**Rational Numbers Handout #1**

**SECTION 1: Simplifying Fractions**

 **Reminder:** When simplifying fractions, you will need to consider the factors (the numbers that can divide evenly into a given number) of the numerator (top) and the denominator (bottom).

 **Definitions:**

* Greatest Common Factor (the GCF): the largest factor common to two or more numbers.
* Equivalent Fractions: Two or more fractions that are equal in value, but represented in different ways. When the fractions are in simplest form they are the same.

**Example #1:** $\frac{15}{20}$ What number can divide into 15 and into 20? (What is the greatest common factor?)

* The factors of 15 are 1, 3, 5, 15

 The factors of 20 are 1, 2, 4, 5, 10, 20

* The GCF is 5

 $\frac{15}{20}$ Divide both numbers by 5 = $\frac{3}{4}$ $\frac{15}{20}$ & $\frac{3}{4}$ are equivalent fractions!

 **Example #2:** $\frac{6}{9}$ Ask yourself: What number can divide into 6 and into 9? The number 3 can!

 Now, divide both the 6 and 9 by 3:

 $\frac{6}{9}$ = $\frac{2}{3}$

 **PART A**

1. List all the factors of the following numbers:

\*Please note that you can use the multiplication chart posted at the front left of class.

* 1. 22 c. 12
	2. 45 d. 27
1. What is the greatest common factor of each pair of numbers?
	1. 12 and 6 c. 10 and 25
	2. 7 and 21 d. 8 and 12
2. Are the following pairs of fractions equivalent fractions?
	1. $\frac{5}{10}$ and $\frac{1}{2}$ c. $ \frac{3}{12}$ and $\frac{1}{3}$
	2. $\frac{15}{21}$ and $\frac{2}{3}$ d. $\frac{-24}{30}$ and $\frac{4}{-5}$

**PART B**

Simplify the following fractions (into lowest terms):







**SECTION 2: Finding a common denominator**

 **Reminder:** When finding a common denominator for two or more fractions, you will need to figure out what number both denominators can divide into (or the LCM).

* When fractions have a common denominator, they can be:
	+ Put into order from least to greatest
	+ Added, subtracted, multiplied, and divided

 **Definition:**

* Lowest Common Multiple (the LCM): The smallest number that two or more numbers can divide into evenly.

**Example #1:** Find the common denominator for the following pair of fractions:

 $\frac{3}{10}$ and $\frac{1}{2}$ Ask yourself: What number can both 10 and 2 divide into?

 2 and 10 can both go into the number 10

The fraction $\frac{3}{10}$ already has 10 as the denominator, so it can stay as it is.

The fraction $\frac{1}{2}$ needs to be changed to a fraction with a denominator 10

* Ask yourself how many times does 2 go into 10?
	+ It goes in 5 times (2 x **5** = 10)

Now, multiply both the numerator (1) and the denominator (2) by 5!

 $\frac{1}{2}$ x 5 = $\frac{5}{10}$

**Example #2:** Find the common denominator for the following pair of fractions:

 $\frac{1}{3}$ and $\frac{3}{5}$ Ask yourself, what number can both 3 and 5 divide into?

 Don’t know?????

* If you don’t know, do this (how to find the LCM):

 3, 6, 9, 12, 15, 18, 21, 24 (keep adding 3….)

 5, 10, 15, 20, 25, 30, 35 (keep adding 5…)

* You should continue both lines until they have a number in common!
* What number do they have in common? They both have the number 15!
* Now, you have to look at each denominator:

 $\frac{1}{3}$ How many 3’s make 15? 5, so multiply top and bottom by 5:

 $\frac{1}{3}$ x 5 = $\frac{5}{15}$

 $\frac{3}{5}$ How many 5’s make 15? 3, so multiply top and bottom by 3:

 $\frac{3}{5}$ x 3 = $\frac{9}{15}$

 Now, they have a common denominator!

**PART A:** Find the LCM of the pair of numbers. Circle the LCM in each strand.

1. 4, \_\_\_, …… 2. 7, \_\_\_, ….

 3, \_\_\_\_, …… 4, \_\_\_, ….

**PART B:** Find the common denominator for the following pairs of fractions.

1. $\frac{1}{3}$ and $\frac{3}{10}$ 2. $\frac{2}{3}$ and $\frac{1}{2}$ 3. $\frac{1}{2}$ and $\frac{4}{5}$ 4. $\frac{1}{4}$ and $\frac{1}{5}$
2. $\frac{1}{3}$ and $\frac{5}{7}$ 6. $\frac{9}{10}$ and $\frac{2}{4}$ 7.$ \frac{1}{2}$ and $\frac{2}{6}$ 8. $\frac{8}{3}$ and $\frac{3}{5}$

**SECTION 3: Rules for adding positive and negative numbers**

* If BOTH numbers are NEGATIVE, then the answer will be NEGATIVE!
* If BOTH numbers are POSITIVE, then the answer will be POSITIVE!
* If there is one POSITIVE and one NEGATIVE number, then the answer will be:
	+ Positive – if the larger number is positive
	+ Negative – if the larger number is negative

**Example #1:** Add the following numbers:

 (-8) + (-2) 🡪 both are negative, therefore the answer will be negative!

 Now, just add the 8 and 2, and put a negative sign in front!

 (-8) + (-2) 🡪8 + 2 = 10 🡪 -10

**Example #2:** Add the following integers:

 (-9) + (+3) 🡪 the bigger number (9) is negative, so the answer will be negative!

* Now, take the smaller number (3) from the larger number (9)
	+ 9 - 3 = 6
* (-9) + (+3) = -6

**Example #3:** Add the following decimals:

 (-0.2) + (+4.5) 🡪the bigger number (4.5) is positive, so the answer will be positive!

* Now, take the smaller number (0.2) from the larger number (4.5)
	+ 4.5 – 0.2 = 4.3
* (-0.2) + (+4.5) = +4.3

Example #4: Add the following fractions:

 $(-\frac{2}{8})$ + (+ $\frac{3}{4})$ 🡪 First, you need to make sure that they have a common denominator

before you can determine if the answer will be positive or negative.

* + The LCM of 8 and 4 is 8!
	+ The first fraction already has 8 as a denominator so you can leave it for now.
	+ To change ¾ : 4 goes into 8 twice, so you need to multiply top and bottom by 2.
	+ (+ $\frac{3}{4})$ x 2 = (+ $\frac{6}{8})$
* $(-\frac{2}{8})$ + (+ $\frac{3}{4})$ = $(-\frac{2}{8})$ + (+ $\frac{6}{8})$ 🡪6 is bigger than 2, so the answer will be +
* Subtract the smaller numerator (2) from the larger one (6) $\frac{6-2}{8}$ = $\frac{4}{8}$
* = $\frac{-4}{8}$ (don’t forget to put the negative back in!)

**PART A:** Will the answer be positive or negative?

1. (-5) + (-6) 🡪
2. (-1.2) + (+3) 🡪
3. (+4.5) + (+2.6) 🡪
4. (+67) + (-23) 🡪

**PART B:** Add the following:

1. Add the following integers:
	1. (+13) + (-12) = c. (-23) + (-7) =
	2. (-4) + (+9) = d. (+18) + (+11) =
2. Add the following decimals:
	1. (-0.3) + (-1.5) = c. (+5.6) + (+1.2) =
	2. (-7.8) + (+1.4) = d. (-6.5) + (+9.7) =
3. Add the following fractions:
	1. $(-\frac{2}{5})$ + ($+$ $\frac{3}{5})$ b. $(-\frac{2}{3})$ + ($-$ $\frac{3}{6})$ c. $(+\frac{2}{5})$ + ($+$ $\frac{3}{10})$ d. $(+\frac{3}{14})$ + ($+$ $\frac{2}{7})$