

2.5 Completing the Square

Solve

$$x^2 - 6x + 9 = 16$$

$$\frac{-14 \quad -14}{x^2 - 6x - 7 = 0}$$

$$(x-7)(x+1) = 0$$

$$x=7 \quad x=-1$$

$$x^2 - 6x + 9 = 16$$

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

$$\sqrt{(x-3)^2} = \sqrt{16}$$

$$x-3 = \pm 4 + 3$$

$$x = 4 + 3 = 7$$

$$x = -4 + 3 = -1$$

Solve using square roots

$$\underline{x^2 + 12x + 36 = 81}$$

$$(x+6)(x+6) = 81$$

$$\sqrt{(x+6)^2} = \sqrt{81}$$

$$x+6 = \pm 9$$

$$\begin{array}{cc} -6 & -6 \end{array}$$

$$x = 9 - 6 = 3$$

$$x = -9 - 6 = -15$$

$$\underline{x^2 - 16x + 64 = 9}$$

$$(x-8)(x-8) = 9$$

$$\sqrt{(x-8)^2} = \sqrt{9}$$

$$x-8 = \pm 3$$

$$x = \pm 3 + 8$$

$$= 3 + 8 \quad x = -3 + 8$$

$$11 \quad 5$$

$$16 = x^2 - 10x + 25$$

2.5

18, 20, 22, 23

$$\frac{5}{3} = \frac{3x^2}{3} - \frac{36x}{3} + \frac{108}{3}$$

$$\frac{5}{3} = x^2 - 12x + 36$$

$$\frac{5}{3} = (x-6)(x-6)$$

$$\sqrt{\frac{5}{3}} = \sqrt{(x-6)^2}$$

$$\pm \sqrt{\frac{5}{3}} = x-6$$

$$x = 6 \pm \sqrt{\frac{5}{3}}$$

$$\frac{50}{2} = \frac{2x^2}{2} + \frac{16x}{2} + \frac{32}{2}$$

$$25 = x^2 + 8x + 16$$

$$\sqrt{25} = \sqrt{(x+4)^2}$$

$$\begin{array}{ccc} \pm 5 & = & x + 4 \\ -4 & & -4 \end{array}$$

$$x = -4 \pm 5$$

$$-4 + 5 = 1$$

$$-4 - 5 = -9$$

Solve by Completing the Square

$$x^2 + 4x + 8 = 0$$

$$x^2 + 4x + 4 = -8 + 4$$

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

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

$$x+2 = \pm 2i$$

$$x = -2 \pm 2i$$

Complete the Square

Step 1 a has to equal 1

Step 2 Everything with x on one side of equation

Step 3 Divide "b" term by 2

Step 4 Answer from Step 3 square it.

Step 5 Answer from Step 4 and add to BOTH sides of equation

$$0 = x^2 - 8x + 17$$

-17

-17

$$-17 = x^2 - 8x + 16 + 1$$

$$-1 = x^2 - 8x + 16$$

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

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

$$\pm i = x - 4$$

$$x = 4 \pm i$$

$$x^2 + .6x - 19.1 = 0$$

$$\begin{array}{r} .3 \\ \hline .3 \\ \hline .09 \end{array}$$

$$x^2 + .6x + .09 = 19.1$$

+ .09

$$\sqrt{(x + .3)^2} = \sqrt{19.19}$$

$$x + .3 = \pm \sqrt{19.19}$$

$$x = -.3 \pm \sqrt{19.19}$$

$$\frac{14}{4} = \frac{4x^2}{4} + \frac{4x}{4}$$

$$\frac{14}{4} = x^2 + x + \frac{1}{4}$$

$$+ \frac{1}{4}$$

$$\frac{15}{4} = x^2 + x + \frac{1}{4}$$

$$\sqrt{\frac{15}{4}} = \sqrt{\left(x + \frac{1}{2}\right)^2}$$

$$\pm \frac{\sqrt{15}}{2} = x + \frac{1}{2}$$

$$-\frac{1}{2} \pm \frac{\sqrt{15}}{2}$$