Solving Quadratics

What is a quadratic?

- Polynomial of 2nd degree
-Standard form:

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

-graph is parabolic

vertex

$$a(x-h)^2+k$$

To Solve Quadratics

- Quadratic Formula
- Factoring
- Graphing
- Square rooting (if b = 0)
- Completing the square

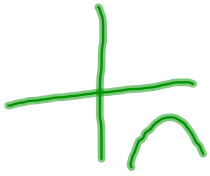
Discriminant:

$b^2 - 4ac$

$b^2 - 4ac$	positive	~~two solutions~~ two real irrat. / two real rational
$b^2 - 4ac$	zero	one solution
$b^2 - 4ac$	negative	no *real* solution

pos. & perfect

2 imag. sol.



Solve by factoring.

$4x^2 - 10x - 6 = 0$

$b^2 - 4ac$

$25 - 4(2)(-3)$

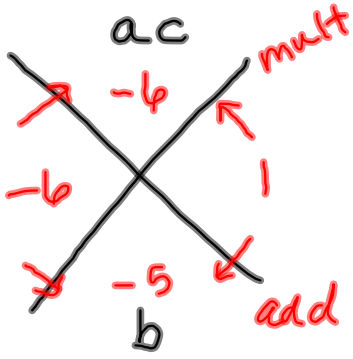
$= 49$

$2(2x^2 - 5x - 3) = 0$

$2((2x^2 - 6x) + (x - 3)) = 0$

$2[2x(x-3) + 1(x-3)] = 0$

$2[(x-3)(2x+1)] = 0$



$2(x-3)(2x+1) = 0$

$x - 3 = 0 \qquad 2x + 1 = 0$

$x = 3 \qquad x = -\frac{1}{2}$

$$x^2+8x=4$$

$64-4(1)(-4)=80$

$x^2+8x+16=4+16$

$(x+4)^2=20$

$x+4=\pm 2\sqrt{5}$

$x=-4\pm 2\sqrt{5}$

$x=\frac{-8\pm\sqrt{80}}{2}$

$x=\frac{-8\pm 4\sqrt{5}}{2}$

$\rightarrow x=-4\pm 2\sqrt{5}$

$$9x^2 - 25 = 0$$

Square root method

$(3x-5)(3x+5)=0$

$x=\frac{5}{3}$ $x=-\frac{5}{3}$

$9x^2=25$

$x^2=\frac{25}{9}$

$x=\pm\frac{5}{3}$

$$(x - 3)^2 = 7$$

$$x - 3 = \pm\sqrt{7}$$

$$x = 3 \pm \sqrt{7}$$

Completing the square:

-force a quadratic to become a perfect square trinomial

- leading coeffecient must be 1 (a = 1)

$$6x = 4 - x^2$$

$36 - 4(1)(-4)$

$= 52$

$x^2 + 6x - 4 = 0$

$\left(\frac{b}{2}\right)^2$

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

$(x+3)^2 = 13$

$x + 3 = \pm\sqrt{13}$

$x = -3 \pm \sqrt{13}$

$$x^2 + 5x + 2 = 0$$

$$x^2 + 5x + \frac{25}{4} = -2 + \frac{25}{4}$$

$$\left(x + \frac{5}{2}\right)^2 = \frac{17}{4}$$

$$x + \frac{5}{2} = \pm\frac{\sqrt{17}}{2}$$

$$x = \frac{-5 \pm \sqrt{17}}{2}$$

$$3x^2 - 18x + 25 = 0$$

$3x^2 - 18x = -25$

$x^2 - 6x + 9 = -\frac{25}{3} + \frac{27}{3}$

$(x-3)^2 = \frac{2}{3}$

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

$x = 3 \pm \frac{\sqrt{6}}{3}$

$324 - 4(3)(25)$

24

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

$x = \frac{9 \pm \sqrt{6}}{3}$

$9x^2 - 12x = 14$

$x^2 - \frac{4}{3}x + \frac{4}{9} = \frac{14}{9} + \frac{4}{9}$

$\left(x - \frac{2}{3}\right)^2 = \frac{18}{9}$

$\frac{4}{3} \cdot \frac{1}{2} = \frac{4}{6}$

$\frac{2}{3}$

$x - \frac{2}{3} = \sqrt{2}$

$x = \frac{2}{3} \pm \sqrt{2}$

Solve using any method:

$3x + 4 = 2x^2 - 7$

$9 - 4(2)(-11) =$

$= 97$

$2x^2 - 3x - 11$

$x = \frac{3 \pm \sqrt{97}}{4}$

$x = \frac{3 \pm \sqrt{97}}{4}$