3 Proportions and Variation

"I am doing an experiment with slope. I want you to run up and down the board 10 times."

This is what happens when you give a dog too many biscuits.

"Now with 2 more dog biscuits, do it again and we'll compare your rates."
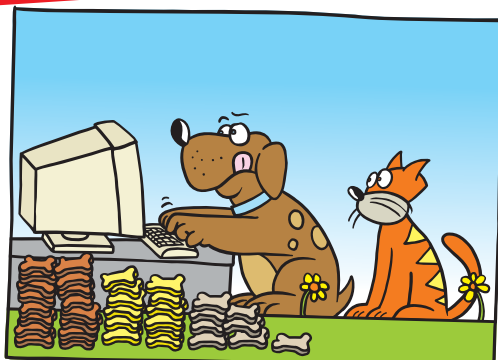
"Dear Sir: I counted the number of bacon, cheese, and chicken dog biscuits in the box I bought."

And while you're at it, how about throwing in a couple of tuna and mouse flavors!

"There were 16 bacon, 12 cheese, and only 8 chicken. That's a ratio of 4:3:2. Please go back to the original ratio of 1:1:1."

What You Learned Before

"I wonder if our rate is proportional to the slope of the hill."

...or possibly proportional to our stupidity!

● Simplifying Fractions

Example 1   Simplify $\dfrac{4}{8}$.

$$\frac{4 \div 4}{8 \div 4} = \frac{1}{2}$$

> Simplify fractions by using the Greatest Common Factor.

Example 2   Simplify $\dfrac{10}{15}$.

$$\frac{10 \div 5}{15 \div 5} = \frac{2}{3}$$

Try It Yourself
Simplify.

1. $\dfrac{75}{100}$ 2. $\dfrac{16}{24}$ 3. $\dfrac{12}{144}$ 4. $\dfrac{15}{45}$

● Comparing Equivalent Fractions

Example 3   Is $\dfrac{1}{4}$ equivalent to $\dfrac{13}{52}$?

$$\frac{13 \div 13}{52 \div 13} = \frac{1}{4}$$

∴ $\dfrac{1}{4}$ is equivalent to $\dfrac{13}{52}$.

Example 4   Is $\dfrac{30}{64}$ equivalent to $\dfrac{5}{8}$?

$$\frac{30 \div 2}{64 \div 2} = \frac{15}{32}$$

∴ $\dfrac{30}{64}$ is *not* equivalent to $\dfrac{5}{8}$.

Try It Yourself
Are the fractions equivalent? Explain.

5. $\dfrac{15}{60} \stackrel{?}{=} \dfrac{3}{4}$ 6. $\dfrac{2}{5} \stackrel{?}{=} \dfrac{24}{144}$ 7. $\dfrac{15}{20} \stackrel{?}{=} \dfrac{3}{5}$ 8. $\dfrac{2}{8} \stackrel{?}{=} \dfrac{16}{64}$

● Converting Measures

Example 5   A person must be at least 56 inches tall to drive a race car at an amusement park. Gina is 4 feet 11 inches tall. Is she tall enough to drive?

$$4 \text{ feet} \times \frac{12 \text{ inches}}{1 \text{ foot}} + 11 \text{ inches} = 48 \text{ inches} + 11 \text{ inches} = 59 \text{ inches}$$

∴ Because 59 inches is greater than 56 inches, Gina is tall enough to drive.

Try It Yourself
Convert.

9. 15 feet = ▢ yards   10. 5 quarts = ▢ pints   11. 6000 pounds = ▢ tons