Algebra 1: 11.4 Notes & CW/HW **Name** _____ **Period** _____
Factored Form of a Quadratic Function

Let's Review

What is a quadratic function?

Examples:

What are 2 forms of writing a quadratic function?

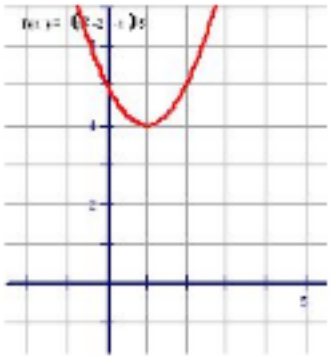
3rd Form: Writing a Quadratic Function in Factored Form

Solutions for Quadratic Functions

When you graph a quadratic equation, the solutions are the _____ or the point(s) where the parabola crosses the *x*-axis.

The *x*-intercepts also called the _____ or _____.

How many solutions does each parabola have?



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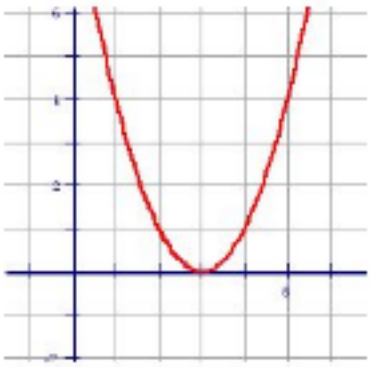

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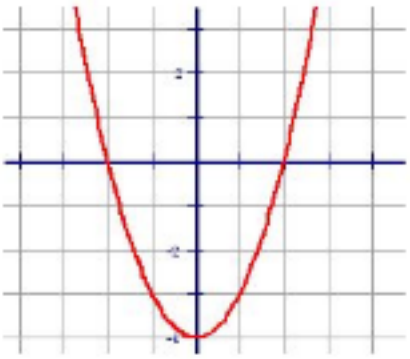

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A quadratic equation can have _____, _____, or _____ real solutions.

Solving Quadratic Functions in Factored Form

Use the ***Zero Product Property***: _____

Think about It! If $4 \cdot b = 0$, what is the value of b? _____

Let's Look at an Example! How do we find a solution?

If $(x + 4)(x - 3) = 0$, then $(x + 4) = 0$ **or** $(x - 3) = 0$

Find the solution(s) or x-intercept(s) for each quadratic function written in factored form.

1. $(x + 7)(3x - 1) = 0$
2. $(4s + 8)(s + 9) = 0$
3. $j(j - 8) = 0$
4. $(x - 4)(3x - 12) = 0$
5. $\frac{1}{2}(x-4)(x+1) = 0$
6. $-(x - 3)(x - 11) = 0$

Writing a Quadratic Function in Factored Form

We need to know two things!

1. Does the parabola open up or down?
2. What are the x-intercepts?

Let's Look at an Example! How do we write a quadratic function in factored form?

The parabola opens UP and x-intercepts are (2, 0) and (4, 0).

$f(x)$ = _____

Write a quadratic equation in factored using the given information.

1. The parabola opens DOWN and the x-intercepts are (–3, 0) and (1, 0).

2. The parabola opens UP and the x-intercepts are (3.5, 0) and (–4.3, 0).

3. The parabola opens DOWN and the x-intercepts are (0, 0) and (5, 0).

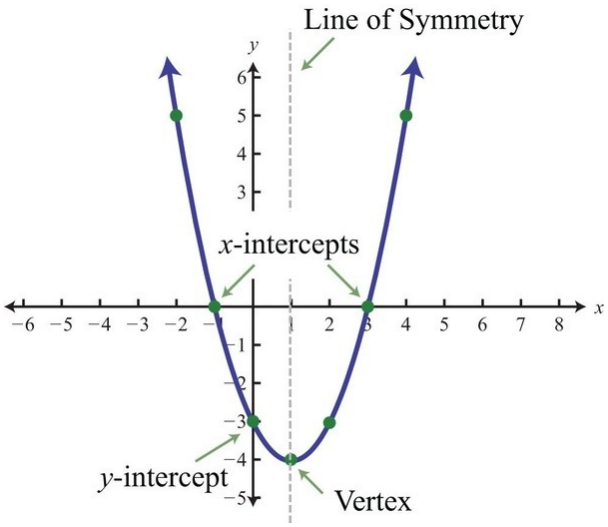
4. The parabola opens UP and the x-intercepts are $\left(-\frac{1}{2},0\right)$ and $\left(-\frac{3}{4},0\right)$.

5. The parabola opens DOWN and the x-intercepts are (4, 0) and (–2, 0).

6. The parabola opens UP and the x-intercepts are (1, 0) and $\left(\frac{2}{3},0\right)$.

Finding the Axis of Symmetry

The ***axis of symmetry*** is the midpoint between the x-coordinates of the x-intercepts.



How do we find the axis of symmetry given the x-intercepts?

Let's Look at an Example!

Find the axis of symmetry if the x-intercepts are (–1, 0) and (3, 0)?

Determine the axis of symmetry of a parabola with the given x-intercepts.

1. The x-intercepts are (–12, 0) and (4, 0).
2. The x-intercepts are (7, 0) and (0, 0).
3. The x-intercepts are (–8, 0) and (–2, 0).
4. The x-intercepts are (-3.5, 0) and (4.1, 0).

Finding the Vertex

Follow These Steps!

1. Find the axis of symmetry (AOS). ***This is the x-coordinate of the vertex!***
2. Plug the AOS in for ***x*** and solve the quadratic equation. ***This is y-coordinate of the vertex!***

Let's Look at an Example! How do we find the vertex of a quadratic function given the x-intercepts?

Determine the vertex for a parabola given the quadratic function: $f(x) = (x + 2)(x - 2)$ and the x-intercepts $(-2, 0)$ and $(2, 0)$.

1. Find the axis of symmetry:
2. Let $x = 0$ and solve for y (or $f(x)$):

Determine the vertex of a parabola given the quadratic function and the x-intercepts.

1. The quadratic function is $f(x) = (x + 3)(x + 1)$ and the x-intercepts are $(-3, 0)$ and $(-1, 0)$.

2. The quadratic function is $f(x) = (x + 5)(x - 3)$ and the x-intercepts are $(-5, 0)$ and $(3, 0)$.

3. The quadratic function is $f(x) = (x - 2)(x - 12)$ and the x-intercepts are $(2, 0)$ and $(12, 0)$.

Graphing a Quadratic Function

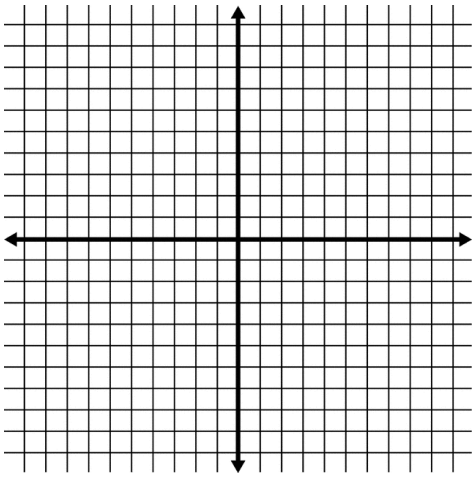
Putting It All Together!

1. Use the quadratic equation written in factored form to find the x-intercepts.
2. Use the x-intercepts to find the axis of symmetry.
3. Use the axis of symmetry to find the vertex.
4. Graph all 3 points: the x-intercepts and the vertex to form a U-shaped curve called a parabola.

Quadratic Equation → x-intercepts → Axis of Symmetry → Vertex → Parabola

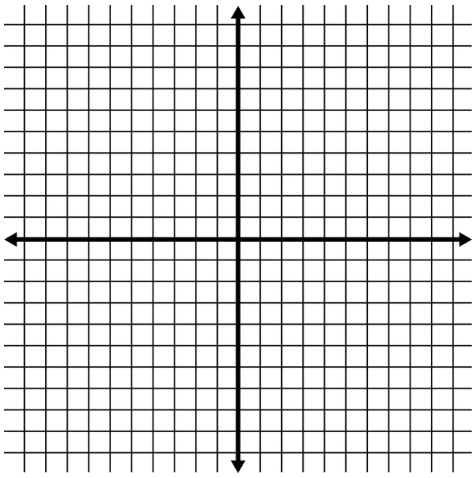
Let's Look at an Example! How do we graph a quadratic function?

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

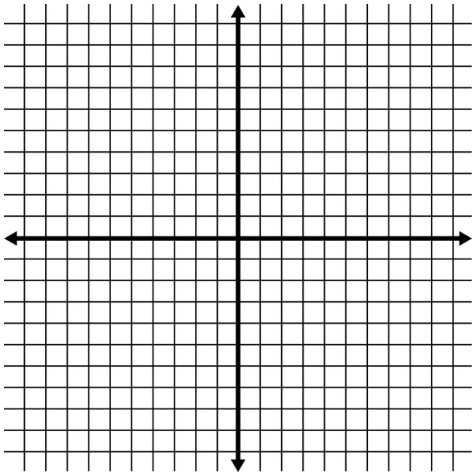


Identify the x-intercepts and the vertex. Then, graph each of the quadratic functions.

1. $f(x) = (x + 1)(x - 3)$



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



3. $f(x) = -x(x - 4)$