

2.3 Proportion Word Problems

proportion - fraction = fraction

**Cross multiply to solve

Word Problems:

** Fraction word problems

- Define numerator and denominator
- Define original fraction

** Direct Variation (relationship)

- Basic ratio setup

Examples:

1. The numerator of a fraction is 8 less than the denominator of the fraction. The value of the fraction is $\frac{3}{5}$. Find the fraction.

let x = denominator
 $x-8$ = numerator
 $\frac{x-8}{x}$ = original fraction

$$\frac{x-8}{x} = \frac{3}{5}$$

$$5(x-8) = 3(x)$$

$$5x - 40 = 3x$$

$$5x - 3x - 40 = 0$$

$$2x - 40 = 0$$

$$2x = 40$$

$$x = \frac{40}{2}$$

$$x = 20$$

$$\frac{x-8}{x}$$

$$\frac{20-8}{20}$$

$$\frac{12}{20}$$

2. The denominator of a fraction is 30 more than the numerator of the fraction. If 10 is added to the numerator of the fraction and the denominator is unchanged, the value of the resulting fraction becomes $\frac{3}{5}$. Find the original fraction.

let x = numerator

$x+30$ = denominator

$\frac{x}{x+30}$ = original fraction

$$\frac{x+10}{x+30} = \frac{3}{5}$$

$$5(x+10) = 3(x+30)$$

$$5x + 50 = 3x + 90$$

$$5x - 3x + 50 = 90$$

$$2x + 50 = 90$$

$$2x = 90 - 50$$

$$2x = 40$$

$$x = \frac{40}{2}$$

$$x = 20$$

$$\frac{x}{x+30}$$

$$\frac{20}{20+30}$$

$$\frac{20}{50}$$

$$\frac{20}{50}$$

3. In Grantville, four out of five people belong to a union. How many union members can be expected if the population is 45,000?

$\frac{\text{union}}{\text{population}}$

let x = # of union members

$$\frac{x}{45,000} = \frac{4}{5}$$

$$5x = 4(45,000)$$

$$5x = 180,000$$

$$x = \frac{180,000}{5}$$

$$x = 36,000$$

36,000 union members

4. There are 81 calories in a slice of bread that weighs 30 grams. How many calories are there in a package of this bread that weighs 600 grams?

$\frac{\text{calories}}{\text{grams}}$

let x = # of calories

$$\frac{81}{30} = \frac{x}{600}$$

$$30x = 600(81)$$

$$30x = 48,600$$

$$x = \frac{48,600}{30}$$

$$x = 1,620$$

1,620 calories

5. The scale on a map is 5 cm represents 3.5 km. How far apart are two towns if the distance between these two towns on the map is 8 cm?

$\frac{\text{cm}}{\text{km}}$

let x = kms apart

$$\frac{5}{3.5} = \frac{8}{x}$$

$$5x = 8(3.5)$$

$$5x = 28$$

$$x = \frac{28}{5}$$

$$x = 5.6$$

5.6 km apart

HOMEWORK

Worksheet - HW 2.3 Proportion
Word Problems