GRADE 10 ESSENTIAL   Name:_____
UNIT X – FRACTIONS   Date: _____
GREATEST COMMON FACTOR (GCF)

In a previous lesson we learned how to whittle down numbers into their constituent basic prime parts using prime factors.

For example: 105 = 3 * 5 * 7; and 120 = 2 * 2* 2 * 3 * 5. So we could then say that $\frac{105}{120} = \frac{3*5*7}{2*2*2*3*5} = \frac{7}{2*2*2} = \frac{7}{8}$. The 3's and the 5's divided each other to make one, so they disappeared. This is the preferred method.

So 105 slices of a 120 piece pizza is the same amount of pizza as 7 slices of an 8 slice pizza.

There is *another method* to whittle down a fraction and simplify it. In the example just above $\frac{105}{120} = \frac{3*5*7}{2*2*2*3*5} = \frac{7}{2*2*2} = \frac{7}{8}$; we say that the 3 * 5; or 15, was common to both the top numerator and the bottom denominator. The 15 is called a Greatest Common Factor (GCF).

The new method is to find the GCF directly without having to break numbers down then put them back together again.

Lesson 8 Greatest Common Factor

Sometimes called GCD; Greatest Common Divisor

1, 2, 3, and 6 are **common factors** of 12 and 30.
6 is the **greatest common factor** of 12 and 30.
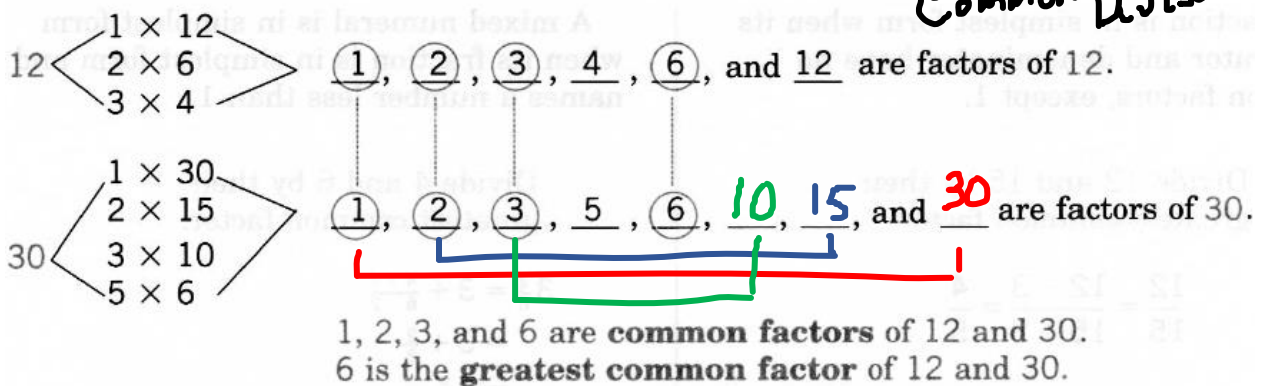
Start on the outside and work your way in

List the factors of each number named below. Then list the common factors and the greatest common factor of each pair of numbers.

	factors	common factor(s)	greatest common factor
1. 6	_____	_____	_____
10	_____		
2. 5	_____	_____	_____
8	_____		
3. 12	*1,2,3, 4,6,12*	*1,3*	*3*
15	*1,3, ,5,15*		
4. 10	_____	_____	_____
20	_____		
5. 14	_____	_____	_____
16	_____		
6. 15	_____	_____	_____
7	_____		
7. 24	_____	_____	_____
18	_____		

Example usage: Simplify (reduce) the following fractions:

$\dfrac{105}{120}$; the GCF is 15:

Many calculators, have a GCF function!

105: 1, 3, 5, 7,   15, 21, 35, 105

120: 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120

GCF: 15

gcd(105, 120)   15

Nobody said it was pretty! **Avoid this method**, but be aware it exists in case a favourite relative asks you! *It works well for small numbers*.

1. $\dfrac{8}{10}$ _____ $\dfrac{10}{20}$ 1,2,5,10
   1,2,4,5,10,20 $\dfrac{14}{21}$

GCF = 10

$\dfrac{10 \div 10}{20 \div 10} = \dfrac{1}{2}$

2. $2\dfrac{4}{8}$ GCF = 4

↖ ONLY Reduce the Fraction

$2 + \dfrac{4 \div 4}{8 \div 4} = 2 + \frac{1}{2} = 2\frac{1}{2}$ $3\dfrac{6}{9}$ $5\dfrac{8}{10}$

3. $\dfrac{12}{18}$ $5\dfrac{9}{12}$ $\dfrac{15}{18}$

4. $6\dfrac{8}{12}$ $\dfrac{25}{30}$ $3\dfrac{12}{16}$

5. $\dfrac{24}{30}$ $3\dfrac{14}{18}$ $\dfrac{16}{32}$

Make up some of your own! Check them with an app of some sort on your phone or other device.

You will still likely find it easier to whittle it down by prime factors! And it is a more useful way when you get into algebra.

$\dfrac{24 \div 6}{30 \div 6} = \dfrac{4}{5}$

24: 1,2,3,4,6,8,12,24
30: 1,2,3,5,6,10,15,30

GCF Method

$\dfrac{24}{30} = \dfrac{12 \cdot 2}{15 \cdot 2} = \dfrac{12}{15} = \dfrac{3 \cdot 4}{3 \cdot 5} = \dfrac{4}{5}$

'*Whittle it down*' with Prime Factors method