

Key Points In Each Form Of The Quadratic Equation Notes

4/19 + 4/20

Zero / Roots = the x-values where the parabola intersect the x-axis, these are sometimes called x-intercepts.

Y intercept = the y value where the parabola intersect the y-axis

Vertex = the coordinates (x,y) where the parabola is "turning", this point is also called the extrema (in other words it is the spot where the parabola reaches a maximum or a minimum).

In STANDARD FORM $Y = 3x^2 - 12x + 9$

In FACTORED FORM $Y = 3(x - 1)(x - 3)$

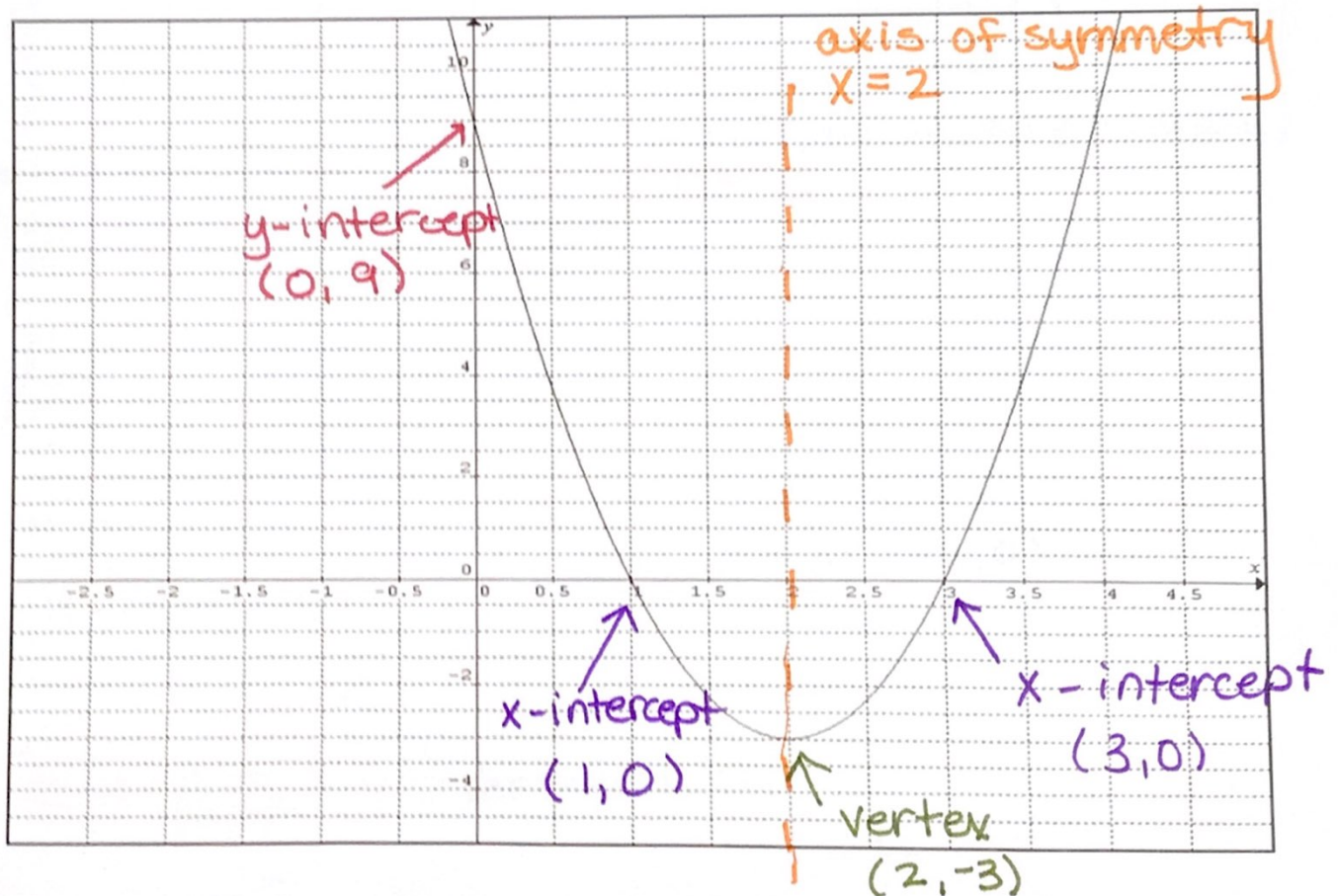
In VERTEX FORM $Y = 3(x - 2)^2 - 3$

The y-intercept of that graph is $(0, 9)$

The roots of that graph are 1 and 3

The vertex of that graph is $(2, -3)$

→ $f(x) = ax^2 + bx + c$
→ $f(x) = a(x - m)(x - n)$
→ $f(x) = a(x - h)^2 + k$



Graphing from Factored Form Notes

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

$$= (x - m)(x - n)$$

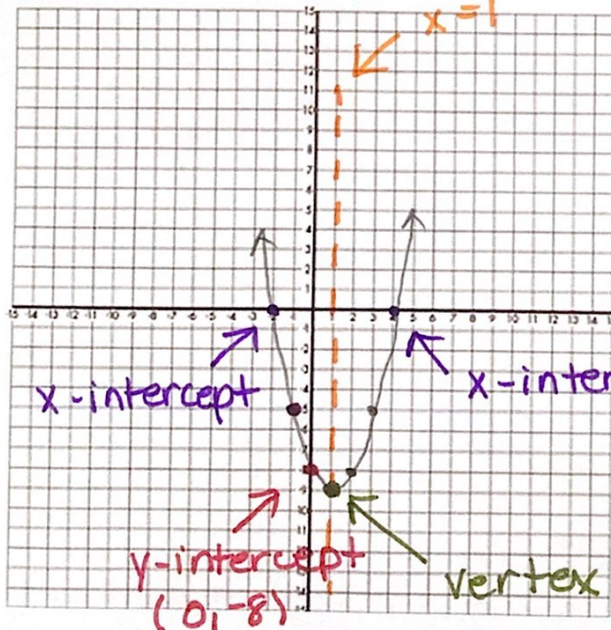
$$= (x - 4)(x - (-2))$$

Finding the Axis of Symmetry by Using Zeros

WORDS	NUMBERS	GRAPH
<p>One Zero</p> <p>If a function has one zero, use the x-coordinate of the vertex to find the axis of symmetry.</p>	<p>Vertex: (3, 0)</p> <p>Axis of symmetry: $x = 3$</p>	
<p>Two Zeros</p> <p>If a function has two zeros, use the average of the two zeros to find the axis of symmetry.</p>	<p>Zeros: -4 and 0</p> $\frac{-4 + 0}{2} = \frac{-4}{2} = -2$ <p>Axis of symmetry: $x = -2$</p>	

<p>1. Determine the zeros/roots from the factored form.</p> <p>Roots/ Zeros <u>4</u> <u>-2</u></p> <p>x-intercepts</p> <p>(<u>4</u> , 0) (<u>-2</u> , 0) Plot points</p>	<p>2. Determine the axis of symmetry by averaging the roots.</p> $x = \frac{(4) + (-2)}{2}$ $= \frac{2}{2}$ <p>Draw in axis $x = 1$</p>	<p>3. Determine the y coordinate of the vertex</p> $f(1) = (1 - 4)(1 + 2)$ $= (-3)(3)$ $= -9$ <p>(<u>1</u> , <u>-9</u>) Plot the vertex</p>
<p>4. Determine the y-intercept – Substitute $x=0$ into the equation.</p> $f(0) = (0 - 4)(0 + 2)$ $= (-4)(2)$ $= -8$ <p>(<u>0</u> , <u>-8</u>) Plot the y-intercept</p>	<p>5. Calculate one more point on the same side of the axis of symmetry as the y-intercept.</p> $f(-1) = (-1 - 4)(-1 + 2)$ $= (-5)(1)$ $= -5$ <p>(<u>-1</u> , <u>5</u>) Plot the point. Then reflect all the points.</p>	

Graph and Label the Key Features



x-intercept

x-intercept (4, 0) (-2, 0)

y-intercept (0, -8)

vertex (1, -9)

axis of symmetry $x = 1$