Quadratic Formula

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

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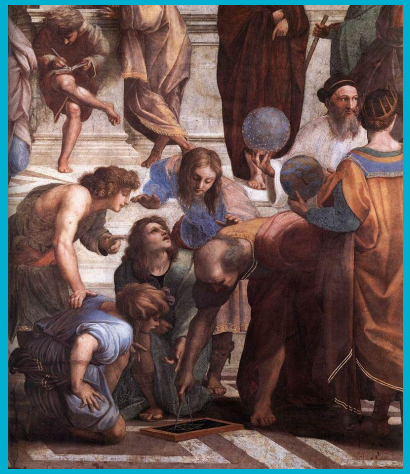
History

Who? The Indian mathematician Brahmagupta (597-668 AD)

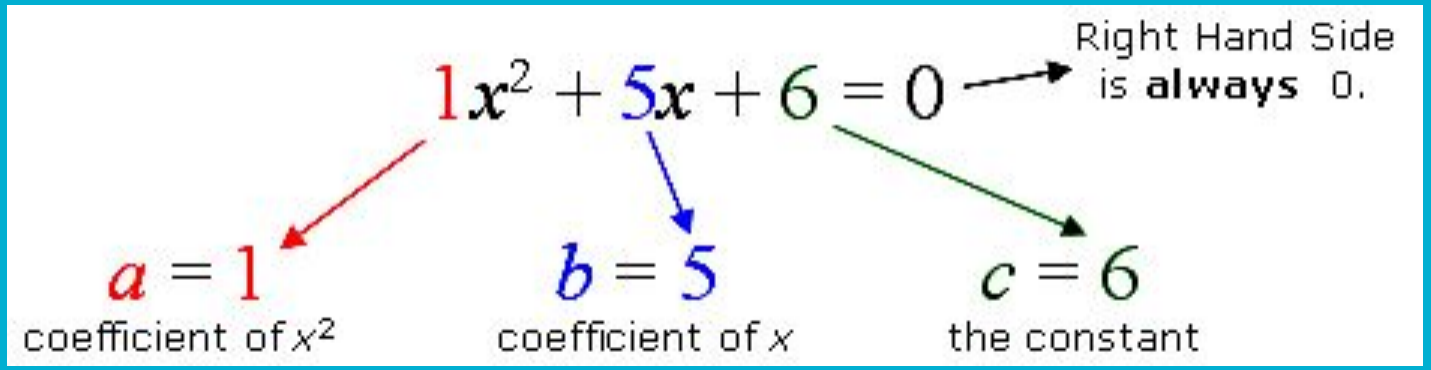
It was written in words not symbols. "To the absolute number multiplied by four times the [coefficient of the] square, add the square of the [coefficient of the] middle term; the square root of the same, less the [coefficient of the] middle term, being divided by twice the [coefficient of the] square is the value." This is equal to...

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

When? described the quadratic formula in his treatise Brāhmasphuṭasiddhānta (628 AD)



Different parts of Quadratic Formula



Different parts of Quadratic Formula

Discriminant

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

Axis of symmetry

Different parts of Quadratic Equations

If $b^2-4ac > 0$ Then there are 2 solutions

If $b^2-4ac = 0$ Then there is 1 solution

If $b^2-4ac < 0$ Then there is NO solution

Real life Example

If you throw a ball (or shoot an arrow, fire a missile or throw a stone) it will go up into the air, slowing down as it goes, then come down again...

The quadratic equation would tell you where it will be!!!

Quadratic Equation 1

Formula and work

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

$$\frac{-2 \pm \sqrt{(2)^2 - 4(1)(-3)}}{2(1)}$$

$$\downarrow$$

$$\frac{-2 \pm \sqrt{4 + 12}}{2} \rightarrow \frac{-2 \pm \sqrt{16}}{2}$$

$$\frac{-2 \pm 4}{2} \nearrow \frac{-2+4}{2} \rightarrow \frac{2}{2} \rightarrow 1$$

$$\frac{-2 \pm 4}{2} \searrow \frac{-2-4}{2} \rightarrow \frac{-6}{2} \rightarrow -3$$

Quadratic Equation 2

Formula and work

$$2x^2 - 3x - 10$$

$$a = 2$$

$$b = -3$$

$$c = -10$$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-10)}}{2(2)}$$

$$x = \frac{3 \pm \sqrt{9 + 80}}{4}$$

$$x = \frac{3 \pm \sqrt{89}}{4}$$

Interview Video

Sources

http://www.mathwarehouse.com/quadratic/the-quadratic-formula.php

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