Unit 9 Family Support Materials

Get acquainted with the topics and concepts your student will be learning during Unit 9.

More 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.

Here's an example of a quadratic function in a situation

A ball is thrown straight up, from 3 meters above the ground, with a velocity of 14 meters/second. The pathway the ball travels is modeled by the equation $h = -5t^2 + 14t + 3$. When does it hit the ground?

If h, represents the height, and t, represents the time in seconds since the ball was thrown.

Then, when the ball hits the ground, the height is zero.

$-5t^2 + 14t + 3 = 0$

How can we solve this?

One way to solve this equation is to use the quadratic formula. The formula can be used to find the solutions to any quadratic equation in the form of $ax^2 + bx + c = 0$, where a, b, and c are numbers and a is not 0.

The Quadratic Formula

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

The quadratic formula can be used to find the time when the ball hits the ground by solving $-5t^2 + 14t + 3 = 0$, in which $a = -5$, $b = 14$, and $c = 3$.

Example using the quadratic formula

STEP 1: Substitute the values of a, b, and c into the formula.

$$t = \frac{-(14) \pm \sqrt{(14)^2 - (4)(-5)(3)}}{2(-5)}$$

STEP 2: Evaluate each part of the expression.

$$t = \frac{-14 \pm \sqrt{196 + 60}}{-10}$$

$$t = \frac{-14 \pm \sqrt{256}}{-10}$$

$$t = \frac{-14 \pm 16}{-10}$$

STEP 3: Write each equation separately.

$t = \frac{-14 + 16}{-10}$ and $t = \frac{-14 - 16}{-10}$

STEP 4: Simplify.

$t = \frac{2}{-10} = -\frac{1}{5}$ and $t = \frac{-30}{-10} = 3$

STEP 5: Find the solution(s).

The equation has two solutions, $t = -\frac{1}{5}$ and $t = 3$. The solution $t = -\frac{1}{5}$ does not make sense for this problem because t represents time and the ball's pathway starts at time equal to 0. Time cannot be negative in this situation. The solution $t = 3$ means the ball hits the ground 3 seconds after being thrown in the air. The solution is $t = 3$.

Apply

Try this task with your student

Solve $2x^2 - 13x + 20 = 0$ using the quadratic equation.

**You can find the answers on the next page*

Hide the answers until you have attempted the questions

$a = 2$, $b = -13$, and $c = 20$.

$$x = \frac{-(-13) \pm \sqrt{(-13)^2 - (4)(2)(20)}}{2(2)}$$

$$x = \frac{13 \pm \sqrt{169 - 160}}{4}$$

$$x = \frac{13 \pm 3}{4}$$

$x = \frac{13+3}{4} = 4$ and $x = \frac{13-3}{4} = 2.5$

The solutions are $x = 4$ and $x = 2.5$.

Review

Video lesson summaries for Unit 9: More 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:

- Families can stay informed on concepts and vocabulary students are learning about in class.
- Families can watch with their students and pause at key points to predict what comes next or think up other examples of vocabulary terms.

Video Title	Related Lessons
Completing the Square	• What Are Perfect Squares? • Completing the Square, Part (s) 1, 2, & 3
The Quadratic Formula	• The Quadratic Formula • Applying the Quadratic Formula
Vertex Form	• Writing Quadratics in Different Forms • Rewriting Quadratic Expressions in Vertex Form
Rational and Irrational Solutions	• Quadratic Equations with Irrational Solutions

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