

Date: _____

3.4 Common Factors**Greatest Common Factor (GCF):**

Largest Factor shared by two or more terms. (Careful not to confuse with LCM)

Ex. State the GCF of 12 & 28

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

$$28: 1, 2, 4, 7, 14, 28$$

Ex. Determine the GCF of each pair of terms:

$$x \cdot x \cdot y \quad x \cdot x \cdot y \cdot y \cdot y$$

a) $16x^2y$ and $24x^2y^3$

b) $5m^2n$ and $15mn^2$

c) $48ab^3c$ and $36a^2b^2c^2$

$$GCF = 8x^2y$$

$$GCF = 5mn$$

$$GCF = 12ab^2c$$

variable common
to all terms
& smaller
exponent

Recall distribution: $2x(3x^2 - 4) = 6x^3 - 8x$

GCF Factoring is the reverse process: $6x^3 - 8x = 2x(3x^2 - 4)$

To factor means to write as a product.

Ex. Write each polynomial in factored form.

$$\begin{array}{l} \text{a) } 16r^2 - 20r \\ = 4r(4r - 5) \end{array}$$

$$\begin{array}{l} \text{c) } 27r^2s^2 - 18r^3s^2 - 36rs^3 \\ = 9rs^2(3r - 2r^2 - 4s) \end{array}$$

$$\begin{array}{l} \text{b) } 4x^3y^2 - 14x^2 \\ = 2x^2(2xy^2 - 7) \end{array}$$

$$\begin{array}{l} \text{d) } 12n^5p^4 + 8n^4p^3 - 4n^3p^2 \\ = 4n^3p^2(3n^2p^2 + 2np - 1) \end{array}$$

Recall double distribution: $(x - 3)(2x + y) = x(2x + y) - 3(2x + y)$ Step 1

$$= 2x^2 + xy - 6x - 3y \quad \text{Step 2}$$

We can reverse step 1 by factoring a binomial factor:

Ex. Factor each polynomial.

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

$$\boxed{(x-4) \cdot (3x+5)}$$

GCF $\nearrow$ $\boxed{(3x+5)(x-4)}$

We can reverse step 2 by group factoring:

Ex. Factor each polynomial.

a) $y^2 + 8xy + 2y + 16x$

$$= y(y + 8x) + 2(y + 8x)$$

$$= (y + 8x)(y + 2)$$

$$= (8x + y)(y + 2)$$

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

$$= \boxed{(x+5)(4 - 3x)}$$

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

$$= \boxed{(-3x + 4)(x + 5)}$$

b) $a^2 - a + 3ab - 3b$

$$a(a-1) + 3b(a-1)$$

$$(a-1)(a+3b)$$