Operations with Fractions

Recall the appropriate mathematical terms for basic operations and their symbols:

Name of the operation	Symbol	Name of the result of the operation
addition	+	Sum
Subtraction	−	difference
multiplication	× | • | ( )( )	product
division	÷ | $\frac{\square}{\square}$	quotient

Reducing Fractions

To reduce a fraction is to express it in its lowest terms. That is divide the numerator and the denominator by their largest common factor.

Example: Express given fractions in lowest terms:

$\frac{4 \div 2}{6 \div 2}$	$\frac{7 \div 7}{28 \div 7}$	$\frac{2}{13}$	$\frac{18 \div 2}{32 \div 2}$	$\frac{-9 \div 3}{15 \div 3}$
$\frac{2}{3}$	$\frac{1}{4}$	$\frac{2}{13}$	$\frac{9}{16}$	$\frac{-3}{5}$

Multiplying Fractions

To multiply fractions, follow these steps:

Ex. $\frac{10}{15} \times \frac{12}{72}$

1. Reduce each fraction if possible.

$\frac{10^{2}}{15_{3}} \times \frac{12^{1}}{72_{6}} \rightarrow \frac{2}{3} \times \frac{1}{6}$

2. Reduce fractions diagonally if possible.

$\frac{2^{1}}{3} \times \frac{1}{6_{3}} \rightarrow \frac{1}{3} \cdot \frac{1}{3}$

3. Multiply all numerators.

$1 \times 1 = 1$

4. Multiply all denominators.

$3 \times 3 = 9$

$\frac{1}{9}$

5. Double check that the numerator and denominator do not have a common factor other than 1.

$\boxed{\frac{1}{9}}$

Example: Multiply. Remember to show your work and clearly identify the final answer.

1	$\frac{3}{7} \times \frac{2}{11}$	$\frac{3 \times 2}{7 \times 11} = \boxed{\frac{6}{77}}$

2	$\frac{6}{7} \times \frac{5}{21}$	$\frac{2}{7} \times \frac{5}{7} = \boxed{\frac{10}{49}}$
3	$\frac{2}{8} \times \frac{3}{6}$	$\frac{1}{4} \times \frac{1}{2} = \boxed{\frac{1}{8}}$
4	$\frac{24}{6} \times \frac{5}{16}$	$\frac{4}{1} \times \frac{5}{16} = \frac{1}{1} \times \frac{5}{4} = \boxed{\frac{5}{4}} = \boxed{1\frac{1}{4}}$
5	$\frac{3}{7} \times \frac{2}{9} \times \frac{14}{5}$	$\frac{1}{1} \times \frac{2}{3} \times \frac{2}{5} = \boxed{\frac{4}{15}}$
6	$\frac{10}{12} \times \frac{3}{5} \times \frac{11}{23}$	$\frac{5}{2} \times \frac{3}{5} \times \frac{11}{23} = \frac{1}{2} \times \frac{1}{1} \times \frac{11}{23} = \boxed{\frac{11}{46}}$
7	$\frac{15}{6} \times \frac{10}{5} \times \frac{32}{8}$	$\frac{5}{1} \times \frac{2}{1} \times \frac{4}{1} = \frac{5 \times 1 \times 4}{1 \times 1 \times 1} = \frac{20}{1} = \boxed{20}$
8	$\frac{14}{16} \times \frac{12}{11} \times \frac{21}{7}$	$\frac{7}{8} \times \frac{12}{11} \times \frac{3}{1} = \frac{7 \times 3 \times 3}{2 \times 11} = \boxed{\frac{63}{22}} = \boxed{2\frac{19}{22}}$