

PREPARATORY MATH SKILLS LAB

Lab **PM** 3
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MATH ACTIVITY

Learning How to Multiply and Divide Numbers and Units

MATH SKILLS LAB OBJECTIVES

When you complete this activity, you should be able to do the following:

- 1. Multiply numbers that contain units and obtain the final answer as a correct number and unit.**
- 2. Divide numbers that contain units and obtain the final answer as a correct number and unit.**

Most quantities used and measured by technicians are described by numbers that include units. For example, consider the following:

- 10 feet: 10 is the number; feet is the unit.
- 20 miles/hour: 20 is the number; miles/hour is the unit.
- 3 cm³: 3 is the number; cm³ is the unit.
- 5 lb/ft²: 5 is the number; lb/ft² is the unit.

When multiplying or dividing numbers that contain units, the numbers and the units are handled separately. Study the following examples:

- $10 \text{ ft} \times 20 \text{ ft} = (10 \times 20) \times (\text{ft} \times \text{ft}) = 200 \text{ ft}^2$.
(Multiplying $\text{ft} \times \text{ft}$ is feet squared, written as ft^2 .)
- $\left(20 \frac{\text{mi}}{\text{hr}}\right) \times 10 \text{ hr} = (20 \times 10) \times \left(\frac{\text{mi}}{\text{hr}} \times \text{hr}\right) = 200 \text{ mi}$
(Multiplying $\frac{\text{mi}}{\text{hr}} \times \text{hr}$ is simplified by canceling the "hr" in the numerator with the identical unit "hr" in the denominator.)
- $\left(5 \frac{\text{lb}}{\text{ft}^2}\right) \times 10 \text{ ft}^2 = (5 \times 10) \times \left(\frac{\text{lb}}{\text{ft}^2} \times \text{ft}^2\right) = 50 \text{ lb}$
(The ft^2 in the numerator cancels ft^2 in the denominator.)
- $5 \text{ gm} \div 10 \text{ cm}^2 = \frac{5 \text{ gm}}{10 \text{ cm}^2} = \left(\frac{5}{10}\right) \times \left(\frac{\text{gm}}{\text{cm}^2}\right) = 0.5 \text{ gm/cm}^2$
- $1.125 \frac{\text{gm}}{\text{cm}^3} \times 1000 \text{ cm}^3 = (1.125 \times 1000) \times \left(\frac{\text{gm} \times \text{cm}^3}{\text{cm}^3}\right) = 1125 \text{ gm}$
- $20 \text{ N} \div 5 \text{ m}^2 = \frac{20 \text{ N}}{5 \text{ m}^2} = \left(\frac{20}{5}\right) \times \left(\frac{\text{N}}{\text{m}^2}\right) = 4 \text{ N/m}^2$
- $5 \frac{\text{lb}}{\text{ft}^3} \times 2 \text{ ft} = (5 \times 2) \times \left(\frac{\text{lb} \times \text{ft}}{\text{ft}^3}\right) = 10 \left(\frac{\text{lb} \times \text{ft}}{\text{ft} \times \text{ft} \times \text{ft}}\right) = 10 \text{ lb/ft}^2$

PRACTICE EXERCISES

Multiply or divide the quantities given below as indicated, and obtain the answer as a correct number and unit.

- a. $5 \text{ lb} \times 10 \text{ ft} = \underline{\hspace{2cm}}$
- b. $10 \text{ lb} + 2 \text{ ft}^2 = \underline{\hspace{2cm}}$
- c. $100 \text{ N} + 5 \text{ m}^2 = \underline{\hspace{2cm}}$
- d. $1000 \text{ cm}^3 \times 13.6 \frac{\text{gm}}{\text{cm}^3} = \underline{\hspace{2cm}}$
- e. $16 \frac{\text{miles}}{\text{hour}} \times 0.5 \text{ hr} = \underline{\hspace{2cm}}$
- f. $5 \text{ hours} \times 60 \frac{\text{minutes}}{\text{hour}} = \underline{\hspace{2cm}}$
- g. $2 \text{ ft}^2 \times \frac{144 \text{ in}^2}{\text{ft}^2} = \underline{\hspace{2cm}}$
- h. $3 \text{ m}^2 \times 10,000 \frac{\text{cm}^2}{\text{m}^2} = \underline{\hspace{2cm}}$
- i. $62.4 \frac{\text{lb}}{\text{ft}^3} \times 10 \text{ ft} = \underline{\hspace{2cm}}$
- j. $10 \frac{\text{N}}{\text{m}^3} \times 2 \text{ m} = \underline{\hspace{2cm}}$