Rates, Ratios, Proportions

Rates & Ratios

Definition 1.1 (Ratio)

A **ratio** is a comparison of amounts or quantities.

Example 1.2. The Dodge Family College of Arts and Sciences oversees 30 departments while the Gallogly College of Engineering has 9 departments. What is the ratio of Arts and Sciences departments to Engineering departments?

Ratios can be expressed several ways:

Ratio Expressions

- Simplified fractions in the form $\frac{a}{b}$
- With a colon in the form $a : b$
- Verbally in the form "a to b"

Example 1.3. Express the answer from the previous example in two other ways

Example 1.4. In Giada de Laurentiis' recipe for lasagna rolls, she calls for 15 ounces of ricotta and 1 cup of shredded mozzarella cheese. What is the ratio of mozzarella to ricotta? 1 dry cup is equal to 6.8 ounces.

Definition 1.5 (Rate)

A **rate** is a ratio comparing two items with different units

Example 1.6. Give five different examples of rates that you might see in the wild.

Example 1.7. On March 16, 2022, Shai Gilgeous-Alexander scored 14 field goals on 22 shot attempts against the San Antonio Spurs.

(a) What is the rate of field goals made to field goals attempted?

(b) When we perform the division represented by a rate, we find the **unit rate**. What was Gilgeous-Alexander's unit rate for shots attempted to shots made in this game? (In basketball, this unit rate is called the field goal percentage)

Example 1.8. According to Google Maps, the distance between Oklahoma State and the University of Oklahoma is 88.1 miles. Amy drove from OSU to OU in exactly 100 minutes. What the unit rate (in miles per hour) for her speed on the trip? (This unit rate is her average speed)

Example 1.9. At Walmart, a 12.4 oz box of Cheez-Its costs \$3.68 while a 21 oz box costs \$5.28. Which box is the most cost effective purchase? Why?

Proportions

Definition 1.10 (Proportion)

A **proportion** is an equation which relates two ratios.

Example 1.11. Write a proportion relating the number of centimeters in one meter to the number of centimeters in five meters.

Example 1.12. 25% of what number is 32?

Example 1.13. You have an irregularly sized photograph measuring 4 inches by 8 inches, but want to scale it up so that the larger side measures 20 inches. How long does the shorter side have to be to maintain the size ratio?