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.

Here is an example for using multiplication of fractions. "If there were 150 students in school and 2/3 of the students were fifth grade students, we could find the number of fifth grade students by multiplying $2/3 \times 150$. We would fin out that 100 of the students were in the fifth grade.

In multiplication of mixed numbers we multiply the numerators times each other and the denominators times each other. However, we must first change each mixed number into an improper fraction.

Multiplying Fractions

Multiplying a Fraction and a Whole Number

Multiplying Mixed Fractions

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

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

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

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

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

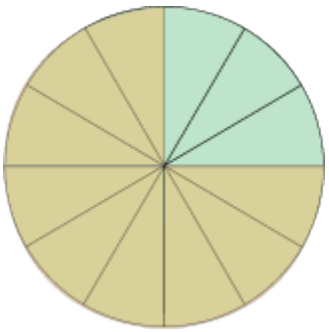
$$\frac{2 \times 3}{1 \times 1} = \frac{6}{1} = 6$$

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 a Fraction and a Whole Number

Find $\frac{3}{4}$ of 12



Multiply $\frac{3}{4} \times 12$

$$\frac{3}{\cancel{4}_{1}} \times \frac{\cancel{12}^{3}}{1}$$

$$\frac{3 \times 3}{1 \times 1} = \frac{9}{1} = 9$$

Notice that in the drawing the pie is divided into 12 parts and $\frac{3}{4}$ of the parts make 9 parts.

Multiplying Mixed Fractions

Change the mixed numbers into improper fractions.

$1\frac{1}{11} = \frac{11}{11} + \frac{1}{11} = \boxed{\frac{12}{11}}$ or $\frac{11\times1+1}{11}$

$2\frac{4}{9} = \frac{18}{9} + \frac{4}{9} = \boxed{\frac{22}{9}}$ or $\frac{9\times2+4}{9}$

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

Multiply $1\frac{1}{11}\times2\frac{4}{9}$

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

$$\overset{4}{\cancel{12}}\,\overset{}{\cancel{11}}\times\frac{\cancel{22}^{\,2}}{\cancel{9}_{\,3}}$$

$$\frac{4\times2}{1\times3} = \frac{8}{3} = 2\frac{2}{3}$$

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

To check, use estimation to see if the answer is reasonable.

$$(1\frac{1}{11}\approx1),(2\frac{4}{9}\approx2)$$

$1 \times 2 = 2$ which is close to $2\frac{2}{3}$.