Honors Algebra 2 Name ____________________

Solving Quadratic Equations Using Non-Factoring Methods January 21, 2018

$ax^2+bx+c=0$ { 1. IO 2. Factor 3. CS 4. QF

I. Solving Quadratic Equations using Inverse Operations

The two types of equations we can solve using inverse operations <u>generally</u> look like:

$$ax^2+c=0 \quad \text{or} \quad a(x-h)^2+k=0$$

<u>How to Solve a Quadratic Equation using Inverse Operations</u>

1. **Isolate the variable or expression** that is being squared by using inverse operations.

2. Undo the square by using the inverse operation – a square root. This step will always produce positive and negative roots so use $\pm$.

3. Continue solving for x if needed using inverse operations. Simplify the radical as much as possible and combine like terms if needed.

Please note: In this unit we will find real and imaginary solutions. A quadratic equation always has 2 solutions; 2 real, 2 imaginary, or 1 real, <u>repeated</u> solution. What type of quadratic equation gives a repeated solutions? Perfect Square Trinomial

$x^2+14x+49=0$

$(x+7)(x+7)=0$

$\sqrt{(x+7)^2}=\pm\sqrt{0}$

$x+7=0$

$x=-7$ mult. 2

Solve the equation using inverse operations. Write the answer in simplest form (no decimals).

1. $x^2+16=0$ $-16 \quad -16$ $\sqrt{x^2}=\pm\sqrt{-16}$ $\boxed{x=\pm 4i}$ 2 Imaginary Complex conjugates	2. $7x^2+207=4x^2+300$ $-4x^2 \quad -4x^2$ $3x^2+207=300$ $-207 \quad -207$ $\frac{3x^2}{3}=\frac{93}{3}$ $\sqrt{x^2}=\pm\sqrt{31}$ $\boxed{x=\pm\sqrt{31}}$ 2 irrational solutions radical conjugates $a\pm\sqrt{b}$
3. $(x+2)^2+49=0$ $-49 \quad -49$ $\sqrt{(x+2)^2}=\pm\sqrt{-49}$ $x+2=\pm 7i$ $-2 \quad -2$ $\boxed{x=-2\pm 7i}$ $x=-2-7i,\ -2+7i$	4. $\frac{2}{3}(x+8)^2-6=0$ $+6 \quad +6$ $\frac{3}{2}\cdot\frac{2}{3}(x+8)^2=\frac{6}{1}\left(\frac{3}{2}\right)$ $\sqrt{(x+8)^2}=\pm\sqrt{9}$ $x+8=\pm 3$ $x=-8\pm 3$ $x=-8+3=-5$ $x=-8-3=-11$ $x=-5,-11$

5. $x^2+14=-22$

$-14 \quad -14$

$\pm\sqrt{x^2} = \pm\sqrt{-36}$

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

6. $2x^2-5=5x^2+37$

$2x^2-42=5x^2$

$-42=3x^2$

$\pm\sqrt{-14}=\sqrt{x^2}$

$\boxed{x=\pm\sqrt{14}\,i}$

7. $\frac{1}{4}(x-5)^2=16$

$\frac{1}{4}\cdot\frac{4}{1}(x-5)^2=16\cdot\frac{4}{1}$

$\sqrt{(x-5)^2}=\pm\sqrt{64}$

$x-5=\pm 8$

$x=5+8$

$\quad\; 5-8$

$\boxed{x=13,-3}$

8. $-(x+9)^2=-12$

$\sqrt{(x+9)^2}=\pm\sqrt{12}$

$x+9=\pm\sqrt{12}$

$\boxed{x=-9\pm 2\sqrt{3}}$

Additional Practice: Show all work and check you answer (below).

9. $7x^2+16=9x^2-20$

10. $2(x+2)^2+72=0$

11. $(4x-5)^2-14=50$

12. $6x^2+65=x^2+5$

Solutions

9. $x=\pm 3\sqrt{2}$

10. $x=-2\pm 6i$

11. $x=-\frac{3}{4},\frac{13}{4}$

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