MULTIPLYING FRACTIONS AND MIXED FRACTIONS

To multiply fractions find the product of two fractions by multiplying the numerators and the denominators, and then reduce when needed. We can use canceling to simplify the multiplication. Canceling is a process of simplifying the numerators and denominators before multiplying.

To multiply mixed fractions, express the mixed fraction as an improper fraction first, and then compute.

To multiply several fractions first simplify by canceling any numerator with any denominator. Canceling can be done as many times as needed. Once all canceling is completed, multiply the numerators and denominators.

Write fraction answers using the form in these examples.

Example 1: two-thirds is written as 2/3.
Example 2: five and three fourths is written as 5 3/4.

Multiplication of Fractions

Multiplying Fractions

To multiply fractions, multiply the numerators and multiply the denominators. Simplify the fractions when necessary.

numerator – A numerator is the top part of a fraction. In the fraction 2/3, the numerator is two $\left(\frac{2}{3}\right)$.

denominator – A denominator is the bottom part of a fraction. In the fraction 2/3, the denominator is three $\left(\frac{2}{3}\right)$.

proper fraction – A proper fraction is a fraction where the numerator is less than the denominator. An example of a proper fraction is $\frac{7}{8}$.

*Recall that the answer to a multiplication problem is called the **product**.

Example 1: Find the product of the proper fractions, 2/3 × 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 can be made easier by using canceling to simplify first, and then multiplying the numerators and the denominators.

Canceling

Look for a numerator and a denominator that will simplify.

Example 2: Find the product of proper fractions, 3/4 × 8/11.

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

$$\frac{3}{4}\times\frac{8}{11} = \frac{3}{\cancel{4}_{1}}\times\frac{\cancel{8}^{2}}{11} = \frac{3\times 2}{1\times 11} = \frac{6}{11}$$

Cancel the 4 and 8 by 4.

Example 3: Find the product of 2/3 of 9.

Make the whole number 9 a fraction by placing it over 1. 9 = 9/1.

$$\frac{2}{3}\times\frac{9}{1} = \frac{2}{\cancel{3}_{1}}\times\frac{\cancel{9}^{3}}{1} = \frac{2\times 3}{1\times 1} = \frac{6}{1} = 6$$

Cancel the 3 and 9 by 3.

Multiplying Mixed Numbers

improper fraction – An improper fraction is a fraction where the numerator is larger than or equal to the denominator. An example of an improper fraction is $\frac{12}{5}$.

mixed number – A mixed number is a number that is a combination of a whole number and a fraction. An example of a mixed number is $2\frac{2}{5}$.

*To multiply mixed numbers, first change the mixed numbers to improper fractions.

Example 4: Find the improper fractions for 1 1/11 and 2 4/9.

*Multiply the denominator by the whole number, and then add on the numerator. Put that number over the denominator.

$$1\frac{1}{11}=\frac{11\times1+1}{11}=\frac{12}{11} \qquad 2\frac{4}{9}=\frac{9\times2+4}{9}=\frac{22}{9}$$

Click on the tracks below to play a game.

Example 5: Find the product of the mixed numbers, 1 1/11 × 2 4/9.

In the previous problem, the two mixed numbers are expressed as improper fractions. (1 1/11 = 12/11 and 2 4/9 = 22/9)

$$\frac{12}{11}\times\frac{22}{9} = \frac{\cancel{12}^{4}}{\cancel{11}_{1}}\times\frac{\cancel{22}^{2}}{\cancel{9}_{3}} = \frac{8}{3} = 2\frac{2}{3}$$

Cancel the 11 and 22 by 11.

Cancel the 12 and 9 by 3. (Think of a number that will divide into 12 and 9 evenly. That number is 3.

Multiplying Multiple Fractions

Example 6: Find the product of the proper fractions 9/16 × 5/8 × 2/3.

Simplify through canceling, and then multiply the numerators and denominators.

*With multiple fractions, cancel any numerator with any denominator.

Look for a numerator and a denominator that will simplify.

$\frac{\cancel{9}^{3}}{20} \times \frac{5}{8} \times \frac{2}{\cancel{3}^{1}}$ First cancel the 9 and 3.

$\frac{\cancel{9}^{3}}{\cancel{20}^{4}} \times \frac{\cancel{5}^{1}}{8} \times \frac{2}{\cancel{3}^{1}}$ Now cancel the 5 and 20.

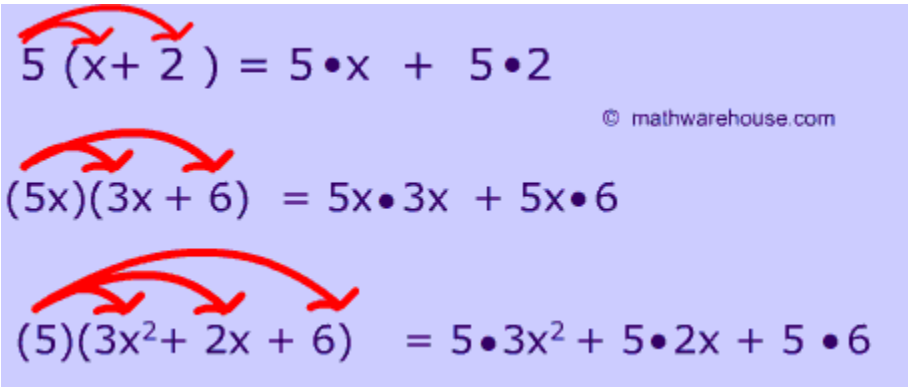
$\frac{\cancel{9}^{3}}{\cancel{20}^{4}} \times \frac{\cancel{5}^{1}}{\cancel{8}^{4}} \times \frac{\cancel{2}^{1}}{\cancel{3}^{1}}$ Last cancel the 2 and 8.

$\frac{\cancel{9}^{3}}{\cancel{20}^{4}} \times \frac{\cancel{5}^{1}}{\cancel{8}^{4}} \times \frac{\cancel{2}^{1}}{\cancel{3}^{1}} = \frac{3}{16}$ Multiply the cancelled numerators and denominators.

The Distributive Property

The distributive property is the ability of one operation to "distribute" over another operation contained inside a set of parenthesis. Most commonly, this refers to the property of multiplication distributing over addition or subtraction, such that $x(a + b) = xa + xb$.

Here's an example:



If, for some reason, you are having trouble accepting the distributive property, look at the examples below.

These 2 examples show that you can apply this property or formula to numbers as well as expressions.