1. You start a business that manufactures and sells space heaters. The building and machinery cost $550,000. Each month you pay $2700 for utilities, insurance, and taxes. Your payroll each month is $10,500. You sell your space heaters for $120 each and your monthly sales average 350 space heaters.

Find the break-even point.

$$Income = exp.$$

$$(120) \cdot 350m = 550,000 + 2700m + 10,500m$$

$$42000m = 550,000 + 13,200m$$

$$28,800m = 550,000$$

$$m = 19.097$$

20 munths

2. Your boat can travel 12mph in calm water. Today you took your boat to a river that has a current of 4 mph.

$$d = r \cdot t$$

a) How long would it take you to travel 9 miles upstream?

$$9 = 8 \cdot t \qquad t = 1.125 \, hrs$$

b) How long would it take you to return?

$$9 = 16 \cdot t \qquad t = 0.5625 \, hrs.$$

3. Your plane can fly 180 mph with no wind. Today there is a 25 mph wind.
a) How far can you travel in 4 hours if you fly with a tailwind?

$$d = (205)(4)$$
$$= 820 mi.$$

b) How long would it take you to return?

$$820 = (155) \cdot t$$
$$t = 5.29 \, hrs.$$

4.) On a canoe trip I paddled upstream (against the current) for 6 hours and traveled 15 miles. Later I paddled downstream (with the current) for 4 hours and traveled 34 miles. Write and solve a system of equations to find the speed of the current and the speed that I can paddle in still water.

$c =$ current
$b =$ boat

$$d = R \cdot t$$

Downstream EQ:

$$34 = (b+c) \cdot 4$$

Upstream EQ:

$$15 = (b-c) \cdot 6$$

$$8.5 = b + c$$
$$2.5 = b - c$$
$$11 = 2b \quad b = 5.5 mph$$
$$c = 3 mph$$

5.) It takes you 3 hours in your canoe to travel 12.6 miles downstream. The return trip upstream takes you 7 hours. Write and solve a system of equations to find the speed of the canoe and the speed of the current.

$$d = r \cdot t$$

Downstream EQ:

$$12.6 = (b+c)3$$

Upstream EQ:

$$12.6 = (b-c)7$$

$$\begin{array}{l} 4.2 = b+c \\ 1.8 = b-c \end{array} +$$

$$2b = 6 \quad b = 3mph$$

$$c = 1.2''$$

You mix together two acid solutions to get a final solution that is 9% acid by volume. If there ends up being 15 liters of this new solution how many liters of pure acid do you have?

$$15 * 0.09$$
$$= 1.35 \text{ liters}$$

There is a flask with unknown amount of solution. This solution is 6% acid by volume. Write an expression that gives the amount of pure acid in the flask.

$$0.06X \qquad X = amt \\ sol.$$

You mix an unknown # of liters of a 9% acid solution with an unknown # of liters of a 15% acid solution. You end up with a total of 20 liters of solution.

$$X = 9\% \, sol. \qquad y = 15\% \, sol.$$

Write an equation which represents the above information.

$$X + y = 20$$

You want to create 8 gallons of an acid solution that is 12% acid by volume. All you have on the shelf are solutions that are 15% acid and 10% acid by volume. How many gallons of each should you mix together?

$X = 3.2 \text{ gal}$ $Y = 4.8 \text{ gal}$

x = gallons of 15% solution   y = gallons of 10% solution

Gallons of Solution $X + Y = 8$

Gallons of Pure Acid $0.15X + .10Y = .12 \cdot 8$

$-.05X = -.16$
$X = 3.2$

$(X + Y = 8) \cdot 10$
$.15X + .10Y = .96$
$.10X + .10Y = .80$
$-.15X + .10Y = .96$

1.) Sally's favorite color is pink. Her favorite shade of pink is the paint that is 33% red. She wants to mix up 5 gallons of her favorite of pink but all that is available is paint that is 17% red and another is 37% red. How many gallons of each these paints should be mixed to get what she wants (33 % red)?

Gal of Paint $X + Y = 5$ Variables: x = Gal of 17% red paint $= 1 \text{ gal}$
Amount of Red $Y = 5 - X$ y = Gal of 37% red paint $= 4 \text{ gal}$

$0.17X + .37Y = 1.65$

$.17X + .37(5 - X) = 1.65$
$.17X + 1.85 - .37X = 1.65$
$-.2X = -.2$
$X = 1$

2.) You are going to mix together two kinds of window cleaner. One of the cleaners has 2% ammonia and the other has 5% ammonia.

How many ounces of each acid solution should you use so that you will end up with 24 ounces of a mixture that is 3% ammonia?

x = ounces of 2% solution y = ounces of 5% ammonia

Ounces of Solution:

Ounces of Pure Ammonia:

HW #6 -- due tomorrow

Section 7.4 (use the sheet I gave you)

#1-4 on the sheet; 5, 6, 15 from textbook.

IXL #4 - T.1 & T.3 due Friday, February 15th!