MULTIPLYING FRACTIONS WITH AN AREA MODEL  5.1.1, 5.1.4, 5.2.2

Multiplication of fractions is reviewed using a rectangular area model. Lines that divide the rectangle to represent one fraction are drawn vertically, and the correct number of parts are shaded. Then lines that divide the rectangle to represent the second fraction are drawn horizontally and part of the shaded region is darkened to represent the product of the two fractions.

Example 1

\( \frac{1}{2} \cdot \frac{5}{8} \) (that is, \( \frac{1}{2} \) of \( \frac{5}{8} \))

Step 1: Draw a generic rectangle and divide it into 8 pieces vertically. Lightly shade 5 of those pieces. Label it \( \frac{5}{8} \).

Step 2: Use a horizontal line and divide the generic rectangle in half. Darkly shade \( \frac{1}{2} \) of \( \frac{5}{8} \) and label it.

Step 3: Write a number sentence. \( \frac{1}{2} \cdot \frac{5}{8} = \frac{5}{16} \)

The rule for multiplying fractions derived from the models above is to multiply the numerators, then multiply the denominators. Simplify the product when possible.

For additional information, see the Math Notes box in Lesson 5.1.4 of the Core Connections, Course 1 text. For additional examples and practice, see the Core Connections, Course 1 Checkpoint 7A materials.

Example 2

a. \( \frac{2}{3} \cdot \frac{2}{7} \Rightarrow \frac{2 \cdot 2}{3 \cdot 7} \Rightarrow \frac{4}{21} \)

b. \( \frac{3}{4} \cdot \frac{6}{7} \Rightarrow \frac{3 \cdot 6}{4 \cdot 7} \Rightarrow \frac{18}{28} \Rightarrow \frac{9}{14} \)
Problems

Draw an area model for each of the following multiplication problems and write the answer.

1. $\frac{1}{3} \cdot \frac{1}{6}$
2. $\frac{1}{4} \cdot \frac{3}{5}$
3. $\frac{2}{3} \cdot \frac{5}{9}$

Use the rule for multiplying fractions to find the answer for the following problems. Simplify when possible.

4. $\frac{1}{3} \cdot \frac{2}{5}$
5. $\frac{2}{3} \cdot \frac{7}{7}$
6. $\frac{3}{4} \cdot \frac{1}{5}$
7. $\frac{2}{5} \cdot \frac{2}{3}$
8. $\frac{2}{3} \cdot \frac{1}{4}$
9. $\frac{5}{6} \cdot \frac{2}{3}$
10. $\frac{4}{5} \cdot \frac{3}{4}$
11. $\frac{2}{15} \cdot \frac{1}{2}$
12. $\frac{3}{7} \cdot \frac{1}{2}$
13. $\frac{3}{8} \cdot \frac{4}{5}$
14. $\frac{2}{9} \cdot \frac{3}{5}$
15. $\frac{3}{10} \cdot \frac{5}{7}$
16. $\frac{5}{11} \cdot \frac{6}{7}$
17. $\frac{5}{6} \cdot \frac{3}{10}$
18. $\frac{10}{11} \cdot \frac{3}{5}$
19. $\frac{5}{12} \cdot \frac{3}{5}$
20. $\frac{7}{9} \cdot \frac{5}{14}$

Answers

1. $\frac{1}{18}$
2. $\frac{3}{20}$
3. $\frac{10}{27}$
4. $\frac{2}{15}$
5. $\frac{4}{21}$
6. $\frac{3}{20}$
7. $\frac{4}{15}$
8. $\frac{2}{12} = \frac{1}{6}$
9. $\frac{10}{18} = \frac{5}{9}$
10. $\frac{12}{20} = \frac{3}{5}$
11. $\frac{2}{30} = \frac{1}{15}$
12. $\frac{3}{14}$
13. $\frac{12}{40} = \frac{3}{10}$
14. $\frac{6}{45} = \frac{2}{15}$
15. $\frac{15}{70} = \frac{3}{14}$
16. $\frac{30}{77}$
17. $\frac{15}{60} = \frac{1}{4}$
18. $\frac{30}{58} = \frac{6}{11}$
19. $\frac{15}{60} = \frac{1}{4}$
20. $\frac{35}{126} = \frac{5}{18}$