

Name: _____ Hour: _____ Date: _____

Factoring Using the Quadratic Pattern

What is the Quadratic Pattern?	When do I use the Quadratic Pattern?
Factor non-quadratic polynomials as if they were quadratic.	$ax^4 + bx^2 + c$ Ex: $x^4 + 8x^2 + 7$ $x^4 - 10x^2 + 25$

Factor the following polynomials using the Quadratic Pattern:

1) $x^4 + 7x^2 + 6$

$$\begin{array}{r} 6 \\ \times 1 \\ \hline 7 \end{array}$$

$$(x^2 + 6)(x^2 + 1)$$

2) $x^4 - 3x^2 - 10$

$$\begin{array}{r} -10 \\ \times 2 \\ \hline -5 \\ \times 3 \end{array}$$

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

Solve on the back

Sometimes we need to factor further than we did for the two problems above. We need to factor completely

when one of our factors contains a difference of squares binomial.

Examples of the Difference of Squares:

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

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

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

$$x^2 - 16 = (x + 4)(x - 4)$$

$$x^2 - 25 = (x + 5)(x - 5)$$

$$x^2 - 36 = (x + 6)(x - 6)$$

Factor the following polynomials. Make sure to factor completely.

1) $x^4 - 2x^2 - 8$

$$\begin{array}{r} -8 \\ \times 2 \\ \hline -4 \\ \times -2 \end{array}$$

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

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

2) $x^4 - 5x^2 - 36$

$$\begin{array}{r} -36 \\ \times 4 \\ \hline -9 \\ \times -5 \end{array}$$

$$(x^2 - 9)(x^2 + 4)$$

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

3) $x^4 + 15x^2 - 16$

$$\begin{array}{r} -16 \\ \times -1 \\ \hline 16 \\ \times 15 \end{array}$$

$$(x^2 + 16)(x^2 - 1)$$

$$(x^2 + 16)(x - 1)(x + 1)$$

Solve on back

$$\textcircled{1} \quad (x^2+6)(x^2+1)$$

$$x^2+6=0$$

$$\begin{array}{r} -6 \quad -6 \\ \hline \end{array}$$

$$\sqrt{x^2} = \sqrt{-6}$$

$$x = \pm i\sqrt{6}$$

$$x^2+1=0$$

$$\begin{array}{r} -1 \quad -1 \\ \hline \end{array}$$

$$\sqrt{x^2} = \sqrt{-1}$$

$$x = \pm i$$

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

$$x^2 - 5 = 0$$

$$+5 \quad +5$$

$$\sqrt{x^2 - 5}$$

$$x = \pm \sqrt{5}$$

$$x^2 + 2 = 0$$

$$-2 \quad -2$$

$$\sqrt{x^2} = \sqrt{-2}$$

$$x = \pm i\sqrt{2}$$

$$\textcircled{1} \quad (x+2)(x-2)(x^2+2)$$

$$\begin{array}{r} x+2=0 \\ -2 \quad -2 \\ \hline x=-2 \end{array}$$

$$\begin{array}{r} x-2=0 \\ \hline x=2 \end{array}$$

$$\begin{array}{r} x^2+2=0 \\ -2 \quad -2 \\ \hline \sqrt{x^2}=\sqrt{-2} \\ x=\pm i\sqrt{2} \end{array}$$

$$\textcircled{2} \quad (x^2 + 4)(x + 3)(x - 3)$$

$$x^2 + 4 = 0$$
$$\begin{array}{r} -4 \quad -4 \\ \hline \end{array}$$

$$\sqrt{x^2} = \sqrt{-4}$$

$$x = \pm 2i$$

$$x + 3 = 0$$

$$x = -3$$

$$x - 3 = 0$$

$$x = 3$$