

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Notes

Algebra Section 9.8

Pages 606-613



**Goal:** “You will factor polynomials completely”

**Ex:**  $2x(x + 4) - 3(x + 4)$

**Ex:**  $4x(x - 3) + 5(x - 3)$

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

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

**Ex:**  $3y^2(y - 2) + 5(2 - y)$

**Ex:**  $2y^2(y - 5) - 3(5 - y)$

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

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

**Ex:**  $x(x - 2) + (x - 2)$

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

**Factor by grouping:**

**Ex:**  $x^3 + 3x^2 + 5x + 15$

**Ex:**  $y^2 + y + yx + x$

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

$(y + 1)(y + x)$

**Ex:**  $a^3 + 3a^2 + a + 3$

**Ex:**  $x^3 + 2x^2 + 8x + 16$

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

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

**Ex:**  $r^2 + 4r + rs + 4s$

$(r + 4)(r + s)$

**Factoring by grouping (rearrange first):**

**Ex:**  $x^3 - 6 + 2x - 3x^2$

**Ex:**  $y^2 + 2x + yx + 2y$

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

( $y + 2$ )( $y + x$ )

**Ex:**  $x^3 - 10 - 5x + 2x^2$

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

**Factor completely:**

**Ex:**  $n^2 + 2n - 3$

**Ex:**  $4x^3 - 44x^2 + 96x$

( $n + 3$ )( $n - 1$ )

4 $x(x - 8)(x - 3)$

**Ex:**  $50h^4 - 2h^2$

**Ex:**  $3x^3 - 12x$

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

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

**Ex:**  $2y^3 - 12y^2 + 18y$

**Ex:**  $m^3 - 2m^2 - 8m$

2 $y(y - 3)^2$

$m(m + 2)(m - 4)$

**Ex:**  $x^2 - 4x + 3$

**Ex:**  $3x^3 - 21x^2 - 54x$

( $x - 3$ )( $x - 1$ )

3 $x(x - 9)(x + 2)$

**Ex:**  $x^4 - x^2 + 3x^2 - 3$

**Ex:**  $8d^3 + 24d$

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

8 $d(d^2 + 3)$

**Solve:**

**Ex:**  $3x^3 + 18x^2 = -24x$

$3x(x+4)(x+2)$   
 $x = 0 \quad x = -4 \quad x = -2$

**Ex:**  $w^3 - 8w^2 + 16w = 0$

$w(w-4)(w-4)$   
 $w = 0 \quad w = 4$

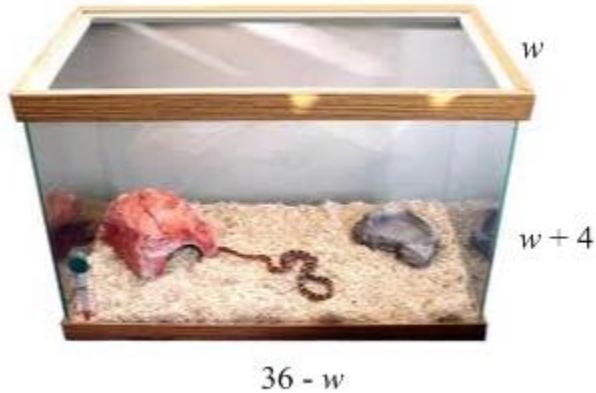
**Ex:**  $c^3 - 7c^2 + 12c = 0$

$c(c-3)(c-4)$   
 $c = 0 \quad c = 3 \quad c = 4$

**Ex:**  $2x^3 - 18x^2 = -36x$

$2x(x-6)(x-3)$   
 $x = 0 \quad x = 6 \quad x = 3$

**Terrarium** A terrarium in the shape of a rectangular prism has a volume of 4608 cubic inches. Its length is more than 10 inches. The dimensions of the terrarium are shown. Find the length, width and the height of the terrarium.



$$\begin{aligned}w(w+4)(36-w) &= 4608 \\(w^2 + 4w)(36-w) &= 4608 \\36w^2 - w^3 + 144w - 4w^2 &= 4608 \\-w^3 + 32w^2 + 144w - 4608 &= 0 \\-1(w^3 - 32w^2 - 144w + 4608) &= 0 \\-1(w^2 - 144)(w - 32) &= 0 \\-1(w + 12)(w - 12)(w - 32) &= 0 \\w = -12 \quad w = 12 \quad w = 32\end{aligned}$$

Length has to be more than ten inches so  $w$  cannot = 32  
 $w$  must be 12. 12 in by 16 in by 24 in