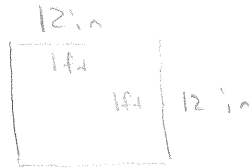


Example 5: Square Units

a) How many square inches are in a square foot?

$$12 \cdot 12 = \boxed{144}$$

$$12 \cdot 12 = \frac{12 \cdot 12}{1} = \frac{144}{1}$$



b) The area of a table is 280 square inches. How many square feet is this?

$$280 \text{ in}^2 \cdot \frac{1 \text{ ft}}{12 \text{ in}} \cdot \frac{1 \text{ ft}}{12 \text{ in}} = \boxed{1.94 \text{ ft}^2}$$

c) You want to carpet a room that measures 10 feet by 12 feet, making an area of 120 square feet. But carpet is usually sold by the square yard rather than by the square foot. How many square yards of carpet do you need?

$$10 \text{ ft} \cdot 12 \text{ ft} \cdot \frac{1 \text{ yd}}{3 \text{ ft}} \cdot \frac{1 \text{ yd}}{3 \text{ ft}} = \boxed{13.3 \text{ yd}^2}$$

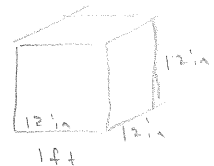
$$10 \text{ ft} \cdot 12 \text{ ft} = 120 \text{ sq ft} = \frac{120 \text{ sq ft}}{9 \text{ sq ft}} = 13.3 \text{ yd}^2$$



Example 6: Cubic Units: Purchasing Garden Soil

a) How many cubic inches are in 2 cubic feet?

$$2 \text{ ft} \cdot \text{ft} \cdot \text{ft} \cdot \frac{12 \text{ in}}{1 \text{ ft}} \cdot \frac{12 \text{ in}}{1 \text{ ft}} \cdot \frac{12 \text{ in}}{1 \text{ ft}} = 2(1728) = \boxed{3456 \text{ in}^3}$$



$$1 \text{ ft}^3 = 1728 \text{ in}^3$$

b) How many cubic feet are in 4 cubic yards?

$$4 \text{ yd}^3 \cdot \frac{27 \text{ ft}^3}{1 \text{ yd}^3} = \boxed{108 \text{ ft}^3}$$

c) You are preparing a vegetable garden that is 40 feet long and 16 feet wide, and you need enough soil to fill it to a depth of 1 foot. The landscape supply store sells soil by the cubic yard. How much soil should you order?

$$40 \text{ ft} \cdot 16 \text{ ft} \cdot 1 \text{ ft} \cdot \frac{1 \text{ yd}}{3 \text{ ft}} \cdot \frac{1 \text{ yd}}{3 \text{ ft}} \cdot \frac{1 \text{ yd}}{3 \text{ ft}} = \frac{108}{27} = \boxed{23.70 \text{ yd}^3}$$

Example 7: Distance, Time, and Speed

A car is traveling 25 miles every half-hour. How fast is it going?

$$\frac{25 \text{ miles}}{\frac{1}{2} \text{ hour}} = \boxed{50 \frac{\text{miles}}{\text{hour}}}$$

Example 8: Buying Farm Land

You are buying 1.3 million square feet of farm land at \$12,000 per acre. What is the total cost?

1 acre = 43,560 square feet

$$1,300,000 \text{ ft}^2 \cdot \frac{1 \text{ acre}}{43,560 \text{ ft}^2} \cdot \frac{\$12,000}{\text{acre}} = \$358,126.72$$

Example 9: Exam Check

You are a grader for a math course. An exam question reads: Eli purchased 5 pounds of apples at a price of 50 cents per pound. How much did he pay for the apples? On the paper you are grading, a student has written: "50 ÷ 5 = 10. He paid 10 cents." Write a note to the student explaining what went wrong.

$$5 \text{ lb} \cdot \frac{50 \text{¢}}{1 \text{ lb}} = 250 \text{¢} = \$2.50$$
$$50 \text{¢} \div 5 \text{ lb} = 10 \text{ ¢/lb}$$

Example 10: Gas Mileage

Your destination is 90 miles away, and your fuel gauge shows that your gas tank is only one-quarter full. You know that your tank holds 12 gallons of gas and that your car averages about 25 miles per gallon. Do you need to stop for gas?

$$\frac{12}{4} = 3 \text{ gal} \cdot \frac{25 \text{ miles}}{\text{gallon}} = 75 \text{ miles}$$

Yes