

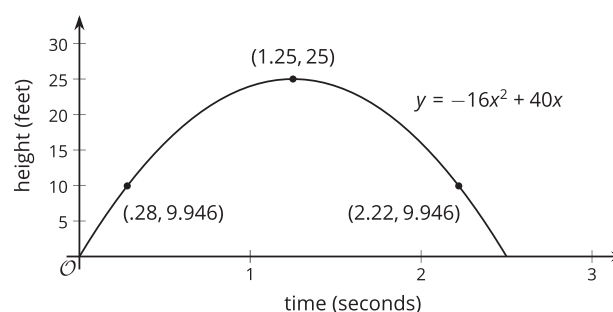
# Family Support Materials

## Quadratic Equations

In this unit, your student will be learning how to solve quadratic equations using several methods. In the previous unit, students saw how quadratic functions can represent a variety of situations such as the height of a ball thrown into the air over time.

The graph shows that the ball is 10 feet above the ground at about 0.28 seconds, and again at about 2.22 seconds after being thrown.

The solutions to the equation  $-16x^2 + 40x = 10$  would give us the *exact* times when the ball is 10 feet above the ground. However, finding those exact solutions can be challenging.



To learn how to solve these more complicated equations, students first reason about solving equations like  $x^2 = 9$  or  $(x - 1)^2 = 9$ . Can you figure out the solutions to these equations?

You probably noticed that one solution to  $x^2 = 9$  is 3 because  $3^2 = 9$ . Also, -3 is a solution because  $(-3)^2$  is also equal to 9. By similar reasoning, the solutions to  $(x - 1)^2 = 9$  are 4 and -2. You can check those solutions because  $4 - 1 = 3$  and  $-2 - 1 = -3$ .

Later in the unit, your student will learn to rewrite expressions to quickly find the values that make an expression equal to 0. A diagram can be useful. Here is a diagram showing  $x^2 + 3x$  is equal to  $x(x + 3)$ .

	$x$	$3$
$x$	$x^2$	$3x$

That means solutions to the equation  $x^2 + 3x = 0$  are the same as the solutions to the equation  $x(x + 3) = 0$ . Can you “see” from the second equation that the solutions are 0 and -3?

By the end of the unit, students have learned that the quadratic formula that can be used to find the exact solutions to any quadratic equation.

Here is a task to try with your student:

Solve the equation  $x^2 - 4x + 3 = 0$  in two ways.

1. Rewrite it in factored form. Here is a diagram to help you.

	$x$	$-3$
$x$	$x^2$	$-3x$
$-1$	$-1x$	$3$

2. Make both sides perfect squares. Here are the first few steps to help you.

$$x^2 - 4x + 3 = 0$$

$$x^2 - 4x + 4 = 1$$

$$(x - 2)^2 = 1$$

**Solution:**

1.  $(x - 1)(x - 3) = 0$  and the solutions are  $x = 1$  and  $x = 3$ .
2. One solution is  $x = 1$  because  $(1 - 2)^2 = (-1)^2$ , which equals 1. The other solution is  $x = 3$  because  $(3 - 2)^2 = (1)^2$ , which also equals 1.

## Video Lesson Summaries

Here are the video lesson summaries for Algebra 1, Unit 7: Quadratic Equations. Each video highlights key concepts and vocabulary that students learn across one or more lessons in the unit. The content of these video lesson summaries is based on the written Lesson Summaries found at the end of lessons in the curriculum. The goal of these videos is to support students in reviewing and checking their understanding of important concepts and vocabulary. Here are some possible ways families can use these videos:

- Keep informed on concepts and vocabulary students are learning about in class.
- Watch with their student and pause at key points to predict what comes next or think up other examples of vocabulary terms (the bolded words).
- Consider following the Connecting to Other Units links to review the math concepts that led up to this unit or to preview where the concepts in this unit lead to in future units.

Algebra 1, Unit 7: Quadratic Equations	Vimeo	YouTube
Video 1: Solutions to Quadratic Equations (Lessons 1-5)	<a href="#">Link</a>	<a href="#">Link</a>
Video 2: Factored Form (6-10)	<a href="#">Link</a>	<a href="#">Link</a>
Video 3: Completing the Square (Lessons 11-15)	<a href="#">Link</a>	<a href="#">Link</a>
Video 4: The Quadratic Formula (Lessons 16-18)	<a href="#">Link</a>	<a href="#">Link</a>
Video 5: Rational and Irrational Solutions (Lessons 19-21)	<a href="#">Link</a>	<a href="#">Link</a>
Video 6: Vertex Form (Lessons 22-24)	<a href="#">Link</a>	<a href="#">Link</a>

### Video 1

Video 'VLS Alg1U7V1 Solutions to Quadratic Equations (Lessons 1-5)' available here:  
<https://player.vimeo.com/video/524344018>.

### Video 2

Video 'VLS Alg1U7V2 Factored Form (6-10)' available here: <https://player.vimeo.com/video/524508901>.

### Video 3

Video 'VLS Alg1U7V3 Completing the Square (Lessons 11-15)' available here:  
<https://player.vimeo.com/video/526584806>.

### Video 4

Video 'VLS Alg1U7V4 The Quadratic Formula (Lessons 16-18)' available here:  
<https://player.vimeo.com/video/531440950>.

### Video 5

Video 'VLS Alg1U7V5 Rational and Irrational Solutions (Lessons 19–21)' available here:  
<https://player.vimeo.com/video/531442545>.

### **Video 6**

Video 'VLS Alg1U7V6 Vertex Form (Lessons 22-24)' available here:  
<https://player.vimeo.com/video/531444254>.