Objective:
This handout will help students multiply and divide fractions.

Vocabulary Review:

Numerator - the number above the fraction bar.
Denominator - the number below the fraction bar.

\[ \frac{\text{Numerator}}{\text{Denominator}} \]

Proper Fraction - a fraction whose numerator is smaller than the denominator.
Examples: \[ \frac{3}{4}, \frac{5}{12}, \frac{100}{177} \]

Improper Fraction - a fraction whose numerator is the same as or larger than the denominator.
Examples: \[ \frac{5}{4}, \frac{13}{11}, \frac{101}{57}, \frac{5}{5} \]

Divisor - a factor that divides into a number without leaving a remainder.

Multiply Fractions
To multiply two fractions, multiply the numerators straight across and the denominators straight across.

\[ \frac{a \cdot c}{b \cdot d} = \frac{a \cdot c}{b \cdot d} = \frac{ac}{bd} \]
Example 1:

\[
\frac{2 \cdot 5}{3 \cdot 7} = \frac{10}{21}
\]

The fraction \(\frac{10}{21}\) is in its simplest form. There are no common factors for 10 and 21 except one.

Note: When multiplying fractions, if any numerator has a factor in common with any denominator, the common factors can be canceled. This process is like simplifying or “reducing” a fraction. Simplifying before you multiply makes the problem easier to work.

Example 2:

\[
\frac{5}{27} \cdot \frac{9}{55}
\]

\[
\frac{5}{9 \cdot 3} \cdot \frac{9}{11} = \frac{1}{3} \cdot \frac{1}{1} = \frac{1}{33}
\]

Try these exercises:

1) \(\frac{8}{9} \cdot \frac{5}{11}\)

2) \(\frac{3}{7} \cdot \frac{4}{7}\)

3) \(\frac{3}{5} \cdot \frac{11}{12}\)

4) \(\frac{8}{55} \cdot \frac{77}{64}\)

5) \(\frac{4}{21} \cdot \frac{7}{44}\)

Answers:

1) \(\frac{40}{99}\)

2) \(\frac{12}{49}\)

3) \(\frac{11}{20}\)

4) \(\frac{7}{40}\)

5) \(\frac{1}{33}\)
**Vocabulary Review:**

*Reciprocal of a Fraction* - two fractions are reciprocals if their product is equal to 1. To find the reciprocal of a fraction flip the numerator and the denominator. In other words, turn the fraction upside-down.

\[
\frac{3}{4} \div \frac{3}{4} = 1 \quad \frac{4}{3} \text{ is the reciprocal of } \frac{3}{4}.
\]

**Divide Fractions**

To divide two fractions multiply the first fraction by the reciprocal of the second fraction.

\[
\frac{a}{b} \div \frac{c}{d} = \frac{a \cdot d}{b \cdot c} = \frac{ad}{bc}
\]

**Example 3:** \(\frac{3}{11} \div \frac{2}{5}\)

\[
\frac{3}{11} \div \frac{2}{5} = \frac{3 \cdot 5}{11 \cdot 2} = \frac{15}{22}
\]

15/22 is simplified because there are no common factors for both 15 and 22, except for one.

**Try these exercises:**

1) \(\frac{3}{14} \div \frac{5}{8}\)  
2) \(\frac{3}{14} \div \frac{6}{7}\)  
3) \(\frac{3}{4} \div \frac{1}{8}\)  
4) \(\frac{5}{16} \div \frac{3}{4}\)  
5) \(\frac{2}{5} \div \frac{1}{2}\)

**Answers:**

1) \(\frac{12}{35}\)
2) \(\frac{1}{4}\)
3) \(\frac{6}{1} = 6\)
4) \(\frac{5}{12}\)
5) \(\frac{4}{5}\)