

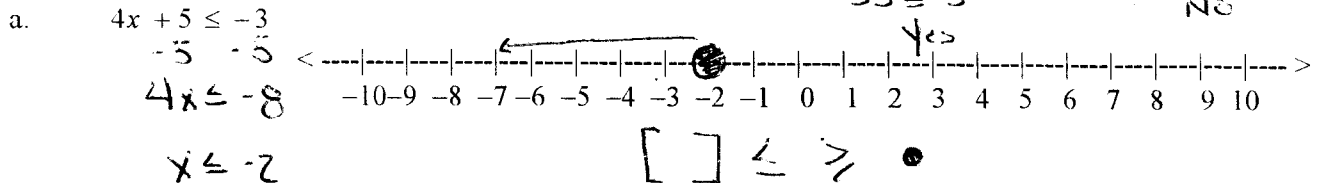
Writing the Equation of a Line

Quality – Accuracy – Transfer – 100%

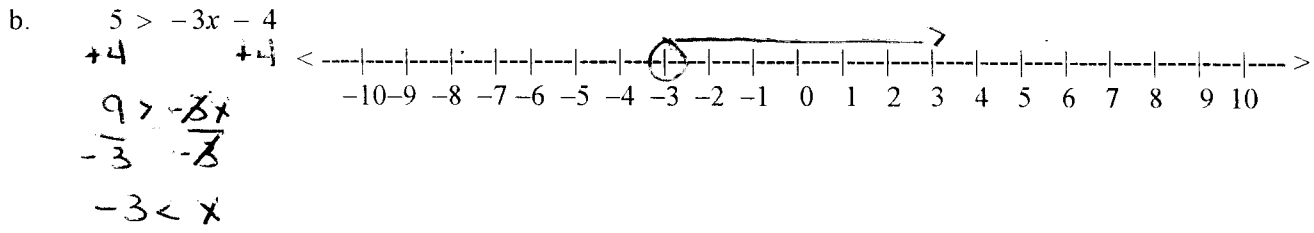
Pre-Lesson Session:

1. Graph the following Inequalities:

$@ x = -10$ $@ x = 0$
 $4(-10) + 5 \leq -3$ $4(0) + 5 \leq -3$
 $-40 + 5 \leq -3$ $5 \leq -3$
 $-35 \leq -3$ **NO**

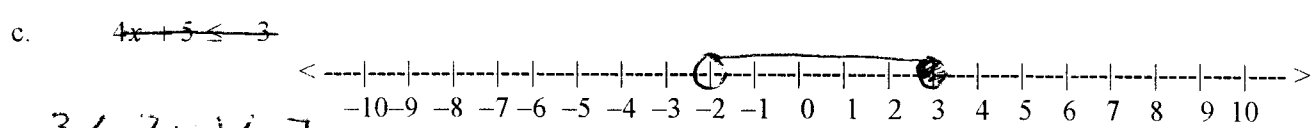


Interval Notation: $(-\infty, -2]$



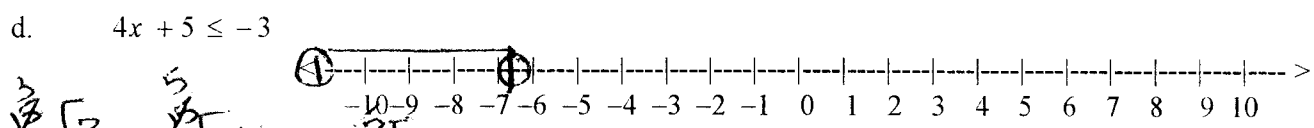
Interval Notation: $(-3, \infty)$

Concept: "Betweenness"



$-3 < 2x + 1 \leq 3$
 $-1 \quad -1$
 $-4 < 2x \leq 2$
 $-2 < x \leq 1$

Interval Notation: $(-2, 3]$



$\frac{3}{3} \left[\frac{3}{3} < -x - 5 < \frac{55}{-5} \right]$
 $9 < -5x - 25 < 30$
 $+25 \quad +25 \quad +25$
 $34 < -5x < 55$
 $-\frac{34}{-5} > x > -\frac{55}{-5}$
 $-6.8 > x > -11$

Interval Notation: $(-11, -6.8)$

Re-Arranging Linear Equations: $y = mx + b$

2. $2x + 3y = 12$ $\frac{3y}{3} = \frac{-2x + 12}{3}$ $y = \frac{-2}{3}x + 4$
 slope: $\frac{-2}{3}$ y-intercept: $(0, 4)$

3. $x - 5y - 20 = 0$ $\frac{-5y}{-5} = \frac{-1x + 20}{-5}$ $y = +\frac{1}{5}x - 4$
 slope: $\frac{1}{5}$ y-intercept: $(0, -4)$

4. $4y + 2x = -8$ $\frac{4y}{4} = \frac{-2x - 8}{4}$ $y = -\frac{1}{2}x - 2$
 slope: $-\frac{1}{2}$ y-intercept: $(0, -2)$

5. $14 = -3x + 2y$ $\frac{2y}{2} = \frac{3x + 14}{2}$ $y = \frac{3}{2}x + 7$
 $-3x + 2y = 14$
 slope: $\frac{3}{2}$ y-intercept: $(0, +7)$

Find the Slope of the line between Two Points:

6. $A(-3, 5)$ and $B(2, 15)$

$$m = \frac{\Delta y}{\Delta x} = \frac{15 - 5}{2 - (-3)}$$

$$= \frac{10}{5}$$

$$m = 2$$

7. $C(6, -4)$ and $D(-2, 10)$

$$m = \frac{\Delta y}{\Delta x} = \frac{10 - (-4)}{-2 - 6}$$

$$= \frac{14}{-8}$$

$$m = -\frac{7}{4}$$

Name _____
Date _____
Prof. Philip Abel

Math 098 – Elementary Algebra
Class #13

Writing the Equation of a Line

Quality – Accuracy – Transfer – 100%

Section 1. Writing the Equation of ANY Line: 3 Methods.

1. What is the general form for the Equation of ANY Line: $y = mx + b$
x and y: Can be taken from any Point on the line (x, y)
m = Slope - Given or Found = $\frac{\Delta y}{\Delta x}$
b = y-int. Constant - Calculated

2. Practice Method 1: Knowing the slope and the y-intercept:

- a. Write the equation of a line with a slope of $-\frac{2}{3}$ and a y-intercept of +5.

1. State Slope 2. y intercept 3. Write Equation
 $m = -\frac{2}{3}$ $b = +5$ X and Y
 $y = -\frac{2}{3}x + 5$

- b. Write the equation of a line with a slope of $\frac{4}{3}$ and passes through the point (0, -2)

1. State Slope 2. y intercept 3. Write Equation
 $m = \frac{4}{3}$ $b = -2$ $y = \frac{4}{3}x - 2$

3. Practice Method 2: Knowing 2 points on a line. The "Abel - 1 - 2 - 3 Method"

Step 1: State Slope (Given - Calculate) Step 2: Find Intercept (*Calculated*) Step 3: Write x and $y = x$ and y

a. Write the equation of a line that passes through the points A(2, 8) and B(10, 4)

1. State Slope

$$m = \frac{\Delta y}{\Delta x} = \frac{4 - 8}{10 - 2} = \frac{-4}{8} = \boxed{-\frac{1}{2}}$$

2. Step 2 - Find

$$y = mx + b$$

$$8 = -\frac{1}{2}(2) + b$$

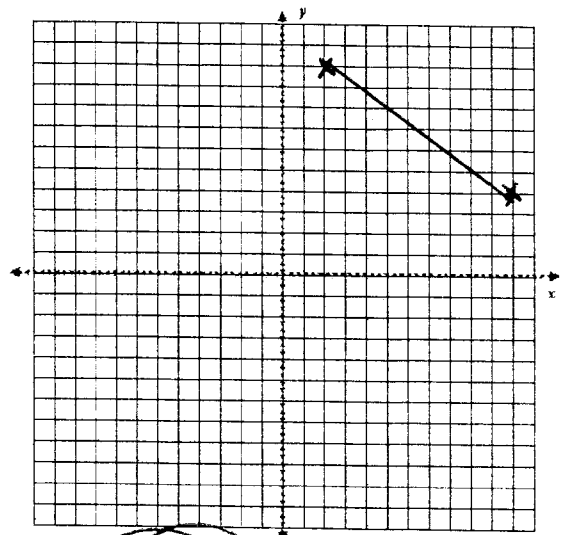
$$8 = -1 + b$$

$$\boxed{+1} \quad \boxed{+1}$$

$$\boxed{9 = b}$$

3. Equation

$$y = -\frac{1}{2}x + 9$$



b. Write the equation of a line that passes through the points C(-1, 8) and D(4, -2)

1. State Slope

$$m = \frac{\Delta y}{\Delta x} = \frac{-2 - 8}{4 - (-1)}$$

$$= \frac{-10}{5} = -2$$

2. $y = mx + b$

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

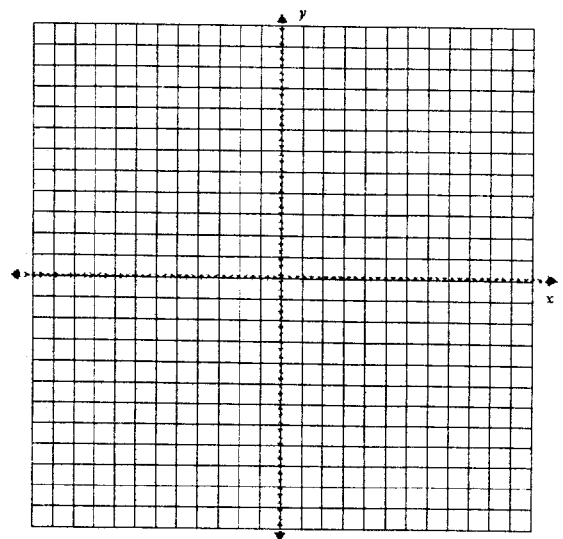
$$-2 = -8 + b$$

$$+8 \quad +8$$

$$b = 6$$

3. Equation

$$y = -2x + 6$$

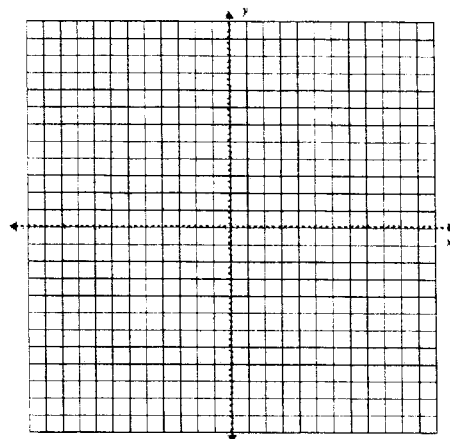


4. Writing the Equation of a Line – YOUR TURN! [Use of the Graphs are Optional].

- a. Write the Equation of the line with a slope of $-\frac{2}{3}$ and passes through the point $(0, -5)$.

$$y = mx + b$$

$$y = -\frac{2}{3}x - 5$$



- b. Write the equation of a line that passes through the points $A(-2, 5)$ and $B(4, -7)$

1. Slope

$$m = \frac{\Delta y}{\Delta x} = \frac{-7 - 5}{4 - (-2)}$$

$$= \frac{-12}{6}$$

$$m = -2$$

2. $y = mx + b$

$$-7 = -2(4) + b$$

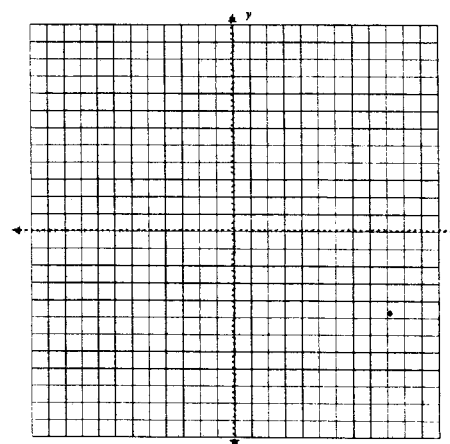
$$-7 = -8 + b$$

$$+8 \quad +8$$

$$1 = b$$

3. Equation

$$y = -2x + 1$$



- c. Write the equation of a line.

$(-3, 9)$ $(3, 1)$

1. Slope

$$m = \frac{\Delta y}{\Delta x} = \frac{1 - 9}{3 - (-3)}$$

$$= \frac{-8}{6} = -\frac{4}{3}$$

2. $y = mx + b$

$$1 = -\frac{4}{3}(3) + b$$

$$1 = -4 + b$$

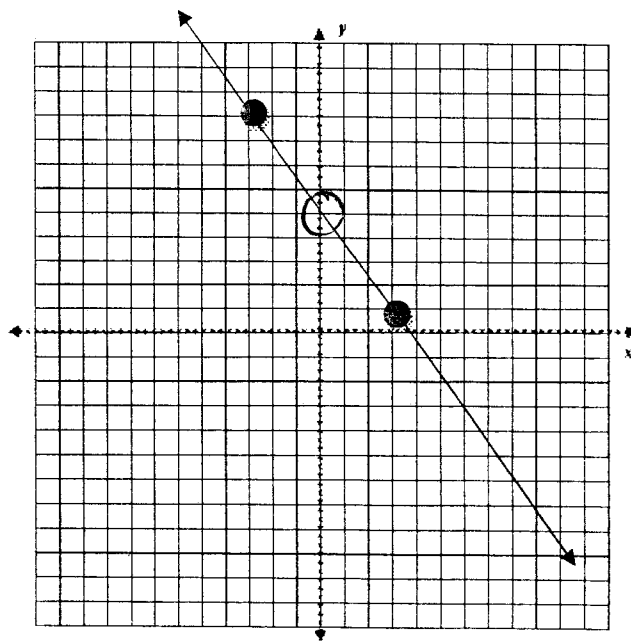
$$+4 \quad +4$$

$$5 = b$$

3. Equation

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

Combined



WORKSHOP:

1. Write the equation of a line that passes through the point $A(4, -5)$ and has a slope of $m = -\frac{3}{2}$

1. Slope

$$m = -\frac{3}{2} = \frac{\Delta y}{\Delta x}$$

2. Solve for b

$$\begin{aligned} y &= mx + b \\ -5 &= -\frac{3}{2}(4) + b \\ -5 &= -6 + b \\ +6 & \quad +6 \\ 1 &= b \end{aligned}$$

3. Equation

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

2. Write the equation of a line that passes through the point $B(6, -1)$ and has a slope of $m = \frac{2}{3}$

3. Write the equation of a line that passes through the points $A(2, -5)$ and $B(6, -1)$.

4. Write the equation of a line that passes through the points $C(4, 6)$ and $D(6, 3)$

Same Slope
 Not Perpendicular
 $3/2 \rightarrow -2/3$

WORKSHOP 2:

1. Are the following Points on lines that a Parallel, Perpendicular, or Neither.

a. $A(-5, 4)$ and $B(3, 10)$
 $C(2, 10)$ and $D(5, 6)$

b. $E(4, 10)$ and $F(7, 12)$
 $G(-5, -4)$ and $H(-3, -1)$

c. $2x + 3y = -12$
 $y = -\frac{2}{3}x + 3$ ← Write

$y = -\frac{2}{3}x + 3$
 $m = -\frac{2}{3}$
 $b = (0, 3)$

Parallel

$2x + 3y = -12$
 $\frac{2x}{2} = \frac{-2x - 12}{2}$
 $y = -\frac{2}{3}x - 4$
 $m = -\frac{2}{3}$

d. $5x - 6y = 18$
 $-6x + 5y = 10$

$5x - 6y = 18$
 $-\frac{6y}{-6} = \frac{-5x + 18}{-6}$
 $y = +\frac{5}{6}x - 3$

Neither

$-6x + 5y = 10$
 $\frac{5y}{5} = \frac{+6x + 10}{5}$
 $y = \frac{6}{5}x + 2$

Homework Section – Chapter _____

$m = \frac{5}{6}$ $b = (0, -3)$

$m = \frac{6}{5}$ $b = (0, 2)$

Section	Page(s)	Problems
4.4	270 → 271	13, 17, 29, 33, 41, 43, 51, 53, 57, 61