Names (pair) _____ Date _____

Equations That Become Quadratic

Example

In $x^4 - 5x^2 + 4 = 0$ we introduce a new unknown $t = x^2$. Then $x^4 = t^2$:

$t^2 - 5t + 4 = 0 \Rightarrow t_1 = 1$, $t_2 = 4$

Back to x: $x^2 = 1$ gives $x = \pm 1$, and $x^2 = 4$ gives $x = \pm 2$. The equation has **four** solutions.

1 IN PAIRS Solve using the substitution $t = x^2$. **Student A** does the top three equations and **student B** the bottom three. Then check your partner's solutions by substituting.

	equation	t_1, t_2	solutions x	number
student A	$x^4 - 10x^2 + 9 = 0$			
	$x^4 - 13x^2 + 36 = 0$			
	$x^4 - 3x^2 - 4 = 0$			
student B	$x^4 - 17x^2 + 16 = 0$			
	$x^4 - 5x^2 - 36 = 0$			
	$x^4 + 3x^2 + 2 = 0$			

Remember

When the same expression appears both **squared** and **on its own** (e.g. x^4 and x^2, or $(x^2 - x)^2$ and $x^2 - x$), introduce a new unknown t for it. Solve the quadratic equation in t, then **go back to** x. If $x^2 = t$ and $t < 0$, there are no real solutions.

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2 IN PAIRS Solve $(x^2 - x)^2 - 8(x^2 - x) + 12 = 0$ using the substitution $t = x^2 - x$.

$t^2 - 8t + 12 = 0 \Rightarrow t_1 = \square \; t_2 = \square$

$x^2 - x = \square \Rightarrow \square$

$x^2 - x = \square \Rightarrow \square$

3 IN PAIRS Solve by substitution: $(x + 1)^2 - 5(x + 1) + 6 = 0$. Which substitution did you choose?

4 IN PAIRS How many solutions can $x^4 + bx^2 + c = 0$ have? Write one equation each with four, three, two and no solutions.

four: $\square$

three: $\square$

two: $\square$

none: $\square$

★ ON YOUR OWN **Exit card.** Solve: $x^4 - 26x^2 + 25 = 0$.