PREPARATORY MATH SKILLS LAB

MATH ACTIVITY
Multiplying and Dividing Units Written as Fractions

MATH SKILLS LAB OBJECTIVE
When you complete the math lab activities, you should be able to multiply or divide one physical unit written as a fraction by another.

a. Units written as fractions can be *multiplied* the same way as number fractions. Multiply numerator by numerator and denominator by denominator. Write the result as a fraction. The following examples show how to do this.

$$\frac{cm}{sec} \times \frac{cm}{sec} = \frac{cm \times cm}{sec \times sec} = \frac{cm^2}{sec^2}$$

$$\frac{lb}{ft^3} \times \frac{ft}{1} = \frac{lb \times ft}{ft^3 \times 1} = \frac{lb \times ft}{ft \times ft \times ft} = \frac{lb}{ft^2} \quad \text{(Cancel ft units.)}$$

$$\frac{m}{sec^2} \times \frac{sec}{1} = \frac{m \times sec}{sec \times sec} = \frac{m}{sec} \quad \text{(Cancel sec units.)}$$

b. Units written as fractions can be *divided* in the same way number fractions are. Use the rule: "Invert the fraction in the denominator and multiply it by the fraction in the numerator." The following examples show how this is done:

$$\frac{cm/sec}{sec} = ?$$

First write the "sec" in the denominator as a fraction. This is done by rewriting sec as $\frac{sec}{1}$. Note that $\frac{sec}{1}$ is the same thing as "sec" since dividing anything by one does not change its value.

Then rewrite and follow the rule: *invert and multiply.*

$$\frac{cm/sec}{sec/1} = \frac{cm}{sec} \times \frac{1}{sec} = \frac{cm \times 1}{sec \times sec} = \frac{cm}{sec^2}$$

Let's try another one.

$$\frac{lb/in^2}{gal/min} = ?$$

Follow the rule: *invert and multiply.*

$$\frac{lb/in^2}{gal/min} = \frac{lb}{in^2} \times \frac{min}{gal} = \frac{lb \cdot min}{in^2 \cdot gal}$$

PRACTICE EXERCISES

Multiply or divide the following units as indicated.

MULTIPLICATION

$$\frac{ft}{sec^2} \times \frac{sec}{1} = \underline{\hspace{1cm}}$$

$$\frac{lb}{ft^3} \times \frac{ft}{1} = \underline{\hspace{1cm}}$$

$$\frac{N}{m^2} \times \frac{m^2}{1} = \underline{\hspace{1cm}}$$

$$\frac{cal}{sec} \times \frac{sec}{1} = \underline{\hspace{1cm}}$$

$$\frac{lb/min}{in^2/gal} \times \frac{gal}{min} = \underline{\hspace{1cm}}$$

DIVISION

$$\frac{ft/sec}{sec} = \underline{\hspace{1cm}}$$

$$\frac{N/m^2}{\ell/sec} = \underline{\hspace{1cm}} \qquad (\ell \text{ stands for liters.})$$

$$\frac{cm/sec^2}{sec} = \underline{\hspace{1cm}}$$

$$\frac{kg \cdot m/sec^2}{m^2} = \underline{\hspace{1cm}}$$