Algebra 2 Name _____

5-3a Solving Polynomial Equations Date _____ **A#7**

Goal: (a) To solve polynomial equations by factoring
(b) To solve polynomial equations by graphing

Warm Up: Factor each of the following

a. $2x^2 - 5x - 3$ b. $4x^2 - 81$ c. $4x^2 - 20x + 25$

Example 1 GCF and Other: Solve the polynomial equation by factoring.

$2x^3 - 4x^2 = 48x$	Original Problem
	Standard form
	Factor GCF
	Factor by snowflake
	Zero-Product Property

Example 2 Factoring: What are the real or imaginary solutions to each polynomial equation?

$x^4 - 12x^2 = 64$	Original Problem
	Standard form
	Factor by snowflake (using x^2)
	Zero-Product Property

take note

Summary Polynomial Factoring Techniques

Factoring Out the GCF: Factor out the greatest common factor of all the terms.

6. $12x^6 + 8x^4 - 48x^3 = \square(3x^3 + \square - \square)$

Quadratic Trinomials
For $ax^2 + bx + c$, find factors with product ac and sum b.

7. $2x^2 + 11x + 15 = (2x + \square)(x + \square)$

Perfect Square Trinomials
$a^2 + 2ab + b^2 = (a + b)^2$
$a^2 - 2ab + b^2 = (a - b)^2$

8. $x^2 - \square + 49 = (x - \square)^2$

Difference of Squares
$a^2 - b^2 = (a + b)(a - b)$

9. $16x^2 - 11 = (\square + \sqrt{11})(4x - \square)$

Factoring by Grouping: $ax + ay + bx + by = a(x + y) + b(x + y) = (a + b)(x + y)$

10. $x^3 - 3x^2 + x - 3 = \square(x - 3) + \square(x - 3) = (\square + 1)(x - \square)$

Example 3: Factor by Grouping

$2x^3 + 8x^2 + 4x = -16$ Original Problem

Standard form

Factor each half

Factor the whole

Zero-Product Property

Practice: Solve by factoring

$x^3 + 2x^2 - 3x - 6 = 0$

Sum or Difference of Cubes
$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

11. $8x^3 + 27 = (\quad + 3)(4x^2 - \quad + \quad)$

Example 4 Sum or Difference of Cubes: Solve by factoring

a. $x^3 + 512 = 0$

Original problem

Rewrite as cubes

Substitute into formula

Zero-Product Property

Solve using mad skills

Perfect Cubes

$1^3 =$
$2^3 =$
$3^3 =$
$4^3 =$
$5^3 =$
$6^3 =$
$7^3 =$
$8^3 =$
$9^3 =$
$10^3 =$

a. $27x^3 - 1 = 0$

Original problem

Rewrite as cubes

Substitute into formula

Zero-Product Property

Solve using mad skills