

Lesson 6.1 Factoring

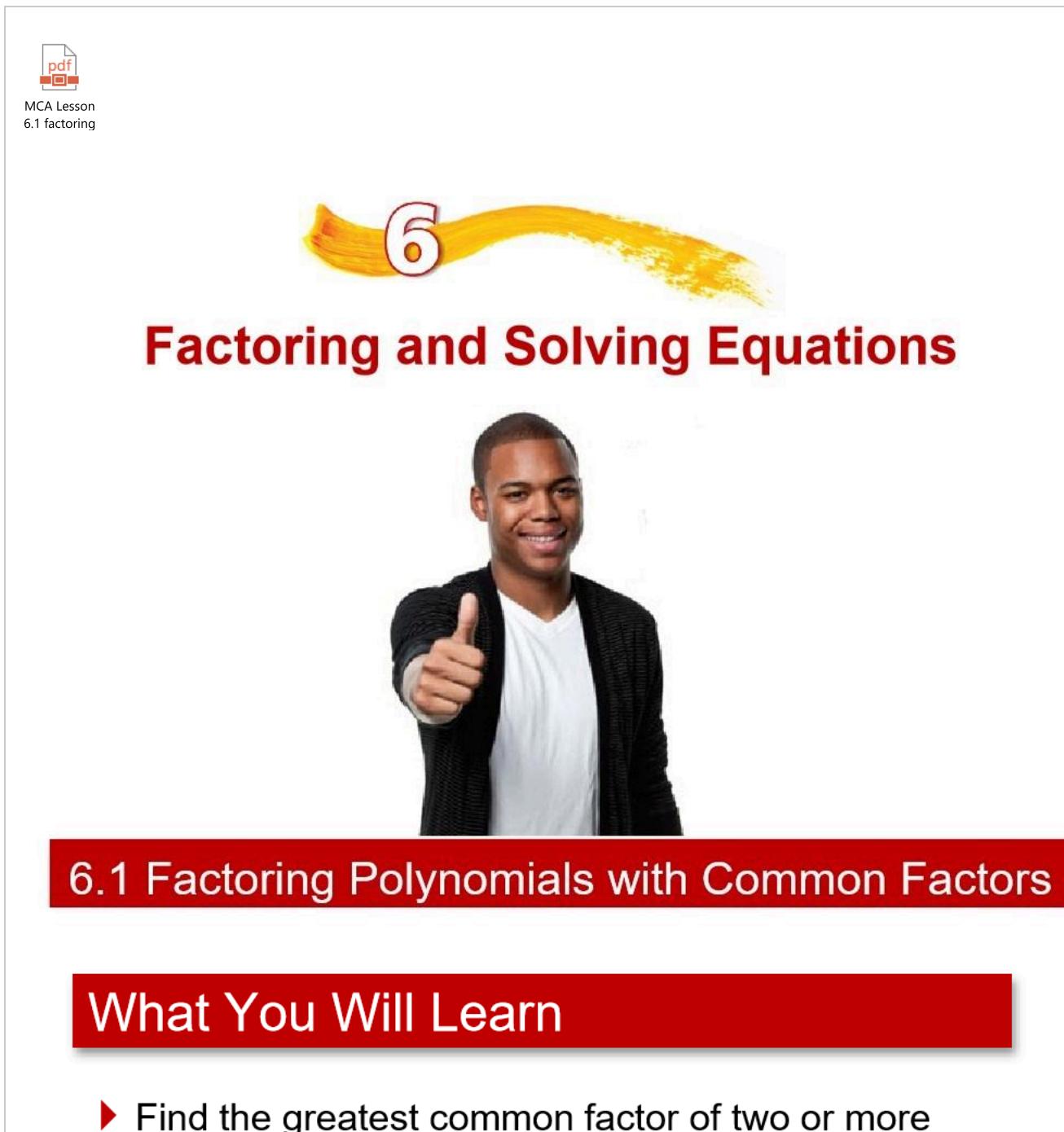
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The slide features a yellow ribbon banner with the number '6' in red. Below the banner, the title 'Factoring and Solving Equations' is displayed in large red text. A young man in a black cardigan and white shirt is smiling and giving a thumbs up. At the bottom, a red bar contains the text '6.1 Factoring Polynomials with Common Factors'. Another red bar at the bottom contains the text 'What You Will Learn'. A bullet point '► Find the greatest common factor of two or more' is listed.

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MCA Lesson
6.1 factoring

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Factoring and Solving Equations



6.1 Factoring Polynomials with Common Factors

What You Will Learn

- Find the greatest common factor of two or more

expressions.

- ▶ Factor out the greatest common monomials factor from polynomials.
- ▶ Factor polynomials by grouping.

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Greatest Common Factor

You have used the Distributive Property to multiply polynomials.

In this chapter, you will study the *reverse* process, which is **factoring**.

Multiplying Polynomials

$$\begin{array}{ccc} \text{Factor} & \text{Factor} & \xrightarrow{\hspace{1cm}} \\ 2x(7 - 3x) & & 14x - 6x^2 \\ \text{Product} & & \end{array}$$

Factoring Polynomials

$$\begin{array}{ccc} \text{Product} & \xrightarrow{\hspace{1cm}} & \text{Factor} \quad \text{Factor} \\ 14x - 6x^2 & & 2x(7 - 3x) \\ X \quad X \cdot X & & \end{array}$$

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Example 1 – Finding the Greatest Common Factor

Find the greatest common factor of $5x^2y^2$ and $30x^3y$, first factor each term.

$$5x^2(u/u + b/x)$$



Find the greatest common factor of $8x^5$, $20x^3$, and $16x^4$, first factor each term.

$$4x^3$$

Factor out the greatest common monomial factor from $6x - 18$

$$3(2x - 6)$$

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Example 4 – Greatest Common Monomial Factor

Factor out the greatest common monomial factor from $10y^3 - 25y^2$.

$$5y^2(2y - 5)$$

Factor out the greatest common monomial factor from $45x^3 - 15x^2 - 15$.

$$15(3x^3 - x^2 - 1)$$

Factor out the greatest common monomial factor from

$$\underline{3xy^2} - \underline{15x^2y} + \underline{12xy}$$

$$3xy(y - 5x + 4)$$

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Example 7 – Greatest Common Monomial Factor

Factor out the greatest common monomial factor from

$$35y^3 - 7y^2 - 14y \quad 7y(5y^2 - y - 2)$$

Factor the polynomial $-2x^2 + 8x - 12$ $-2(x^2 - 4x + 6)$

Example 9 – Common Binomial Factors

Factor each expression.

a. $5x^2(7x - 1) - 3(7x - 1)$

$$(5x^2 - 3)(7x - 1)$$

b. $2x(3x - 4) + 1(3x - 4)$

$$(2x + 1)(3x - 4)$$

c. $3y^2(y - 3) + 4(3 - y)$

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

Factoring by Grouping 2

But suppose you *group* the first two terms together and the last two terms together.

$$x^3 + 2x^2 - 3x + 6 = \underline{(x^3 + 2x^2)} + \underline{(3x + 6)} \quad \text{Group terms.}$$

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

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

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Example 10 – Factoring by Grouping

Factor $x^3 + 2x^2 + x + 2$.

$$x^3 + x \quad 2x^2 + 2$$
$$x(x^2 + 1) + 2(x^2 + 1)$$
$$(x+2)(x^2 + 1)$$

Factor $3x^2 - 12x - 5x + 20$.

$$3x(x - 4) \quad -5(x - 4) \quad (3x - 5)(x - 4)$$

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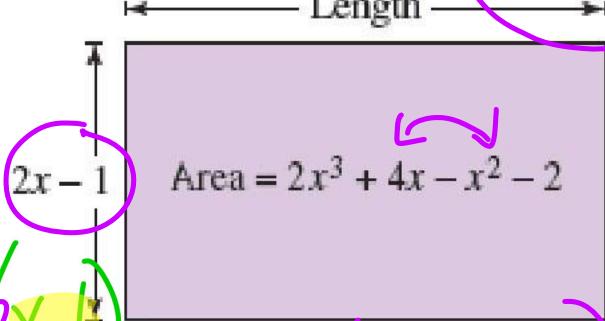
Example 12 – Geometry: Area of a Rectangle

The area of a rectangle of width $(2x - 1)$ feet is $(2x^3 + 4x - x^2 - 2)$ square feet, as shown below. Factor this expression to determine the length of the rectangle.

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

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

$$2(2x - 1)$$



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