

MULTIPLYING FRACTIONS AND MIXED FRACTIONS

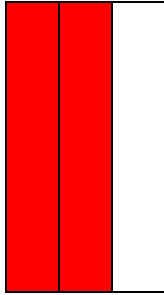
To multiply fractions we multiply the numerators, multiply the denominators, and then simplify when needed. We can also make the multiplication easier by canceling first. First we'll examine making models for multiplication of fractions. Then we'll practice multiplication of fractions and multiplication of mixed fractions with paper and pencil.

ANALYZING PATTERNS

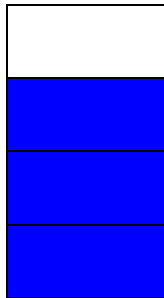
On another note we will examine analyzing patterns. Patterns are everywhere in nature and in manmade creations. Patterns make the world around us more interesting and colorful. Let's study a pattern, analyze the pattern, and then describe what we see.

Making a Model for Multiplication of Fractions

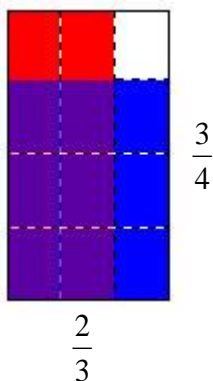
Divide a piece of paper vertically into three equal sections by folding it and color in $\frac{2}{3}$ of it red.



Divide the same piece of paper horizontally into four equal sections and color $\frac{3}{4}$ of it blue.



The sections that are colored both red and blue making purple represent the answer to the multiplication problem.



The area is now divided into 12 equal smaller rectangles where 6 are both shaded, blending to make purple rectangles. This model demonstrates multiplication of fractions.

$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}$$

Multiplying Fractions

Multiply $\frac{2}{3} \times \frac{8}{9}$

$$\frac{2}{3} \times \frac{8}{9} = \frac{2 \times 8}{3 \times 9} = \frac{16}{27}$$

Multiply the numerators.
Multiply the denominators.

Multiplication of fractions may be made easier by using canceling, and then multiplying the numerators and denominators.

Canceling: Look for a numerator and a denominator that will simplify.

Multiply $\frac{3}{4} \times \frac{8}{11}$

$$\frac{3}{\cancel{4}^1} \times \frac{\cancel{8}^2}{11}$$

$$\frac{3 \times 2}{1 \times 11} = \frac{6}{11}$$

Cancel the 4 and 8 by
dividing 4 into 4 to get 1 and
dividing 4 into 8 to get 2.

In canceling, one number
must be in the numerator
and the other number must
be in the denominator.

Multiply $\frac{2}{3}$ of 9

$$\frac{2}{\cancel{3}^1} \times \frac{\cancel{9}^3}{1}$$

$$\frac{2 \times 3}{1 \times 1} = \frac{6}{1} = 6$$

First make the 9 a fraction by
placing it over 1.

Cancel the 3 and 9 by
dividing 3 into 3 to get 1 and
dividing 3 into 9 to get 3.

Multiplying Mixed Fractions

Change the mixed numbers into improper fractions.

$$1\frac{1}{11} = \frac{11}{11} + \frac{1}{11} = \frac{12}{11} \text{ or } \frac{11 \times 1 + 1}{11}$$

$$2\frac{4}{9} = \frac{18}{9} + \frac{4}{9} = \frac{22}{9} \text{ or } \frac{9 \times 2 + 4}{9}$$

Rule: Multiply the denominator by the whole number, and then add the numerator. Put that number over the denominator.

Multiply $1\frac{1}{11} \times 2\frac{4}{9}$

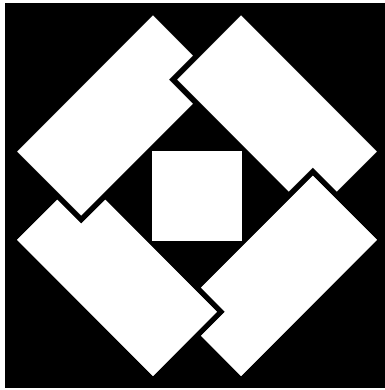
$$\frac{12}{11} \times \frac{22}{9}$$

$$\begin{array}{r} 4 \\ \cancel{1}2 \\ \hline 1 \\ \cancel{1}1 \end{array} \times \begin{array}{r} 22 \\ \cancel{9}3 \\ \hline 2 \\ \cancel{9}3 \end{array}$$

Cancel the 12 and 9 by 3 to get 4 and 3. Cancel the 11 and 22 by 11 to get 1 and 2.

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

Analyzing Patterns



Patterns are everywhere in nature and in manmade creations. Rules may be written to describe patterns.

Below is a rule describing how to create this pattern.

Using rectangular cards that are congruent, place them around a square whose sides are the same length as the width (shorter side) of the rectangle. The tip of the square touches the center of the bottom edge of the card. The lower left corner of one card is to be placed on top of the lower right corner of the next card.

Think of some ways to improve this description. Share them with your instructor.