7-3 Solving Quadratic equations by completing the square Day 1

Remember: $a^2 + 2ab + b^2 = (a+b)^2$

determine the constant that must be added to the expression to make it a perfect square trinomial. Then factor the expression.

$p^2 + 14p + 49 = (p+7)^2$

You Try

$w^2 + 12w + 36 = (w+6)^2$ $\frac{12}{2} = 6^2 = 36$

$w^2 + 8w + 16 = (w+4)^2$ $\frac{8}{2} = 4^2 = 16$

Step 1: group x terms together and move the constant to the other side of the equation (factor out the coefficient of x^2 if there is one)

$x^2 + 4x - 5 = 0$

$+5 \quad +5$

$x^2 + 4x + \underline{4} = 5 + \underline{4}$

Step 2: leave a blank behind the group of x's and on the other side of the equation

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

Step 3: to form a perfect square, create the () for the squared group

$(x + \underline{2})^2 = 5 + \underline{4}$

$x^2 + 4x + \underline{4} = 5 + \underline{4}$

$\frac{4}{2}$

Step 4: find $\frac{b}{2}$ and plug it in the () blank

$(x + \underline{2})^2 = 5 + \underline{4}$

Step 5: square the number from step 4 and place in in the blank with x's (if you have a coefficient - multiply this number by the coefficient and fill in remaining blanks)

Step 6: simplify and solve

$$(x+2)^2 = 5+4$$

$$(x+2)^2 = 9$$

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

$$x+2 = \pm 3$$

$$x = -2 \pm 3$$

$$x = 1, -5$$

$x^2 - 18x = -61$

$x^2 - 18x + 81 = -61 + 81$

$\sqrt{(x-9)^2} = \sqrt{20}$

$x - 9 = \pm\sqrt{20}$

$\sqrt{20} = \sqrt{4}\sqrt{5}$

$\frac{-18}{2} = (-9)^2 = 81$

$x - 9 = \pm 2\sqrt{5}$

$+9 \quad +9$

$x = 9 \pm 2\sqrt{5}$

Solve by completing the square.

$x^2 + 6x + 1 = 0$

$-1 \quad -1$

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

$\sqrt{(x+3)^2} = \sqrt{8}$

$x + 3 = \pm\sqrt{8}$

$\sqrt{8} = \sqrt{4}\sqrt{2}$

$\frac{6}{2} = 3^2 = 9$

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

$-3 \quad -3$

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

You Try

$b^2 + 2b - 8 = 0$

$+8 \quad +8$

$b^2 + 2b + 1 = 8 + 1$

$\sqrt{(b+1)^2} = \sqrt{9}$

$b + 1 = \pm 3$

$b = -1 \pm 3$

$b = -1 + 3$

$b = -1 - 3$

$b = 2 \quad b = -4$

Solve by completing the square.

$x^2 - 8x + 9 = 0$

$-9 \quad -9$

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

$\sqrt{(x-4)^2} = \pm\sqrt{7}$

$x - 4 = \pm\sqrt{7}$

$+4 \quad +4$

$x = 4 \pm \sqrt{7}$

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

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

no real solution