Rawafed Private School

مدرسة الروافد الخاصة

Subject: MATHEMATICS	**Date: / 4 /2016**
Name: _____	**Grade: 08_____**

Factors By GCF

- **Introduction:** Perhaps, the process of factoring by removing the greatest common factor can be best stated as the reverse **distributive property**. In the distributive property, one is multiplying a certain factor to all of the terms. In factoring by **GCF**, one is dividing all of the terms by the GCF.

  Consider this expression which utilizes the distributive property:

$$2x(x+3) = 2x \bullet x + 2x \bullet 3$$
$$= 2x^2 + 6x$$

  After simplifying using the distributive property, you get $2x^2 + 6x$

- **Factor by GCF:** Let's now take your answer to the problem above: Using what was learned in the last lesson, the GCF of $2x^2$ and $6x$ is $2x$.

  Recall - this is because the greatest common factor of 20 and 15 is 5, and because the GCF of like variable quantities is always the lowest exponent.

  Now, divide each term in the original expression by the GCF $2x$

  Divide $2x^2$ by $2x$ equals x,
  Divide $6x$ by $2x$ equals 3,

  Therefore, after dividing by the GCF, the expression is $(x+3)$.

  To complete this reverse distributive process, write the GCF in front of a set of parentheses. Inside of the parentheses, place the expression that is left after dividing by the GCF.

$$= 2x \qquad (x+3)$$

GCF what's left after dividing

  So, after factoring by removing the GCF, the answer is $2x(x+3)$.

Example: Factor the greatest common factor: $8y^5 - 12y^3 + 4y$

The **GCF** is of the three terms is 4y, because the GCF of 8, 12, and **4** is 4, and the GCF of $y^5,\ 12y^3,\ and\ 4y$ is **y**.

So, the **GCF** (**4y**) will be placed in front of the parentheses, and all of the terms in the expression will be divided by **4y**.

$$8y^5 - 12y^3 + 4y = 4y(2y^4 - 3y^2 + 1)$$

Generating the last term in this expression is where many students make a mistake. In order to get "+1", one has to divide 4y by 4y. Some students would think this is zero, and they would not write anything. However, it's important to see that $4y \div 4y = 1$.

Example: Factor the greatest common factor: $16c^7 - 6c^3$

The GCF is $2c^3$.

Now, you complete the problem below:

$16c^7 - 6c^3 = 2c^3(8c^4 - 3)$

Example: Factor the greatest common factor: $12a^2b - 15a^2 + 7b$

Note that the GCF of the coefficients (12, -15, and -7) is **1**.
Also, note that the terms do not all share any **common variables**.

Obviously, it makes little sense that the GCF is 1. In this case we write that the expression is **PRIME**.

BRONZE LEVEL

I) Factor by GCF

a) $5x - 5w$ **b)** $3a + 3b$ **c)** $x^2 - 5x$

d) $xy^2 + zy^2$ **e)** $2x^2 + 12$ **f)** $x^4 + x^2$

g) $3x - 12$ **h)** $5c^3 - 2c^2$ **i)** $8x - 56a$

SILVER LEVEL

II) Factor by GCF

a) $9x^2 - 21x$ **b)** $15x^2 + 20x$ **c)** $12x^2 + 28x$

d) $12x^2 + 10$ **e)** $35x^3 + 15$ **f)** $8 - 18x^2$

g) $12x^3 + 27$ **h)** $6x^2 - 10$ **i)** $15x^4 - 24x^2$

GOLD LEVEL

III) Factor by GCF

a) $6a^2 b - 2ab^2$

b) $3x^2 - 12x$

c) $t^2h + 3t$

d) $35m^3n + 105m^2n^3$

e) $34x^4y^3 - 17x^2y^5$

f) $36xy^2 - 48x^2y$

g) $75b^2c^3 + 60bc^6$

h) $20p^2 - 16p^2 q^2$

i) $12x^3 + 6x^2 - 30$

j) $4x^4 - 22x^2 + 18x$