Warmup: Solve by square roots

$4x^2 + 8 = 44$

$-8 \quad -8$

$\frac{4x^2}{4} = \frac{36}{4}$

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

$x = \pm 3$

$3x^2 - 3 = -39$

$+3 \quad +3$

$\frac{3x^2}{3} = \frac{-36}{3}$

$\sqrt{x^2} = \pm\sqrt{-12}$

$x = \pm 2i\sqrt{3}$

Warmup: Solve by square roots

$2(x+1)^2 - 4 = 36$

$+4 \quad +4$

$2(x+1)^2 = 40$

$\frac{2(x+1)^2}{2} = \frac{40}{2}$

$\sqrt{(x+1)^2} = \sqrt{20}$

$x+1 = \pm 2\sqrt{5}$

$-1 \quad -1$

$x = -1 \pm 2\sqrt{5}$

$-3(2x-3)^2 + 2 = 14$

$-2 \quad -2$

$\frac{-3(2x-3)^2}{-3} = \frac{12}{-3}$

$\sqrt{(2x-3)^2} = \sqrt{-4}$

$2x - 3 = \pm 2i$

$+3 \quad +3$

$\frac{2x}{2} = \frac{3 \pm 2i}{2}$

$x = \frac{3 \pm 2i}{2}$

1) $n^2 = -80$ $n = \pm 4i\sqrt{5}$

2) $x^2 = -57$ $x = \pm i\sqrt{57}$

3) $6x^2 = -486$ $x^2 = -81$ $x = \pm 9i$

4) $-8x^2 = 504$ $x^2 = -63$ $x = \pm 3i\sqrt{7}$

5) $6p^2 + 4 = -86$ $6p^2 = -90$ $p^2 = -15$ $p = \pm i\sqrt{15}$

6) $6n^2 - 5 = -65$ $6n^2 = -60$ $n^2 = -10$ $n = \pm i\sqrt{10}$

7) $(x-3)^2 = -16$

$x-3 = \pm 4i$

$x = 3 \pm 4i$

8) $(5x+1)^2 = -25$

$5x+1 = \pm 5i$

$5x = -1 \pm 5i$

$x = \frac{-1 \pm 5i}{5}$

9) $(x-2)^2 + 25 = 0$

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

$x-2 = \pm 5i$

$x = 2 \pm 5i$

10) $(x+1)^2 + 4 = 0$

$(x+1)^2 = -4$

$x+1 = \pm 2i$

$x = -1 \pm 2i$

11) $2(x-3)^2+10=-8$

$2(x-3)^2=-18$

$(x-3)^2=-9$ $\quad x-3=\pm 3i$

$x=3\pm 3i$

12) $-3(x-4)^2=15$

$(x-4)^2=-5$ $\quad x-4=\pm i\sqrt{5}$

$x=4\pm i\sqrt{5}$

13) $-4(6x-1)^2-5=223$

$-4(6x-1)^2=228$

$(6x-1)^2=-57$

$6x-1=\pm i\sqrt{57}$ $\quad 6x=1\pm i\sqrt{57}$

$x=\frac{1\pm i\sqrt{57}}{6}$

14) $(6x+2)^2+4=-28$

$(6x+2)^2=-32$

$6x+2=\pm 4i\sqrt{2}$

$6x=-2\pm 4i\sqrt{2}$ $\quad x=\frac{-2\pm 4i\sqrt{2}}{6}$

$x=\frac{-1\pm 2i\sqrt{2}}{3}$

$\frac{-2}{6}=\frac{-1}{3}$ $\quad \frac{1}{2}\pm\frac{2i\sqrt{2}}{3}$

$\frac{4}{6}=\frac{2}{3}$ $\quad \frac{-2}{6}\pm\frac{4i\sqrt{2}}{6}$

Quiz #4
Solving by Square Roots

E.Q.:

How do we solve quadratic equations using the quadratic formula?

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

$x^2 + 1x + 2x + 2$

$\rightarrow x^2 + 3x + 2 \leftarrow$

$ax^2 + bx + c$

standard form of a quadratic

The Quadratic Formula

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

This formula works for all **standard form** quadratic equations.

It is directly derived by completing the square on the standard form of a quadratic equation:

$$ax^2 + bx + c = 0$$

The **Quadratic Formula** is a method of solving quadratics that **works for every quadratic equation**.

-In order to set up quadratic formula, we need our quadratic equation written in standard form:

$$ax^2 + bx + c$$

-Once the quadratic is in standard form, we plug **the coefficients** a, b, and c into the quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Solve using the quadratic formula:

$$x^2 + 6x + 5 = 0$$

$a = 1 \qquad b = 6 \qquad c = 5$

$$= \frac{-6 \pm \sqrt{(6)^2 - 4(1)(5)}}{2(1)}$$

$$= \frac{-6 \pm \sqrt{36 - 20}}{2} = \frac{-6 \pm \sqrt{16}}{2}$$

$$= \frac{-6 \pm 4}{2}$$

$$\frac{-6+4}{2} \qquad \frac{-6-4}{2}$$

$$\frac{-2}{2} = -1 \qquad \frac{-10}{2} = -5$$

EXAMPLES Set up the quadratic formula for each of the following quadratic equations.

$6x^2 - 45 = 3x$

$-3x \quad -3x$

$6x^2 - 3x - 45 = 0$

$a = 6$

$b = -3$

$c = -45$

$-b \pm \sqrt{\quad}$

opposite of b

$$\frac{-(-3) \pm \sqrt{(-3)^2 - 4(6)(-45)}}{2(6)}$$

$$\frac{3 \pm \sqrt{9 + 1080}}{12}$$

$$\frac{3 \pm \sqrt{1089}}{12} = \frac{3 \pm 33}{12}$$

$3 = \frac{36}{12}$ $\qquad \frac{-30}{12} = \frac{-5}{2}$

$4x^2 = -9 - 9x$

$+9x+9 \quad +9 \quad +9x$

$4x^2 + 9x + 9 = 0$

$a = 4$

$b = 9$

$c = 9$

$$\frac{-9 \pm \sqrt{9^2 - 4(4)(9)}}{2(4)}$$

$$\frac{-9 \pm \sqrt{81 - 144}}{8}$$

$$\frac{-9 \pm \sqrt{-63}}{8}$$

$$\frac{-9 \pm i\sqrt{63}}{8}$$

$$\frac{-9 \pm 3i\sqrt{7}}{8}$$

$$8x^2 + x - 13 = -11x$$

$5x^2 = 80$

HW #9:
Solving Quadratic Equations Using the Quadratic Formula