

- A distance of 61 furlongs is equivalent to how many feet?  
(1 furlong = 220 yards and 1 yard = 3 feet)

*Solution:*

We are given:

$$1 \text{ furlong} = 220 \text{ yards}, \quad 1 \text{ yard} = 3 \text{ feet}$$

To convert 61 furlongs to feet:

$$61 \text{ furlongs} \times \left( \frac{220 \text{ yards}}{1 \text{ furlong}} \right) \times \left( \frac{3 \text{ feet}}{1 \text{ yard}} \right) = 61 \times 220 \times 3 = 40260 \text{ feet}$$

*Final Answer:* 40260

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- A runner is traveling at a constant speed of 15 miles per hour. What is this speed in feet per second? (1 mile = 5,280 feet)

*Solution:*

To convert miles per hour to feet per second, we use dimensional analysis to cancel out the units:

$$15 \frac{\text{miles}}{\text{hour}} \times \frac{5,280 \text{ feet}}{1 \text{ mile}} \times \frac{1 \text{ hour}}{60 \text{ minutes}} \times \frac{1 \text{ minute}}{60 \text{ seconds}}$$

First, multiply the constants in the numerator:

$$15 \times 5,280 = 79,200 \text{ feet per hour}$$

Next, convert hours to seconds ( $60 \times 60 = 3,600$ ):

$$\frac{79,200 \text{ feet}}{3,600 \text{ seconds}} = 22 \text{ feet per second}$$

*Final Answer:* 22

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- A rectangular floor has an area of 108 square feet. What is the area of the floor in square yards?  
(1 yard = 3 feet)

*Solution:*

When converting units of area, the conversion factor must be squared. Since 1 yard = 3 feet, then:

$$(1 \text{ yard})^2 = (3 \text{ feet})^2 \implies 1 \text{ square yard} = 9 \text{ square feet}$$

Now, divide the total square footage by the conversion factor:

$$\text{Area in sq yd} = \frac{108 \text{ sq ft}}{9 \text{ sq ft/sq yd}} = 12 \text{ square yards}$$

*Final Answer:* 12

- An object travels at a constant speed of 25 meters per second. What is this speed in kilometers per hour? (1,000 meters = 1 kilometer)

*Solution:*

We need to convert meters to kilometers and seconds to hours.

$$25 \frac{\text{m}}{\text{s}} \times \frac{1 \text{ km}}{1,000 \text{ m}} \times \frac{3,600 \text{ s}}{1 \text{ hour}}$$

Multiply the numerators:

$$25 \times 1 \times 3,600 = 90,000$$

Divide by the denominator:

$$\frac{90,000}{1,000} = 90 \text{ km/h}$$

*Final Answer:* 90

- A liquid has a density of 1.2 grams per milliliter. What is the mass, in kilograms, of 5 liters of this liquid? (1 liter = 1,000 milliliters; 1 kilogram = 1,000 grams)

*Solution:*

First, find the total volume in milliliters:

$$5 \text{ L} \times 1,000 \frac{\text{mL}}{\text{L}} = 5,000 \text{ mL}$$

Next, find the mass in grams using the density formula (mass = density  $\times$  volume):

$$1.2 \frac{\text{g}}{\text{mL}} \times 5,000 \text{ mL} = 6,000 \text{ g}$$

Finally, convert grams to kilograms:

$$\frac{6,000 \text{ g}}{1,000 \text{ g/kg}} = 6 \text{ kg}$$

*Final Answer:* 6

- In a certain country, gasoline costs 1.50 Euros per liter. If the exchange rate is 1 Euro = 1.10 U.S. Dollars and 1 Gallon is approximately 3.8 liters, what is the approximate cost of one gallon of gasoline in U.S. Dollars?

*Solution:*

Set up the conversion chain to end with Dollars per Gallon:

$$\frac{1.50 \text{ Euros}}{1 \text{ Liter}} \times \frac{1.10 \text{ Dollars}}{1 \text{ Euro}} \times \frac{3.8 \text{ Liters}}{1 \text{ Gallon}}$$

Multiply the values:

$$1.50 \times 1.10 \times 3.8$$

$$1.50 \times 1.10 = 1.65$$

$$1.65 \times 3.8 = 6.27$$

The cost is 6.27 Dollars per Gallon. *Final Answer: 6.27*

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*Problems adapted from the College Board SAT Question Bank and released SAT practice tests.*