Algebra: Please clear your desk except for...

1. Assignment #22

2. SNB

① slope

$y = mx + b$ ② y-coordinate of y-intercept

Write the equation of the line with the given information.

1. $m = -2/3$ and $(0, 8)$	2. $(0, -2)$ and $(1, 2)$	3. $(0, 3)$ and parallel to $-x + 3y = 12$

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1. $m = -2/3$ and $(0, 8)$

$b = 8$

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

2. $(0, -2)$ and $(1, 2)$

$b = -2$

$m = \frac{\Delta y}{\Delta x} = \frac{2 - (-2)}{1 - 0} = \frac{4}{1} = 4$

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

3. $(0, 3)$ and parallel to $-x + 3y = 12 \rightarrow 3y = x + 12$

$b = 3$

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

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

$m = \frac{1}{3}$

What information do we need to write a linear equation in Slope-Intercept Form?

$$y = mx + b$$

We need two pieces of information to write the equation.

☆ 1. Slope 2. y-coordinate of the y-intercept

Write the equation of the line with the given information.

Ex 1: m = 2 and passes through (1, 0)

- (1, 0) is NOT the y-intercept!
- (1, 0) must be a solution to y = mx + b.
- Substitute 2 for m, 1 for x, 0 for y, and solve for b.
- y = mx + b

$0 = 2(1) + b$

$0 = 2 + b$

$b = -2$

$\boxed{y = 2x + (-2)}$

Ex 2: m = 5 and passes through (10, 15)

$$y = mx + b$$
$$15 = 5(10) + b$$
$$15 = 50 + b$$
$$b = -35$$

$$\boxed{y = 5x + (-35)}$$

Symmetric
Property

Ex 3: Passes through both (-2, 1) and (2, 5)

- Find the slope first.

$$m = \frac{\Delta y}{\Delta x} = \frac{5-1}{2-(-2)} = \frac{4}{4} = 1$$

- Substitute 1 for m, -2 for x, 1 for y, and solve for b.

$$y = mx + b$$
$$1 = 1(-2) + b \quad \text{or} \quad 5 = 1(2) + b$$
$$1 = -2 + b \qquad\qquad 5 = 2 + b$$
$$b = 3 \qquad\qquad\qquad b = 3 \qquad \boxed{y = x + 3}$$

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Ex 4: Passes through both (7, 5) and (-7, -5)

$$m = \frac{\Delta y}{\Delta x} = \frac{5-(-5)}{7-(-7)} = \frac{10}{14} = \frac{5}{7}$$

$$y = mx + b$$

$$5 = \left(\frac{5}{7}\right)(7) + b$$

$$5 = 5 + b$$

$$b = 0$$

$$\boxed{y = \frac{5}{7}x}$$

Write the equation of the line with the given information.

1. Passes through (2, 0) and parallel to 3x -2y =5.	2. Passes through $(-3, 5\frac{1}{2})$ and (-3, 2).	3. Passes through (0, 8) and (-3, 4).
$-2y = -3x + 5$	$m = \frac{\Delta y}{\Delta x} = \frac{5\frac{1}{2}-2}{-3-(-3)}$	$b = 8$
$y = \frac{3}{2}x + \left(-\frac{5}{2}\right)$	$m = \frac{3\frac{1}{2}}{0}$	$m = \frac{\Delta y}{\Delta x} = \frac{8-4}{0-(-3)}$
$m = \frac{3}{2}$ $y = mx + b$	m is undefined.	$m = \frac{4}{3}$
$0 = \frac{3}{2}(2) + b$	Line is vertical.	
$0 = 3 + b$	$\boxed{x = -3}$	$\boxed{y = \frac{4}{3}x + 8}$
$b = -3$		
$\boxed{y = \frac{3}{2}x + (-3)}$		

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Word Problem Procedures

1. Assign your variables.
    Decide what is the dependent variable (y)
    and the independent variable (x).

2. Determine the slope and "y-intercept".

    Given the slope and y-intercept

    Given the slope and a point

    Given two points

3. Write the equation for the problem.
    (Define your variables!)

Using Slope-Intercept Form with Word Problems

**Ex 1: My son got \$120 for his birthday. He wants to
buy a new laptop and starts saving \$5 a week.**

1. Assign your variables.

    T = # of \$ (total savings) (w, T)
    W = # of weeks

2. Determine the slope and "y-intercept".

    $m = \dfrac{\Delta \$}{\Delta weeks} = \dfrac{5}{1} = 5$ $b = 120$ $(0, 120)$

    (\$5 per week)   After 0 weeks,
    he had saved \$120.

3. Write the equation for the problem.

    $T = 5w + 120$ where T is the
    amount saved after W weeks.

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Using Slope-Intercept Form with Word Problems

How much will he have saved after 12 weeks?

$W = 12$

$T = 5w + 120$
$T = 5(12) + 120$
$T = 60 + 120$
$T = 180$

After 12 weeks, he will have saved $180.

If the laptop he wants is selling for $389,
how many weeks will he have to wait until he can buy it?

$T = 389$

$T = 5w + 120$
$389 = 5w + 120$
$5w = 269$
$w = 53\frac{4}{5}$

He will be able to buy the $389 laptop in 54 weeks.

Ex 2:   Ed started a job in January and saved the same amount each month. At the end of February, he had saved $68. By the end of May, he had saved $119.

$T = $ # of $ (Total saved)
$M = $ # of months after Start job

(M, T)

$m = \frac{\Delta \$}{\Delta \text{ months}}$ $(2, 68)$ $(5, 119)$

$m = \frac{\Delta T}{\Delta M} = \frac{119 - 68}{5 - 2} = \frac{51}{3} = \$17$ per month

$y = mx + b$
$68 = 17(2) + b$
$68 = 34 + b$
$b = \$34$
$[\text{Savings before the job}]$

$T = 17M + 34$ where T is the total saved after M months.

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Ex 3: On the Saturday after Thanksgiving, I drove home from my grandfather's house. After 6 hours, I was still 470 miles away from home. After 14 hours, I crossed a bridge that is 30 miles away from my house.

H = # of hours

A = # of miles away from house

(H, A)

$m = \dfrac{\Delta \text{miles}}{\Delta \text{hours}}$ $(6, 470)$ $(14, 30)$

$m = \dfrac{\Delta A}{\Delta H} = \dfrac{470-30}{6-14} = \dfrac{440}{-8} = -55 \text{ mph}$

$y = mx + b$

$470 = (-55)(6) + b$

$470 = -330 + b$

$b = 800 \text{ miles}$

{on line 800 miles from your grandfather}

$A = -55H + 800$ where

A is the number of miles away after H hours.

Assignment #23

p. 296-298
#3-5 (Write the equation and graph labeling 3 points)
#9-13, 20-22, 38-43, 47-48

Correct the Chapter 4 Test!