

Algebra 1



Chapter 9

Section 9-5

Apr 17-9:41 PM

9-5: Completing the Square

In general, you can change the expression $x^2 + bx$ into a perfect-square trinomial by adding $\left(\frac{b}{2}\right)^2$ to $x^2 + bx$. This process is called **completing the square**. The process is the same whether b is positive or negative.

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

Apr 17-9:57 PM

Find the value of c such that each expression is a perfect-square trinomial.

7. $x^2 + 18x + c$

$$\frac{b}{2} = \frac{18}{2} = 9$$

$$9^2 = 81$$

$$x^2 + 18x + 81$$

8. $z^2 + 22z + c$

$$\frac{22}{2} = 11 \quad 11^2 = 121$$

$$z^2 + 22z + 121$$

Apr 17-9:58 PM

Solve each equation by completing the square. If necessary, round to the nearest hundredth.

$$a^2 - 2a - 35 = 0$$

$$+35 +35$$

$$a^2 - 2a + 1 = 35 + 1$$

$$\frac{-2}{2} = -1 \quad (-1)^2 = 1$$

$$a^2 - 2a + 1 = 36$$

$$\sqrt{(a-1)^2} = \sqrt{36}$$

$$a-1 = \pm 6$$

$$a = 1 \pm 6$$

$$a = 7, -5$$

$$r^2 - 4r = 30$$

$$\frac{-4}{2} = (-2)^2 \quad (c=4)$$

$$r^2 - 4r + 4 = 30 + 4$$

$$r^2 - 4r + 4 = 34$$

$$\sqrt{(r-2)^2} = \sqrt{34}$$

$$r-2 = \pm 5.83$$

$$r = 2 \pm 5.83$$

$$r = 7.83, -3.83$$

Apr 17-10:00 PM

$$x = \frac{-b}{2a}$$

Vertex: $(x, f(x))$

The equation $y = (x - h)^2 + k$ represents a parabola with vertex (h, k) . You can use the method of completing the square to find the vertex of quadratic functions of the form $y = x^2 + bx + c$.

Apr 17-10:03 PM

$y = (x-h)^2 + k$ $v: (h, k)$

Find the vertex of each parabola by completing the square.

$y = x^2 + 4x - 16$

$y = (x^2 + 4x + 4) - 16 - 4$

$y = (x+2)^2 - 20$

$y = (x - (-2)) + (-20)$

$h = -2$ $k = -20$

$(-2, -20)$

$y = x^2 + 2x - 28$

$y = (x^2 + 2x + 1) - 28 - 1$

$y = (x+1)^2 - 29$

$h = -1$ $k = -29$

$(-1, -29)$

Apr 17-10:06 PM

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

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

$$\frac{-b}{2a} = \frac{-(-4)}{2} = 2 \rightarrow 4$$

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

$h = 2$ $k = -3$
 $(2, -3)$

Apr 18-9:52 AM

Solve each equation by completing the square. If necessary, round to the nearest hundredth.

$$\frac{4a^2}{4} - \frac{8a}{4} = \frac{24}{4}$$

$$a^2 - 2a = 6$$

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

$$a^2 - 2a + 1 = 6 + 1$$

$$\sqrt{(a-1)^2} = \sqrt{7}$$

$$a-1 = \pm 2.65$$

$$+1 \quad +1$$

$$a = 1 \pm 2.65$$

$$a = 3.65, -1.65$$

$$\frac{2p^2}{2} - \frac{15p}{2} + \frac{8}{2} = \frac{43}{2}$$

$$p^2 - 7.5p + 4 = 21.5$$

$$p^2 - 7.5p = 17.5$$

$$p^2 - 7.5p + 14.0625 = 17.5 + 14.0625$$

$$\sqrt{(p-3.75)^2} = \sqrt{31.5625}$$

$$p-3.75 = \pm 5.62$$

$$+3.75 \quad +3.75$$

$$p = 3.75 \pm 5.62$$

$$p = 9.37, -1.87$$

Apr 17-10:08 PM

Homework 9-5 Online
Due Friday by midnight
Quiz Monday over 9-1 to 9-4

Apr 17-10:23 PM