

Name Key

Date \_\_\_\_\_

Factoring Polynomials by Grouping

Find the Greatest Common Factor (GCF) for each binomial.

- 1)  $(3x^2 + 6x)$  GCF =  $3x$     2)  $(2y + 14by)$  GCF =  $2y$     3)  $(7bx^2 + 21abx)$  GCF =  $7bx$   
 ~~$(3x^2)$ ,  $(6x)$~~      ~~$(2y)$ ,  $(14by)$~~      ~~$(7bx^2)$ ,  $(21abx)$~~

Factor the Following Polynomials by Grouping and Check Your Answer

4)  $x^4 + x^3 + 5x^2 + 5x$  (Group using Like numbers)  
 $(x^4 + x^3) + (5x^2 + 5x)$   
 $\swarrow$  GCF =  $x^3$      $\swarrow$  GCF =  $5x$   
 $x^3(x+1) + 5x(x+1)$   
 $\swarrow$  GCF =  $x+1$   
 $(x+1)(x^3+5x)$

Check  
 F  $x(x^3) = x^4$   
 O  $x(5x) = 5x^2$   
 I  $1(x^3) = x^3$   
 L  $1(5x) = 5x$

$x^4 + 5x^2 + x^3 + 5x$   
 or  
 $x^4 + x^3 + 5x^2 + 5x$  ✓

5)  $2x^3 + x^2 + 2x + 1$  (Group using Like numbers)  
 $2x^3 + 2x + x^2 + 1$   
 $(2x^3 + 2x) + (x^2 + 1)$   
 $\swarrow$  GCF =  $2x$      $\swarrow$  GCF =  $1$   
 $2x(x^2+1) + 1(x^2+1)$   
 $\swarrow$  GCF =  $x^2+1$   
 $(x^2+1)(2x+1)$

Check  
 F  $x^2(2x) = 2x^3$   
 O  $x^2(1) = x^2$   
 I  $1(2x) = 2x$   
 L  $1(1) = 1$

$2x^3 + x^2 + 2x + 1$  ✓

6)  $7abx^5 + 7abx^4 - 3cx^3 - 3cx^2$   
 $(7abx^5 + 7abx^4) + (-3cx^3 - 3cx^2)$   
 $\swarrow$  GCF =  $7abx^4$      $\swarrow$  GCF =  $-3cx^2$   
 $7abx^4(x+1) - 3cx^2(x+1)$   
 $\swarrow$  GCF =  $x+1$   
 $(x+1)(7abx^4 - 3cx^2)$

Check  
 F  $x(7abx^4) = 7abx^5$   
 O  $x(-3cx^2) = -3cx^3$   
 I  $1(7abx^4) = 7abx^4$   
 L  $1(-3cx^2) = -3cx^2$

$7abx^5 - 3cx^3 + 7abx^4 - 3cx^2$   
 $7abx^5 + 7abx^4 - 3cx^3 - 3cx^2$  ✓

over

7)  $6x^3 + 2x^2 + 18x + 6$   
 $(6x^3 + 2x^2) + (18x + 6)$   
 $\swarrow$  GCF =  $2x^2$      $\swarrow$  GCF =  $6$   
 $2x^2(3x+1) + 6(3x+1)$   
 $\swarrow$  GCF =  $3x+1$   
 $(3x+1)(2x^2+6)$

Check  
 F  $3x(2x^2) = 6x^3$   
 O  $3x(6) = 18x$   
 I  $1(2x^2) = 2x^2$   
 L  $1(6) = 6$   
 $6x^3 + 18x + 2x^2 + 6$   
 $6x^3 + 2x^2 + 18x + 6$  ✓

8) This time, I am grouping differently (Does it matter?)

$$3x^3 + 2x^2 + 15x + 10$$

$$(3x^3 + 15x) + (2x^2 + 10)$$

$$\swarrow \text{GCF} = 3x \quad \swarrow \text{GCF} = 2$$

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

$$\uparrow \text{GCF} = x^2 + 5$$

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

Check

$$3x^3 + 2x^2 + 15x + 10 \checkmark$$

$$F \ x^2(3x) = 3x^3$$

$$O \ x^2(2) = 2x^2$$

$$I \ 5(3x) = 15x$$

$$L \ 5(2) = 10$$

$$3x^5 + 7x^4 - 6x^3 - 14x^2$$

$$(3x^5 + 7x^4) + (-6x^3 - 14x^2)$$

$$\swarrow \text{GCF} = x^4 \quad \swarrow \text{GCF} = -2x^2$$

$$x^4(3x + 7) - 2x^2(3x + 7)$$

$$\uparrow \text{GCF} = 3x + 7$$

$$(3x + 7)(x^4 - 2x^2)$$

Check

$$F \ 3x(x^4) = 3x^5$$

$$O \ 3x(-2x^2) = -6x^3$$

$$I \ 7(x^4) = 7x^4$$

$$L \ 7(-2x^2) = -14x^2$$

$$3x^5 - 6x^3 + 7x^4 - 14x^2$$

$$\downarrow$$

$$3x^5 + 7x^4 - 6x^3 - 14x^2 \checkmark$$

10)  $35abcx^4 + 20abx^3 - 21cx - 12$

$$(35abcx^4 - 21cx) + (20abx^3 - 12)$$

$$\swarrow \text{GCF} = 7cx$$

$$\swarrow \text{GCF} = 4$$

$$7cx(5abx^3 - 3) + 4(5abx^3 - 3)$$

$$\uparrow \text{GCF} = 5abx^3 - 3$$

$$(5abx^3 - 3)(7cx + 4)$$

Check

$$F \ 5abx^3(7cx) = 35abcx^4$$

$$O \ 5abx^3(4) = 20abx^3$$

$$I \ -3(7cx) = -21cx$$

$$L \ -3(4) = -12$$

$$35abcx^4 + 20abx^3 - 21cx - 12 \checkmark$$