5. The average movie run time is around 1.8 hours. How many minutes long is the average movie?

Example 5 Application: Converting US Units of Measure

A fully grown African elephant can weigh as much as 7.5 tons. How many pounds is this?

Solution

There are 2000 pounds in 1 ton. Using a unit fraction to convert from tons to pounds gives the following.

$$7.5\ \text{T} = 7.5\ \text{T} \cdot \frac{2000\ \text{lb}}{1\ \text{T}} = 7.5 \cdot 2000\ \text{lb} = 15{,}000\ \text{lb}$$

Thus, a fully grown African elephant can weigh as much as 15,000 pounds.

Now work margin exercise 5.

6. How many fluid ounces are in 8 gallons of apple juice?

Example 6 Application: Converting US Units of Measure

Determine how many seconds are in a 5-day work week assuming an 8 hr work day.

Solution

This number can be found as follows.

$$5\ \text{days} = 5\ \text{days} \cdot \frac{8\ \text{hr}}{1\ \text{day}} \cdot \frac{60\ \text{min}}{1\ \text{hr}} \cdot \frac{60\ \text{sec}}{1\ \text{min}} = 5 \cdot 8 \cdot 60 \cdot 60\ \text{sec} = 144{,}000\ \text{sec}$$

Thus, there are 144,000 seconds in a 5-day work week.

Now work margin exercise 6.

Margin Exercise Answers

1. a. 1 **b.** 2 **c.** 24 **d.** 5280 **2. a.** 108 **b.** 32 **c.** 4 **d.** $3\frac{3}{4}$ or 3.75 **3.** $4\frac{1}{2}$ or 4.5 pounds **4. a.** 5 **b.** 136 **c.** 16 **d.** 15,840 **5.** 108 minutes **6.** 1024 fluid ounces

5.1 Exercises

Concept Check

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

1. There are two cups in 1 ____, which is equivalent to ___ fluid ounces.

2. Sixteen ounces equals 1 _____ and 2000 _____ equals 1 ton.

3. Both 3 feet and 36 inches equal 1 ____.

4. When converting from one unit of measure to another smaller unit, _____ is necessary.

5. When using a unit fraction for conversions, the numerator should have the same units as the result and the denominator should be in the units to be _____.

6. A fraction equivalent to 1 is called a ____ fraction.

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.)

7. Capacity can be measured using ounces, quarts, and gallons.

8. One mile is equivalent to 2000 feet.

9. To convert from smaller units to larger units, division will be required.

10. Multiplication by a unit fraction does not change the value of the expressions being converted.

Practice

Use the units you have memorized from Table 1 to convert each measurement. See Example 1.

1. 1 ft = ___ in.

2. 1 week = ___ days

3. 2000 lb = ___ T

4. 2 c = ___ pt

5. 4 qt = ___ gal

6. 36 in. = ___ yd

7. 1 mi = ___ ft

8. 1 lb = ___ oz

9. 24 hr = ___ day

10. 12 in. = ___ ft

11. 1 c = ___ fl oz

12. 1 qt = ___ pt

Use multiplication or division to convert each measurement. See Example 2.

13. 3 ft = ___ in.

14. 2 lb = ___ oz

15. 5 min = ___ sec

16. 3 yd = ___ ft

17. 10,560 ft = ___ mi

18. 6000 lb = ___ T

19. 3 weeks = ___ days

20. 5 yd = ___ ft

21. 72 in. = ___ yd

22. 48 in. = ___ ft

23. 90 min = ___ hr

24. 9 qt = ___ gal

Use unit fractions to convert each measurement. First write the unit fraction you are going to use, then perform the conversion. See Example 4.

25. 7 yd = ___ ft

26. 5 qt = ___ pt

27. 6 pt = ___ qt

28. 32 fl oz = ___ c

29. 13 qt = ___ gal

30. 3 pt = ___ fl oz

31. 18 in. = ___ ft

32. 24 oz = ___ lb

33. 3 mi = ___ ft

34. 5 T = ___ lb

35. 7920 ft = ____ mi

36. 7000 lb = ___ T

Convert each measurement. See Examples 1, 2, and 4.

37. 4 pt = ___ c

38. 3 hr = ___ min

39. 16 T = ___ lb

40. 10 mi = ___ ft

41. 96 hr = ___ days

42. 39 ft = ___ yd

43. 5.5 lb = ___ oz

44. 3.5 ft = ___ in.

45. 6 qt = ___ gal

46. 150 min = ___ hr

47. 2.5 min = ___ sec

48. 1.5 yd = ___ in.

Applications

Solve.

49. Find the area (in sqaure feet) of a rectangle that is $1\frac{1}{2}$ ft by 7 in.

50. A small jar of peanut butter sells for \$0.08 per ounce. A large jar of peanut butter sells for \$1.20 per pound. Which is the better buy and by how much (in cents per ounce)?

51. Sheer fabric costs \$7.99 per yard. If it will take 35 feet of fabric to make drapes for the entire house, how much must you spend on fabric for the drapes, to the nearest cent?

52. While cleaning out the garage, Nelson discovers some containers of oil that need to be taken in for recycling. The containers hold 20 fluid ounces, 3 cups, and 1 quart, respectively. Find the total amount of oil ready to be recycled (in fluid ounces).

53. Joel runs track for Northside High School. He runs the 220-yard sprint, the $\frac{1}{4}$-mile hurdles, and the $\frac{1}{2}$-mile relay (of which he runs one leg, which is $\frac{1}{8}$ of a mile). How far does Joel run in total (in miles)?

54. How many scoops will it take a 2-ton crane (it can scoop 2 tons of material at one time) to move 17,000 pounds of dirt?

55. A ball dropped from the top of a building hits the ground at a speed of 22 feet per second. How fast does the ball hit the ground in miles per hour?

56. The author of this textbook spent 1 year, 23 weeks, 5 days, and 14 hours writing it. How many seconds is this? (**Hint:** There are 52 weeks in a year.)

57. A small bag of cookies sells for \$0.12 per ounce. A large bag of cookies sells for \$2.00 per pound. Which is the better buy and by how much (in cents per ounce)?

58. Adrian exercised three days during the past week. He exercised 50 minutes and 15 seconds during the first day, 84 minutes and 25 seconds on the second day, and 45 minutes and 20 seconds on the third day. How many hours did he spend exercising during the week?

59. Determine how many inches are in 2 miles. (**Hint:** You will need to use more than one conversion factor.)

60. Each load of laundry washed uses 2 fluid ounces of a certain laundry detergent. Determine how many loads of laundry can be washed with a one-gallon jug of laundry detergent. (**Hint:** First determine how many fluid ounces are in one gallon.)

61. Ashleigh works at a coffee shop and is paid $12 per hour. How much is she paid for working for 5 hours and 25 minutes?

62. A baby weighed 7 pounds and 9 ounces at birth. At the last checkup, the baby weighed 12 pounds and 2 ounces. How much weight did the baby gain, in ounces?

63. Marco has a goal to drink 10 cups of water each day. How many 16-ounce water bottles must Marco drink each day to reach his goal?

64. Blake had 2.5 feet of ribbon left over from his last project and purchased a new 5-yard package of the same ribbon. How many inches of the ribbon does Blake have?

Writing & Thinking

65. Colby needs to find out how many yards are in one mile. What two sets of equivalent units would he need to make that determination?

66. In your own words, explain when you would multiply and when you would divide when converting between units.

67. Briefly describe a unit fraction and explain when and how it would be used.

68. Give at least two examples of when you might want to convert between units of measure (outside of a class).