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Lesson 21: Getting the Job Done—Speed, Work, and Measurement Units

**Student Outcomes**

* Students use rates between measurements to convert measurement in one unit to measurement in another unit. They manipulate and transform units appropriately when multiplying or dividing quantities.

Lesson Notes

Prior to this lesson, a measurement center should be made available to students. By allowing all students to handle all the various items, they gain a real sense of each measure and its relationship to the others.

**Measurement Center Materials:** rulers (centimeter and inches), meter sticks, yard sticks, measuring tapes; kilogram, gram, and milligram masses; liter box, liter bottle, or liter graduated cylinder, eyedropper (for milliliter); ounce and pound weights; cup, pint, quart, and gallon containers

**Materials:** copies of conversion charts, calculators

**Vocabulary:** Length, Mass, Weight, Capacity, Metric System, U.S. Customary System, kilo-, deci-, centi-, milli-

Conversion tables contain ratios that can be used to convert units of length, weight, or capacity. You must multiply the given number by the ratio that compares the two units.

Classwork

It may be helpful to copy the vocabulary terms on one side of a handout and the conversion charts on the other. Distribute these to each student. Pair the students for the first two examples.

Opening Exercise (5 minutes)

Opening Exercise

Identify the ratios that are associated with conversions between feet, inches, and yards.

inches  foot; the ratio of inches to feet is *.*

foot  inches*;* the ratio of feet to inches is *.*

feet  yard; the ratio of feet to yards is *.*

yard  feet*;* the ratio of yards to feet is *.*

**Example 1 (10 minutes)**

* Conversion tables are really ratio tables that can be used to convert units of length, weight, or capacity (and other units, too). You must multiply the given number by the ratio that compares the two units.
* Work with your partner to find out how many feet are in inches. Make a ratio table that compares feet and inches. Use the conversion rate of inches per foot or foot per inch.

Allow students to solve the problem using the conversion chart. When all groups finish, make clear that they can multiply by or divide by . The result is feet either way.

Example 1

Work with your partner to find out how many feet are in inches. Make a ratio table that compares feet and inches. Use the conversion rate of inches per foot or foot per inch.

inches equals feet.

**Example 2 (10 minutes)**

Example 2

How many grams are in kilograms? Again, make a record of your work before using the calculator. The rate would be grams per kg. The unit rate would be .

There are grams in kilograms.

**Exercises (10 minutes)**

Exercise 1

How many cups are in quarts? As always, make a record of your work before using the calculator. The rate would be cups per quart. The unit rate would be .

There are cups in quarts.

Exercise 2

How many quarts are in cups?

Closing (5 minutes)

* In Exercise 2, what if it was set up this way: . What is wrong with that set up?
  + *If the conversion factor is flipped upside down, the units will not cancel and the number won’t make sense.*

Lesson Summary

Conversion tables contain ratios that can be used to convert units of length, weight, or capacity. You must multiply the given number by the ratio that compares the two units.

Exit Ticket (5 minutes)

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lesson 21: Getting the Job Done—Speed, Work, and Measurement Units**

Exit Ticket

Jill and Erika made gallons of lemonade for their lemonade stand. How many quarts did they make? If they charge per quart, how much money will they make if they sell it all?

Exit Ticket Sample Solutions

Jill and Erika made gallons of lemonade for their lemonade stand. How many quarts did they make? If they charge $ per quart, how much money will they make if they sell it all?

The conversion rate isquarts per gallon.

Problem Set Sample Solutions

1. ft. in.
2. yd.  ft.
3. m  cm
4. km m
5. oz.  lb.
6. mi.  ft.
7. mi.  yd.
8. fl. oz. c.
9. mL  L
10. g mg
11. Beau buys a -pound bag of trail mix for a hike. He wants to make one-ounce bags for his friends with whom he is hiking. How many one-ounce bags can he make?

bags

1. The maximum weight for a truck on the New York State Thruway is tons. How many pounds is this?

lb.

1. Claudia’s skis are centimeters long. How many meters is this?

m­­

1. Claudia’s skis are centimeters long. How many millimeters is this?

mm

1. Write your own problem and solve it. Be ready to share the question tomorrow.

Answers will vary.

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| U.S. Customary Length | Conversion |
| Inch (in.) | in. = ft. |
| Foot (ft.) | ft. = in. |
| Yard (yd.) | yd. = ft.  yd. = in. |
| Mile (mi.) | mi. = yd.  mi. = ft. |

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| Metric Length | Conversion |
| Centimeter (cm) | cm = mm |
| Meter (m) | m = cm  m = mm |
| Kilometer (km) | km = m |

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| Metric Capacity | Conversion |
| Liter (L) | L = ml |
| Kiloliter (kL) | kL = L |

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| U.S. Customary Weight | Conversion |
| Pound (lb.) | lb. = oz. |
| Ton (T.) | T. = lb. |

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| Metric Mass | Conversion |
| Gram (g) | g = mg |
| Kilogram (kg) | kg = g |

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| U.S. Customary Capacity | Conversion |
| Cup (c.) | c. = fluid ounces |
| Pint (pt.) | pt. = c. |
| Quart (qt.) | qt. = c.  qt. = pt.  qt. = fluid ounces |
| Gallon (gal.) | gal. = qt.  gal. = pt.  gal. = c.  gal. = fluid ounces |