

1.) Write the product in standard form. abc ORDER!

Product Rule! $-3y^3(3y - 4xy)$

$-9y^4 + 12xy^4 \rightarrow 12xy^4 - 9y^4$

2.) Simplify: $(x - 5)^2$

~~$(x)^2 + (-5)^2$~~ $x^2 + 25$

$(x-5)(x-5)$

x	-5
x^2	$-5x$
$-5x$	$+25$

$x^2 - 10x + 25$

3.) A math test worth 150 points has 24 questions. The test consists of fill-in-the-blank questions worth 5 points each and essay questions worth 8 points each. How many essay questions are on the test?

$x = \text{fill-in blank}$ $y = \text{essay}$

$5(x + y = 24)$

$5x + 8y = 150$

$$\begin{array}{r} (-) 5x + 5y = 120 \\ 5x + 8y = 150 \\ \hline -3y = -30 \\ \frac{-3y}{-3} = \frac{-30}{-3} \\ y = 10 \end{array}$$

10 essay questions

Getting Ready for Factoring

Simplify the following:

▪ $a(3a + 7)$	=	$3a^2 + 7a$
▪ $-2m(m^2 + 6m - 1)$	=	$-2m^3 - 12m^2 + 2m$
▪ $4x^3y(x^2 - 2y)$	=	$4x^5y - 8x^3y^2$

WHAT IS FACTORING?

seperating a polynomial back into a product

$$\boxed{4a^2 + 8a} \rightarrow \boxed{4a(a+2)}$$

(Simplest Form) (Factored Form)

Polynomials that cannot be factored are called **prime**.

Factoring: The process of finding what multiples together to get an expression; splitting an expression into a multiplication of simpler expressions

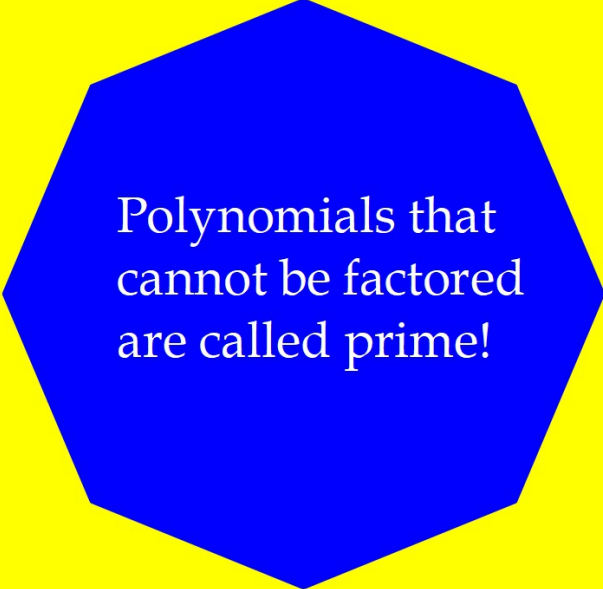
4 Types of Factoring

1.) GCF - *The first step of all factoring exercises!*

2.) Grouping

3.) AC Method

4.) Difference of Squares



Polynomials that cannot be factored are called prime!

The "How" behind the GCF:

FACTORING A GCF (Greatest Common Factor)	There are several factoring methods; the approach depends on the polynomial. We will start by identifying and factoring out the greatest common factor (GCF) of the polynomial.
	Steps for Factoring a GCF:
	Step 1: Identify the GCF of the polynomial: <ul style="list-style-type: none">• Check the coefficients for a GCF.• Now look at the variables. A variable must be present in all terms to be a GCF. If a variable is present in all terms, take the one with the smallest exponent. Step 2: Divide each term by the GCF and leave the remaining factors in parentheses Step 3: Check your work by distributing!

1.) $3x + 12$

3x: 1, **3**, x

12: 1, 2, 2, 6, **3**, 4

$$\frac{3x}{3} + \frac{12}{3}$$

Whatever you circle on **both lists** is your greatest common factor!

GCF: 3 Factored Expression: $3(x+4)$

2.) $7y - 7$

7y: 1, **7**, y

7: 1, **7**

$$\frac{7y}{7} - \frac{7}{7}$$

Whatever you circle on **both lists** is your greatest common factor!

GCF: 7 Factored Expression: $7(y-1)$

$$3. \frac{8m + 36n}{4}$$

$$4(2m + 9n)$$

GCF

→ Remainder

$$4. \frac{5x + 30y}{5}$$

$$5(x + 6y)$$

$$7. 21cd - 3d$$

$$21cd: 1, 21, 3, 7, c, d$$

$$3d: 1, 3, d$$

$$\frac{21cd}{3d} - \frac{3d}{3d}$$

$$3d(7c - 1)$$

$$8. 14gh - 18h$$

$$14gh: 1, 14, 2, 7, g, h$$

$$18h: 1, 18, 2, 9, 3, 6, h$$

$$\frac{14gh}{2h} - \frac{18h}{2h}$$

$$2h(7g - 9)$$

$$11. \frac{ab - a}{a}$$

$$a(b - 1)$$

$$12. x^2y + 3xy$$

$$x^2y: x, x, y$$

$$3xy: 1, 3, x, y$$

$$\frac{x^2y}{xy} + \frac{3xy}{xy} = xy(x + 3)$$

$$13. 5x - 13y$$

PRIME!

~~$$1(5x - 13y)$$~~

$$14. \frac{18a^2bc^2 - 48abc^3}{abc^2}$$

~~$$\frac{18a^2bc^2}{abc^2} - \frac{48abc^3}{abc^2}$$~~

$$abc^2(3a - 8c)$$

$$17. \frac{6y^4}{2y^2} + \frac{14y^3}{2y^2} - \frac{10y^2}{2y^2}$$

$$2y^2(3y^2 + 7y - 5)$$

$$18. 12a^5b^2 - 36a^4b^3 - 6a^2b^2$$

$$21. \frac{m^3n}{mn} - \frac{m^2n^2}{mn} + \frac{5mn^3}{mn}$$

$$mn(m^2 - mn + 5n^2)$$

$$22. 16xy^2 + 28xy + 8y$$

Recap – Rules for finding a GCF of a polynomial:

- 1) Look at **coefficients** first.
- 2) A **variable must be common to all terms** to be a GCF.
- 3) If a variable is common to all terms, take the one with the **smallest exponent**.
- 4) Divide all terms by the GCF to get the remainder in parentheses.

