Title: Multiplying and Dividing Fractions

Class: CA 111, Math 1, Math 4

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Instructions to tutor: Read instructions under "Activity" and follow all steps for each problem exactly as given.

Keywords/Tags: Fraction, multiply, divide, reciprocal, invert

Objective: Multiply and divide fractions.

Activity: You will learn how to multiply fractions and how to divide fractions. You will then practice these strategies.

Multiplying Fractions
Remember, no common denominator is necessary for multiplication of fractions. You can multiply numerators and multiply denominators, then "reduce" the result. Or, you can divide out common factors _first,_ then multiply numerators and multiply denominators.

Example 1. Multiply $\dfrac{5}{6} \times \dfrac{6}{8}$

We can multiply numerators and multiply the denominators first:

$$\frac{5 \times 6}{6 \times 8} = \frac{30}{48}$$

Now, we need to simplify/reduce this result:

Both 30 and 48 can be divided by 6 to give $\dfrac{30 \div 6}{48 \div 6} = \dfrac{5}{8}$

Or, we could divide out common factors first, then multiply.

$$\frac{5}{6} \times \frac{6}{8} = \frac{5 \times 6}{6 \times 8} = \frac{5 \times \cancel{6}}{\cancel{6} \times 8} = \frac{5}{8}$$

Notice, you get the same result with either method.

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Example 2: Multiply $\dfrac{10}{9} \times \dfrac{1}{20}$

We can multiply numerators and multiply the denominators first:

$$\frac{10}{9} \times \frac{1}{20} = \frac{10 \times 1}{9 \times 20} = \frac{10}{180}$$

Now, we need to simplify/reduce this result:

Both 10 and 180 can be divided by 10: $\dfrac{10 \div 10}{180 \div 10} = \dfrac{1}{18}$

Or, we could divide out common factors first, then multiply.

$$\frac{10}{9} \times \frac{1}{20} = \frac{\overset{1}{\cancel{10}} \times 1}{9 \times \underset{2}{\cancel{20}}} = \frac{1 \times 1}{9 \times 2} = \frac{1}{18}$$

Notice, again, you get the same result with either method. You do not need to do both methods—just choose the one you prefer and use it.

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Let's try one on your own now:

Example 3: Multiply $\dfrac{3}{8} \times \dfrac{6}{11}$

Notice that 6 and 8 both have 2 as a common factor. You could use this to simplify before you multiply. Or, you can multiply numerators and multiply denominators first, then "reduce."

Did you get $\dfrac{9}{44}$? Good job!

If you did not get this, check with the tutor to determine where you may have made an error.

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Example 4: Multiply $\dfrac{2}{7} \times \dfrac{1}{8}$.

Did you get the result $\dfrac{1}{28}$? Fantastic!

If you did not get this, check with the tutor to determine where you may have made an error.

<u>Dividing Fractions</u>

Remember, dividing by a fraction is the same as multiplying by its reciprocal. So, you'll first change the division symbol to a multiplication symbol and change the second fraction to its reciprocal. Then you'll follow the steps for multiplication.

Example 5: Divide $\dfrac{3}{4} \div \dfrac{6}{7}$.

We'll first change this to multiplication by the reciprocal.

$$\frac{3}{4} \times \frac{7}{6}$$

Now, we follow the steps for multiplication.

$$\overset{1}{\cancel{3}}{} \times \frac{7}{\underset{2}{\cancel{6}}} = \frac{1 \times 7}{4 \times 2} = \frac{7}{8}$$

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Example 6: Divide $\dfrac{3}{10} \div \dfrac{2}{5}$.

First, change the problem to multiplication by the reciprocal.

Now, follow the steps for multiplication.

You should get $\dfrac{3}{4}$.

If you did not get this, check with the tutor to determine where you may have made an error.

Example 7: Divide $\dfrac{6}{5} \div \dfrac{10}{3}$

Did you get $\dfrac{9}{25}$? Great work!

If you did not get this, check with the tutor to determine where you may have made an error.

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After you go over the previous problems with a tutor, try the following, then check with a tutor to make sure you did them correctly.

1. $\dfrac{2}{9} \times \dfrac{3}{5}$

2. $\dfrac{7}{12} \times \dfrac{18}{5}$

3. $\dfrac{3}{4} \times \dfrac{2}{3}$

4. $\dfrac{9}{10} \times \dfrac{5}{6}$

5. $\dfrac{4}{5} \div \dfrac{6}{7}$

6. $\dfrac{4}{9} \div \dfrac{8}{3}$

7. $\dfrac{11}{2} \div \dfrac{3}{4}$

8. $\dfrac{9}{10} \div \dfrac{9}{2}$

For tutor use: Please check the appropriate box.

☐   Student has completed worksheet but may need further assistance. Recommend a follow-up with instructor.
☐   Student has mastered topic.