

Completing the Square

Date _____

Period _____

Solve each equation by completing the square.

1) $b^2 - 14b + 24 = 0$

$$b^2 - 14b + \underline{49} = \underline{-24} + \underline{49}$$

$$(b-7)^2 = 25$$

$$b = 12$$

$$b = 2$$

3) $b^2 - 2b - 80 = 0$

$$b^2 - 2b + \underline{1} = \underline{80} + \underline{1}$$

$$(b-1)^2 = 81$$

$$b = 10$$

$$b = -8$$

5) $6x^2 - 12x + 54 = 9$

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7) $3v^2 - 12v + 14 = 5$

$$v^2 - 4v + \underline{4} = \underline{-3} + \underline{4}$$

$$(v-2)^2 = 1$$

$$v = 3$$

$$v = 1$$

9) $7k^2 - 2k + 28 = -3$

$$k^2 - \frac{2}{7}k + \frac{1}{49} = \underline{-\frac{31}{7}} + \frac{1}{49}$$

$$(k - \frac{1}{7})^2 = \frac{-216}{49}$$

$$k = \frac{1}{7} + \frac{6i\sqrt{6}}{7}$$

$$k = \frac{1 \pm 6i\sqrt{6}}{7}$$

11) $2n^2 - 7n + 17 = 5$

$$n^2 - \frac{7}{2}n + \frac{49}{16} = \underline{-6} + \frac{49}{16}$$

$$(n - \frac{7}{4})^2 = \frac{-47}{16}$$

$$n = \frac{7}{4} + \frac{i\sqrt{47}}{4}$$

$$n = \frac{7 \pm i\sqrt{47}}{4}$$

2) $x^2 - 6x + 89 = 0$

$$x^2 - 6x + \underline{9} = \underline{-89} + \underline{9}$$

$$(x-3)^2 = -80$$

$$x = 3 \pm 4i\sqrt{5}$$

4) $b^2 - 10b + 75 = 0$

$$b^2 - 10b + \underline{25} = \underline{-75} + \underline{25}$$

$$(b-5)^2 = -50$$

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

6) $7n^2 + 14n - 108 = -10$

$$n^2 + 2n + \underline{1} = \underline{14} + \underline{1}$$

$$(n+1)^2 = 15$$

$$n = -1 \pm \sqrt{15}$$

8) $3k^2 - 18k + 19 = -5$

$$k^2 - 6k + \underline{9} = \underline{-8} + \underline{9}$$

$$(k-3)^2 = 1$$

$$k = 4$$

$$k = 2$$

10) $2k^2 - 6k + 40 = 6$

$$k^2 - 3k + \frac{9}{4} = \underline{-17} + \frac{9}{4}$$

$$(k - \frac{3}{2})^2 = \frac{-59}{4}$$

$$k = \frac{3}{2} + \frac{i\sqrt{59}}{2}$$

$$k = \frac{3 \pm i\sqrt{59}}{2}$$

12) $10x^2 - 9x - 8 = -10$

$$x^2 - \frac{9}{10}x + \frac{81}{400} = \underline{-\frac{1}{5}} + \frac{81}{400}$$

$$(x - \frac{9}{20})^2 = \frac{1}{400}$$

$$x = \frac{1}{2}$$

$$x = \frac{2}{5}$$