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Date _____
Algebra 2

Solving Quadratic Equations Using Completing the Square

1. $x^2 - 6x = 9$

$(-\frac{6}{2})^2 = 9$

$$x^2 - 6x + 9 = 9 + 9$$

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

$$\sqrt{(x-3)^2} = \sqrt{18}$$

$$x-3 = \pm\sqrt{18}$$

$$x = 3 \pm \sqrt{18}$$

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

2. $x^2 + 4x + 6 = 0$

$(\frac{4}{2})^2 = 4$

$$x^2 + 4x = -6$$

$$x^2 + 4x + 4 = -6 + 4$$

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

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

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

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

3. $x^2 + 2x = 4$

$(\frac{2}{2})^2 = 1$

$$x^2 + 2x + 1 = 4 + 1$$

$$(x+1)(x+1) = 5$$

$$\sqrt{(x+1)^2} = \sqrt{5}$$

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

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

4. $x^2 = 10x - 45$

$(\frac{10}{2})^2 = 25$

$$x^2 - 10x = -45$$

$$x^2 - 10x + 25 = -45 + 25$$

$$(x-5)(x-5) = -20$$

$$\sqrt{(x-5)^2} = \sqrt{-20}$$

$$x-5 = \pm i\sqrt{20}$$

$$x = 5 \pm i\sqrt{20}$$

$x = 5 \pm 2i\sqrt{5}$

5. $x^2 - 6x = 18$

$(-\frac{6}{2})^2 = 9$

$$x^2 - 6x + 9 = 18 + 9$$

$$(x-3)(x-3) = 27$$

$$\sqrt{(x-3)^2} = \sqrt{27}$$

$$x-3 = \pm\sqrt{27}$$

$$x = 3 \pm \sqrt{27}$$

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

6. $x^2 - 12x + 4 = 0$

$(\frac{12}{2})^2 = 36$

$$x^2 - 12x = -4$$

$$x^2 - 12x + 36 = -4 + 36$$

$$(x-6)(x-6) = 32$$

$$\sqrt{(x-6)^2} = \sqrt{32}$$

$$x-6 = \pm\sqrt{32}$$

$$x = 6 \pm \sqrt{32}$$

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

$$7. x^2 + 6x = 8x - 26$$

$$-8x + 26 \quad -8x + 26$$

$$x^2 - 2x + 26 = 0$$

$$x^2 - 2x = -26$$

$$x^2 - 2x + \square = -26 + \square$$

$$(x-1)(x-1) = -25$$

$$\sqrt{(x-1)^2} = \sqrt{-25}$$

$$x-1 = \pm 5i$$

$$x = 1 \pm 5i$$

$\sqrt{-25}$
 $\sqrt{25}$
 $5i$

$(-\frac{2}{2})^2 = 1$
 $x-1 = \pm 5i$

$(\frac{8}{2})^2 = 16$
 $\sqrt{-4}$
 $\sqrt{4}$
 $2i$

$$8. x^2 + 5x = -3x - 20$$

$$+3x + 3x$$

$$x^2 + 8x = -20$$

$$x^2 + 8x + 16 = -20 + 16$$

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

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

$$x+4 = \pm \sqrt{-4}$$

$$x+4 = \pm 2i$$

$$x = -4 \pm 2i$$

$$9. 2x^2 = 8x + 16$$

$$x^2 = 4x + 4$$

$$-4x - 4x$$

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

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

$$(x-2)(x-2) = 8$$

$$\sqrt{(x-2)^2} = \sqrt{8}$$

$$x-2 = \pm \sqrt{8}$$

$$x = 2 \pm \sqrt{8}$$

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

$(\frac{-4}{2})^2 = 4$
 $x-2 = \pm \sqrt{8}$
 $x = 2 \pm \sqrt{8}$
 $x = 2 \pm 2\sqrt{2}$

$$10. 2x^2 + 4x + 26 = 0$$

$$x^2 + 2x + 13 = 0$$

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

$$x^2 + 2x + 1 = -13 + 1$$

$$(x+1)(x+1) = -12$$

$$\sqrt{(x+1)^2} = \sqrt{-12}$$

$$x+1 = \pm \sqrt{-12}$$

$$x = -1 \pm \sqrt{-12}$$

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

$(\frac{2}{2})^2 = 1$
 $\sqrt{-12}$
 $\sqrt{12}$
 $2\sqrt{3}$

$$11. 4x^2 = 8x + 12$$

$$x^2 = 2x + 3$$

$$-2x - 2x$$

$$x^2 - 2x = 3$$

$$x^2 - 2x + 1 = 3 + 1$$

$$(x-1)(x-1) = 4$$

$$\sqrt{(x-1)^2} = \sqrt{4}$$

$$x-1 = \pm \sqrt{4}$$

$$x-1 = \pm 2$$

$$x = 1 \pm 2$$

$(\frac{-2}{2})^2 = 1$
 $1+2 = 3$
 $1-2 = -1$

$$12. 2x^2 - 8x + 16 = 0$$

$$x^2 - 4x + 8 = 0$$

$$x^2 - 4x = -8$$

$$x^2 - 4x + 4 = -8 + 4$$

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

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

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

$$x-2 = \pm 2i$$

$$x = 2 \pm 2i$$

$(\frac{-4}{2})^2 = 4$
 $\sqrt{-4}$
 $\sqrt{4}$
 $2i$