

Completing the Square – the process of finding the last term of a perfect square trinomial

Find the value of "c" that makes the quadratic a perfect square trinomial, then factor it.

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

$$\frac{24x}{2x} = 12^2 = 144$$

$$(x+12)^2$$

2. $x^2 + 8x + c$

$$\frac{8x}{2x} = 4^2 = 16$$

$$(x+4)^2$$

3. $x^2 - 10x + c$

$$c = 25$$

$$(x-5)^2$$

4. $x^2 - 12x + c$

$$c = 36$$

$$(x-6)^2$$

Consider the following equation: $y = x^2 + 2x - 3$. Complete the square and factor.

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

$$y = x^2 + 2x + \frac{1}{-3-1}$$

$$y = (x+1)^2 - 4$$

(add b^2 and it's additive inverse)

Now, write the equation in vertex form using $x = \frac{-b}{2a}$ and plugging x in, simplifying and finding y.

$$x = \frac{-2}{2(1)} = \frac{-2}{2} = -1$$

$$y = (-1)^2 + 2(-1) - 3$$

$$y = 1 - 2 - 3 = -4$$

What do you notice? Which way was easier?

They are the same

Graph the function.

Where are the x-intercepts? $(-3,0)$ $(1,0)$

Is there an algebraic way to find these solutions?

$$0 = (x+1)^2 - 4$$

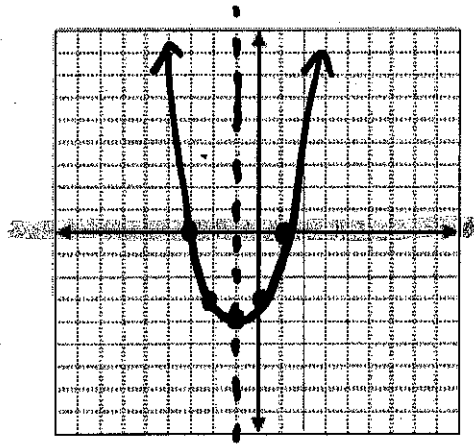
$$+4 \quad +4$$

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

$$-2 \text{ and } 2 = x+1$$

$$\begin{matrix} -1 & -1 \\ (-3,0) & (1,0) \end{matrix}$$

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Completing the Square Worksheet

For each problem:

- a.) Rewrite each quadratic in vertex form by completing the square.
 b.) State the vertex and the line of symmetry c.) State the y-intercept d.) State the x-intercepts.

1. $y = x^2 + 6x + 7$

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

$y = (x^2 + 6x + 9) + 7 - 9$

$y = (x+3)^2 - 2$

$0 = (x+3)^2 - 2$

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

$-1.41 \text{ and } 1.41 = x+3$
 $-3 \qquad \qquad -3$

2. $y = x^2 + 12x + 3$

$y = x^2 + 12x + 36 + 3 - 36$

$y = (x+6)^2 - 33$

$0 = (x+6)^2 - 33 \pm\sqrt{33} = \sqrt{(x+6)^2}$

$-5.74 \text{ and } 5.74 = x+6$
 $-6 \qquad \qquad -6$

3. $y = x^2 - 2x - 31$

$(-11.74, 0) \quad (-0.26, 0)$

- a. $y = (x+3)^2 - 2$
 b. $(-3, -2) \quad x = -3$
 c. $(0, 7)$
 d. $(-4.41, 0)$
 $(-1.59, 0)$

- $\frac{12x}{2x} = 6^2 = 36$
 a. $y = (x+6)^2 - 33$
 b. $(-6, -33) \quad x = -6$
 c. $(0, 3)$
 d. $(-11.74, 0)$
 $(-0.26, 0)$

- a. _____
 b. _____
 c. _____
 d. _____

4. $y = x^2 - 4x + 13$

a. _____

b. _____

c. _____

d. _____

5. $y = x^2 - 7x + 9$

a. _____

b. _____

c. _____

d. _____