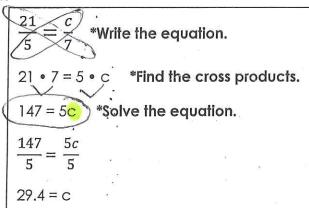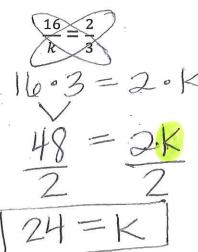# Solving Proportions with Algebra
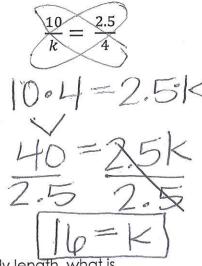
To find the missing value in a proportion, you can use cross products or cross multiplying. An example is shown below.
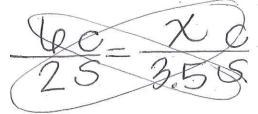
$$\frac{21}{5} = \frac{c}{7}$$ *Write the equation.

$21 \cdot 7 = 5 \cdot c$ *Find the cross products.

$147 = 5c$ *Solve the equation.

$$\frac{147}{5} = \frac{5c}{5}$$

$29.4 = c$

$7 \cdot 21 = c \cdot 5$

Let's try these together!!

$$\frac{16}{k} = \frac{2}{3}$$

$16 \cdot 3 = 2 \cdot k$

$$\frac{48}{2} = \frac{2 \cdot k}{2}$$

$\boxed{24 = k}$

$$\frac{2}{6} = \frac{5}{h}$$

$2 \cdot h = 5 \cdot 6$

$$\frac{2h}{2} = \frac{30}{2}$$

$\boxed{h = 15}$

$$\frac{10}{k} = \frac{2.5}{4}$$

$10 \cdot 4 = 2.5k$

$$\frac{40}{2.5} = \frac{2.5k}{2.5}$$

$\boxed{16 = k}$

A 6-foot crocodile has a 2-foot skull. If skull length is proportional to the body length, what is the length of a crocodile of that same species with a 3.5-foot long skull?

$$\frac{6c}{2s} = \frac{xc}{3.5s}$$

$6 \cdot 3.5 = 2 \cdot x$

$$\frac{21}{2} = \frac{2x}{2}$$

$\boxed{x = 10.5}$

How long will it take Sally to run a 50-meter race if he can run 15 meters in 12 seconds?

$$\frac{15 \, m}{12 \, s} = \frac{50 \, m}{x \, s}$$

$15x = 50 \cdot 12$

$$\frac{15x}{15} = \frac{600}{15}$$

$\boxed{x = 40}$

Determining if quantities are proportional. Simplify or use cross products or unit rates.

1. 2 adults for 10 children and 3 adults for 12 children

2. 12 inches by 8 inches and 18 inches by 12 inches

3. 8 feet in 21 seconds and 12 feet in 31.5 seconds (cross products)

4. $5.60 for 5 pairs of socks and $7.12 for 8 pairs of socks (unit rate)

Solve each proportion.

5. $\dfrac{5}{6} = \dfrac{t}{18}$

6. $\dfrac{6}{k} = \dfrac{24}{28}$

7. $\dfrac{21}{5} = \dfrac{c}{7}$

8. $\dfrac{15}{w} = \dfrac{2}{5}$

9. $\dfrac{3}{n} = \dfrac{2.7}{18}$

10. $\dfrac{0.2}{3} = \dfrac{3}{d}$

11. Orange Juice is on sale 3 half-gallons for $5. At this rate, find the cost of 5 half-gallons of orange juice to the nearest cent.

12. Franco drove 150 miles in 1.5 hours. At this rate, how long will it take him to drive another 25 miles to the next town.

ratios and proportions

1. Yesterday Haley sold 14 Strawberry Kiwi, 18 Tangerine, 8 Grape and 6 Mountain Berry suckers during the football game. Explain whether the ratio of Strawberry Kiwi to Tangerine or the ratio of Grape to Mountain Berry is greater.

2. Mikayla drove 621 miles in 11.5 hours. What was her average speed in miles per hour?

3. At the grocery store, Jack notices that a 7 oz. bag of raisins is $1.10 and a 9 oz. bag of raisins is $1.46. Which size bag has the lowest price per ounce?

find an equivalent ratio to each ratio.

4. $\dfrac{10}{16}$

5. $\dfrac{21}{28}$

6. $\dfrac{12}{25}$

7. $\dfrac{40}{48}$

use cross products † solve each proportion.

8. $\dfrac{N}{8} = \dfrac{15}{4}$

9. $\dfrac{20}{t} = \dfrac{2.5}{6}$

10. $\dfrac{6}{11} = \dfrac{0.12}{z}$

11. One dog year is said to equal 7 human years. If Alexis' dog is 5.5 years old in dog years, what is her dogs age in human years?