

8. 825 milligrams of table salt are added to a meal. Convert this mass to grams using a unit fraction or a metric conversion line.

Example 8 Application: Converting Metric Units of Weight

A box of detergent weighs 475 grams. Convert this mass to kilograms **a.** using a unit fraction and **b.** using a metric conversion line.

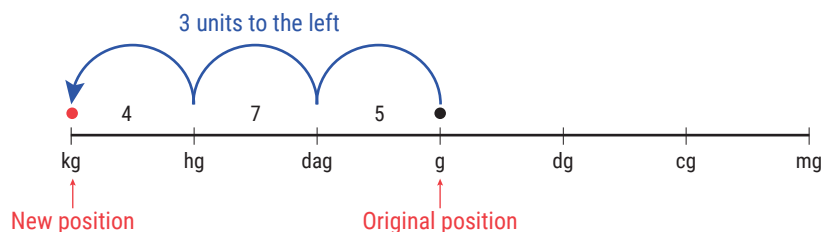
Solution

There are 1000 grams in 1 kilogram. We can convert 475 g to kg as follows.

- a.** Using a unit fraction:

$$475 \text{ g} = 475 \cancel{\text{g}} \cdot \frac{1 \text{ kg}}{1000 \cancel{\text{g}}} = \frac{475}{1000} \text{ kg} = 0.475 \text{ kg}$$

- b.** Using a metric conversion line:



Each method shows that 475 g of detergent is equivalent to 0.475 kg of detergent.

Now work margin exercise 8.

Margin Exercise Answers

1. **a.** milliliters **b.** kiloliters 2. 2810 L 3. 0.0133 kL 4. 49 000 L 5. 169.208 L
6. **a.** grams **b.** kilograms 7. 14 900 g 8. 0.825 g

6.3 Exercises

Concept Check

Fill-in-the-Blank. Complete each sentence using information found in this section.

- Volume measures space occupied and is labeled in _____ units.
- Liquid volume in the metric system is measured in _____ (L).
- The force of the Earth's gravitational pull on an object is the object's _____.
- The amount of material in an object is its _____.
- The basic unit of mass in the metric system is the _____ (kg).

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

- One milliliter is equivalent to one cubic centimeter.
- Volume is measured in square units.

8. In 1 liter there are 100 milliliters.
9. A metric ton and a US customary ton are equal (a metric ton weighs about 2000 US pounds).
10. A dekagram contains 10 grams.

Practice

What metric unit of capacity (liquid volume) would you use to measure each item? (Choose from milliliters, liters, and kiloliters.) See Example 1.

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|------------------------|-------------------------------------|
| 1. A bottle of perfume | 4. A large fish tank at an aquarium |
| 2. A bottle of milk | 5. A drop of water |
| 3. A can of motor oil | 6. A flu shot |

Convert each measurement. See Examples 2 through 4.

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|--------------------|----------------------------------|
| 7. 2 L = ___ mL | 16. 4.27 kL = ___ L |
| 8. 25 L = ___ mL | 17. 76.4 L = ___ kL |
| 9. 19 mL = ___ L | 18. 89.2 L = ___ kL |
| 10. 75 mL = ___ L | 19. 950 mL = ___ L |
| 11. 13 L = ___ mL | 20. 125 mL = ___ L |
| 12. 90 L = ___ mL | 21. 1.25 L = ___ mL |
| 13. 500 mL = ___ L | 22. 5.45 L = ___ mL |
| 14. 600 mL = ___ L | 23. Change 5.3 L to milliliters. |
| 15. 6.3 kL = ___ L | 24. Change 5.3 mL to liters. |

What metric unit of weight (mass) would you use to measure each item? (Choose from milligrams, grams, and kilograms.) See Example 6.

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| 25. A suitcase | 28. An apple |
| 26. Your weight | 29. An aspirin |
| 27. A cell phone | 30. A ladybug |

Convert each measurement. See Example 7.

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|---------------------|---------------------|
| 31. 2 g = ___ mg | 36. 3.94 g = ___ mg |
| 32. 7 kg = ___ g | 37. 2000 g = ___ kg |
| 33. 7.58 t = ___ kg | 38. 600 mg = ___ g |
| 34. 5.6 t = ___ kg | 39. 34.5 mg = ___ g |
| 35. 0.54 g = ___ mg | 40. 92.3 g = ___ kg |

41. $91 \text{ kg} = \underline{\hspace{1cm}} \text{ t}$
42. $42 \text{ kg} = \underline{\hspace{1cm}} \text{ t}$
43. $4.6 \text{ kg} = \underline{\hspace{1cm}} \text{ mg}$
44. $19.8 \text{ kg} = \underline{\hspace{1cm}} \text{ mg}$
45. $2963 \text{ kg} = \underline{\hspace{1cm}} \text{ t}$
46. $3547 \text{ kg} = \underline{\hspace{1cm}} \text{ t}$
47. How many kilograms are there in 5 metric tons?
48. How many kilograms are there in 17 metric tons?
49. Express 96 g in milligrams.
50. Express 342 kg in grams.
51. Convert 75 000 g to kilograms.
52. Convert 3000 mg to grams.
53. How many grams are in 1.6 mg?
54. How many milligrams are in 1.6 g?
55. Change 0.34 g to kilograms.
56. Change 8.96 mg to grams.
57. Convert 7 metric tons to grams.
58. Convert 0.4 t to grams.

What metric unit of measurement would you use to measure each item? (Choose from mm, m, km, mL, L, kL, mg, g, and kg.)

59. The depth of a swimming pool
60. The volume of a swimming pool
61. The amount of water in a glass
62. How heavy a microchip is
63. How far you drive to work
64. The diameter of a quarter
65. The volume of toothpaste in a tube
66. The amount of medicine in an injection
67. How heavy an iPhone is
68. The weight of a whale

Convert each measurement. (**Hint:** Since each metric unit is 10 times the next smaller unit, each cubic metric unit is $10 \cdot 10 \cdot 10 = 1000$ times the next smaller unit.)

69. $6 \text{ dm}^3 = \underline{\hspace{1cm}} \text{ m}^3$
70. $0.04 \text{ cm}^3 = \underline{\hspace{1cm}} \text{ mm}^3$
71. $400 \text{ cm}^3 = \underline{\hspace{1cm}} \text{ L}$
72. $5800 \text{ cm}^3 = \underline{\hspace{1cm}} \text{ hL}$
73. Convert 9 kL to cubic centimeters.
74. Convert 0.73 L to cubic centimeters.

Applications

Solve.

75. How many 5-mL doses of liquid medication can be given from a vial containing 3 deciliters?
76. Salvador's backyard has a swimming pool that holds 960 hectoliters of water. He has a water pump that will pump 16 dekaliters of water per minute into the pool. How long will it take for Salvador to fill his pool?

77. Thomas cleans up after Chemistry lab and part of this job is to empty all of the beakers into a bucket that can be removed for proper disposal. The bucket holds 4 L. There are 5 beakers each containing 50 cL of solution, 3 beakers each with 200 mL of solution, and 2 more beakers with 3 deciliters of solution. Will Thomas be able to dispose of all the leftover solution using just this one bucket? Why or why not?
78. One cup of flour is approximately 120 grams. How many cups of flour can you get out of a bag of flour weighing 2.4 kg?
79. A small dump truck can haul 3 metric tons of sand in one load. If each grain of sand weighs 0.05 mg, how many grains of sand can the dump truck hold in one load?
80. A metric weigh set comes with 10 weights: 2 of them weighing 5 g each, 4 of them weighing 1 g each, and one each weighing 5 mg, 10 mg, 2 cg, and 5 cg. What is the heaviest object that can be weighed using this set (in grams)?
81. Three small fish tanks hold $13\,860\text{ cm}^3$, $28\,290\text{ cm}^3$, and $15\,624\text{ cm}^3$ of water each. How many liters of water would be needed to fill the fish tanks? Round your answer to the nearest tenth of a liter.
82. An apple orchard has plastic bags capable of holding 5 kilograms of weight. If each apple weighs approximately 200 grams, how many bags are needed to package 450 apples?

Writing & Thinking

83. In the metric system, the common unit of capacity is the liter. Discuss how you would change from a measure of liters to milliliters.
84. Conlin said that his mass would change if he lived on Jupiter. Is he correct? Explain.
85. If you were to tell someone what your weight is in metric units, what unit of measure would you use, grams or kilograms? Explain briefly.