

## Unit 5.5 Completing the Square

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Ex #1:  $x^2 + 6x + 9 = 36$

$$\sqrt{(x+3)^2} = \sqrt{36}$$

$$x+3 = \pm 6$$

$$\begin{matrix} -3 & -3 \\ -3 & -3 \end{matrix}$$

$$x = -3 \pm 6$$

$$x = -3+6 \quad x = -3-6$$

$$x = 3 \quad x = -9$$

Ex #2:  $x^2 - 10x + 25 = 27$

$$\sqrt{(x-5)^2} = \sqrt{27}$$

$$x-5 = \pm \sqrt{27}$$

$$\begin{matrix} -5 & -5 \\ -5 & -5 \end{matrix}$$

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

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

$$x = 5+3\sqrt{3} \quad x = 5-3\sqrt{3}$$

$$x \approx 10.2 \quad x \approx -2.2$$

Ex #3:  $x^2 + 16x + c$

#1)  $\frac{16}{2} = 8$

#2)  $8^2 = 64$

$x^2 + 16x + 64$

$(x+8)^2$

3.  $x^2 - 14x + c$

#1)  $\frac{-14}{2} = -7$

#2)  $(-7)^2 = 49$

$x^2 - 14x + 49$

$(x-7)^2$

Ex #4:  $x^2 + 10x - 11 = 0$

$$\begin{matrix} x^2 + 10x + c = 11 \\ +11 & +11 \end{matrix}$$

$$x^2 + 10x + 25 = 11 + 25$$

$$\sqrt{(x+5)^2} = \sqrt{36}$$

$$x+5 = \pm 6$$

$$\begin{matrix} -5 & -5 \\ -5 & -5 \end{matrix}$$

$$x = -5 \pm 6$$

$$x = -5+6 \quad x = -5-6$$

$$x = 1 \quad x = -11$$

Ex #5:  $2x^2 - 7x + 5 = 0$

$$x^2 - \frac{7}{2}x + \frac{5}{2} = 0$$

$$x^2 - \frac{7}{2}x + c = -\frac{5}{2}$$

$$\begin{matrix} -\frac{7}{2} & -\frac{7}{2} \\ -\frac{7}{2} & -\frac{7}{2} \end{matrix}$$

$$x^2 - \frac{7}{2}x + \frac{49}{16} = -\frac{5}{2} + \frac{49}{16}$$

$$\sqrt{(x-\frac{7}{4})^2} = \sqrt{\frac{9}{16}}$$

$$x - \frac{7}{4} = \pm \frac{3}{4}$$

$$x = \frac{7}{4} \pm \frac{3}{4}$$

$$x = \frac{10}{4} = \frac{5}{2}, \quad x = \frac{4}{4} = 1$$

Ex #6:  $x^2 + 8x + 22 = 0$

$$\begin{matrix} x^2 + 8x + c = -22 \\ -22 & -22 \end{matrix}$$

$$x^2 + 8x + 16 = -22 + 16$$

$$\sqrt{(x+4)^2} = \sqrt{-6}$$

$$x+4 = \pm \sqrt{-6}$$

$$x = -4 \pm \sqrt{-6}$$

$$x^2 + 8x + 16 = -22 + 16$$

$$\sqrt{(x+4)^2} = \sqrt{-6}$$

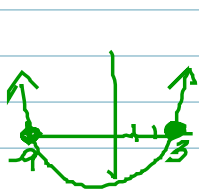
$$x+4 = \pm \sqrt{-6}$$

$$x = -4 \pm \sqrt{-6}$$

# Unit 5.5 Completing the Square

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Ex #1:  $x^2 + 6x + 9 = 36$  Ex #2:  $x^2 - 10x + 25 = 27$



$$\sqrt{(x+3)^2} = \sqrt{36}$$

$$x+3 = \pm 6$$

$$\begin{array}{r} x+3 \\ -3 \end{array} = \begin{array}{r} \pm 6 \\ -3 \end{array}$$

$$x = -3 \pm 6$$

$x = -3 + 6$     $x = -3 - 6$   
 $x = 3$     $x = -9$



$$\sqrt{(x-5)^2} = \sqrt{27} < 9 < \frac{3}{3}$$

$$x-5 = \pm \sqrt{3 \cdot 3 \cdot 3}$$

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

$$\begin{array}{r} x-5 \\ +5 \end{array} = \begin{array}{r} \pm 3\sqrt{3} \\ +5 \end{array}$$

$x = 5 \pm 3\sqrt{3}$   
 $x \approx 10.2$     $x \approx -2$

Ex #3:  $x^2 + 16x + c$

#1)  $\frac{16}{2} = 8$   
 #2)  $8^2 = 64$   
 $x^2 + 16x + 64$   
 $\begin{array}{r} x \quad x \\ \quad 8 \quad 8 \end{array}$   
 $(x+8)^2$

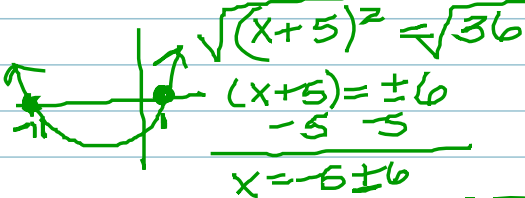
3.  $x^2 - 14x + c$

#1)  $-\frac{14}{2} = -7$   
 #2)  $(-7)^2 = 49$   
 $x^2 - 14x + 49$   
 $\begin{array}{r} x \quad x \\ \quad -7 \quad -7 \end{array}$   
 $(x-7)^2$

Ex #4:  $x^2 + 10x - 11 = 0$

$\begin{array}{r} +11 \quad +11 \\ \hline x^2 + 10x + c = 11 \end{array}$

$\frac{10}{2} = 5$     $x^2 + 10x + 25 = 11 + 25$



$$\sqrt{(x+5)^2} = \sqrt{36}$$

$$(x+5) = \pm 6$$

$$\begin{array}{r} x+5 \\ -5 \end{array} = \begin{array}{r} \pm 6 \\ -5 \end{array}$$

$$x = -5 \pm 6$$

$x = -5 + 6$     $x = -5 - 6$   
 $x = 1$     $x = -11$

Ex #6:  $x^2 + 8x + 22 = 0$

$\begin{array}{r} -22 \quad -22 \\ \hline x^2 + 8x + c = -22 \end{array}$

#1:  $\frac{8}{2} = 4^2 = 16$

Ex #5:  $2x^2 - 7x + 5 = 0$

$x^2 - \frac{7}{2}x + \frac{5}{2} = 0$

$\begin{array}{r} -5/2 \quad -5/2 \\ \hline x^2 - \frac{7}{2}x + c = -5/2 \end{array}$

#1)  $-\frac{7}{2} \div 2 = \left(\frac{-7}{4}\right)^2 = \frac{49}{16} = c$   
 $x^2 - \frac{7}{2}x + \frac{49}{16} = -\frac{5}{2} + \frac{49}{16}$

$\sqrt{(x-\frac{7}{4})^2} = \sqrt{16}$   
 $x - \frac{7}{4} = \pm \frac{3}{4}$   
 $\begin{array}{r} +7/4 \quad +7/4 \end{array}$     $x = \frac{5}{2}, 1$

$x = \frac{7}{4} \pm \frac{3}{4}$

$x = \frac{10}{4} = \frac{5}{2}$ ,  $x = \frac{4}{4} = 1$

$x^2 + 8x + 16 = -22 + 16$   
 $\sqrt{(x+4)^2} = \sqrt{6} = \sqrt{-1 \cdot 6}$

$x+4 = \pm i\sqrt{6}$   
 $\begin{array}{r} =4 \quad -4 \end{array}$   
 $x = -4 \pm i\sqrt{6}$