

MAKE MULTIPLICATION

Ex 3: Factor the polynomial using the GCF.

GCF

$$\frac{-4y^3}{2} + \frac{6y}{2} - \frac{2}{2}$$

$2(-2y^3 + 3y - 1)$

Check

$$-4y^2 + 6y - 2$$

How to factor a GCF out of a polynomial

1. Identify GCF for polynomial
 - a. What can be divided into each? 2!
2. Divide GCF from each term and put outside ()
3. Inside () should be remaining factors.
4. Check: Multiply GCF by polynomial in (); should get original expression.

a. $\frac{8x^3}{4x^2} - \frac{12x^2}{4x^2}$

$4x^2(2x - 3)$

Check...

b. $\frac{x^2}{1x^2} - \frac{4x^4}{1x^2}$

$x^2(1 - 4x^2)$

Check...

$$1x^2 - 4x^4$$

c. $\frac{-5m^4}{5m^2} - \frac{5m^3}{5m^2} + \frac{5m^2}{5m^2}$

$5m^2(-m^2 - 1m + 1)$

$$-5m^4 - 5m^3 + 5m^2$$

Factoring by Grouping: May be used to further factor.

PREREQUISITE: DOES IT HAVE 4 TERMS? IF SO...

YOU FACTOR OUT GCF OF 1st 2 TERMS, FACTOR OUT GCF OF LAST 2 TERMS, COMBINE

Ex 4:

$$x^4 - 2x^3 + 6x^2 - 12x$$

$$x(x^3 - 2x^2 + 6x - 12)$$

$$\left(\frac{x^3}{x^2} - \frac{2x^2}{x^2}\right) + \left(\frac{6x}{6} - \frac{12}{6}\right)$$

$$x^2(x - 2) + 6(x - 2)$$

Check...

$x(x^2 + 6)(x - 2)$

How to Factor by Grouping

1. Factor out GCF if possible.
2. Regroup:
 - a. Put first two terms together in ()
 - b. Put second 2 terms together in ()
3. Take out GCF of each pair.
4. Bring GCFs together as a binomial.
5. Check!

1	x^3	$+6x$
-2	$-2x^2$	-12

 $\rightarrow (x^3 - 2x^2 + 6x - 12)x$
 $\rightarrow x^4 - 2x^3 + 6x^2 - 12x$

Factor:

a. $\frac{2x^4}{2x} - \frac{2x^3}{2x} - \frac{6x^2}{2x} + \frac{6x}{2x}$

$2x(x^3 - x^2 - 3x + 3)$

$(\frac{x^3 - x^2}{x^2} + \frac{-3x + 3}{-3 -3})$

$x^2(x-1) - 3(x-1)$

Bring GCFs together

Check... $2x(x^2 - 3)(x - 1)$ • BRING GCFs together • write one group of binomials

	x^2	-3
x	x^3	$-3x$
-1	$-1x^2$	$+3$

$2x(x^3 - 1x^2 - 3x + 3)$

GCF?

KARATE CHOP!

GCF OF BOTH GROUPS

b. $\frac{-4x^3}{2} - \frac{16x^2}{2} - \frac{10x}{2} - \frac{40}{2}$

$2(-2x^3 - 8x^2 - 5x - 20)$

$(\frac{-2x^3 - 8x^2}{-2x^2 -2x^2} + \frac{-5x - 20}{-5 -5})$

$2 \cdot (-2x^2(x+4) - 5(x+4))$

$2 \cdot (-2x^2 - 5)(x+4)$

	$-2x^2$	-5
x	$-2x^3$	$-5x$
$+4$	$-8x^2$	-20

$2(-2x^3 - 8x^2 - 5x - 20)$

$-4x^3 - 16x^2 - 10x - 40$

Exit Ticket: What is a factor? What does it mean to factor? How are these two meanings related?