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.

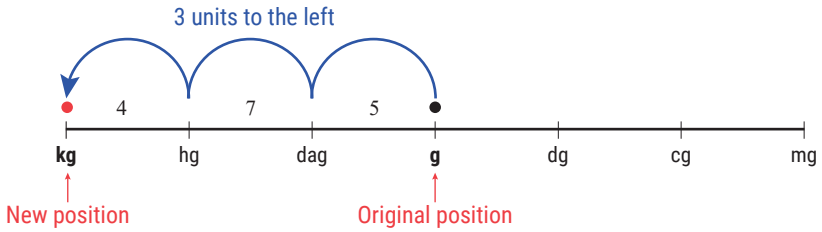
Solution

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

5.3 Exercises

Concept Check

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

1. Volume measures space occupied and is labeled in _____ units.

2. Liquid volume in the metric system is measured in _____ (L).

3. The force of the Earth's gravitational pull on an object is the object's _____.

4. The amount of material in an object is its _____.

5. 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.)

6. One milliliter is equivalent to one cubic centimeter.

7. 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.

1. A bottle of perfume

2. A bottle of milk

3. A can of motor oil

4. A large fish tank at an aquarium

5. A drop of water

6. A flu shot

Convert each measurement. See Examples 2 through 4.

7. 2 L = ___ mL

8. 25 L = ___ mL

9. 19 mL = ___ L

10. 75 mL = ___ L

11. 13 L = ___ mL

12. 90 L = ___ mL

13. 500 mL = ___ L

14. 600 mL = ___ L

15. 6.3 kL = ___ L

16. 4.27 kL = ___ L

17. 76.4 L = ___ kL

18. 89.2 L = ___ kL

19. 950 mL = ___ L

20. 125 mL = ___ L

21. 1.25 L = ___ mL

22. 5.45 L = ___ mL

23. Change 5.3 L to milliliters.

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.

25. A suitcase

26. Your weight

27. A cell phone

28. An apple

29. An aspirin

30. A ladybug

Convert each measurement. See Example 7.

31. 2 g = ___ mg

32. 7 kg = ___ g

33. 7.58 t = ___ kg

34. 5.6 t = ___ kg

35. 0.54 g = ___ mg

36. 3.94 g = ___ mg

37. 2000 g = ___ kg

38. 600 mg = ___ g

39. 34.5 mg = ___ g

40. 92.3 g = ___ kg

41. 91 kg = ___ t

42. 42 kg = ___ t

43. 4.6 kg = ___ mg

44. 19.8 kg = ___ mg

45. 2963 kg = ___ t

46. 3547 kg = ___ 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. $6\ dm^3$ = ___ m^3

70. $0.04\ cm^3$ = ___ mm^3

71. $400\ cm^3$ = ___ L

72. $5800\ cm^3$ = ___ 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 cm^3, 28 290 cm^3, and 15 624 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.