

7-2 Factoring by GCF

□ Factoring is the opposite/reverse of the Distributive Property.

*Factoring "undoes" the Distributive Property.

DISTRIBUTIVE PROPERTY: $2(x+4) \rightarrow 2x+8$

FACTORING: $2x+8 \rightarrow 2(x+4)$

□ FACTOR $8x^3 - 4x^2 - 16x$

STEP 1: Find the GCF of all terms.

$8x^3$: 1, 2, 4, 8, $x \times x \times x$
 $-4x^2$: -1, 1, 2, 4, $x \times x$
 $-16x$: -1, 1, 2, 4, 8, 16, x
GCF = $4x$

STEP 2: "Reverse" distribute/divide out the GCF from each term.

$$4x(2x^2 - x - 4)$$

STEP 3: Check by re-distributing the GCF.

$$4x(2x^2 - x - 4) \\ 8x^3 - 4x^2 - 16x \checkmark$$

EXAMPLES:

1. $15b^3 + 10b$

GCF = $5b$

$$5b(3b^2 + 2)$$

$$15b^3 + 10b \checkmark$$

2. $-14x - 12x^2$

GCF = $-2x$

$$-2x(7 + 6x)$$

$$-14x - 12x^2 \checkmark$$

3. $4x^3 - 16x^2$

GCF = $4x^2$

$$4x^2(x - 4)$$

$$4x^3 - 16x^2 \checkmark$$

□ FACTORING OUT A BINOMIAL FACTOR

$$4. \boxed{5(x+2)} + \boxed{3x(x+2)}$$

$$\text{GCF} = (x+2)$$

$$\boxed{(x+2)(5+3x)}$$

$$5. -2b(b^2+1) + 1(b^2+1)$$

$$\text{GCF} = (b^2+1)$$

$$\boxed{(b^2+1)(-2b+1)}$$

$$6. 2(z-6) - 4z(z-6)$$

$$\text{GCF} = (z-6)$$

$$\boxed{(z-6)(2-4z)}$$

$$6. 3y(y^3+4) + 7(y^3+4)$$

$$\text{GCF} = (y^3+4)$$

$$\boxed{(y^3+4)(3y+7)}$$

□ FACTORING BY GROUPING

$$7. (6h^4 - 4h^3) + (12h - 8)$$

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

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

$$(3h-2)2(h^3+2)$$

$$\boxed{2(3h-2)(h^3+2)}$$

$$9. (5s^3 - 5s^2) + (-2s + 2)$$

$$5s^2(s-1) + 2(-s+1)$$

$$5s^2(s-1) - 2(s-1)$$

$$\boxed{(s-1)(5s^2-2)}$$

$$8. (5y^4 - 15y^3) + (y^2 - 3y)$$

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

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

$$(y-3)y(5y^2+1)$$

$$\boxed{y(y-3)(5y^2+1)}$$

$$10. (4x^2 - 12x) + (12x - 36)$$

$$4x(x-3) + 12(x-3)$$

$$(x-3)(4x+12)$$

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

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