**UNIT 3 – Multiplying & Dividing Rational Numbers**

**Vocabulary:**

**reciprocal/multiplicative inverse** - the number you can multiply a fraction by and get 1

 for an answer (the numerator & denominator flipped )

 **quotient** (the answer to a division problem)

 **divisor dividend**

 what you are starting with (numerator or 1st number in problem)

 how many “pieces” the dividend is

being broken into (denominator or 2nd number in problem)

What you are dividing by

**Multiplying Fractions (don’t forget to use integer rules if you have negatives)**

1. Change any mixed numbers into improper fractions
2. Multiply numerators
3. Multiply denominators
4. Put product of numerators “over” product of denominators
5. **Simplify**

Example:

$4\frac{2}{3}$ ● $\frac{4}{7}$ $\frac{14}{3}$ ● $\frac{4}{7}$ = $\frac{56}{21}$ or 2$\frac{2}{3}$

OR

1. Change any mixed numbers into improper fractions
2. **\*Reduce/cancel any numerators and denominators (check across too)**
3. Multiply numerators
4. Multiply denominators
5. Put product of numerators “over” product of denominators

Examples:

***\*****Remember – cancelling is simplifying BEFORE you multiply. To cancel – find the GCF of any numerator and denominator, divide that numerator & denominator by the GCF, (as many pairs as you can), then multiply across.*

-1

 1) $\frac{3}{5}$● - $\frac{5}{6}$ = - $\frac{3}{6}$ or $\frac{1}{2}$

1

Cancel

**Dividing Fractions (don’t forget to use integer rules if you have negatives)**

**\*Multiply directly** (numerator-numerator and denominator-denominator)

Don’t forget positive/negative rules.

 *\*Only works if the second fraction’s numerator and denominator are multiples of the first.*

Example:

 $\frac{6}{15}$ **÷** $\frac{3}{5}$ = $\frac{2}{3}$

OR

**“Multiply by the reciprocal”** which means

1. Keep the first fraction the same
2. Change division sign to multiplication sign
3. “Flip” the fraction that comes directly *after* the division symbol
4. Multiply as you normally would
5. Simplify

Examples:

 1) - $\frac{5}{6}$ **÷** $\frac{3}{7}$ $\frac{-5}{6}$ ● $\frac{7}{3}$ = - $\frac{35}{18}$ = **-** $1\frac{17}{18}$

 2) 5$\frac{4}{5}$ **÷** 1$\frac{1}{3}$ $\frac{24}{5}$ **÷** $\frac{4}{3}$ $\frac{24}{5}$ ● $\frac{3}{4}$ = $\frac{72}{20}$ = 3 $\frac{12}{20}$ or 3$\frac{3}{5}$

**Multiplying Decimals**

To multiply decimals:

1. line up **last digit** in each number (just like you would if you were multiplying whole numbers – put number with most digits on top)
2. multiply as if they were whole numbers
3. count the number of digits to the *right* of the decimal point in *each* number – get the total
4. make sure your answer has the same number of digits (total) to the right of the decimal point

ex. 3.5 x 4.12 4**.**12 (2 digits after decimal point)

 x 3.5 (1 digit after decimal point)

 2060

 12300

 14.360 (3 digits total after decimal point)

**Dividing Decimals (don’t forget to use integer rules if you have negatives)**

To divide decimals: set up like a regular long division problem

1. if the divisor (# on the outside) is a decimal, move the decimal point to the right until it is a whole number (if the divisor is a whole number, just divide as usual)
2. move the decimal point in the dividend (the # inside) the same number of spaces to the right as you moved it in the divisor
3. bring the decimal point up into the quotient (so you won’t forget it)
4. divide as usual

\*annex zeros as needed until it terminates (remainder of zero) or starts to repeat

 **-**49.25

ex. 78.8 ÷ **-**1.6 1.6 78.8 16 788.*00*

 - 64

 148

 - 144

 4*0*

 -32

 8*0*

 -80

 0