Essential Question

How can we use ratios to find an unknown amount?

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What Is a Ratio?

- A ratio compares two amounts
- Write as 3 : 2, 3 to 2, or a fraction
- Order matters: first named goes first

You can write it as 3 : 2, as 3 to 2, or as the fraction 3/2.

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Simplifying Ratios

- Divide both numbers by the same factor
- Make the units match first
- Simplified ratio means the same thing

Simplify a ratio the same way you simplify a fraction: divide both numbers by the same factor.

Ratios as Recipes

- A recipe is a fixed ratio
- Balanced equations are recipes too
- Coefficients give the mole ratio

A recipe is a fixed ratio: 2 slices of bread for every 1 slice of cheese, no matter how many sandwiches you make.

Setting Up a Proportion

- A proportion: two equal ratios
- Same units on top, same units on bottom
- Use x for the unknown

A **proportion** is an equation that says two ratios are equal.

Solving by Cross-Multiplying

- Multiply across the equals sign
- Set the two products equal
- Divide to get x by itself

To solve a proportion, **cross-multiply**: multiply the top of each fraction by the bottom of the other and set the two products equal.

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Example: Map Scale

Try it first!

On a map, two towns are 8.4 cm apart. The map scale is 2 cm = 15 km. What is the real distance between the towns?

Example: Mole Ratio

Try it first!

Ammonia forms by $N_2 + 3\ H_2 \rightarrow 2\ NH_3$. How many moles of NH_3 form from 4.5 mol of H_2?

Example: Solution Concentration

Try it first!

A salt solution has 12 g of salt in 250 mL. A student pours out 75 mL of the same solution. How many grams of salt are in the 75 mL?

Big Ideas

- A ratio compares two amounts
- Order and units must match
- A proportion sets two ratios equal
- Cross-multiply, then divide

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