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) $\dfrac{2}{3} \times \dfrac{4}{5}$

$= \dfrac{8}{15}$

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

$= \dfrac{-120 \div 20}{20 \div 20}$

$= \dfrac{-6}{1}$ or $= -6$

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

$= \dfrac{40}{63}$

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.

$\dfrac{-\cancel{8}^{2}}{\cancel{5}_{1}} \times \dfrac{\cancel{15}^{3}}{\cancel{4}_{1}}$

$= \dfrac{-6}{1}$ or -6

Another!

$\dfrac{\cancel{6}^{1}}{\cancel{7}_{1}} \times \dfrac{\cancel{21}^{3}}{\cancel{12}_{2}}$

$= \dfrac{3}{2}$

An big one!

$\dfrac{\cancel{7}^{1}}{\cancel{5}_{1}} \times \dfrac{\cancel{8}^{2}}{\cancel{3}_{1}} \times \dfrac{\cancel{9}^{3}}{\cancel{14}_{\cancel{2}_{1}}} \times \dfrac{\cancel{25}^{5}}{\cancel{4}_{1}}$

$= \dfrac{15}{1} = 15$

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 <mark>BEFORE</mark> 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) $\dfrac{4}{5} \div \dfrac{3}{7}$

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

$= \dfrac{28}{15}$

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

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

$= \dfrac{27}{32}$

$\dfrac{-2}{3} = -0.\overline{6}$

$\dfrac{2}{-3} = -0.\overline{6}$

c) $\dfrac{6}{11} \div \dfrac{-3}{2}$

$= \dfrac{6^2}{11} \times \dfrac{-2}{3^1}$

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

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

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

$= \dfrac{245}{324}$

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

$\dfrac{11}{5} \div \dfrac{1}{10}$

$= \dfrac{11}{5} \times \dfrac{10^2}{1} = \dfrac{22}{1}$

∴ She can do 22 experiments.

"therefore"

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