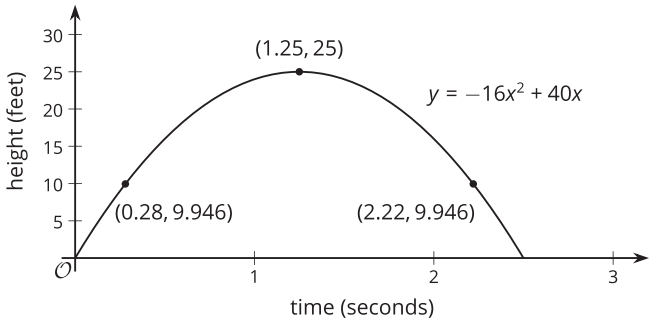
Unit 8 Family Support Materials

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 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 that solutions to the equation $x^2 + 3x = 0$ are the same as the solutions to the equation $x(x + 3) = 0$. The solutions of 0 and -3 are clearer from the second equation.

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

Here is a task to try with your student:

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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.