Name: _____

Details of a Quadratic – Quadratic Formula

There are three important details needed to graph a quadratic: the **vertex**, **zeros** and **x-intercepts** (also known as "zeros," "roots," or "solutions"). All of these details can be found from standard form, using the Quadratic Formula (or parts of it).

<table>
<tr>
<td>1. $f(x) = x^2 - 2x - 15$

Y-intercept:

Vertex:

Zeros:</td>
<td><u>Formulas</u>

Y-intercept: The last number in the standard form (c) equation is the y-intercept.

Vertex:
$x = \frac{-b}{2a}$ … then, plug that x into the original equation and solve for y.
Zeros:
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

<u>Answers:</u>
1. Y-intercept: $(0, -15)$
Vertex: $(1, -16)$
Zeros: $(-3, 0)$ & $(5, 0)$
2. Y-intercept: $(0, 25)$
Vertex: $(-4, 9)$
Zeros: $(-4 - 3i, 0)$ & $(-4 + 3i, 0)$
3. Y-intercept: $(0, 9)$
Vertex: $(-3, 0)$
Zeros: $(-3, 0)$ ~~& $(-3, 0)$~~</td>
</tr>
<tr>
<td>2. $f(x) = x^2 + 8x + 25$

Y-intercept:

Vertex:

Zeros:</td>
<td>3. $f(x) = x^2 + 6x + 9$

Y-intercept:

Vertex:

Zeros:</td>
</tr>
</table>

4. $f(x) = 9x^2 - 12x + 4$

Y-intercept:

Vertex:

Zeros:

Formulas

Y-intercept: The last number in the standard form (c) equation is the *y*-intercept.

Vertex:

$x = \frac{-b}{2a}$ … then, plug that x into the original equation and solve for *y*.

Zeros:

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

Answers:

4. Y-intercept: $(0, 4)$
   Vertex: $\left(\frac{2}{3}, 0\right)$
   Zeros: $\left(\frac{2}{3}, 0\right)$ ~~& $\left(\frac{2}{3}, 0\right)$~~
5. Y-intercept: $(0, -26)$
   Vertex: $(3, -8)$
   Zeros: $(3 + 2i, 0)$ & $(3 - 2i, 0)$
6. Y-intercept: $(0, 4)$
   Vertex: $\left(-\frac{2}{3}, 8\right)$
   Zeros: $\left(\frac{-2-2\sqrt{2}}{3}, 0\right)$ & $\left(\frac{-2+2\sqrt{2}}{3}, 0\right)$

5. $f(x) = -2x^2 + 12x - 26$

Y-intercept:

Vertex:

Zeros:

6. $f(x) = -9x^2 - 12x + 4$

Y-intercept:

Vertex:

Zeros:

7. $f(x) = 4x^2 + 8x + 13$

Y-intercept:

Vertex:

Zeros:

8. $f(x) = 9x^2 + 6x + 1$

Y-intercept:

Vertex:

Zeros:

Formulas

Y-intercept: The last number in the standard form (c) equation is the *y*-intercept.

Vertex:

$x = \frac{-b}{2a}$ … then, plug that x into the original equation and solve for *y*.

Zeros:

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

Answers:

7. Y-intercept: $(0, 13)$
   Vertex: $(-1, 9)$
   Zeros: $\left(\frac{-2-3i}{2}, 0\right)$ & $\left(\frac{-2+3i}{2}, 0\right)$
8. Y-intercept: $(0, 1)$
   Vertex: $\left(-\frac{1}{3}, 0\right)$
   Zeros: $\left(-\frac{1}{3}, 0\right)$ ~~& $\left(-\frac{1}{3}, 0\right)$~~
9. Y-intercept: $(0, -71)$
   Vertex: $(2, -75)$
   Zeros: $\left(2 - 5\sqrt{3}, 0\right)$ & $(2 + 5\sqrt{3}, 0)$

9. $f(x) = x^2 - 4x - 71$

Y-intercept:

Vertex:

Zeros:

10. $f(x) = 2x^2 - 3x - 35$

Y-intercept:

Vertex:

Zeros:

11. $f(x) = 5x^2 - 20x + 20$

Y-intercept:

Vertex:

Zeros:

12. $f(x) = x^2 + 10x + 57$

Y-intercept:

Vertex:

Zeros:

Formulas

Y-intercept: The last number in the standard form (c) equation is the *y*-intercept.

Vertex:

$x = \frac{-b}{2a}$ … then, plug that x into the original equation and solve for *y*.

Zeros:

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

Answers:

10. Y-intercept: $(0, -35)$
    Vertex: $\left(\frac{3}{4}, -\frac{289}{8}\right)$
    Zeros: $\left(-\frac{7}{2}, 0\right)$ & $(5, 0)$
11. Y-intercept: $(0, 20)$
    Vertex: $(2, 0)$
    Zeros: $(2, 0)$ ~~& (2, 0)~~
12. Y-intercept: $(0, 57)$
    Vertex: $(-5, 32)$
    Zeros: $\left(-5 - 4i\sqrt{2}, 0\right)$ & $(-5 + 4i\sqrt{2}, 0)$