Name: KEY Date: _____

SOLVING QUADRATICS BY INVERSE OPERATIONS

Now that we have a good feeling for square roots, we can use them to help us solve special types of quadratic equations (those equations involving a squared quantity). Let's make sure we first understand a basic concept.

Exercise #1: Solve each of the following equations for all values of x. Write your answers in simplest radical form.

(a) $\sqrt{x^2} = \sqrt{16}$

$x = \pm 4$

(b) $\sqrt{x^2} = \sqrt{100}$

$x = \pm 10$

(c) $\sqrt{x^2} = \sqrt{20}$

$x = \sqrt{4 \cdot 5}$

$x = 2\sqrt{5}$

So, the key here is that the **inverse operation** to **squaring** is taking a **square root**. BUT, when you do this, you always introduce both a positive and negative answer. Squaring is a **non-reversible** process, meaning that you can't simply undo it.

Now, let's add some additional operations. Recall that we always solve equations by undoing operations in the opposite order in which they have been done. And in terms of order of operations, exponents essentially come first, so they will be "undone" last.

Exercise #2: Solve each of the following equations for all values of x by using inverse operations. In each case your final answers will be rational numbers.

(a) $2x^2 + 10 = 28$

$-10 \quad -10$

$\frac{2x^2}{2} = \frac{18}{2}$

$\sqrt{x^2} = \sqrt{9}$

$x = \pm 3$

(b) $\frac{x^2}{2} - 5 = 3$

$+5 \quad +5$

$2 \cdot \frac{x^2}{2} = 8 \cdot 2$

$\sqrt{x^2} = \sqrt{16}$

$x = \pm 4$

(c) $(x-2)^2 = 25$

$\sqrt{(x-2)^2} = \sqrt{25}$

$x - 2 = \pm 5$

$+2 \quad +2$

$x = \pm 5 + 2$

$x = -3, 7$

(d) $2(x+5)^2 - 50 = 150$

$+50 \quad +50$

$\frac{2(x+5)^2}{2} = \frac{200}{2}$

$\sqrt{(x+5)^2} = \sqrt{100}$

$x + 5 = \pm 10$

$-5 \quad -5$

$x = 5, -15$