

Determining the Vertex of a Quadratic

The rules for finding the vertex:

1. In Vertex Form: $f(x) = a(x - h)^2 + k$

The vertex is (h, k) .The axis of symmetry is $x = h$ The maximum $(-a)$ or minimum $(+a)$ is $y = k$

2. In Standard Form: $f(x) = ax^2 + bx + c$

The vertex is located at $x = -\frac{b}{2a}$. To find y , just plug that value in for x and solve.The Axis of Symmetry is $x = -\frac{b}{2a}$ The Maximum $(-a)$ or Minimum $(+a)$ is $y = f(-\frac{b}{2a})$ **EXAMPLE**

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

$-a$ $-h = +2$ $+k = +3$
 maximum! $h = -2$ $k = 3$

Vertex is (h, k) , Axis is the x -value, Max/Min is the y -value
So...Vertex: $(-2, 3)$ Axis of Symmetry: $x = -2$ (Circle one) **Maximum** or Minimum: $y = 3$ **EXAMPLE**

$$f(x) = 2x^2 + 20x - 14$$

$a = +2$ $b = 20$ $c = -14$
 Minimum

$$x = -\frac{b}{2a} = -\frac{(20)}{2(2)} = -\frac{20}{4} = -5$$

$$f(-5) = 2(-5)^2 + 20(-5) - 14$$

$$f(-5) = 2(25) - 100 - 14$$

$$f(-5) = 50 - 114$$

$$f(-5) = -64$$

Vertex: $(-5, -64)$ Axis of Symmetry: $x = -5$ (Circle one) Maximum or **Minimum**: $y = -64$

1. $f(x) = 7(x + 1)^2 - 2$

Vertex: _____ Axis of Symmetry: $x =$ _____(Circle one) Maximum or Minimum: $y =$ _____

2. $f(x) = -5(x - 3)^2 + 1$

Vertex: _____ Axis of Symmetry: $x =$ _____(Circle one) Maximum or Minimum: $y =$ _____

3. $f(x) = -(x + 6)^2 + 8$

Vertex: _____ Axis of Symmetry: $x =$ _____(Circle one) Maximum or Minimum: $y =$ _____

4. $f(x) = 4(x)^2 - 2$

Vertex: _____ Axis of Symmetry: $x =$ _____(Circle one) Maximum or Minimum: $y =$ _____

5. $f(x) = -3x^2 - 6x + 4$

Vertex: _____ Axis of Symmetry: $x =$ _____(Circle one) Maximum or Minimum: $y =$ _____

6. $f(x) = 4x^2 - 16x - 10$

Vertex: _____ Axis of Symmetry: $x =$ _____(Circle one) Maximum or Minimum: $y =$ _____

<p>7. $f(x) = 6(x - 2)^2$</p> <p>Vertex: _____ Axis of Symmetry: $x =$ _____</p> <p>(Circle one) Maximum or Minimum: $y =$ _____</p>	<p>13. $f(x) = 8x^2 + 8x + 6$ Yes, x is a fraction. Breathe.</p> <p>Vertex: _____ Axis of Symmetry: $x =$ _____</p> <p>(Circle one) Maximum or Minimum: $y =$ _____</p>
<p>8. $f(x) = -3(x + 1)^2 + 1$</p> <p>Vertex: _____ Axis of Symmetry: $x =$ _____</p> <p>(Circle one) Maximum or Minimum: $y =$ _____</p>	
<p>9. $f(x) = 8(x - 2)^2 + 4$</p> <p>Vertex: _____ Axis of Symmetry: $x =$ _____</p> <p>(Circle one) Maximum or Minimum: $y =$ _____</p>	<p>14. $f(x) = 9x^2 + 36x + 40$</p> <p>Vertex: _____ Axis of Symmetry: $x =$ _____</p> <p>(Circle one) Maximum or Minimum: $y =$ _____</p>
<p>10. $f(x) = -9(x - 4)^2 + 3$</p> <p>Vertex: _____ Axis of Symmetry: $x =$ _____</p> <p>(Circle one) Maximum or Minimum: $y =$ _____</p>	

Now for some plug 'n' chug practice...

<p>15. $f(x) = -3x^2 - 6x + 4$</p> <p>$f(-3) =$</p> <p>$f(-2) =$</p> <p>$f(-1) =$</p> <p>$f(0) =$</p> <p>$f(1) =$</p>	<p>17. $f(x) = 8x^2 + 8x + 6$</p> <p>$f(-2) =$</p> <p>$f(-1) =$</p> <p>$f\left(-\frac{1}{2}\right) =$</p> <p>$f(0) =$</p> <p>$f(1) =$</p>
<p>16. $f(x) = 4x^2 - 16x - 10$</p> <p>$f(0) =$</p> <p>$f(1) =$</p> <p>$f(2) =$</p> <p>$f(3) =$</p> <p>$f(4) =$</p>	<p>18. $f(x) = 9x^2 + 36x + 40$</p> <p>$f(-4) =$</p> <p>$f(-3) =$</p> <p>$f(-2) =$</p> <p>$f(-1) =$</p> <p>$f(0) =$</p>