<table>
<thead>
<tr>
<th>$x$</th>
<th>$(x + 4)(x - 3)$</th>
<th>$f(x)$</th>
<th>$(x, f(x))$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>$(2)(-5) = -10$</td>
<td>-10</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>$(4)(-3)$</td>
<td>-12</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>$(5)(-2)$</td>
<td>-10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>$(6)(-1)$</td>
<td>-6</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>$(7)(0)$</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Expand the quadratic

\[ (x + 4)^2 + 1 \]

\[ (x+4)(x+4) + 1 \]

\[ x^2 + 4x + 4x + 16 + 1 \]

\[ x^2 + 8x + 17 \]
(h,k) form of a quadratic

\[ f(x) = a(x - h)^2 + k \]

General Quadratic Function

\[ f(x) = ax^2 + bx + c \]
\[ f(x) = ax^2 + bx + c \]

A Quadratic Function is also referred to as a Parabola
$f(x) = -x^2 + 4x - 3$

**Domain & Range**

$D: (-\infty, +\infty)$

$-\infty < x < +\infty$

$R: (-\infty, 1]$  

$y \leq 1$

**Vertex**  

$(2, 1)$
The vertex of a parabola is either the minimum value or maximum value.

\[ f(x) = ax^2 + bx + c \]

We can find the vertex using the formula:

\[ \left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right) \]
What is the minimum or maximum value of the function:

\[ f(x) = 1x^2 + 4x - 3 \]

\[ a = 1, \; b = 4, \; c = -3 \]

\[ \left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right) \]

\[ \left(-\frac{4}{2(1)}, f(-2)\right) \]

\[ (-2, -7) \]

\[ f(-2) = (-2)^2 + 4(-2) - 3 \]
To find the y-intercept, substitute 0 for $x$

$$f(x) = x^2 + 4x - 3$$

$$f(0) = 0^2 + 4(0) - 3$$

$$= -3$$
Find the y-intercept and vertex of the following quadratic:

$$3x^2 + 2x - 16$$
To find the roots of a quadratic set the function equal to zero:

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

The solutions of a quadratic equation are called roots of the equation. One method for finding the roots of a quadratic equation is to find the zeros of the related quadratic function.
Two Solutions
2 Roots
2 Zeros
2 x-int

One Solution
1 Root
1 Zero
1 x-int

No Real Solutions
0 Roots
0 Zeros
0 x-int
$2x^2 + x - 1$

Vertex?

Roots?