# Bellwork

Factor each of the following completely:

1. $x^2 + 24x + 144$

$\sqrt{x^2} = x$

$\sqrt{144} = 12$

Check: 2(x)(12) = middle term

$(x + 12)(x + 12)$
OR
$(x + 12)^2$

2. $x^2 - 28x + 196$

$x^2 = x$

$196 = 14$

Check: 2(x)(14) = middle term

$(x - 14)(x - 14)$
OR
$(x - 14)^2$

3. What is the relationship between the coefficient of the middle term and the constant? The relationship is that the middle term is twice the square root of the constant.

## Completing the Square

What is completing the square?

Completing the square is a process that allows you to put a quadratic equation in the form $(\#x + p)^2$.

Helpful when:

1. Factoring quadratics
2. Graphing quadratics (Next!)
3. Solving quadratics (Coming soon!)

## Procedure

Step 1: Divide the middle coefficient by 2.

Step 2: Square the result from Step 1.

Step 3: Write the answer.

Step 4: For practice, you can factor each of the problems out.

# Examples

Complete the square:

1. $x^2 + 14x + \_\_\_\_$

$\left(\frac{14}{2}\right)^2 = (7)^2 = \boxed{49}$

Factored out:
$(x + 7)^2$

2. $x^2 - 6x + \_\_\_\_$

$\left(\frac{-6}{2}\right)^2 = (-3)^2 = \boxed{9}$

Factored out:
$(x - 3)^2$

3. $x^2 - 9x + \_\_\_\_$

$\left(\frac{-9}{2}\right)^2 = \boxed{\frac{81}{4}}$

Factored out:
$\left(x - \frac{9}{2}\right)^2$

4. $x^2 + 5x + \_\_\_\_$

$\left(\frac{5}{2}\right)^2 = \boxed{\frac{25}{4}}$

Factored out:
$\left(x + \frac{5}{2}\right)^2$