

# BE-Alg.1

Wednesday 2-22-12

①  $\sqrt{25} = ?$

③

②  $\pm\sqrt{81} = ?$

④

⑤ Solve:  $x^2 = 49$

⑥ Solve:  $(x+3)^2 = 4$

## SOLUTION

⑤  $x^2 = 49$

$$\sqrt{x^2} = \pm\sqrt{49}$$

$$x = \pm 7$$

CK  $( )^2 \stackrel{?}{=} 49$

+7  $(7)^2 \stackrel{?}{=} 49 \checkmark$

CK  $( )^2 \stackrel{?}{=} 49$

-7  $(-7)^2 = 49 \checkmark$

⑥  $(x+3)^2 = 4$

$$\sqrt{(x+3)^2} = \pm\sqrt{4}$$

$$x+3 = \pm 2$$

$$x = -3 \pm 2$$

$$x = \{-1, -5\}$$

CK  $(-1+3)^2 \stackrel{?}{=} 4 \checkmark$

CK  $(-5+3)^2 \stackrel{?}{=} 4 \checkmark$

NOTE:  $(x+3)^2 = x^2 + 6x + 9$

1.

LOOK AT  $(x+3)^2 = 4$

$$(x+3)(x+3) = 4$$

$$x^2 + 6x + 9 = 4$$

$$\begin{array}{ccc} \downarrow & \downarrow & \downarrow \\ a^2 & + 2ab & + b^2 \end{array}$$

OR  $a^2 + \underline{2b(a)} + b^2$

TAKE  $\frac{1}{2}$  of the coefficient of the middle term and square it.

\* **IFF** the coefficient of  $a^2$  is 1  
(if and only if)

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THIS LEADS TO THE BASIC METHOD OF SOLVING  $ax^2 + bx + c = 0$ , the QUADRATIC EQUATION, when  $d$  is not a perfect square but is positive  $\Rightarrow$

COMPLETING THE SQUARE = SOLVING  $ax^2 + bx + c = 0$  when it cannot be factored.

EX

$$x^2 + 6x + 2 = 0$$

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

$$\left. \begin{array}{l} b^2 - 4ac \\ (6)^2 - 4(1)(2) \\ 36 - 8 = \underline{28} \end{array} \right\} \begin{array}{l} \downarrow \\ 2 \text{ real roots,} \\ \text{irrational.} \end{array}$$

$$x^2 + 6x + \boxed{\phantom{00}} = -2$$

↑  
 TAKE  $\frac{1}{2}$  of  
 6 and square it,  
 Add to both sides.  $\Rightarrow \frac{6}{2} = 3, 3^2 = 9$

$$x^2 + 6x + \boxed{9} = -2 + 9$$

$$a^2 + 2ab + b^2$$

$$(x + 3)^2 = 7$$

$$\sqrt{(x+3)^2} = \sqrt{7}$$

$$x + 3 = \pm \sqrt{7}$$

$$x = -3 \pm \sqrt{7} \quad \boxed{x = \{-3 + \sqrt{7}, -3 - \sqrt{7}\}}$$

$$x = -3 + \sqrt{7}$$

$$x = -3 - \sqrt{7}$$

$$x = -3 + 2.65$$

$$x = -3 - 2.65$$

$$x = -.35$$

$$x = -5.65$$

$$\boxed{x \approx \{-.35, -5.65\}}$$

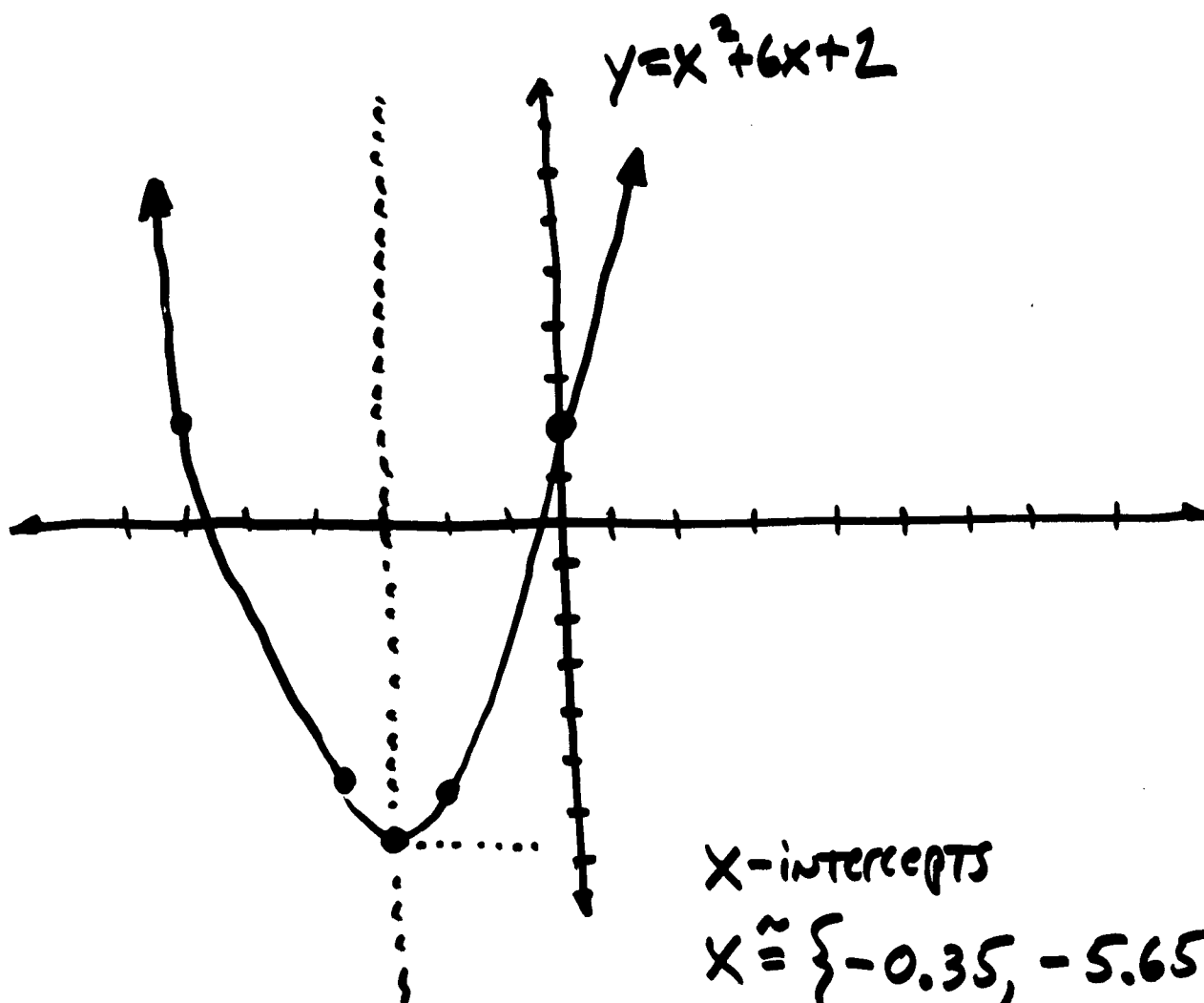
LOOK AT THE GRAPH OF

$$x^2 + 6x + 2 = y$$

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

$$x = \frac{-6}{2} = -3$$

x	y
-3	$9 - 18 + 2 = -7$
0	2
-2	$4 - 12 + 2 = -6$



x-intercepts

$$x \approx \{-0.35, -5.65\}$$

# Ch. 10-3 Completing The Square

CTS is "the biggie", it can be used TO SOLVE ANY Q.E.

EX3  
pg 540  
Solve

$$a^2 - 14a + 3 = -10$$

-3                      -3

$$a^2 - 14a + \text{cloud} = -13$$

↑  
TAKE  $-\frac{14}{2}$   
AND SQUARE

$$a^2 - 14a + 49 = -13 + 49$$

$$(a-7)^2 = 36$$

$$\sqrt{(a-7)^2} = \pm \sqrt{36}$$

$$a-7 = \pm 6$$

$$a = 7 \pm 6$$

$a = \{13, 1\}$

↑  
RATIONAL, YOU COULD FACTOR  
 $a^2 - 14a + 13 = 0$

Recall, the rule of "take  $\frac{1}{2}$  of the coefficient of the middle term and square it" only works if " $a=1$ ",  
WHAT IF IT IS NOT?

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⊙  $2x^2 - 5x + 8 = 7$

$$\frac{2x^2}{2} - \frac{5x}{2} + \boxed{\phantom{0}} = -\frac{1}{2}$$

$$x^2 - \frac{5}{2}x + \left(\frac{5}{4}\right)^2 = -\frac{1}{2} + \frac{25}{16}$$

$$\left(x - \frac{5}{4}\right)^2 = -\frac{8}{16} + \frac{25}{16} = \frac{17}{16}$$

$$x - \frac{5}{4} = \pm \sqrt{\frac{17}{16}}$$

$$x = +\frac{5}{4} \pm \sqrt{\frac{17}{16}}$$

$$x = +1.25 + \sqrt{\frac{17}{16}}$$

$$x = +1.25 + 1.03$$

$$x = 2.28$$

$$x = +1.25 - \sqrt{\frac{17}{16}}$$

$$x = +1.25 - 1.03$$

$$x = 0.22$$

⚡  
÷  
everything  
By  
a

Homework:

Solve by "CTS"

$$\textcircled{1} \quad x^2 - 4x + 4 = 9$$

$$\textcircled{2} \quad x^2 + 10x + 25 = 11$$

$$\textcircled{3} \quad x^2 - 8x + 5 = 0$$

$$\textcircled{4} \quad 2x^2 - x - 9 = 0$$

↑  
÷ by 2 before CTS

**ANSWERS**

$$\textcircled{1} \quad x = \{-1, 5\} \quad \textcircled{2} \quad x = \{-5 \pm \sqrt{11}\} \approx \{-1.68, -8.32\}$$

$$\textcircled{3} \quad x = \{4 \pm \sqrt{11}\} \approx \{0.68, 7.32\}$$

$$\textcircled{4} \quad x = \left\{ \frac{1}{4} \pm \sqrt{\frac{73}{16}} \right\} \approx \{-1.89, 2.39\}$$