

Math 9 – Unit 1: Real Numbers

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Lesson #2: Multiplying and Dividing Fractions

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Learning Goal: We are learning to multiply and divide fractions.

Much of Mathematics is learning the rules. These next few lessons have rules. Follow them and you will succeed.

Multiplying Fractions:

The process to multiplying fractions is straight-forward:

1. Multiply the numerators together
2. Multiply the denominators together
3. Reduce to lowest terms.

Examples:

a) $\frac{2}{3} \times \frac{4}{5}$

$$= \frac{8}{15}$$

b) $\frac{-8}{5} \times \frac{15}{4}$

$$= \frac{-120}{20}$$

$$= \frac{-6}{1}$$

reducing

c) $\frac{-4}{3} \times \frac{2}{7} \times \frac{-5}{3}$

$$= \frac{40}{63}$$

Typically, the hardest part is reducing. There is another way to approach multiplying fractions. First reduce **ANY** numerator with **ANY** denominator (this is sometimes called cross reducing). Let's look at example two again, but this time reduce first.

$$\frac{-8}{5} \times \frac{15}{4}$$

$$= -6$$

Another!

$$\frac{6}{7} \times \frac{21}{12}$$

$$= \frac{3}{2}$$

An big one!

$$\frac{7}{5} \times \frac{8}{3} \times \frac{9}{14} \times \frac{25}{4}$$

$$= \frac{15}{1} = 15$$

NOTE: You may reduce first or last, it does not matter, but you must always reduce

Dividing Fractions:

The process to dividing has one extra step done BEFORE the multiplying steps. We need to change the division to a multiplication, so instead of dividing by a fraction, we multiply by the reciprocal. This means to flip the fraction to the right of the division sign. Once this is done, you now have a multiplication question and can follow the steps from above.

Examples:

$$a) \frac{4}{5} \div \frac{3}{7}$$

$$= \frac{4}{5} \times \frac{7}{3}$$

$$= \frac{28}{15}$$

$$b) \frac{9}{4} \div \frac{8}{3} \quad (\text{note: you may be tempted to reduce, but not yet!})$$

$$= \frac{9}{4} \times \frac{3}{8}$$

$$= \frac{27}{32}$$

$$c) \frac{6}{11} \div \frac{3}{2}$$

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

Keep in numerator

$$= \frac{-4}{11}$$

$$d) \frac{5}{9} \div \frac{6}{7} \div \frac{12}{14}$$

$$= \frac{5}{9} \times \frac{7}{6} \times \frac{14}{12}$$

$$= \frac{245}{324}$$

Application: A chemist is measuring the acid needed for an experiment. If she has $2\frac{1}{5}$ cylinders (or $\frac{11}{5}$) and she needs $\frac{1}{10}$ of a cylinder for each experiment, how many experiments can she do?

Divide!

$$\begin{aligned} & \frac{11}{5} \div \frac{1}{10} \\ &= \frac{11}{5} \times \frac{10}{1} \\ &= 22 \end{aligned}$$

\therefore She can do 22 experiments.

Success Criteria:

- I can multiply fractions by reducing before OR after multiplying
- I can divide fractions by multiplying by the reciprocal of the divisor