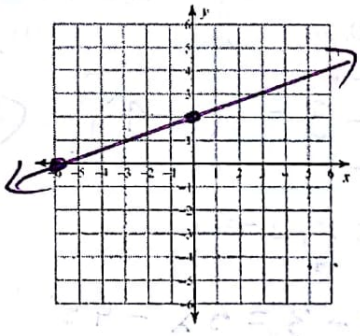
11) $3x + 2y = 6$ (0, 3) (2, 0)

12) $-3x + 6y = 18$ (0, 3) (-6, 0)

Examples – Graph each of the following lines.







13) $3x + 2y = 6$ (0, 3) (2, 0)

14) $y = -3x + 2$

15) $-2x + 6y = 12$ (0, 2) (-6, 0)

Applications – Find the x-intercept and y-intercept for each of the following equations.

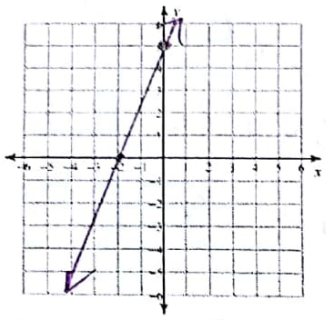
1) $8x - 4y = 12$ (0, -3)

$\frac{8x}{8} = \frac{12}{8} = \frac{3}{2}$ $(\frac{3}{2}, 0)$

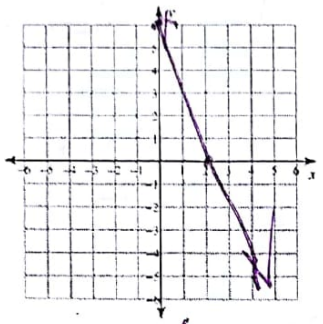
2) $x - 3y = 6$ (0, -2) (6, 0)

3) $11x - 8y = -48$ (0, 6) $(-\frac{48}{11}, 0)$

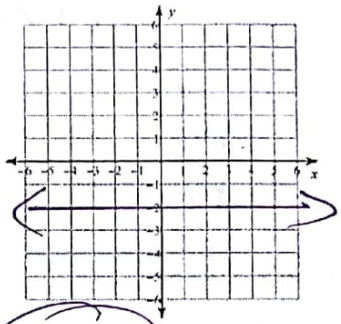
Applications (cont.) – Graph the following lines.



4) $2y - 5x = 10$ (0, 5) (-2, 0)



5) $3x + y = 6$ (0, 6) (2, 0)



6) $y = -2$ $m = 0$

Point-Slope Form

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

Examples – For each of the following, write an equation of the line in Point-Slope Form.

16) (9, 3) m = 5

$y - 3 = 5(x - 9)$

SLOPE-INT:

$y - 3 = 5x - 45$

$+3 \quad +3$

$y = 5x - 42$ ✓

17) (-2, 4) m = -1/2

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

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

$+4 \quad +4$

$y = -\frac{1}{2}x + 3$ ✓

18) (0, 2) m = -2

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

$y - 2 = -2x$

$y = -2x + 2$

All 3 Forms of Linear Equations Name: _____

Identify A, B, C Find the Slope and y-intercept. Graph the line.

1) $7x + y = 5$

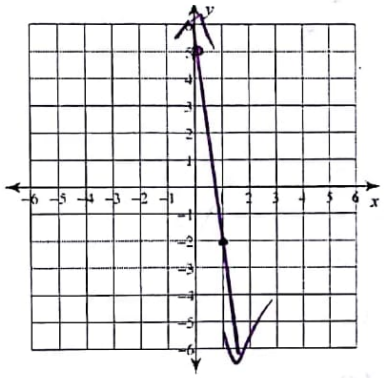
A= 7

B= 1

C= 5

Slope: $-7/1 = -7$

y-int: $\frac{5}{1} = 5$



2) $3x + 5y = -5$

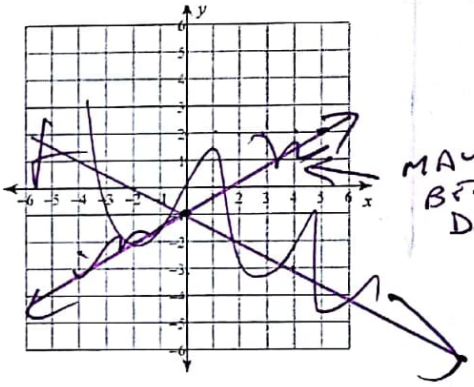
A= 3

B= 5

C= -5

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

y-int: $\frac{5}{-5} = -1$



3) $y = 4$

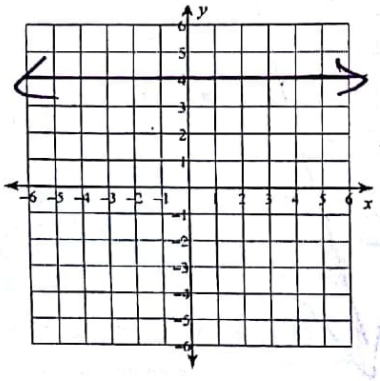
A= 0

B= 1

C= 4

Slope: 0

y-int: 4



4) $6x + 5y = 20$

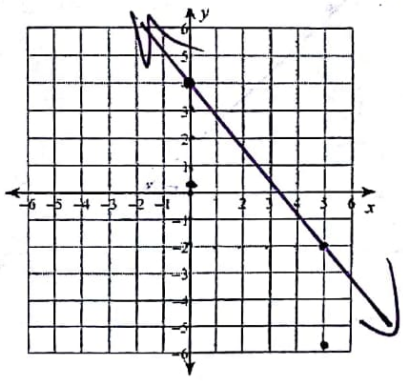
A= 6

B= 5

C= 20

Slope: $-\frac{6}{5}$

y-int: $\frac{20}{5} = \frac{4}{1}$



Identify A, B, C Find the Slope and y-intercept. Graph the line.

5) $x = -3$

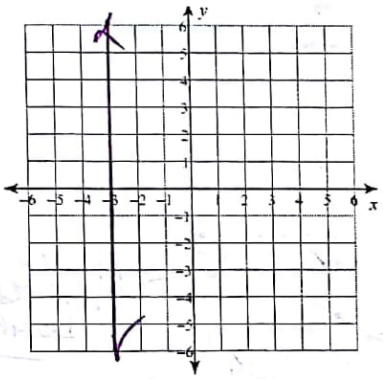
A= 1

B= 0

C= -3

Slope: UNDEF.

y-int: NONE.



6) $2x + y = 4$

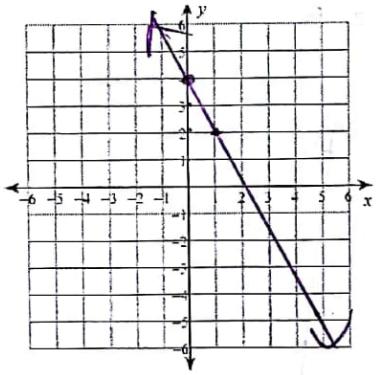
A= 2

B= 1

C= 4

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

y-int: $\frac{4}{1} = 4$



7) $x + y = 3$

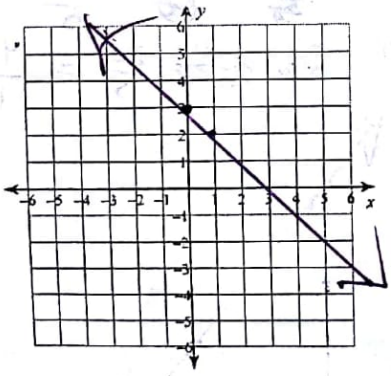
A= 1

B= 1

C= 3

Slope: $-\frac{1}{1} = -1$

y-int: $\frac{3}{1} = 3$



8) $10x - 3y = 15$

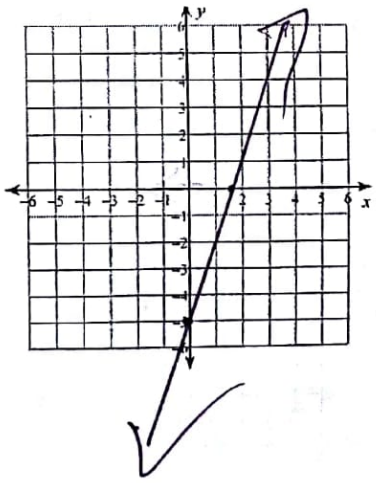
A= 10

B= -3

C= 15

Slope: $-\frac{10}{-3} = 10/3$

y-int: $\frac{15}{-3} = -5$



Write the equation to find the **slope**:

Write the equation for **point-slope** form:

Write the equation for **slope-intercept** form:

Write the equation for **standard form**:

For each of the following 1. Write the equation of line in point-slope form. 2. Convert the point-slope form to slope-intercept form. 3. Convert slope-intercept to the standard form.

1. $(2, 2)\ m = -3$

2. $(1, -6)\ m = -1$

3. $(-3, -4)\ m = 0$

$y + 4 = 0(x + 3)$

$y + 4 = 0$

$y = -4$

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

$y - 3 = -\frac{3}{4}(x - 1)$

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

$+3 \qquad +\frac{12}{4}$

$y = -\frac{3}{4}x + \frac{15}{4}$

$4\left(\frac{3}{4}x + y = \frac{15}{4}\right)$

$3x + 4y = 15$

5. $(-8,\ 5)\ m = -\frac{2}{5}$

$y - 5 = -\frac{2}{5}(x + 8)$

$y - 5 = -\frac{2}{5}x - \frac{16}{5}$

$+5 \qquad +\frac{25}{5}$

$y = -\frac{2}{5}x + \frac{9}{5}$

$5\left(\frac{2}{5}x + y = \frac{9}{5}\right)$

$2x + 5y = 9$

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

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

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

$-3 \qquad -3$

$y = \frac{1}{3}x - 4$

$-\frac{1}{3}x \qquad -\frac{1}{3}x$

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

$x - 3y = 12$