

What's Going On?

Checking In

Yesterday...

Minds on

Back It Up!

Action!

Factoring

Consolidation

Board Work

Learning Goal - I will be able to factor various polynomials.

Summary Slide

To square a binomial, use one of the following patterns.

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a - b)^2 = a^2 - 2ab + b^2$$

To find the product of the sum and difference of two terms (a difference of squares) use the following pattern.

$$(a + b)(a - b) = a^2 - b^2$$

$(x+1)(x+1)$

\downarrow

$(x+1)^2$

$(4)(4)$

$$\begin{aligned} & (x+1)(x+1) \\ &= x^2 + \underbrace{x+x}_{2x} + 1 \end{aligned}$$

$$\begin{aligned} & (3x-2)(3x-2) & (3x-2)^2 \\ & = 9x^2 - 6x - 6x + 4 & = 9x^2 - 12x + 4 \\ & = 9x^2 - 12x + 4 \end{aligned}$$

$$\begin{array}{l} \cancel{(3x)}^2 \quad 2(3x)(-2) \\ \cancel{3}^2 x^2 \quad -12x \end{array}$$

$$\begin{aligned}(x-3)^2 &= (x-3)(x-3) \\ &= x^2 - 3x - 3x + 9 \\ &= x^2 - 6x + 9\end{aligned}$$

$$\begin{aligned}(x-3)^2 &= (x)^2 + 2(x)(-3) \\ &\quad + (-3)^2 \\ &= x^2 - 6x + 9\end{aligned}$$

$$(3x+5)(3x-5)$$
$$= 9x^2 - \cancel{15x} + \cancel{15x} - 25$$

Minds on

Back It Up

Expand

$$3(x + y)$$

$$= 3x + 3y$$

FACTOR

$$3x + 3y$$

$$= 3(x + y)$$

Minds on

Back It Up

Expand

$$3(x + y)$$

$$= 3x + 3y$$

F A C T O R

$$3x + 3y$$

$$= 3(x + y)$$

Today we will be learning how to 'factor' various polynomials.

Basically, we will be working backwards from the expanded form.

Action!

Factoring

Factor.

$$8x^3 - 6x^2y^2 + 4x^2y$$

The GCF of 8, 6, 4 is 2 !

The GCF of $x^3, x^2y^2,$
and x^2y is x^2

Our monomial common factor is $2x^2$

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

Monomial Common Factor

To factor this polynomial:

1. Find the greatest common factor (GCF) of the coefficients.
2. Find the GCF of the variable factors.
3. "Factor out" the monomial common factor.

- Divide each term by the MCF

$$\frac{8x^3}{2x^2} = 4x \quad \frac{6x^2y^2}{2x^2} = 3y^2 \quad \frac{4x^2y}{2x^2} = 2y$$

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1(a, e, g, h)

2(a, e, k, l)

$$\begin{aligned} \text{l.a)} \quad & 5x + 25 \\ & = 5(x + 5) \end{aligned}$$

$$\begin{aligned} \text{e)} \quad & 25x^2 + 10x \\ & = 5x(5x + 2) \end{aligned}$$

$$\begin{aligned} \text{g)} \quad & 5pqr - pqs - 10prt \\ & pq(5r - s - 10t) \end{aligned}$$

$$\begin{aligned} \text{h)} \quad & 2x^2 - 2x - 6 \\ & = 2(x^2 - x - 3) \end{aligned}$$

$$\begin{aligned} \text{2.a)} \quad & 9a^3 + 27b^2 \\ & = 9(a^3 + 3b^2) \end{aligned}$$

$$\text{e)} \quad 6rst + 3rs - 7t$$

This cannot
be factored!

$$\begin{aligned} \text{k) } & 27a^2b^3 + 9a^2b^2 - 18a^3b^2 \\ & = 9a^2b^2(3b + 1 - 2a) \end{aligned}$$

$$\begin{aligned} \text{l) } & 6m^3n^2 + 18m^2n^3 - 12mn^2 \\ & = 6mn^2(m^2 + 3mn - 2) \end{aligned}$$

Action!

Factoring

Factor.

$$2x(z + 1) + 3y(z + 1)$$

→ Our binomial common factor is $(z + 1)$

$$= (z + 1)(2x + 3y)$$

Binomial Common Factor

To factor this polynomial:

1. Identify the binomial that is common to both portions of the polynomial. This is the binomial common factor.
2. Factor out the binomial common factor from each part.

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#3

$$\begin{aligned} a) & 5x(a+b) + 3(a+b) \\ &= (a+b)(5x+3) \end{aligned}$$

$$\begin{aligned} e) & 4t(m+7) + (m+7) \\ &= (m+7)(4t+1) \end{aligned}$$

$$f) 3t(x-y) - (x+y)$$

different

This cannot be factored

Action!

Factoring

Factor.

$$\begin{aligned}
 & \underbrace{2m^2 - 6m} - \underbrace{3t + mt} \\
 & = \underbrace{2m^2 - 6m} - \underbrace{3t + mt} \\
 & = 2m(m-3) + t(-3+m) \\
 & = 2m(m-3) + t(m-3) \\
 & = (2m+t)(m-3)
 \end{aligned}$$

Factoring by Grouping

To factor this polynomial:

1. Group terms that have a common factor.
2. Common Monomial Factor each pair of terms.
3. Look for a Binomial Common Factor and factor the polynomial as outlined on the previous slide.

Action!

Factoring

There is more than one route to factoring a polynomial by grouping.

Keep in mind that $x(y - z)$ is the same as $-x(z - y)$

$$\begin{array}{ccc} x(y - z) & \xleftrightarrow{=} & -x(z - y) \\ = xy - xz & & = -xz + xy \end{array}$$

Action!

Factoring

There is more than one route to factoring a polynomial by grouping.

$$2m^2 - 3t - 6m + mt$$

$$= 2m^2 + mt - 3t - 6m$$

$$= m(2m+t) + 3(-t-2m)$$

change
each sign

$$= m(2m+t) - 3(t+2m)$$

$$= (m-3)(2m+t)$$

$$2m^2 - 3t - 6m + mt$$

Consolidation

Board Work

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Consolidation

Homework

WRITE IN YOUR LOG

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1 - 4, 6 *