MrF

GRADE 10 ESSENTIAL
UNIT X – FRACTIONS
TOOLS TO SIMPLIFY A FRACTION

Name:_____
Date: _____

Fractions are very useful devices. Often they end up being a little unwieldy and the numerator and denominator are very large. For example:

$$\frac{15}{16} * \frac{8}{25} = \frac{120}{400}.$$

You may have a difficult time trying to picture in your head 120 slices of a 400 slice pizza. It turns out there we can rename $\frac{120}{400}$ as a more simple equivalent fraction:

$$\frac{120}{400} = \frac{3}{10}$$

We can easily picture this **simpler** and **reduced equivalent** fraction; 3 slices of a 10 slice pizza.

To **simplify** a fraction we first need to break it into its basic elements. Just like water is H2O, two Hydrogen atoms and an Oxygen atom, we can break most numbers down into their basic elements. For example: 12 is really 2*2*3. We say 12 has the **prime factors** of 2, 2, and 3.

Neither the 2 nor the 3 can be broken down any further into other elements multiplied together.

Prime #s are not in times table

Factors multiply

Lesson 7 Prime Factorization

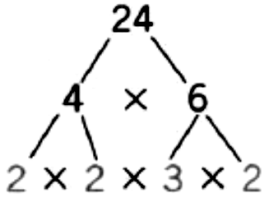
2, 3, 5, 7, 11, 13, 17, 19, 23, ...

A prime number is any number greater than 1 that has only two factors, 1 and itself. A composite number has more than two factors.

A composite number can be written as the product of prime numbers. This is called the prime factorization of the number.

You can use a factor tree to write the prime factorization of a number.

Write the prime factorization of 24.



Begin by choosing any two factors.

Stop when all of the factors are prime numbers.

We made a factor tree to find the prime factors.
Finally, list all the prime factors from least to greatest.
The **prime factorization** of 24 is 2 * 2 * 2 * 3

State whether each number is *prime* or *composite*.

	a	*b*	*c*
1.	4 _____	3 _____	5 _____
2.	8 _____	9 _____	11 _____

Write the prime factorization of each number.

	a	*b*
3.	12	36
	_____	_____
4.	54	60
	_____	_____
1.	80	68
	_____	_____
2.	96	125
	_____	_____
3.	108	132
	_____	_____

4. What number is always a factor of even numbers? _____

5. Use the pattern in the prime factorization of 8, 16, and 32 to determine the prime factorization of 64 and 128.

8: _____ 64: _____

16: _____ 128:_____

32: _____

6. **Divisibility Rules**. You know that every even number (ending in 0,2,4,6,8) has 2 as a factor. There are other useful rules too!

a. Every number ending in 0 is divisible by 10, which of course means it is divisible 2 and 5. Example: 30 = 3 * 10 = *3 * 2 * 5*.

b. Every number ending in 0 or 5 is divisible by 5. So for example 15 is really a 3 * 5

c. Every number where its individual digits add to make a number that is divisible by 3 is itself divisible by three. WTH? Example: the number 54: its digits 5 + 4 make a sum of 9. And 9 is divisible by three! So 54 is **3***18, which of course is really **3***3*6 which of course is really **3***3*3*2

Notice that knowing your multiplication tables is rather key to being able to find factors of a number. You had best have the multiplication tables nailed down by now! Or else get a calculator that does fractions and avoid any career that involves a trade such as cook, carpenter, plumber, or anything involving science (medicine, nursing, teacher [of any subject!], ….)

Simplify each of the **fractions** by factoring the numerator and denominator and then canceling (dividing) common factors.

Example: $\frac{8}{10} = \frac{2*2*2}{2*5} = \frac{2*2}{5} = \frac{4}{5}$

a. $\frac{10}{20} =$ b. $\frac{14}{21} =$

c. $\frac{12}{18} =$ d. $\frac{15}{18} =$

e. $2\frac{4}{8} =$ f. $5\frac{8}{10} =$

g. $\mathbf{6\frac{8}{12}} =$

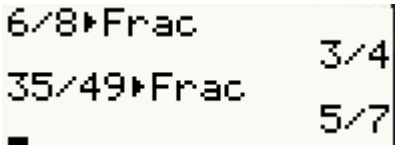
h. $\mathbf{\frac{25}{30}} =$

i. $\mathbf{3\frac{12}{16}} =$

j. $\mathbf{3\frac{4}{16}} =$

Conclusion. Now you know how to 'whittle down' a fraction into its basic prime factors and 'cancel' the common factors that are common to the numerator and denominator.

Of course there is button on your calculator or device that likely does this simplifying of fractions too!



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Next Lesson. The next lesson is a slightly different way to 'whittle down' the numbers into their lowest form. But the method in this lesson is ideal and preferred if you every progress into algebraic expressions such as:

$$\frac{12x^2y^4}{28xy^3} = \frac{3xy}{7}$$