Finding Proportions

- When two quantities are equal it’s called an **equation**.

- A **proportion** is a special type of **equation**.

- A **proportion** states that two ratios or rates are equal.
  - For example: \[
  \frac{1}{4} = \frac{10}{40}
  \]

- A **proportion** is an equation and must have an equal sign.
Finding Proportions

Most word problems will tell you if a proportion is involved (...although it may be implied). For instance.

- A machine produces 200 bolts in 24 minutes. **At the same rate**, how many bolts would be produced in 42 minutes?

- A certain medicine is given in an amount proportional to a patient's body weight. Suppose a patient weighing 100 pounds requires 125 milligrams of medicine. What is the weight of a patient who requires 300 milligrams of medicine?

- Carmen drove 780 miles in 12 hours. **At the same rate**, how long would it take her to drive 455 miles?
Finding Proportions

- A proportion is made up of four values.

- If three of the four values are known, we can solve for the fourth.

- It’s **important** to keep the relationship of the quantities of the proportion the same.
Finding Proportions

For Example: A machine produces 200 bolts in 24 hours. **At the same rate**, how many bolts would be produced in 42 hours?

\[
\frac{\text{bolts}}{\text{hours}} \quad (\text{relationship}) \quad \frac{200}{24} = \frac{x}{42}
\]

- Notice we put bolts in the numerators and hours in the denominators

- To solve for \(x\), we can equate the cross products to form an equivalent equation

\[
\frac{200}{24} = \frac{x}{42} \quad (\text{cross products}) \quad 200 \times 42 = 24x
\]

\[
200 \times 42 = 24x \quad (\text{solving for } x) \quad \frac{200 \times 42}{24} = x
\]