Graphing Quadratic Functions

Quadratic functions are nonlinear and can be written in the form: $f(x) = ax^2+bx+c$

This is called the standard form of a quadratic equation.

The graph of a quadratic function takes the shape of a parabola.

When $a>0$ the parabola opens up 

When $a<0$ the parabola opens downward. 

The Axis of Symmetry is a vertical line that passes through the turning point of a parabola.

Formula → $x = \frac{-b}{2a}$

Vertex - the axis of symmetry intersects the parabola at only one point called the vertex. Use the formula for the axis of symmetry to find x, then substitute the value of x to find y.

$y = ax^2+bx+c$

The y-intercept is where the graph intersects the y-axis. The y-intercept always occurs at $(0, c)$. $y = ax^2+bx+c$ ← y-intercept

Graphing Quadratic Functions

Create a table of values listing the domain (X), and range (Y) of the function.

X	Y

Since the x-coordinate from the axis of symmetry is the turning point, use this value as the middle value for x in your table of values.

The Texas Instruments TI-30XS Multiview calculator can be used to create the table of values.

Enter your function in the (table) button, then hit enter 5 times. The table of values will pop up!

The discriminant is the expression under the radical in the quadratic formula → $b^2 - 4ac$.

Quadratic equations have one, two or no solutions. You can determine how many solutions (roots) a quadratic equation has by using the discriminant formula.

If the discriminant is positive - the graph has 2 solutions.

If the discriminant is negative - the graph has no solution.

If the discriminant is zero - the graph has one solution.

End Behavior of a Quadratic Function

$y = 2x^2 + 4x - 3$ $a=2, b=4, c=-3$

$a > 0$ the parabola will point upward!

Axis of Symmetry

$x = \frac{-b}{2a}$ $\frac{-4}{2(2)} = \frac{-4}{4} = -1$

$x = -1$

discriminant

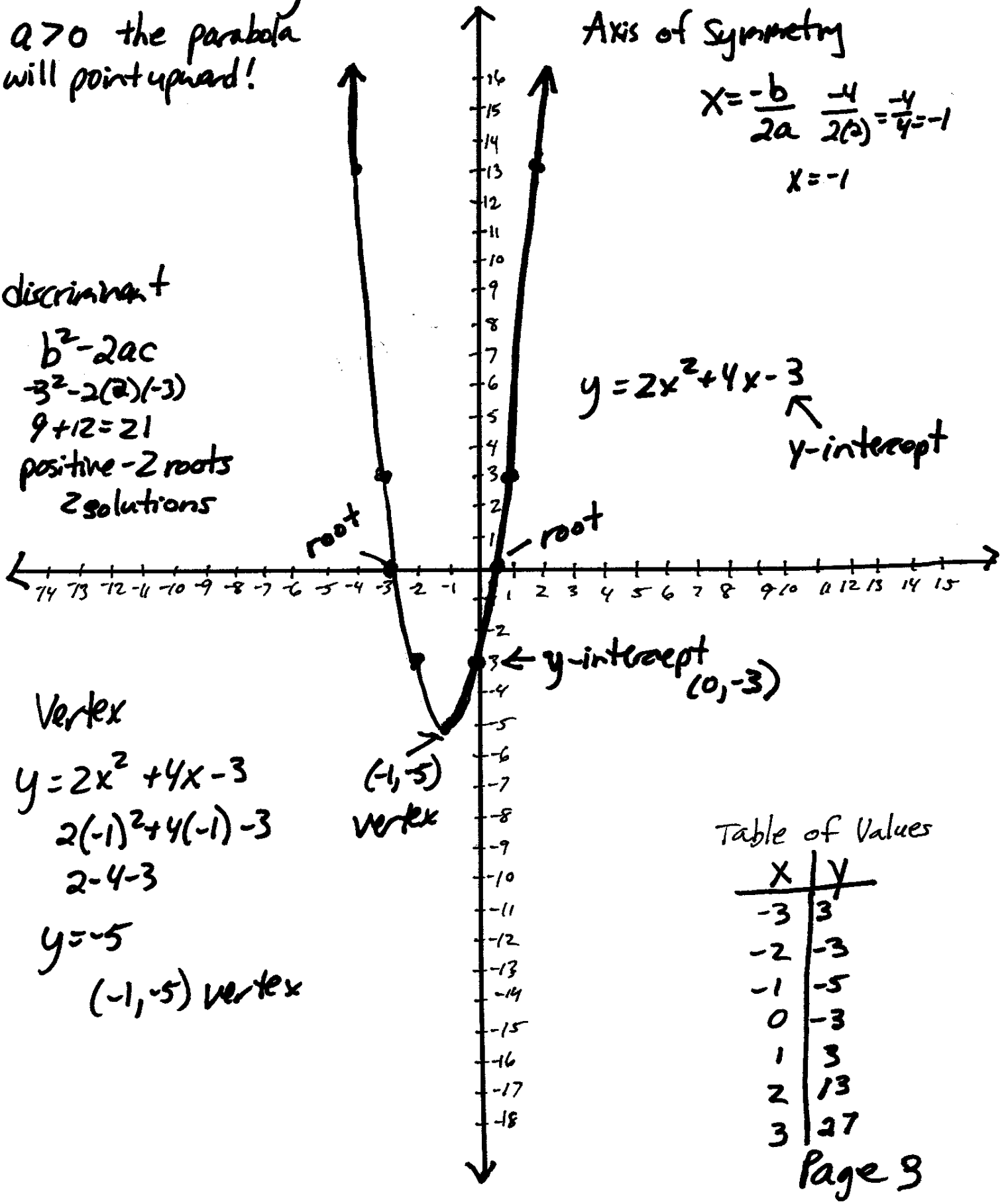
$b^2 - 2ac$

$-3^2 - 2(2)(-3)$

$9 + 12 = 21$

positive - 2 roots

2 solutions



$y = 2x^2 + 4x - 3$ ← y-intercept

Vertex

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

$2(-1)^2 + 4(-1) - 3$

$2 - 4 - 3$

$y = -5$

$(-1, -5)$ vertex

Table of Values

x	y
-3	3
-2	-3
-1	-5
0	-3
1	3
2	13
3	27