

FORMS OF QUADRATIC FUNCTIONS

GENERAL FORM

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

Solve with quadratic formula

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

FACTOR

MULTIPLY "FOIL"

MULTIPLY PATTERN
 $(s+t)^2 = s^2 + 2st + t^2$
 $(s-t)^2 = s^2 - 2st + t^2$

COMPLETE THE SQUARE

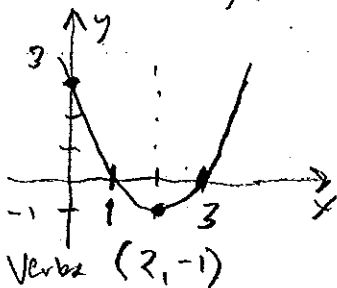
INTERCEPT FORM

$$y = a(x-p)(x-q)$$

Solutions: $x=p, x=q$

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

$$y = (x-1)(x-3)$$



VERTEX FORM

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

Vertex = (h, k)

Solve by "extracting square root"

$$y = (x-2)^2 - 1$$

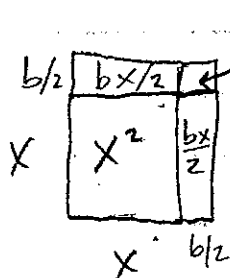
$$(x-2)^2 = 1$$

$$x-2 = \pm\sqrt{1}$$

$$x = 2 \pm 1 \begin{cases} x=3 \\ x=1 \end{cases}$$

COMPLETING THE SQUARE = FROM GENERAL FORM TO VERTEX FORM

$x^2 + bx$ INTO PERFECT SQUARE $(x-h)^2 + \text{a constant}$.



Needed to complete square

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

perfect square $(x + \frac{b}{2})^2$

$$x^2 + bx + \left(\frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2$$

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

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

EX.

COMPLETE $x^2 + 10x + 11$

$$\rightarrow \frac{b}{2} = \frac{10}{2} = 5$$

$$(x^2 + 10x) + 11 = ((x+5)^2 - 25) + 11 = (x+5)^2 - 14$$

NOTE SOLUTION

$$x = 5 \pm 6$$

$$x = 1, -11$$