

MATH 191 FUNDAMENTALS OF MATHEMATICS II
SECTION 11.4 AND 11.2: CONVERTING UNITS AND LENGTH, AREA, VOLUME, AND
DIMENSION
JANUARY 31, 2014

Converting Units

We know, for example, that $1 \text{ inch} = 2.54 \text{ cm}$ or $1 \text{ kg} = 2.2 \text{ lb}$. When we know how units are related, we can convert from one unit to another by multiplying or dividing. When do we multiply, and when do we divide?

1. Julie is confused about why we multiply by 3 to convert 6 yards to feet. She thinks we should divide by 3 because feet are smaller than yards.
 - a. Make a math drawing to show how yards and feet are related. Make sure your picture accurately portrays length as a one-dimensional attribute. Use your drawing and the meaning of multiplication to explain why we multiply by 3 to convert 6 yards to feet.
 - b. Discuss the relationship between the *size* of a unit and the *number* of units it takes to describe the length of an object.
2. Give an example of a unit conversion problem where we would have to divide. Explain using the “how many groups?” interpretation of division why division is appropriate for the problem you came up with.

Dimensional Analysis

If we don't know how units are directly related, we may can make a chain of conversions. Dimensional analysis is a process where we repeatedly multiply by

For example, suppose a person is 1.63 meters tall. How tall is this person in feet?

$$1.63 \text{ meters} \times \frac{\text{cm}}{\text{cm}} \times \frac{\text{ft}}{\text{cm}} =$$

The fractions must be equal to _____. We choose the fractions so that _____.

Area and Volume Conversions

3. What is wrong with saying that 1 yard = 3 feet, so 1 square yard = 3 square feet? Make a drawing explaining.

Example: Converting 800 square feet to square meters.

Length, Area, Volume, and Dimension

Let's revisit the ideas of length, area, and volume and see how they are different.

Length describes the size of something that is _____.

Area or surface area describes the size of something that is _____.

Volume describes the size of something that is _____.

Examples of things that are one-dimensional, two-dimensional, and three-dimensional:

Perimeter measures _____ and is a _____ measurement.

When we measure area or surface area of an object, we are answering questions such as

When we measure the volume of an object, we are answering questions such as