Kuta Software - Infinite Algebra 1

Name Key

Solving Equations by Completing the Square

Date _____ Period ____

Solve each equation by completing the square.

1) $a^2 + 2a - 3 = 0$

$a^2+2a+\_\_ = 3+\_\_$

$a^2+2a+(1)^2 = 3+(1)^2$

$(a+1)^2 = 4$

$\sqrt{(a+1)^2} = \pm\sqrt{4}$

$a+1 = \pm 2$

$a = -1 \pm 2$

$a = -1+2 = \boxed{+1}$

$a = -1-2 = \boxed{-3}$

2) $a^2 - 2a - 8 = 0$

$a^2-2a+\_\_ = 8+\_\_$ $\left(\frac{-2}{2}\right)^2 = (-1)^2$

$a^2-2a+(-1)^2 = 8+(-1)^2$

$(a-1)^2 = 9$

$\sqrt{(a-1)^2} = \pm\sqrt{9}$

$a-1 = \pm 3$

$a = 1 \pm 3$

$a = 1+3 = \boxed{4}$

$a = 1-3 = \boxed{-2}$

3) $p^2 + 16p - 22 = 0$

$p^2+16p+\_\_ = 22+\_\_$

$p^2+16p+(8)^2 = 22+(8)^2$

$(p+8)^2 = 86$

$\sqrt{(p+8)^2} = \pm\sqrt{86}$

$p+8 = \pm\sqrt{86}$

$\boxed{p = -8 \pm \sqrt{86}}$

4) $k^2 + 8k + 12 = 0$

$k^2+8k+\_\_ = -12+\_\_$

$k^2+8k+(4)^2 = -12+(4)^2$

$(k+4)^2 = 4$

$\sqrt{(k+4)^2} = \pm\sqrt{4}$

$k+4 = \pm 2$

$k = -4 \pm 2$

$\boxed{k = -2}$ $\boxed{k = -6}$

5) $r^2 + 2r - 33 = 0$

$r^2+2r+\_\_ = 33+\_\_$

$r^2+2r+(1)^2 = 33+(1)^2$

$(r+1)^2 = 34$

$\sqrt{(r+1)^2} = \pm\sqrt{34}$

$r+1 = \pm\sqrt{34}$

$\boxed{r = -1 \pm \sqrt{34}}$

6) $a^2 - 2a - 48 = 0$

$a^2-2a+\_\_ = 48+\_\_$

$a^2-2a+(-1)^2 = 48+(-1)^2$

$(a-1)^2 = 49$

$\sqrt{(a-1)^2} = \pm\sqrt{49}$

$a-1 = \pm 7$

$a = 1 \pm 7$

$\boxed{a = 8}$ $\boxed{a = -6}$

7) $m^2 - 12m + 26 = 0$

$m^2-12m+\_\_ = -26+\_\_$

$m^2-12m+(-6)^2 = -26+(-6)^2$

$(m-6)^2 = 10$

$\sqrt{(m-6)^2} = \pm\sqrt{10}$

$m-6 = \pm\sqrt{10}$

$\boxed{m = 6 \pm \sqrt{10}}$

8) $x^2 + 12x + 20 = 0$

$x^2+12x+\_\_ = -20+\_\_$

$x^2+12x+(6)^2 = -20+(6)^2$

$(x+6)^2 = 16$

$\sqrt{(x+6)^2} = \pm\sqrt{16}$

$x+6 = \pm 4$

$x = -6 \pm 4$

$\boxed{x = -2}$ $\boxed{x = -10}$

9) $k^2 - 8k - 48 = 0$

$k^2-8k+\_\_ = 48+\_\_$

$k^2-8k+(-4)^2 = 48+(-4)^2$

$(k-4)^2 = 64$

$\sqrt{(k-4)^2} = \pm\sqrt{64}$

$k-4 = \pm 8$

$k = 4 \pm 8$

$\boxed{k = 12}$ $\boxed{k = -4}$

10) $p^2 + 2p - 63 = 0$

$p^2+2p+\_\_ = 63+\_\_$

$p^2+2p+(1)^2 = 63+(1)^2$

$(p+1)^2 = 64$

$\sqrt{(p+1)^2} = \pm\sqrt{64}$

$p+1 = \pm 8$

$p = -1 \pm 8$

$\boxed{p = 7}$ $\boxed{p = -9}$

11) $m^2 + 2m - 48 = -6$

$m^2+2m+\_\_ = 42+\_\_$

$m^2+2m+(1)^2 = 42+(1)^2$

$(m+1)^2 = 43$

$\sqrt{(m+1)^2} = \pm\sqrt{43}$

$m+1 = \pm\sqrt{43}$

$\boxed{m = -1 \pm \sqrt{43}}$

12) $p^2 - 8p + 21 = 6$

$p^2-8p+\_\_ = -15+\_\_$

$p^2-8p+(-4)^2 = -15+(-4)^2$

$(p-4)^2 = 1$

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

$p-4 = \pm 1$

$p = 4 \pm 1$

$\boxed{p = 5}$

$\boxed{p = 3}$