

# Algebra 2 Notes

Name: key

## Section 0.7 - Proportional Reasoning

Recall that a ratio is a Comparison of two numbers by division and a proportion is an equation stating that two ratios are equal. In a proportion, the cross products are equal.

| Cross Products Property                       |  |   |
|---|--|---|
| Words   | Numbers  | Algebra   |
| The cross products of a proportion are equal. | $\frac{3}{5} \times \frac{9}{15}$ $3 \cdot 15 = 5 \cdot 9$ | For real numbers $a, b, c$ , and $d$ , where $b \neq 0$ and $d \neq 0$ :<br>If $\frac{a}{b} = \frac{c}{d}$ , then $ad = bc$ |

If a proportion contains a variable, you can cross multiply to solve for the variable. When you set the cross products equal, you create a linear equation that you can solve by using the skills you learned in Section 2.1.

Example 1: Solve each proportion.

|   |   |
|---|---|
| a. $\frac{22}{9} \times \frac{x}{13.5}$<br>$9 \cdot x = 22 \cdot 13.5$<br>$\frac{9x}{9} = \frac{297}{9}$<br>$x = 33$  | b. $\frac{512}{16} \times \frac{64}{w}$<br>$512w = 16 \cdot 64$<br>$\frac{512w}{512} = \frac{1024}{512}$<br>$w = 2$   |
| c. $\frac{y-5}{12} \times \frac{77}{84}$<br>$84(y-5) = 12 \cdot 77$<br>$84y - 420 = 924$<br>$\quad +420 \quad +420$<br>$\frac{84y}{84} = \frac{1344}{84}$<br>$y = 16$ | d. $\frac{15}{5x-3} \times \frac{2.5}{7}$<br>$7 \cdot 15 = 2.5(5x-3)$<br>$105 = 12.5x - 7.5$<br>$\quad +7.5 \quad +7.5$<br>$\frac{112.5}{12.5} = \frac{12.5x}{12.5}$<br>$x = 9$ |

Example 2: Solving Percent Problems

A college brochure states that 11.5% of the students attending the college are majoring in engineering. If 2400 students are attending the college, how many are majoring in engineering?

$$\frac{\text{percent}}{100} = \frac{\text{part}}{\text{whole}}$$

$$\frac{11.5}{100} \neq \frac{x}{2400}$$

$$\frac{100x}{100} = \frac{27600}{100}$$

$$x = 276$$

276 students

Example 3: Applications

a. A pedometer measures how far a jogger has run. To set her pedometer, Rita must know her stride length. Rita counts 328 strides as she runs once around a 400-meter track. A meter is about 39.37 inches. How long is her stride in inches?

$$\text{Stride length} = \frac{\text{meters}}{\text{strides}}$$

$$\frac{400 \text{ m}}{328 \text{ strides}} \neq \frac{x \text{ m}}{1 \text{ stride}}$$

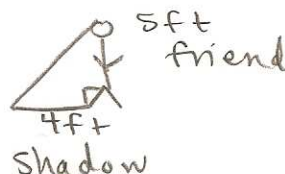
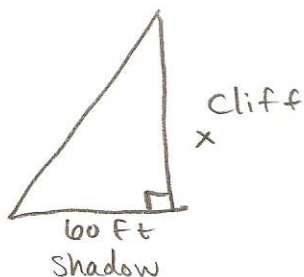
$$\frac{328x}{328} = \frac{400}{328}$$

$$x = \frac{50}{41} \text{ m/stride}$$

$$\frac{\frac{50}{41} \text{ m}}{1 \text{ stride}} \cdot \frac{39.37 \text{ in}}{1 \text{ m}}$$

$$\approx 48 \text{ inches}$$

b. A rock climber wants to know the height of a cliff. The climber measures the shadow of her friend, who is 5 feet tall and standing beside the cliff, and measures the shadow of the cliff. If the friend's shadow is 4 feet long and the cliff's shadow is 60 feet long, how tall is the cliff?



$$\frac{\text{height}}{\text{shadow}}$$

$$\frac{x}{60} \neq \frac{5}{4}$$

$$\frac{4x}{4} = \frac{300}{4}$$

$$x = 75$$

75 feet