Grade 7/8 Math Review of Fraction Operations

Name: _____ Class: ____

Once you know the rules for fraction operations, they will no longer terrify you. Rules depend on the operation but here are a couple of rules that will help with all fraction operations.

Equivalent Fractions – Fractions are more about the relationship of the two numbers – the top (numerator) and the bottom (denominator). If the fraction is multiplied on top and bottom by the same number, it has the same proportion and is therefore equal – these are known as *equivalent fractions*.

$$\frac{4}{5} \text{ x } \frac{3}{3} = \frac{12}{15}$$

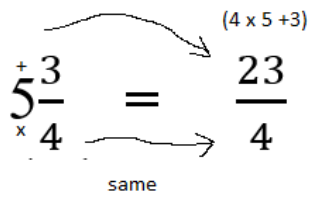
We can check this by getting the *decimal equivalent* of each fraction. To do this, take the top number and divide it by the bottom number. In each of the above fractions, we will see that they are 0.8 and are equivalent. Interestingly, 3/3 is equal to one and therefore does not change what the fraction is equal to since anything times one is the same thing – it just looks differently since it is a fraction. Tip: to make an equivalent fraction you can only multiply or divide and you must do the same operation on the top and the bottom with the same number. You also cannot have a decimal in a fraction.

Mixed and Improper Fractions – Sometimes the numerator is bigger than the denominator. This means that the number represents something bigger than 1. It can be represented two ways – the first is as an *improper fraction* and the second is called a *mixed fraction* (this has a whole number and a fraction that is less than 1). They are equivalent but look different from each other.

$$5\frac{3}{4} = \frac{23}{4}$$

Mixed Improper

Note how the denominators are the same. The way you can think about them is 'How many quarters do I have?' In the first, you have five groups of quarters or five groups of four (20) and three others (total of 23) or 23 quarters 23/4. In order to convert any mixed fraction, the pattern is to multiply the denominator by the whole number and then add the numerator and place that number over the original denominator.



To convert a mixed fraction to an improper fraction to a mixed fraction, you have to see how many denominators you can get out of the numerator and then how many are left over. This is the same as long division with remainders. With easy fractions, you might see them easily but with more complex fractions, you have to do the long division.

$$\frac{24}{7}$$

If you do long division on this, you will get *3 remainder 3*. This means that there are three whole groups of seven and three sevenths left. This is represented by:

$$3\frac{3}{7}$$

Remember that all you are doing is taking the numerator and dividing it by the denominator through long division.

Once you know these things about fractions, the operations are a lot easier.

ADDING AND SUBTRACTING FRACTIONS

The rule for adding and subtracting is that the numerators must be the same. We call this *common denominators*. To add or subtract, the bottoms must be the same. To do this as easily as possible, you must have the lowest common multiple. Sometimes this involves getting a reduced fraction of one of your fractions.

$$\frac{4}{8} \times \frac{3}{3} + \frac{1}{3} \times \frac{8}{8}$$

So, we get

$$\frac{12}{24} + \frac{8}{24}$$

Now that the denominators are the same, we just do the operation on the numerators and put the answer on top of the same denominator.

$$\frac{20}{24}$$

This has to be reduced – we do this by dividing out the greatest common factor (4).

$$\frac{20}{24} \div \frac{4}{4} = \mathbf{\frac{5}{6}}$$

The same process works for subtraction.

MULTIPLYING FRACTIONS

Good news! This is the easiest of all the operation for fractions. No need to get common denominators or anything. All you have to do is multiply the numerators and multiply the denominators.

$$\frac{4}{5} \text{ x } \frac{1}{3} = \mathbf{\frac{4}{15}}$$

That is it!! No need to do anything else. Just remember that the numerators create the new numerator and the denominators create the new denominator. Remember that we have been doing this already when getting equivalent fractions.

DIVIDING FRACTIONS

There is a trick to fractions and that is that we do not actually do division but change it to a multiplication of the reciprocal of the second fraction. What? Yes, there is a pattern and that is to change the operation to a multiplication and then flip the second fraction (called the reciprocal). Here is an example.

$$\frac{4}{5} \div \frac{2}{3}$$

What we are doing here is dividing by 2 and dividing by 1/3 (dividing by 1/3 is the same as multiplying by 3). So it is the same as multiplying by 3/2. So, it is the same as:

$$\frac{4}{5} \text{ x } \frac{3}{2}$$

Now we are back to the easy multiplication, so the answer is

$$\frac{12}{10} \div \frac{2}{2} = \frac{6}{5} = \mathbf{1\frac{1}{5}}$$

The pattern for **addition and subtraction** is **common denominator and operate on numerators only.**

The pattern for **multiplication** is just to **multiply straight across**.

The pattern for **division** is to convert to multiplication of the reciprocal (of second). **Flip second and multiply**.

The other thing to remember is to convert all mixed fractions to improper fractions before starting and to reduce all fractions at the end (put in mixed fraction if improper).

Practice on the following questions. Show all work!!

$\frac{5}{6} + \frac{1}{4} =$

$3\frac{1}{2} + 5\frac{2}{7} =$

$\frac{4}{8} - \frac{1}{3} =$

$5\frac{3}{7} - 3\frac{7}{9} =$

$\frac{2}{5} \times \frac{5}{7} =$

$3\frac{1}{8} \times 5\frac{8}{12} =$

$\frac{10}{12} \div \frac{5}{6} =$

$4\frac{3}{5} \div 3\frac{3}{4} =$