

3.4 & 3.5 - Multiplying & Dividing Fractions

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3.4 & 3.5: Multiplying & Dividing Fractions

Multiplying fractions is way easier than adding or subtracting. All you need to do is multiply straight across the numerators and the denominators.

Example 1: Multiplying Rational Numbers in Fraction Form

$$\text{a) } \frac{3}{2} \times \frac{1}{5} = \frac{3 \times 1}{2 \times 5} = \frac{3}{10}$$

$$\text{b) } \frac{-7}{3} \times \frac{3}{2} = \frac{(-7) \times 3}{3 \times 2} = \frac{-21}{6} \stackrel{\text{reduce}}{=} \frac{-7}{2}$$

$$\text{c) } 2\frac{1}{4} \times 3\frac{2}{7} = \frac{9}{4} \times \frac{23}{7} = \frac{207}{28}$$

Since decimals are considered rational numbers we will need to be able to multiply and divide them as well. For the most part, we can simply use a calculator to determine these values, but we can estimate what the answer is going to be.

In order to estimate a decimal answer, we round the decimal to the nearest whole number and then calculate as normal. The resulting answer should be close to what the non-rounded answer will be.

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Example 2: Multiplying Rational Numbers in Decimal Form

Estimate and then solve:

a) $(1.8)(2) =$
round
 $(2)(2) = 4$
estimation ↗

True value:

$$1.8 \times 2 = 3.6$$

<calculator>

b) $(-9.1)(3.3) =$
round
 $(-9)(3) = -27$
estimation ↗

True value:

$$(-9.1)(3.3) = -30.03$$

<calculator>

Dividing fractions is similar to multiplication. What we **cannot** do is divide across the numerator and denominator.

First, we need to introduce the **reciprocal**. A reciprocal is when we take a fraction and “flip” it, that is, switch its numerator with its denominator.

Example 3: Determining the Reciprocal of a Fraction

Determine the reciprocal of the following fractions:

a) $\frac{2}{3} \rightsquigarrow \frac{3}{2}$

b) $\frac{-5}{4} \rightsquigarrow \frac{4}{-5} = \frac{-4}{5}$

c) $\frac{1}{3} \rightsquigarrow \frac{3}{1} = 3$

d) $7 = \frac{7}{1} \rightsquigarrow \frac{1}{7}$

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Now we can divide fractions. To do so, we leave the first fraction alone, change the division sign to a multiplication sign, and then change the second fraction to its reciprocal.

This is known as “multiplying by the reciprocal”. I also call it the “kiss and flip” method.

We’re then left with a multiplication equation that we already know how to solve.

Example 4: Dividing Rational Numbers in Fraction Form

$$\text{a) } \frac{4}{5} \div \frac{6}{7} =$$

$$\frac{\cancel{4}^{\cancel{7}}}{\cancel{5}^{\cancel{6}}} \times \frac{\cancel{7}^{\cancel{6}}}{\cancel{6}^{\cancel{5}}} = \frac{4 \times 7}{5 \times 6} = \frac{28}{30} \stackrel{\div 2}{=} \frac{14}{15}$$

$$\text{b) } \frac{-4}{7} \div \frac{2}{-3} =$$

$$\frac{-4}{7} \times \frac{-3}{2} = \frac{-4 \times (-3)}{7 \times 2} = \frac{12}{14} \stackrel{\div 2}{=} \frac{6}{7}$$

$$\text{c) } 5\frac{3}{7} \div 6\frac{6}{9} = \frac{38}{7} \div \frac{60}{9} = \frac{38}{7} \times \frac{9}{60} = \frac{342}{420} \stackrel{\div 2}{=} \frac{171}{210} \stackrel{\div 3}{=} \frac{57}{70}$$



Textbook Assignment: Pg. 127 # 4, 5, 7, 10 AND Pg. 134 #4, 5, 11 (#11 with a calculator)