

BE - Geometry I

Friday 9-2-11

- ① Find d , the discriminant
for $x^2 - 7x - 44 = 0$
- ② What does it tell you about
the solutions to a quadratic
equation in standard form
 $ax^2 + bx + c = 0$ if d is a
perfect square? If $d = 0$?

• Homework review.

Answers to homework: # 7, 8, 9, 10, 12.

$$\textcircled{7} \left\{ \frac{3}{2}, \frac{1}{2} \right\}$$

$$\textcircled{8} \{ 3, -1 \}$$

$$\textcircled{9} \{ 11, 9 \}$$

$$\textcircled{10} \left\{ -7 + \sqrt{127}, -7 - \sqrt{127} \right\}$$

$$\textcircled{12} \{ 11, -4 \}$$

Complete The Square on $ax^2 + bx + c = 0$

$$ax^2 + bx = -c$$

$$x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2 = \frac{-c}{a} + \frac{b^2}{4a^2} = \frac{-4ac}{4a^2} + \frac{b^2}{4a^2}$$

$$\downarrow \quad \downarrow$$

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

$$x + \frac{b}{2a} = \frac{\pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \text{OR}^* \quad \frac{-b \pm \sqrt{d}}{2a}$$

Quadratic Formula

A "pre-solved" Completing the Square
for any quadratic equations.

Ex # 4 from Worksheet: (using QF)

$$(4) \quad 9x^2 + 18x + 14 = 7$$

$$9x^2 + 18x + 7 = 0$$

$$a = 9 \quad b^2 - 4ac$$

$$b = 18 \quad (18)^2 - 4(9)(7)$$

$$c = 7 \quad 324 - 252 = 72 = d$$

$$x = \frac{-b \pm \sqrt{d}}{2a} = \frac{-18 \pm \sqrt{72}}{2(9)}$$

$$x = \frac{-18 \pm \sqrt{36 \cdot 2}}{18} = \frac{-18 \pm 6\sqrt{2}}{18}$$

DIVIDE
BY 6

$$x = \frac{-3 \pm \sqrt{2}}{3} \quad \checkmark$$

SAME ANSWER AS
COMPLETING THE SQUARE.

$$x = \frac{-b \pm \sqrt{d}}{2a}$$

Meaning of $b^2 - 4ac = d$

$\pm \sqrt{d} \Rightarrow$ If d is a perfect square
the solutions are rational.

$\pm \sqrt{d} \Rightarrow$ if $d = 0$ there is only
one rational solution
since $x = \frac{-b + \sqrt{d}}{2a} = \frac{-b}{2a}$

$\pm \sqrt{d} \Rightarrow$ if d is positive and
NOT a perfect square
there are 2 irrational solutions.

$\pm \sqrt{d} \Rightarrow$ if d is negative, there
are no real solutions.

Ex # 12 on Worksheet Using QF

$$x^2 - 7x - 52 = -8$$

$$x^2 - 7x - 44 = 0$$

Find d

$a = 1$	$b^2 - 4ac$
$b = -7$	$(-7)^2 - 4(1)(-44)$
$c = -44$	$49 + 176 = 225 = d$

$$x = \frac{-b \pm \sqrt{d}}{2a} = \frac{-(-7) \pm \sqrt{225}}{2(1)}$$

$$x = \frac{7 \pm 15}{2} = \left\{ \frac{7+15}{2}, \frac{7-15}{2} \right\}$$

$$x = \{11, -4\}$$

RATIONAL

- if FACTORS EXIST {
- Could have solved using "magic numbers" to factor, then ZPP to find x values.
- Always {
- Could have solved by completing the square.
 - Could solve by QF.
- HW: memorize QF.
Do ≥ 3 problems on Worksheet