

# CHAPTER 10 MEASUREMENT AND GEOMETRIC FIGURES

## Section 10.1

### TERMINOLOGY

**10.1**

For each of the following terms, provide 1) a definition in your own words, 2) the formal definition (as provided by your text or instructor), and 3) an example of the term using a drawing or problem. A sample filled-out form is available in the Introduction.

#### U.S. Customary System of Measurement

Your definition	
Formal definition	
Example	

#### Metric System of Measurement

Your definition	
Formal definition	
Example	

### READING AND SELF-DISCOVERY QUESTIONS

**10.1**

- When two units of measure are equal to each other, how many unit fractions can be formed?

**Two unit fractions can be formed. Example: If 2 cips = 6 wids, then  $1 = \frac{6 \text{ wids}}{2 \text{ cips}} = \frac{2 \text{ cips}}{6 \text{ wids}}$**

- When converting from one unit of measure to another, how do you decide which unit fraction to use?

**Use the unit fraction with the units you are converting to in the numerator.**

$$\text{Example: } 5 \text{ cips} = 5 \text{ cips} \times \frac{6 \text{ wids}}{2 \text{ cips}} = 15 \text{ wids}$$

3. What process do you use when you need to convert from one unit of measure to another and both are U.S. units?

- 1) Write down the relationship between the units
- 2) Identify the unit you want to end up with.
- 3) Write down a unit fraction that has the unit you want to end up with in the numerator.
- 4) Multiply by the unit fraction.

4. What process do you use for converting from one metric unit of measure to another metric unit of measure?

**When you change from one metric prefix to another by moving to the right on the prefix chart, move the decimal point to the right the same number of places. When you change from one metric prefix to another by moving to the left on the prefix chart, move the decimal point to the left the same number of places.**

5. Powers of what number allow us to move the decimal point when converting from one metric unit to another?

**The number 10.**

## CRITICAL THINKING QUESTIONS

10.1

1. Create a *mnemonic* (a meaningful acronym) to help you remember the metric units:

**K**(ilo)      \_\_\_\_\_ **Kim** \_\_\_\_\_

**H**(ecto)      \_\_\_\_\_ **Hall** \_\_\_\_\_

**D**(eka)      \_\_\_\_\_ **Drives** \_\_\_\_\_

**B**(ase unit)      \_\_\_\_\_ **By** \_\_\_\_\_

**D**(eci)      \_\_\_\_\_ **Duke** \_\_\_\_\_

**C**(enti)      \_\_\_\_\_ **Campus** \_\_\_\_\_

**M**(illi)      \_\_\_\_\_ **Monthly** \_\_\_\_\_

**Student answers will vary; this is just a sample answer.**

2. Why is converting units within the metric system so much easier than converting units within the U.S. system?

**Converting units within the metric system is so much easier than converting units with the U.S. system because you only have to move the decimal point if you know the prefix chart. With the U.S. method you have to remember lots of unit fractions.**

3. Why are pounds abbreviated as *lbs*?

**Pounds are related to the Roman "libra," which is why the abbreviation is "lb."**

## DEMONSTRATE YOUR UNDERSTANDING

## 10.1

1. Write the series of conversion factors to convert a measurement in cups to gallons.

$$16 \text{ cups} = 1 \text{ quart} \quad \text{and} \quad 4 \text{ quarts} = 1 \text{ gallon}$$

$$16 \text{ cups} \cdot \left( \frac{1 \text{ quart}}{4 \text{ cups}} \cdot \frac{1 \text{ gallon}}{4 \text{ quarts}} \right) = \frac{16}{16} \text{ gallon} = 1 \text{ gallon}$$

2. Write the series of conversion factors to convert a measurement in days to seconds.

$$24 \text{ hours} = 1 \text{ day}, \quad 60 \text{ minutes} = 1 \text{ hour}, \quad 60 \text{ seconds} = 1 \text{ minute}$$

$$2 \text{ days} \left( \frac{24 \text{ hours}}{1 \text{ day}} \cdot \frac{60 \text{ minutes}}{1 \text{ hour}} \cdot \frac{60 \text{ seconds}}{1 \text{ minute}} \right) = \frac{2 \cdot 24 \cdot 60 \cdot 60}{1} \text{ seconds} = 172,800 \text{ seconds}$$

## IDENTIFY AND CORRECT THE ERRORS

## 10.1

In the second column, identify the error(s) you find in each of the following worked solutions. Describe the error made in the second column. Solve the problem correctly in the third column.

Problem	Describe Error	Correct Process
1. Perform the following conversion: 34 centimeters to meters	<b>Student used the wrong conversion factor.</b>	$34 \text{ m} \cdot \frac{1 \text{ m}}{100 \text{ cm}} = 0.34 \text{ cm}$
<b>Worked Solution</b> (What is wrong here?)		
$34 \text{ cm} \left( \frac{100 \text{ cm}}{1 \text{ m}} \right) =$ <b>3400 meters</b>		
Problem	Describe Error	Correct Process
2. Perform the following conversion: 36 gallons to fluid ounces	<b>Student used the wrong number of ounces per cup in the last set of parentheses.</b>	$36 \text{ gallons} \cdot \left( \frac{4 \text{ quarts}}{1 \text{ gallon}} \right) \left( \frac{4 \text{ cups}}{1 \text{ quart}} \right) \left( \frac{8 \text{ ounces}}{1 \text{ cup}} \right)$ $= 36 \cdot 128 \text{ ounces} = 4608 \text{ ounces}$
<b>Worked Solution</b> (What is wrong here?)		
$36 \text{ gallons} \left( \frac{4 \text{ quarts}}{1 \text{ gallon}} \right) \left( \frac{4 \text{ cups}}{1 \text{ quart}} \right) \left( \frac{4 \text{ fl. ounces}}{1 \text{ cup}} \right)$ <b>= 2304 fluid ounces</b>		