

## Bellwork

Fill in the \_\_\_\_\_ by Completing the Square:

1.  $x^2 + 22x + \underline{\hspace{2cm}}$

**Divide the b term by 2  
and reduce:**

$$\frac{22}{2} = 11$$

**Square that result:**

$$(11)^2 = \boxed{121}$$

2.  $x^2 - 14x + \underline{\hspace{2cm}}$

**Divide the b term by 2 and  
reduce:**

$$\frac{-14}{2} = -7$$

**Square that result:**

$$(-7)^2 = \boxed{49}$$

## Solving Quadratics by Completing the Square

Procedure:

Step 1: Move all x terms to one side of the equation, and move the constant to the other side.

Step 2: Divide **EVERYTHING** by what is in front of the squared term.

Step 3: Divide the number in front of the x term, the b, by 2 and add it to both sides squared.

Step 4: Factor the variable side by making it  $\left(x + \frac{b}{2a}\right)^2$

Step 5: Simplify the side with the constants.

Step 6: Take the square root of both sides.

Simplify the side with the radical term.

**NOTES: A. DO NOT FORGET +/-**

**B. If the constant is a neg,**

**Then pull the neg out and make it i.**

Step 7: Solve for x. Simplify if possible.

Step 8: CHECK YOUR ANSWER!!

## Examples

Solve by Completing the Square:

1.  $x^2 + 5x = 84$

**This is already set up and ready to go!**

$$\begin{aligned}x^2 + 5x + (5/2)^2 &= 84 + (5/2)^2 \\(x + 5/2)^2 &= 84/1 + 25/4 \\(x + 5/2)^2 &= 336/4 + 25/4 \\(x + 5/2)^2 &= 361/4 \\\sqrt{(x + 5/2)^2} &= \sqrt{361/4} \\x + 5/2 &= \pm 19/2 \\&\quad \underline{-5/2 \quad -5/2} \\x &= -5/2 \pm 19/2\end{aligned}$$

**So then we have...**

$$\begin{aligned}x &= -5/2 + 19/2 = 14/2 = \boxed{7} \\&\quad \text{and} \\x &= -5/2 - 19/2 = -24/2 = \boxed{-12}\end{aligned}$$

2.  $3x^2 = 2x + 8$

$$\begin{aligned}&\quad \underline{-2x \quad -2x} \\3x^2 - 2x &= 8 \\(3/3)x^2 - (2/3)x &= 8/3 \\x^2 - (2/3)x &= 8/3 \\x^2 - (2/3)x + (-1/3)^2 &= 8/3 + (-1/3)^2 \\(x - 1/3)^2 &= 8/3 + 1/9 \\(x - 1/3)^2 &= 24/9 + 1/9 \\\sqrt{(x - 1/3)^2} &= \sqrt{25/9} \\x - 1/3 &= \pm 5/3 \\&\quad \underline{+1/3 \quad +1/3} \\x &= 1/3 \pm 5/3\end{aligned}$$

**So then we have...**

$$\begin{aligned}x &= 1/3 + 5/3 = 6/3 = \boxed{2} \\x &= 1/3 - 5/3 = \boxed{-4/3}\end{aligned}$$

