

2-2 Factoring (GCF and Grouping)

Objectives:

I can factor the greatest common factor out of an expression.

I can factor an expression by grouping.

Find the greatest common factor (GCF) of the terms

$$\begin{array}{l} \underline{4x}, \underline{12} \\ 4x = \textcircled{2}\textcircled{2}x \\ 12 = 3\textcircled{2}\textcircled{2} \\ \text{GCF} = 2 \cdot 2 \\ = \textcircled{4} \end{array} \left\{ \begin{array}{l} \underline{6x^3}, \underline{12x^2}, \underline{15x} \\ 2\textcircled{3}x \cdot x \cdot x \\ 2 \cdot 2 \textcircled{3}x \cdot x \\ \textcircled{3} \textcircled{5} \textcircled{x} \\ \text{GCF} = \textcircled{3x} \end{array} \right.$$

$$\begin{array}{l} \underline{4x^3y^4}, \underline{8x^2y^3}, \underline{12xy^2} \\ 4x^3y^4 = \textcircled{2}\textcircled{2}x \cdot x \cdot x \cdot \textcircled{y}\textcircled{y} \cdot y \cdot y \\ 8x^2y^3 = \textcircled{2}\textcircled{2}\textcircled{2} \cdot \textcircled{x} \cdot \textcircled{x} \cdot \textcircled{y}\textcircled{y} \cdot y \\ 12xy^2 = \textcircled{2}\textcircled{2} \cdot 3 \cdot \textcircled{x} \cdot \textcircled{y}\textcircled{y} \\ \text{GCF} = 2 \cdot 2 \cdot x \cdot y \cdot y \\ = \textcircled{4xy^2} \end{array}$$

Factor out the GCF

$$\underline{4a^2b^2} - \underline{10ab^3} + \underline{18a^3b^4}$$

$$4a^2b^2 = \textcircled{2} \cdot \textcircled{2} \cdot \textcircled{a} \cdot \textcircled{a} \cdot \textcircled{b} \cdot \textcircled{b}$$

$$-10ab^3 = \underline{-1} \cdot \textcircled{2} \cdot \underline{5} \cdot \textcircled{a} \cdot \textcircled{b} \cdot \textcircled{b} \cdot \underline{b}$$

$$18a^3b^4 = \textcircled{2} \cdot \underline{3} \cdot \underline{3} \cdot \textcircled{a} \cdot \underline{a} \cdot \underline{a} \cdot \textcircled{b} \cdot \textcircled{b} \cdot \underline{b} \cdot \underline{b}$$

GCF:
 $2ab^2$

$$\boxed{2ab^2 (2a - 5b + 9a^2b^2)}$$

$$4a^2b^2 - 10ab^3 + 18a^3b^4$$

Check!
Multiply:

Factor out the GCF

$$\underline{6y^3} - \underline{14y^2} + \underline{10y}$$

$$\textcircled{2} \cdot \underline{3} \cdot \textcircled{y} \cdot \underline{y} \cdot \underline{y}$$

$$\underline{-1} \cdot \textcircled{2} \cdot \underline{7} \cdot \textcircled{y} \cdot \underline{y}$$

$$\textcircled{2} \cdot \underline{5} \cdot \textcircled{y}$$

GCF: $2y$

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

$$6y^3 - 14y^2 + 10y$$

Factor out the GCF

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

$$\text{GCF: } 2x$$

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

Factor out the GCF

$$-2b^3 + 10b^2 + 8b$$

Factor out the GCF

$$-5y^2 + 10y$$

Factor out the Greatest Common Binomial Factor

$$\underbrace{4x(x-3)}_{\text{red}} + \underbrace{5(x-3)}_{\text{blue}}$$

GCF: $(x-3)$

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

Factor out the Greatest Common Binomial Factor

$$4a(a-3) + 3(a-3)$$

~~GCF~~ · GCF: $(a-3)$

$$(a-3)(4a+3)$$

Factor by grouping

$$(4x - 4y) + (ax - ay)$$
$$4(x-y) + a(x-y)$$
$$(x-y)(4+a)$$

Factor by grouping

$$(6x^2 + 9x)(-10x - 15)$$
$$\textcircled{3x}(\underline{2x + 3}) \textcircled{-5}(\underline{2x + 3})$$

$$(2x + 3)(3x - 5)$$

Factor COMPLETELY by grouping

$$6x^2 + 8x + 18x + 24$$

Factor by grouping

$$6z^2 + 2z + 9z + 3$$

Factor by grouping

$$2x^2 + 2x + x + 1$$