Fractions and Mixed Numbers

3

SECTION 3.3

Multiplication with Fractions, and the Area of a Triangle

Objectives

A Multiply fractions.

B Find the area of a triangle.

A cookie recipe calls for $\frac{3}{4}$ cup of flour. If you are making only $\frac{1}{2}$ the recipe, how much flour do you use?

This question can be answered by multiplying $\frac{1}{2}$ and $\frac{3}{4}$.

Here is the problem written in symbols:

$$\frac{1}{2} \cdot \frac{3}{4} = \frac{3}{8}$$

Multiplication with Fractions, and the Area of a Triangle

As you can see from this example, to multiply two fractions, we multiply the numerators and then multiply the denominators.

We begin this section with the rule for multiplication of fractions.

A   **Multiplying Fractions**

Multiplying Fractions

Rule **Product of Two Fractions**

If a, b, c, and d represent any numbers and b and d are not zero, then

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{a \cdot c}{b \cdot d}$$

In words: The product of two fractions is the fraction whose numerator is the product of the two numerators and whose denominator is the product of the two denominators.

Example 1

Multiply: $\dfrac{3}{5} \cdot \dfrac{2}{7}$

Solution:

Using our rule for multiplication, we multiply the numerators and multiply the denominators.

$$\frac{3}{5} \cdot \frac{2}{7} = \frac{3 \cdot 2}{5 \cdot 7} = \frac{6}{35}$$

The product of $\dfrac{3}{5}$ and $\dfrac{2}{7}$ is the fraction $\dfrac{6}{35}$.

The numerator 6 is the product of 3 and 2, and the denominator 35 is the product of 5 and 7.

Multiplying Fractions

The properties of multiplication that we developed for whole numbers apply to fractions as well.

That is, if *a*, *b*, and *c* are fractions, then

$$a \cdot b = b \cdot a$$ Multiplication with fractions is commutative.

$$a \cdot (b \cdot c) = (a \cdot b) \cdot c$$ Multiplication with fractions is associative.

Multiplying Fractions

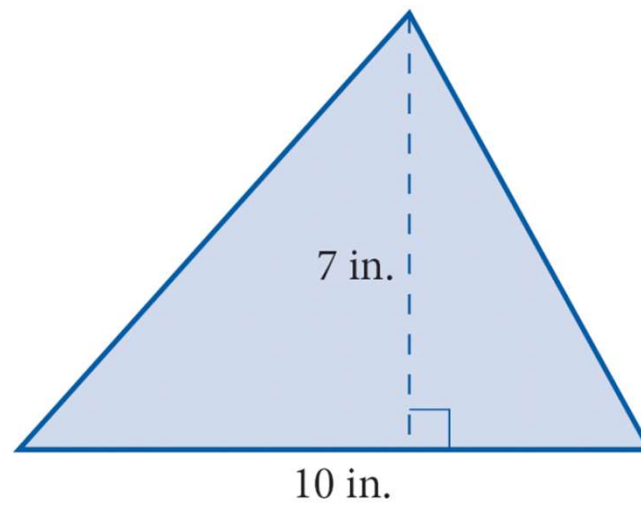To demonstrate the associative property for fractions, we will apply the associative property first.

$$\frac{1}{2}\left(\frac{3}{4}\cdot\frac{1}{5}\right)=\left(\frac{1}{2}\cdot\frac{3}{4}\right)\cdot\frac{1}{5}$$ Associative property

$$=\left(\frac{1\cdot 3}{2\cdot 4}\right)\cdot\frac{1}{5}$$

$$=\left(\frac{3}{8}\right)\cdot\frac{1}{5}$$

$$=\frac{3\cdot 1}{8\cdot 5}$$

$$=\frac{3}{40}$$

B The Area of a Triangle

Example 15

Find the area of the triangle.

7 in.

10 in.

Example 15 – *Solution*

Applying the formula for the area of a triangle, we have

$$A = \frac{1}{2}bh = \frac{1}{2} \cdot 10 \cdot 7$$

$$= 5 \cdot 7$$

$$= 35 \text{ in.}^2$$