Section 9-6
The Quadratic Formula and Discriminant

Students will be able to:
- solve equations using the quadratic formula
- find the number of solutions of a quadratic equation.

-You can use the quadratic formula to solve *any* quadratic equation in standard form.

If $ax^2 + bx + c = 0$, and a is not 0, then the solutions (roots) are:

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

-put in your notes

Use the quadratic formula to solve:

$x^2 - 16x - 36 = 0$

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

a = 1
b = -16
c = -36

$x = \frac{-(-16) \pm \sqrt{(-16)^2 - 4(1)(-36)}}{2(1)}$

$x = \frac{16 \pm \sqrt{256 + 144}}{2}$

$x = \frac{16 \pm \sqrt{400}}{2} = \frac{16 + 20}{2} = 18$

$\boxed{x = -18, -2}$ $\frac{16 - 20}{2} = -2$

Solve:

$-x^2 + 6x - 9 = 0$

$-x^2 + 6x = 9$
$\quad\quad\; -9 \; -9$
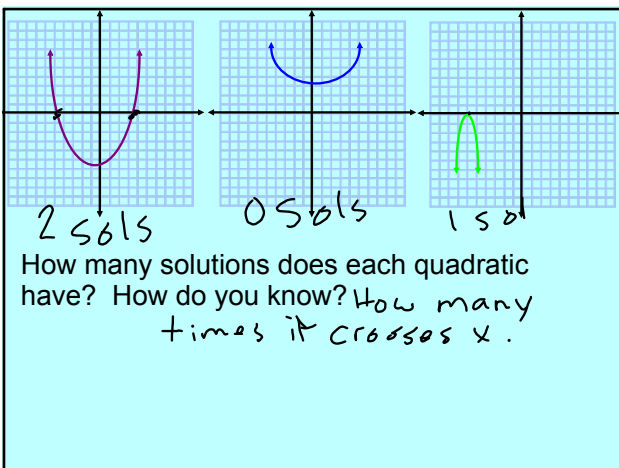
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

a = -1
b = 6
c = -9

$x = \frac{-(6) \pm \sqrt{(6)^2 - 4(-1)(-9)}}{2(-1)}$

$x = \frac{-6 \pm \sqrt{36 - 36}}{-2} = \frac{-6 \pm \sqrt{0}}{-2}$

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

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2 sols   0 sols   1 sol

How many solutions does each quadratic have? How do you know? How many times it crosses x.

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

$b^2 - 4ac$ is called the discriminant

If $b^2 - 4ac > 0$, then the quadratic has 2 distinct real solutions (crosses 2 times)

If $b^2 - 4ac = 0$ then the equation has 1 real solution (a double root) (vertex on axis)

If $b^2 - 4ac < 0$, the the equation has 0 real solutions. (never crosses)

Find the discriminant. Then determine the number of real solutions for each equation by using the discriminant. $b^2 - 4ac$

1) $3x^2 - 6x + 4 = 0$ $(-6)^2 - 4(3)(4) =$
                       $36 - 48 = -12$
                           (0 real Sols)

2) $x^2 - 6x + 11 = 0$ $(-6)^2 - 4(1)(11)$
                       $36 - 44 = -8$
                       (0 real Sol)

3) $x^2 - 6x + 2 = 9$
        $-9 \quad -9$ $(-6)^2 - 4(1)(-7)$
   $x^2 - 6x - 7 = 0$ $36 + 28 = 64$
                       (2 real Sols)

Use any method to solve.

$2x^2 - 3 = -5x$
     $+5x$

$2x^2 + 5x - 3 = 0$
$(2x - 1)(x + 3) = 0$
$x = \frac{1}{2}, -3$

Which method did you choose? Why?

Hwk: pg 586 - 587
#12, 18, 20, 22,
23 - 28 all, 30 - 42 evens

Attachments

Sec5.6NB.notebook