Factoring

The greatest common factor, or GCF, is the largest factor the terms have in common. Factoring a polynomial reverses the multiplication process. To find the GCF, list all the prime factors of each term and then circle or underline the factors common to ALL terms.

Example 1: What is the GCF of 12x3 + 18x2 – 15x?

 A) Find the GCF of the coefficients and the variables

 12x3: 2 \* 2 \* 3 \* x \* x \* x

 18x2: 2 \* 3 \* 3 \* x \* x

 15x: 3 \* 5 \* x

 So, the GCF is **3x**

C) The factors that are not in common will remain inside the parentheses

 3x (4x2 + 6x – 5)

*Note:* When finding the GCF of the variables, find the least power of each variable.

For example: *x*5*y*−*x*3*y*2+*x*2*y*4

 x2 is the least power of x

 y is the least power of y

 GCF is **x2y**

 Final factored answer is x2y (x3 – xy + y3)

See the polynomials below. The GCF is given, fill in the remaining factored answer:

**1. –**33*x*3 + 18*x*2 =3x2(– 11x + 6) **2.** -26*x*4 - 4*x*3 - 5*x*2 = -*x*2(\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

**3.** 31*x*4 + 8*x*3 – 5*x*2 = *x*2(\_\_\_\_\_\_\_\_\_\_\_\_\_\_) **4. –**40*x*6 – 35*x*4 + 15*x*3 = 5*x*3(\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

**5.** 15*x*5 – 100*x*3 + 35*x*2 = 5*x*2(\_\_\_\_\_\_\_\_\_\_\_\_\_\_) **6.** 36*x*7 – 4*x*6 + 6*x*5 = 2*x*5(\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

Let’s Try☺ Factor the following polynomials by giving the GCF first and then give the final factored answer:

1) 4x3 + 12x2 – 8x 2) 5v5 + 10v3

 3) 6m3 – 12m2 – 24m 4) 8x2 – 12x

 5) 5d3 + 10d 6) 3x3 – 12x2 + 15x

7) $24x^{3}y^{2}-8xy$ 8) $-12a^{7}b^{3}-4a^{4}b^{5}$

9) $-18p^{3}m^{2}-9m^{4}p^{3}-3mp$ 10) $72m^{3}p^{2}-9m^{7}p^{2}$

**Factoring by grouping (use parentheses to group)**

Use when there are 4 terms that do not have a common factor.

Factor by grouping!

 x2 + 3x + xy + 3y

 (x2 + 3x) (xy + 3y)

 x (x + 3) + y (x + 3)

 (x + y) (x + 3)

Let’s Try☺

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| --- | --- |
| **1.** 12*x*3 + 3*x*2 + 20*x +* 5 | **2.** 6*v*3 + 42*v*2 + 5*v +* 35 |
| **3.** 8*t*3 + 36*t*2 + 2*t +* 9 | **4.** 10*s*3 + 35*s*2 + 6*s +* 21 |
| **5.** 9*m*3 – 6*m*2 + 12*m –* 8 | **6.** 8*w*3 + 6*w*2 – 28*w –* 21 |
| **7.** 7*r*3 + 16*r*2 – 9*r –* 72 | **8.** 21*x*3 – 28*x*2 – 6*x +* 8 |