35.1 Unit Conversions - Worksheet 1

1 Write an equation that relates inches to centimeters, then use it to determine two conversion factors.

You may not know all of these conversions. You can look them up on the internet if you're not sure.

2 Convert 12 inches into centimeters.

3 Convert 100 centimeters into inches.

4 Write an equation that relates cups to quarts, then use it to determine two conversion factors.

5 Convert 32 cups into quarts.

6 Convert 4 quarts into cups.

35.2 Unit Conversions - Worksheet 2

1 Write an equation that relates inches to kilowatts to watts, then use it to determine two conversion factors.

2 Write an equation that relates inches to deciliters to liters, then use it to determine two conversion factors.

3 Write an equation that relates nanometers to meters, then use it to determine two conversion factors.

4 Write an equation that relates hectares to ares, then use it to determine two conversion factors.

A hectare is the area of a square with side lengths of 100 meters. However, it is not equal to 100 square meters. We'll explore this in a later worksheet.

5 Write an equation that relates centimeters to meters and another equation that relates meters to kilometers. Use these two equations together to determine two conversion factors that relate kilometers to centimeters.

35.3 Unit Conversions - Worksheet 3

In science courses, you will encounter some interesting units that are built to describe specific situations. Although you may not have any intuition with these, as long as you have a formula and you understand the method, you can be begin to work with the problems.

1 A mole of objects is 6.022×10^{23} of those objects. For example, a mole of carbon atoms is 6.022×10^{23} carbon atoms. How many molecules of oxygen are in 5.7 moles of oxygen?

2 An astronomical unit is approximately 1.496×10^{11} meters. This is the approximate distance from the earth to the sun. Mars is approximately 1.52 astronomical units from the sun. About how far is it from the sun to Mars in meters?

3 Words such as millions and billions can also be used as a unit conversion. This is often used when talking about finances at a state or national level. Earlier, we talked about the \$300000000 Mars Climate Orbiter. This could have been written as \$300 million.

Write the quantity 2753.78 billion in standard form and using scientific notation.

1 thousand	$= 10^3$
1 million	$= 10^6$
1 billion	$= 10^9$
1 trillion	$= 10^{12}$

4 A light-year is the distance that light can travels in one year in a vacuum. This distance is approximately 9.46×10^{12} kilometers. The distance between the Milky Way galaxy and the Andromeda galaxy is approximately 2.5 million light-years. Approximately how many kilometers is it between the two galaxies?

35.4 Unit Conversions - Worksheet 4

1 A stone is a measure of weight that is commonly used in the UK and Ireland. One stone is equal to 14 pounds. If an object weighs 37 stone, how many pounds does it weigh?

2 A smoot is a unit of measurement devised as a prank by a fraternity at MIT. It is considered to be 67 inches, which corresponds to the height of Oliver Smoot, who was used to measure Harvard bridge. The bridge was determined to have a length of approximately 364.4 smoots. Convert this distance to feet.

Convert smoots to inches, then inches to feet.

3 When thinking about very large or very small quantities, it is sometimes useful to relate them to quantities that you are more familiar with. For example, we can think of 1 home $= \$400000$ as a relationship for converting dollars into homes. What is the equivalent of $\$1$ billion in homes?

Go through the process of creating a conversion factor.

4 Transistors are an important component for modern electronics. The smallest transistors are about 7 nanometers in size. A human hair is approximately 100 micrometers in diameter. How many transistors would need to be lined up to equate to the thickness of a human hair?

35.5 Unit Conversions - Worksheet 5

A compound unit is a unit that mixes multiple other units together. Some common compound units are speeds like miles per hour ($\frac{\text{miles}}{\text{hours}}$) and pressures like pounds per square inch ($\frac{\text{pounds}}{\text{inch}^2} = \frac{\text{pounds}}{\text{inch}\cdot\text{inch}}$). When converting these, every unit much be converted individually. Here is an example of converting 10 feet per day into inches per week:

$$\begin{aligned} 10\frac{\text{feet}}{\text{day}} &= 10\frac{\cancel{\text{feet}}}{\text{day}} \cdot \frac{12 \text{ inches}}{1 \cancel{\text{foot}}} \cdot \frac{7 \cancel{\text{days}}}{1 \text{ week}} \\ &= 840\frac{\text{inches}}{\text{week}} \end{aligned}$$

1 One mile is equal to about 1.6 kilometers. If a car is traveling 75 miles per hour, how many kilometers per minute is it traveling?

2 Water has a density of about 8.34 pounds per gallon. Convert this to ounces (weight) per ounce (liquid).

3 A hectare is the area of a square that is 100 meters on each side. Determine the conversion factor for hectares to square meters.