Fix Those Fractions!! Self-Help Guide!

Multiplying Fractions

Multiplication is a short-cut for repeated addition. Rather than calculate $3 + 3 + 3 + 3 + 3$, note that the number 3 is added 5 times. In other words, multiply 3 times 5. To calculate $\frac{1}{2} + \frac{1}{2}$, it is possible to multiply $\frac{1}{2}$ by 2 since $\frac{1}{2}$ is listed two times. Therefore $2 \cdot \frac{1}{2}$ must equal 1. To multiply fractions such as $\frac{1}{2} \cdot \frac{1}{3}$, there is only half of one third rather than a whole third. Picture a third of a pie and then take half of that third. The reasonable answer is $\frac{1}{6}$. The process used to multiply fractions should always produce a reasonable answer.

Multiplication does **not** require "like terms" or common denominators. Multiply numerator by numerator, then denominator by denominator and if necessary, simplify.

Example #7: $\dfrac{1}{2} \cdot \dfrac{1}{3}$

Multiply numerator by numerator
and denominator by denominator:
$$\frac{1 \cdot 1}{2 \cdot 3} = \frac{1}{6}$$

Example #8: $\dfrac{2}{3} \cdot \dfrac{5}{9}$

Multiply numerator by numerator
and denominator by denominator:
$$\frac{2 \cdot 5}{3 \cdot 9} = \frac{10}{27}$$

Example #9: $\dfrac{4}{7} \cdot \dfrac{3}{4}$

Multiply numerator by numerator
and denominator by denominator:
$$\frac{4 \cdot 3}{7 \cdot 4} = \frac{12}{28}$$

Simplify:
$$\frac{12}{28} \div \frac{4}{4} = \frac{3}{7}$$

In the above example, note that it is possible to simplify before multiplying.

Simplify before multiplying:
$$\frac{\cancel{4}^{1}}{7} \cdot \frac{3}{\cancel{4}_{1}} = \frac{1}{7} \cdot \frac{3}{1} = \frac{3}{7}$$

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Multiplying Fractions (continued)

Example #10: $\dfrac{5}{7} \cdot \dfrac{7}{5}$

Multiply numerator by numerator
and denominator by denominator: $\dfrac{5 \cdot 7}{7 \cdot 5} = \dfrac{35}{35}$

Simplify: $\dfrac{35}{35} \div \dfrac{35}{35} = \dfrac{1}{1} = 1$

In the above example, note that it is possible to simplify before multiplying.

Simplify before multiplying: $\dfrac{\cancel{5}^{1}}{7} \cdot \dfrac{7}{\cancel{5}_{1}} = \dfrac{1}{\cancel{7}_{1}} \cdot \dfrac{\cancel{7}^{1}}{1} = \dfrac{1}{1} = 1$

To multiply a whole number by a fraction, place the whole number over 1 and multiply numerator by numerator, then denominator by denominator and if necessary, simplify.

Example #11: $5 \cdot \dfrac{3}{16}$

Place the whole number over 1: $\dfrac{5}{1} \cdot \dfrac{3}{16}$

Multiply numerator by numerator
and denominator by denominator: $\dfrac{5 \cdot 3}{1 \cdot 16} = \dfrac{15}{16}$

To produce equivalent fractions, multiply any given fraction by a form of 1 (numerator and denominator must be the same number).

Example #12: Find a fraction equivalent to $\dfrac{3}{4}$.

Multiply by any form of 1:
(in this case $\frac{2}{2}$) $\dfrac{3}{4} \cdot \dfrac{2}{2}$

Multiply numerator by numerator
and denominator by denominator: $\dfrac{3 \cdot 2}{4 \cdot 2} = \dfrac{6}{8}$

In the above example, note that it is possible to multiply by any form of 1 such as $\frac{4}{4}$ or $\frac{5}{5}$. This process is used to produce common denominators when adding or subtracting fractions.