Proportions Review Sheet

Proportion Facts:

Proportions are an equation that has one ratio (fraction) on each side

$$\frac{a}{b} = \frac{c}{d}$$

To solve proportions we cross-multiply

$$\frac{a}{b} = \frac{c}{d} \quad \rightarrow \quad ad = bc \quad \rightarrow \quad d = \frac{bc}{a}$$

Common mistakes in cross-multiplying is when one of the fractions contain a + or – sign: we forget to use the distribution property

RIGHT

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

$$3(x-2) = 2x$$

$$3x - 6 = 2x$$

$$x = 6$$

WRONG

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

$$3x-2 = 2x \quad \text{(error)}$$

$$3x - 2 = 2x$$

$$x \neq 2$$

Lots of word problems can be solved using proportions (or proportional reasoning). These can be geometry problems (example 1) or distance (rate × time) problems (example 2) or "buying" problems (example 3)

Example 1: ***If Jon's shadow is 4 feet long (and he is 6 feet tall) and the telephone poll's shadow is 20 feet long, how tall is the telephone poll?***

$$\frac{4}{6} = \frac{20}{h} \quad \rightarrow \quad 4h = 120 \quad \rightarrow \quad h = 30 \text{ ft}$$

Example 2: ***Lynne made a trip to town and back. The trip there took three hours and the trip back took four hours. She averaged 6 km/hr on the return trip. Find the average speed of the trip there.***

$$d = r \times t \quad \rightarrow \quad d = 3x = 4 \times 6 \quad \rightarrow \quad 3x = 24 \quad \rightarrow \quad x = 8 \text{ km/hr}$$

Example 3: ***If you can buy one can of pineapple chunks for $2 then how many can you buy with $10?***

$$\frac{1}{2} = \frac{x}{10} \quad \rightarrow \quad 2x = 10 \quad \rightarrow \quad x = 5 \text{ cans}$$

Distance Problems:

Distance = rate × time where rate is a distance / time (like mph)

When the same distance is traveled (like in two different directions: going from Marion to Wytheville and from Wytheville to Marion) at two different rates or in two different times, a proportional reasoning problem is developed. The problem is confusing to most students unless they go back to the above equation.

In most proportionality problems, we do the same types of things in the same places of the proportion. In example one on the front, both our ratios are shadows over heights. In the third example, both our ratios are cans over money. In the distance problem above, the ratios we get are counter intuitive (backwards).

$$\text{rate1} \times \text{time1} = \text{distance} = \text{rate2} \times \text{time2}$$

$$\frac{\text{rate1}}{\text{rate2}} = \frac{\text{time2}}{\text{time1}}$$

In the distance problems, since the distance is the constant the ratios in the proportion are backwards.

Be careful in the word problem section.

Proportions Problem Set **Name:** _____

1) $\frac{4}{9}=\frac{2}{x}$

2) $\frac{8n}{8}=\frac{8}{3}$

3) $\frac{p}{8}=\frac{13}{2}$

4) $\frac{10}{12}=\frac{2}{n}$

5) $\frac{x}{9}=\frac{7}{14}$

6) $\frac{v}{12}=\frac{10}{2}$

7) $\frac{6}{a}=\frac{3}{8}$

8) $\frac{7}{9}=\frac{a}{5}$

9) $\frac{3}{13}=\frac{v}{3}$

10) $\frac{11}{10}=\frac{r}{11}$

11) $\frac{a}{10}=\frac{11}{14}$

12) $\frac{6}{14}=\frac{5}{n}$

13) $\frac{5}{x} = \frac{2}{x-3}$

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

Word Problems: round answer to the nearest integer

1) If you can buy one can of pineapple chunks for $2 then how many can you buy with $10?

2) One jar of crushed ginger costs $2. How many jars can you buy for $4?

3) One cantaloupe costs $2. How many cantaloupes can you buy for $6?

4) One package of blueberries costs $3. How many packages of blueberries can you buy for $9?

5) Shawna reduced the size of a rectangle to a height of 2 in. What is the new width if it was originally 24 in wide and 12 in tall?

6) Ming was planning a trip to Western Samoa. Before going, she did some research and learned that the exchange rate is 6 Tala for $2. How many Tala would she get if she exchanged $6?

7) A cattle train left Miami and traveled toward New York. 14 hours later a diesel train left traveling at 45 km/h in an effort to catch up to the cattle train. After traveling for four hours the diesel train finally caught up. What was the cattle train's average speed?

8) A passenger plane made a trip to Las Vegas and back. On the trip there it flew 432 mph and on the return trip it went 480 mph. How long did the trip there take if the return trip took nine hours?