Linear Equations and Problem Solving
Worksheet #2

Name Key

Date _____ Pd ____

1. Two people are running on the same running path. One person starts and runs at a rate of 18 feet per second. Twenty seconds later, the other person starts and runs at a rate of 20 feet per second. In how many seconds will they be running side-by-side?

$18\frac{ft}{sec}$ – rate of 1st

$20\frac{ft}{sec}$ – rate of 2nd

20 sec – head start of 1st

t – time to catch up (sec)

$d_1 = d_2$

$(\text{rate}_{1^{st}})(\text{time}_{\text{up}}) + (\text{head start}) = (\text{rate}_{2^{nd}})(\text{time}_{\text{up}})$

$18(t) + (18)(20) = 20(t)$

$18t + 360 = 20t$

$360 = 2t$

$180 = t$

The two runners will be side-by-side in 180 seconds.

2. From 1988 to 1989, the population of Colorado Springs increased by 5500 and that of Wichita increased by 4700. In 1989, the populations of Colorado springs and Wichita were 284,482 and 297,391, respectively. If the populations continue to increase at the same rates, when will the populations of the two cities be the same?

5,500 – pop. increase of Colorado Springs

4,700 – pop. increase of Wichita

284,482 – pop. of Colorado Springs in 1989

297,391 – pop. of Wichita in 1989

→ Hidden Question

→ How long before the populations are the same?

y = # of years before the pop. are the same

$(\text{Pop of Colorado Springs}) + (\text{Pop inc rate})\cdot(\text{\# of yrs till same}) = (\text{Pop. Wichita}) + (\text{Pop inc rate})\cdot(\text{\# of yrs till same})$

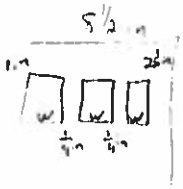
$284,482 + 5,500y = 297,391 + 4,700y$

$700y = 12,909$

$y \approx 16.14$

The populations will be the same in the year 2006.

3. A page of a school yearbook is 8 ½ inches wide. The left and right margins are 1 inch and 2 ½ inches, respectively. The space between two pictures is ¼ inch. How wide should each picture be to fit 3 across the page? (Draw a picture.)



$8\frac{1}{2}$ in - width of page
1 in - left margin
$2\frac{1}{2}$ in - right margin
$\frac{1}{4}$ in - space between pictures
w - width of pictures

$$(\text{left margin}) + (\text{right margin}) + 2(\text{space between}) + 3(\text{width of picture}) = \text{width of page}$$

$$1 + 2\frac{1}{2} + 2\left(\frac{1}{4}\right) + 3w = 8\frac{1}{2}$$

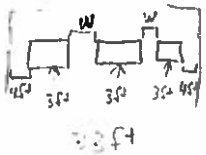
$$4 + 3w = 8\frac{1}{2}$$

$$3w = 4\frac{1}{2}$$

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

Each picture should be $1\frac{1}{2}$ inches wide.

4. You are designing the sidewall of a house with 3 windows, each 3 feet wide. There are 4 feet between each end window and an edge of the house. The width of the wall is 33 feet. You want the distance between the windows to be the same. How far apart should the windows be? (Draw a picture.)



w = width of space between windows

2(boarders) + 2(space between windows) + 3(window) = width of the wall

$$2(4) + 2w + 3(3) = 33$$

$$2w + 17 = 33$$

$$2w = 16$$

$$w = 8$$

The windows should be 8 feet apart.