

#18 Quadratic Formula

9/17/15

When Quadratic equations are not factorable we use the Quadratic to solve for x

Standard Form

$$ax^2 + bx + c = 0$$

a, b, c
come from ~~Q~~ SF

Quadratic Formula

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

* Part under the square root is called the Discriminant

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



* (\pm) plus or minus sign is how we can get two solutions, x intercepts

(Ex 1) $3x^2 + 7x + 2 = 0$ $a=3$ $b=7$ $c=2$

$$x = \frac{-7 \pm \sqrt{7^2 - 4(3)(2)}}{2(3)} \quad \text{simplify } \sqrt{\quad} \text{ first}$$

$$= \frac{-7 \pm \sqrt{49 - 24}}{6}$$

$$\frac{-7 \pm \sqrt{25}}{6} = \frac{-7 \pm 5}{6}$$

$$\rightarrow \frac{-7 + 5}{6} = \frac{-2}{6} = \left(-\frac{1}{3}\right)$$

$$\rightarrow \frac{-7 - 5}{6} = \frac{-12}{6} = (-2)$$

2 Rational Solutions

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2 Rational Solutions

Ex2 $8n^2 - 4n = 18$
 $-18 \quad -18$

Put in standard Form before identify a, b, c

a=8
 b=-4
 c=-18

$8n^2 - 4n - 18 = 0$

$n = \frac{4 \pm \sqrt{(-4)^2 - 4(8)(-18)}}{2(8)}$

$= \frac{4 \pm \sqrt{16 + 576}}{16} = \frac{4 \pm \sqrt{592}}{16} = \frac{4 \pm 24.33}{16}$

2 Irrational Solutions

$n = \frac{4+24.33}{16}, \frac{4-24.33}{16}$
 $n = 1.77, -1.27$

Ex3 $10x^2 + 9 = x$
 $-x \quad -x$
 $10x^2 - x + 9 = 0$

a=10
 b=-1
 c=9

$x = \frac{1 \pm \sqrt{(-1)^2 - 4(10)(9)}}{2(10)} = \frac{1 \pm \sqrt{1 - 360}}{20}$

$= \frac{1 \pm \sqrt{-359}}{20}$

No Real Solutions

because there is a negative under sq root.

Ex4 $x^2 + 10x + 25 = 0$

a=1
 b=10
 c=25

$x = \frac{-10 \pm \sqrt{10^2 - 4(1)(25)}}{2(1)}$

$= \frac{-10 \pm \sqrt{100 - 100}}{2} = \frac{-10 \pm 0}{2} = \frac{-10}{2} = -5$

when discriminant is 0 there is only 1 sol.

Ex 5) $4a^2 - 8 = a$

-4 -8

$$4a^2 - a - 8 = 0$$

Put in standard
Before you identify a, b, c
 $a=4$ $b=-1$ $c=-8$

$$a = \frac{1 \pm \sqrt{(-1)^2 - 4(4)(-8)}}{2(4)} = \frac{1 \pm \sqrt{1 + 128}}{8}$$

$$\frac{1 \pm \sqrt{129}}{8} = \frac{1 \pm 11.36}{8} \begin{cases} \frac{1 + 11.36}{8} = 1.5 \\ \frac{1 - 11.36}{8} = -1.3 \end{cases}$$

The Discriminant

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

The Discriminant $2a$
tells us a lot about the types of solution
when it equals =

= 0 1 Real Solution

= Perfect Square 2 Rational Solutions

= Non-Perfect Square 2 Irrational Solutions

= Negative Non Real Solutions
2 Imaginary Solutions