PAL Worksheet – Chem 6A

Math Readiness – Ratios

I. WORKING WITH RATIOS

Write each of the following as a ratio. In the case of decimals, convert the number first to a ratio. Identify the numerator and denominator in each ratio.

Example 1: Fifty-six miles per hour.

Ans:
This can be written as 56 miles/1 hour. 56 miles is the numerator, 1 hour is the denominator.

$$\frac{\text{56 miles}}{\text{hour}}$$

Example 2: 0.017 (17 thousandths)

Ans:

$\frac{17}{1000}$ 17 is the numerator; 1000 is the denominator

Example 3: one tablet of penicillin contains 250 mg

Ans:
This statement can be written as two different ratios.

$\frac{250\text{ mg}}{1\text{ tablet}}$ 250 mg = numerator; 1 tablet = denominator

$\frac{1\text{ tablet}}{250\text{ mg}}$ 1 tablet = numerator; 250 mg = denominator

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Start practicing!

1. Convert 0.45 to a ratio.

2. Express 753 ten thousandths as a ratio.

3. Express the number 7 as a ratio.

4. 2.5 g of gold (Au) atoms occupies 0.13 cm^3. Express this as a ratio.

5. Amoxicillin dosage is calculated as 30 mg for every kg of body weight. Express as a ratio.

6. A jogger has a running speed of 1 mile in 12 minutes. Express as a ratio, using both possible forms.

7. Soda has 39 g of sugar in one 12 ounce can. NOTE: you can create six different possible ratios from this statement (grams of sugar, number of ounces, one can). Write them <u>all</u>.

II. RATIOS IN CALCULATIONS

We rarely add and subtract ratios in chemistry but we often multiply and divide. Cross-multiplication, where units are included with numbers, is very important in chemical calculations.

Example 1 – cross-multiplying and dividing to solve for a variable, Y

$$\frac{4.3}{Y} = \frac{12}{0.54}$$

Multiply both sides by Y. The Y on the left-hand side cancels and now we have Y in the numerator on the right-hand side.

$$Y \times \frac{4.3}{Y} = \frac{12}{0.54} \times Y \qquad 4.3 = \frac{12 \times Y}{0.54}$$

Then, we can cross-multiply by multiplying 0.54 on both sides. Then we can divide both sides by 12 and complete the math to solve for Y.

$$0.54 \times 4.3 = \frac{12 \times Y}{0.54} \times 0.54 \qquad \frac{0.54 \times 4.3}{12} = \frac{12 \times Y}{12}$$ (could also write it as 12Y)

Now you can complete the math to solve for Y: Y = _____

Example 2 – cross-multiplying to cancel units. This is VERY common in chemistry calculations.

$$2.0 \text{ mol} \times 42 \frac{\text{grams}}{\text{mol}} = 84 \text{ grams}$$

We can do a series of calculations using this method to convert one number containing a unit of measurement to a different type of unit.

$$5 \text{ cm} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{1000 \text{ mm}}{1 \text{ m}} = 50 \text{ mm}$$

Start practicing!

1. Solve for Z in the equation. Show ALL work.

$$\frac{45}{0.012} = \frac{2.7}{Z}$$

2. Solve for W in the equation. Show ALL work.

$$115 + \frac{W}{59} = 224$$

3. Determine the number of cm in 400 meters (1 meter = 100 cm). Start with 400 meters.

4. A baby weighs 7.8 lbs. If 1 lb = 16 ounces, how many ounces does the baby weigh?

5. What is the baby's weight in grams if 1 lb = 456 grams?