**Factoring a GCF**

**Notes:**

**Remember what we can multiply in to a polynomial we can divide out.**

**We call it factoring out a GCF or (Greatest Common factor)**

**What is the GCF in the following example?**

**Example 1**

**What is the largest number that divides into both 21 and 18 evenly?**

**a. 21*xy* – 18*x*2**

*The* **factor of 21 is 3 x 7. The factor of 18 is 3 x 6. The largest factor that they have in common is 3 without leaving a remainder. .**

* **We can divide 21 an18 by 3. However, 3 is only half the GCF.**
* **If there are variables that are shared, we need to divide them out as part of the GCF.**
* **We want to divide out the largest number of variables keeping in mind we have to take the same amount from each.**

**The first term has 1 x and 1 y**

**The second term has 2 x’s**

**Ask yourself what can we take away evenly from each?**

**The most we can take away evenly is 1 x**

**So the largest term or GCF that divides out EVENLY from both terms is**

**In this case the GCF is 3x.**

**Simplify By dividing out the GCF**

**Ex: 1 21*xy* – 18*x*2 = 3x (** $7y-6x)$

**Ex: 2** **64*r*3*s* – 32*r*2*s*3 + 8*r*2*s*2**

**What is the largest number that will divide out of all terms evenly?**

$$The factors of 64 are 64 x 1, 32 x 2, 4 x 16, 8 x 8, $$

$ The factors of 32 are 32 x 1, 2 x 16, 4 x 8,$

$The factors of 8 are 8 x 1, 2 x 4 $

**The largest factor they all share is 8.**

 **The first term has 3 r’s 1 s**

 **The second term has 2 r, 3 s**

 **The third term has 2 r, 2 s.**

**The most r )’s that can be taken away evenly from each evenly is 2 .**

**The most ( S) that can be taken away from each evenly is 8**$r^{2}s$

**The GCF in this case is 8**$r^{2}s$

**Simplify By dividing out the GCF**

64*r*3*s* – 32*r*2*s*3 + 8*r*2*s*2

 = 8*r*2*s*(8*r* – 4*s*2 + *s*)