10.6/10.7 Notes

"The Quadratic Formula"

Another method for finding the zeros/x-intercepts/ solutions of a quadratic equation,

"$ax^2 + bx + c$"

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

Twinkle, Twinkle, Little Star.....

http://www.youtube.com/watch?v=b1q1pPl79TY&feature=related

Can you get as excited as little Emily and learn the song too????

http://www.youtube.com/watch?v=bSQ7nxjmXXg&feature=related

Let's Sing

(to the tune of: Pop goes the weasel)

X equals negative b

Plus or minus square root

B squared minus 4ac

All over 2a

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

The Discriminant..... $b^2 - 4ac$

allows us to determine the # of solutions the quadratic equation has

If the discriminant is...

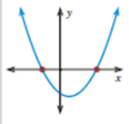
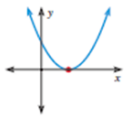
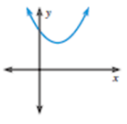
Positive (greater than zero) → 2

Negative (less than zero)→ 0

Zero → 1

KEY CONCEPT *For Your Notebook*

Using the Discriminant of $ax^2 + bx + c = 0$

Value of the discriminant	$b^2 - 4ac > 0$	$b^2 - 4ac = 0$	$b^2 - 4ac < 0$
Number of solutions	Two solutions	One solution	No solution
Graph of $y = ax^2 + bx + c$	 Two x-intercepts	 One x-intercept	 No x-intercept

Find the value of the discriminant AND find the solution(s) (if possible) using the Quadratic Formula

2

1. $x^2 + 4x - 21 = 0$

$$x = \frac{-4 \pm \sqrt{100}}{2}$$

$$x = \frac{-4 \pm 10}{2}$$

$x = 3, -7$

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

$b^2 - 4ac$

$4^2 - 4(1)(-21)$

$16 + 84$

100

Find the value of the discriminant AND find the solution(s) (if possible) using the Quadratic Formula.

Round to the nearest hundredth if necessary.

2. $2x^2 - 14x = 20$

$-20 \quad -20$

$2x^2 - 14x - 20 = 0$

$b^2 - 4ac$

$(-14)^2 - 4(2)(-20)$

$196 + 160$

356

$X = \frac{14 \pm \sqrt{356}}{4}$

$X = \frac{14 \pm 18.87}{4}$

$X = 8.22, -1.22$

Find the value of the discriminant AND find the solution(s) (if possible) using the Quadratic Formula.

Round to the nearest hundredth if necessary.

3. $-x^2 + 6x - 16 = 0$

No Solution

$b^2 - 4ac$

$6^2 - 4(-1)(-16)$

$36 - 64$

-28

Find the number of x-intercepts THEN find the x-intercepts themselves (if possible).

Round to the nearest hundredth, if necessary.

1 Solution

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

$b^2 - 4ac$

$(6)^2 - 4(1)(9)$

$36 - 36$

0

$X = \frac{-6 \pm \sqrt{0}}{2}$

$X = \frac{-6 \pm 0}{2}$

$X = -3$

Find the number of x-intercepts THEN find the x-intercepts themselves (if possible).

Round to the nearest hundredth, if necessary.

2 Solutions

5. $y = \frac{1}{2}x^2 + 5x + 6$

$25 - 12$

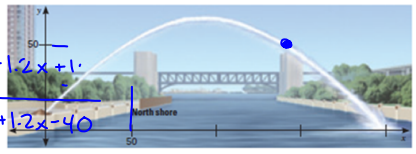
13

$X = \frac{-5 \pm \sqrt{13}}{1}$

$X = -1.39, -8.61$

6. Solve a Multi-Step Problem

FOUNTAINS The Centennial Fountain in Chicago shoots a water arc that can be modeled by the graph of the equation $y = -0.006x^2 + 1.2x + 10$ where x is the horizontal distance (in feet) from the river's north shore and y is the height (in feet) above the river. Does the water arc reach a height of 50 feet? If so, about how far from the north shore is the water arc 50 feet above the water?



$50 = -.006x^2 + 1.2x + 10$

$-50 \quad -50$

$0 = -.006x^2 + 1.2x - 40$

$X = \frac{-1.2 \pm \sqrt{(1.2)^2 - 4(-.006)(-40)}}{2(-.006)}$

$X = \frac{-1.2 \pm \sqrt{1.44 - .96}}{-.012}$

$X = \frac{-1.2 \pm 0.69}{-.012}$

$X = 42.5, 157.5$