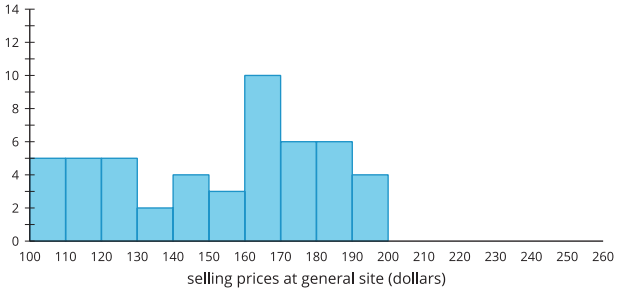
Family Support Materials

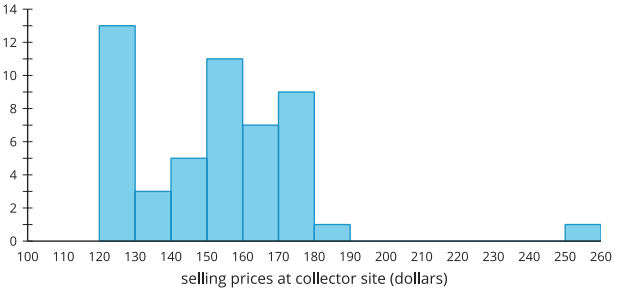
One-variable Statistics

In this unit, your student will be learning about analyzing data. Statistics can help us recognize trends in what is typical, as well as how far from typical we can expect to go.

For example, imagine you discover that one of your student's childhood toys is actually worth a lot of money from toy collectors. What is a good price for the toy, and where should you sell it?

You find two sites where you could auction the toy: one is a site for toy collectors and one is a general online site for selling items. After doing some research, you come across two histograms showing the price when other people sold this toy, as well as some statistics about the prices.





General site:

- Average price: $152.32
- Standard deviation: $28.60

Collector site:

- Average price: $152.68
- Standard deviation: $23.91

The first thing you may notice is that one of the toys on the collector site sold for between $250 and $260. An extremely high value like this can be called an "outlier" and should be investigated to understand why it is so different. In this case, the toy was in its original box and signed by the toy maker. Although we don't usually like to throw out data, it doesn't make sense to include that value when comparing to our toy, so you might take out that

value to get new statistics. This changes the average price at the collector site to $150.51 and the standard deviation to $18.65.

Next, you might notice that the prices for the general site are more spread out than at the collector site. This spread can be represented with a value called the "standard deviation." The general site has a much larger standard deviation, indicating its prices are more spread out. For you, that means you are more likely to sell our toy near the average price on the collector site while the general site is more likely to sell significantly higher or lower than average.

Here is a task to try with your student:

A football coach is considering adding one of two running backs to the team. Some statistics for the number of yards gained on each run for each player are given. Which player should the coach choose? Explain your reasoning.

Running back A:

- Mean (average): 5.4 yards
- Standard deviation: 2.41 yards

Running back B:

- Mean (average): 4.2 yards
- Standard deviation: 0.32 yards

Solution:

Either running back can be a good choice for the team depending on what the coach is looking for.

- Running back A gets more yards per run on average, but is a lot more variable (based on the standard deviation). This means Player A sometimes has really long runs and sometimes very short (or even negative) runs. Running back A will likely be more exciting to watch, but could also be frustrating when they don't get the needed yards.
- Running back B gets fewer yards per run on average, but is a lot less variable (based on the standard deviation). This means that Player B is more consistent and gets close to 4 yards every play they are allowed to run. Running back B will likely be less exciting to watch, but can be relied on to get consistent gains.

Video Lesson Summaries

Here are the video lesson summaries for Algebra 1, Unit 1: One-variable Statistics. 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 1: One-variable Statistics	Vimeo	YouTube
Video 1: Representing Data (Lessons 1, 3)	Link	Link
Video 2: Distribution Types (Lesson 4)	Link	Link
Video 3: Statistics and Data Displays (Lessons 9–11)	Link	Link
Video 4: Manipulating Data (Lessons 12–15)	Link	Link

Video 1

Video 'VLS Alg1U1V1 Representing Data (Lessons 1, 3)' available here: https://player.vimeo.com/video/441642229.

Video 2

Video 'VLS Alg1U1V2 Distribution Types (Lesson 4)' available here: https://player.vimeo.com/video/441642893.

Video 3

Video 'VLS Alg1U1V3 Statistics and Data Displays (Lessons 9–11)' available here: https://player.vimeo.com/video/442081882.

Video 4

Video 'VLS Alg1U1V4 Manipulating Data (Lessons 12–15)' available here: https://player.vimeo.com/video/443095995.

Connecting to Other Units

- *Coming soon*

Family Support Materials

Linear Equations, Inequalities, and Systems

In this unit, your student will analyze constraints on different quantities. For example, the amount you spend on a bicycle may be limited by how much you have saved. To qualify for a sports team, you may need to practice at least a certain number of hours, or lift at least a certain number of pounds.

Here are some ways to write constraints using mathematical notation:

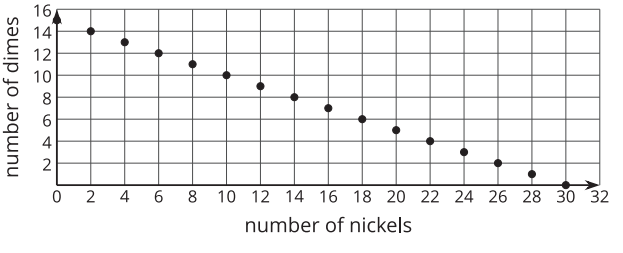
$w < 20$. An apartment building only allows dogs that weigh less than 20 pounds.

$m + g + b = 4$. A casserole recipe calls for four cups of vegetables. You have mushrooms, green beans, and broccoli.

$12.5c + 15a \geq 1{,}000$. In order for a concert to be performed, the artists need to be sure of $1,000 in ticket sales. Tickets for children under 18 are $12.50, and tickets for adults are $15.

$5n + 10d = 150$. You need $1.50 in coins for a parking meter. You have a bunch of nickels and dimes in your pocket.

For this last situation, we can see that using more dimes to make $1.50 means that we can use fewer nickels, and vice-versa. A graph allows us to see this relationship even more clearly.

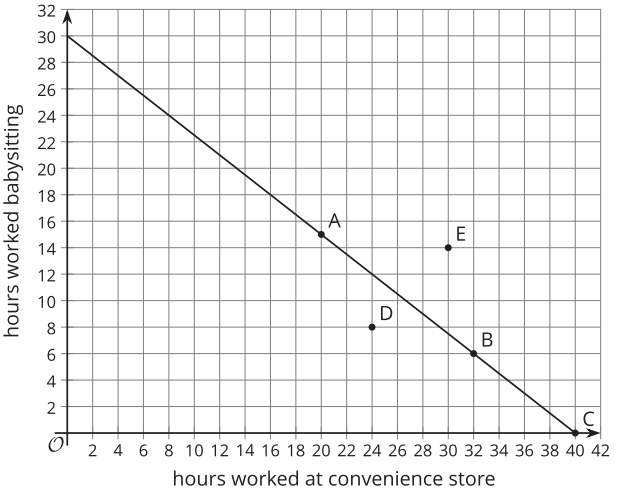


Each point on the graph represents a combination of nickels and dimes that totals $1.50. For example, if you use 8 nickels, you will need 11 dimes.

Here is a task for you to try with your student:

Priya is saving money to go on an overnight school trip. The cost of the trip is \$360. She has a job at a convenience store, which pays \$9 per hour, and sometimes babysits for a family in her neighborhood, which pays \$12 per hour.

The equation $9x + 12y = 360$ represents all the combinations of hours Priya could work at each job and earn a total of \$360. Here is a graph showing those combinations:



1. What are the coordinates of point A?
2. What does it tell us about the number of hours Priya worked at each job?
3. Answer the same questions about points B and C.
4. Point D is not on the line. How should we interpret point D?
5. Point E is not on the line. How should we interpret point E?

Solution:

1. $(20, 15)$
2. Priya works 20 hours at the convenience store and 15 hours babysitting.
3. Point B: $(32, 6)$. Priya works 32 hours at the convenience store and 6 hours babysitting. Point C: $(40, 0)$. Priya works 40 hours at the convenience store and does not babysit at all.
4. Priya does not make enough money. She works 24 hours at the convenience store and 8 hours babysitting. She makes only \$312, since $24 \cdot 9 + 8 \cdot 12 = 312$.
5. Priya makes more than enough money: \$438. She works 30 hours at the convenience store and 14 hours babysitting. $30 \cdot 9 + 14 \cdot 12 = 438$.

Video Lesson Summaries

Here are the video lesson summaries for Algebra 1, Unit 2: Linear Equations, Inequalities, and Systems. 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 2: Linear Equations, Inequalities, and Systems	Vimeo	YouTube
Video 1: Building a Model (Lessons 1–3)	Link	Link
Video 2: Solutions to Linear Equations (Lessons 4–6)	Link	Link
Video 3: Rewriting Equations (Lessons 7–9)	Link	Link
Video 4: Equations and Their Graphs (Lessons 10–12)	Link	Link
Video 5: Solving Systems of Equations (Lessons 13–17)	Link	Link
Video 6: One-Variable Inequalities (Lessons 18–20)	Link	Link
Video 7: Systems of Inequalities (Lessons 21–25)	Link	Link

Video 1

Video 'VLS Alg1U2V1 Building a Model (Lessons 1–3)' available here: https://player.vimeo.com/video/448619590.

Video 2

Video 'VLS Alg1U2V2 Solutions to Linear Equations (Lessons 4–6)' available here: https://player.vimeo.com/video/449365025.

Video 3

Video 'VLS Alg1U2V3 Rewriting Equations (Lessons 7–9)' available here: https://player.vimeo.com/video/455571987.

Video 4

Video 'VLS Alg1U2V4 Equations and Their Graphs (Lessons 10–12)' available here: https://player.vimeo.com/video/455574695.

Video 5

Video 'VLS Alg1U2V5 Solving Systems of Equations (Lessons 13–17)' available here: https://player.vimeo.com/video/458390393.

Video 6

Video 'VLS Alg1U2V6 One-Variable Inequalities (Lessons 18–20)' available here: https://player.vimeo.com/video/458008350.

Video 7

Video 'VLS Alg1U2V7 Systems of Inequalities (Lessons 21–25)' available here: https://player.vimeo.com/video/458405302.

Connecting to Other Units

- *Coming soon*

Family Support Materials

Two-variable Statistics

In this unit, students learn about **two-way tables** and use them to determine if two categories have an association. For example, would you predict that a forecast of rain over a school is associated with the number of students wearing rain boots? What association do you think the rain has with students' eye colors?

It is possible for two things to have no association, as you may have guessed for rain and students' eye colors. With your student, make predictions about associations found in daily life. For example, do these pairs share an association?

- length of time a plant spends in sunlight and its growth
- the size of a car and the amount of gas it takes to be full
- number of open apps on your mobile phone and battery percentage

What other associations can you think of together?

Students can use tables and collected data to determine if two things are associated. One type of table is a **two-way table**, which organizes two categorical variables. A **categorical variable** is a variable that takes on values which can be divided into groups or categories. For example, color is a categorical variable which can take on values like red, blue, or green. In the table, you may notice that it has a total of four categories, but only two categorical variables (hand dominance and fruit preference).

With your student, examine the data collected from 1,914 other students.

	prefer mangoes	prefer pineapples	total
left-handed	50	66	
right-handed	826	972	
total			1,914

1. Predict if there is an association between hand dominance and fruit preference.
2. Complete the table with the totals for each column and row.

3. Among the students who are left-handed, the proportion who prefer pineapples is about 0.57, since $66 \div 116 = 0.57$. This means that about 57% of students in this group who are left-handed prefer pineapples over mangoes. What proportion of those who are left-handed prefer mangoes?

4. What proportion of those who are right-handed prefer mangoes?

5. Is there a significant difference between the proportion of left-handed students who prefer mangoes and the proportion of right-handed students who prefer mangoes?

6. Was your prediction accurate? Is there an association between hand dominance and fruit preference?

Solution

1. Sample response: I think there shouldn't be any association between hand dominance and fruit preference, since neither should influence the other.

2.

	prefer mangoes	prefer pineapples	total
left-handed	50	66	116
right-handed	826	972	1,798
total	876	1,038	1,914

3. 0.43, because $50 \div 116 = 0.43$ or $1 - 0.57 = 0.43$

4. 0.46, because $826 \div 1,798 = 0.46$

5. No, there is no significant difference between left-handed students who prefer mangoes and right-handed students who prefer mangoes, because 0.43 and 0.46 are close in value.

6. Sample response: I predicted there would be no association, and I think that the math supports my prediction. No, there is no association between hand dominance and fruit preference.

Video Lesson Summaries

Here are the video lesson summaries for Algebra 1, Unit 3: Two-Variable Statistics. 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 3: Two-Variable Statistics	Vimeo	YouTube
Video 1: Two-Way Tables (Lessons 1–3)	Link	Link
Video 2: Scatter Plots (Lessons 4–6)	Link	Link
Video 3: Correlation Coefficients (Lessons 7–9)	Link	Link

Video 1

Video 'VLS Alg1U3V1 Two-Way Tables (Lessons 1–3)' available here: https://player.vimeo.com/video/461873337.

Video 2

Video 'VLS Alg1U3V2 Scatter Plots (Lessons 4–6)' available here: https://player.vimeo.com/video/463695012.

Video 3

Video 'VLS Alg1U3V3 Correlation Coefficients (Lessons 7–9)' available here: https://player.vimeo.com/video/466358466.

Connecting to Other Units

- *Coming soon*

Family Support Materials

Functions

In this unit, students learn about functions, building on their work in middle school. A function is a relationship between an input and an output, where for every input there is exactly one output. Here are some examples of functions:

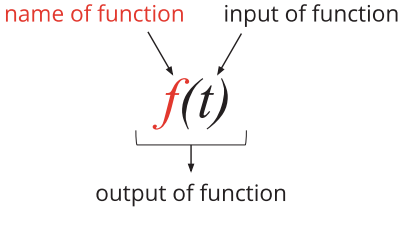
- The relationship between a name (input) and the number of letters in it (output). If the input is "Maya Angelou," the only possible output is 11.
- The relationship between the number of seconds since an oven was turned on (input) and the temperature in the oven (output). For example, 50 seconds after the oven was turned on, the temperature in the oven was 124 degrees Fahrenheit.

We often use the phrase "(output) is a function of (input)" to express how the input and output sets are related. For example, "the number of letters in a name is a function of the name," or "the temperature in the oven is a function of time since it was turned on."

To make it easier to talk about and work with functions, we often use letters to name them, and we use function notation to represent their input and output.

Suppose f is a function that tells us the distance, in feet, that a child ran over time, t, in seconds. So: f is the name of the function, time is the input, and distance is the output.

Here is how we represent this information in function notation:

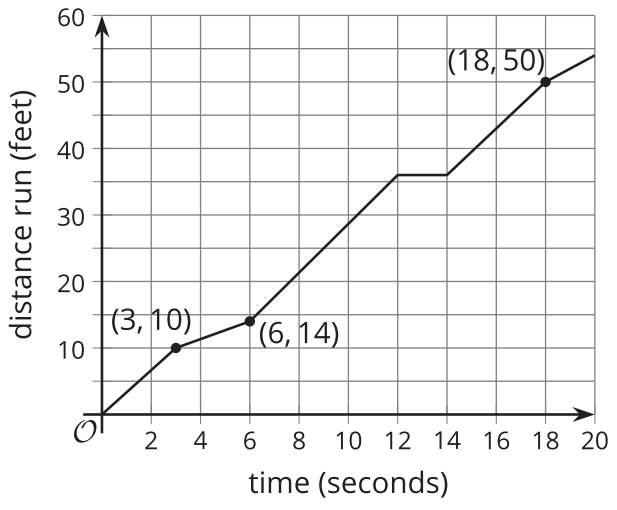


The notation is read "f of t".

Here are examples of some things we can say with function notation:

statement	meaning	interpretation
$f(t)$	the output of f when t is the input	the distance run after t seconds
$f(3)$	the output of f when 3 is the input	the distance run after 3 seconds
$f(6) = 14$	when the input is 6, the output of f is 14	in 6 seconds, the child ran 14 feet
$f(t) = 50$	when the input is t, the output of f is 50	in t seconds, the child ran 50 feet

A function can also be represented with a graph. Here is a graph of function f.



We can use it to estimate the input and output values of the function.

For instance, the graph shows that $f(3) = 10$, which means that 3 seconds after she started running, the child has run 10 feet.

We can also use the graph to find out the time when the child has run 50 feet, or the value of t in $f(t) = 50$. We can see that it happened when t is 18.

Sometimes a rule tells us what to do to the input of a function to get the output.

Suppose function g gives the dollar cost of buying x burritos at \$5 each. To get the output (the cost), we multiply the input (the number of burritos) by 5. We can write: $g(x) = 5x$.

Here is a task to try with your student:

The height of a plant in centimeters is a function of its height in inches, h.

1. Let p represent this function. Name the input and output of p.
2. What does $p(10)$ mean in this situation? What about $p(h) = 50.8$?
3. Because there are 2.54 centimeters in 1 inch, a rule that defines p is $p(h) = 2.54h$. What is the value of $p(10)$?
4. What is the value of h when $p(h)$ is 50.8?

Solution:

1. The input is height in inches. The output is height in centimeters.
2. $p(10)$ represents the plant's height in centimeters when its height is 10 inches. $p(h) = 50.8$ tells us that the plant is 50.8 centimeters tall when its height is h inches.
3. 25.4 centimeters. ($p(10) = 2.54(10) = 25.4$)
4. 20 inches

Video Lesson Summaries

Here are the video lesson summaries for Algebra 1, Unit 4: Functions. 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 4: Functions	Vimeo	YouTube
Video 1: Functions and Function Notation (Lessons 1–2)	Link	Link
Video 2: Interpreting Function Notation (Lessons 3–5)	Link	Link
Video 3: Graphs of Functions (Lessons 6–7)	Link	Link
Video 4: Making and Interpreting Graphs (Lessons 8–9)	Link	Link
Video 5: Domain and Range (Lessons 10–11)	Link	Link
Video 6: Piecewise and Absolute Value Functions (Lessons 12–14)	Link	Link
Video 7: Inverse Functions (Lessons 15–17)	Link	Link

Video 1

Video 'VLS Alg1U4V1 Functions and Function Notation (Lessons 1–2)' available here: https://player.vimeo.com/video/475138382.

Video 2

Video 'VLS Alg1U4V2 Interpreting Function Notation (Lessons 3–5)' available here: https://player.vimeo.com/video/475175352.

Video 3

Video 'VLS Alg1U4V3 Graphs of Functions (Lessons 6–7)' available here: https://player.vimeo.com/video/475177841.

Video 4

Video 'VLS Alg1U4V4 Making and Interpreting Graphs (Lessons 8–9)' available here: https://player.vimeo.com/video/476640104.

Video 5

Video 'VLS Alg1U4V5 Domain and Range (Lessons 10–11)' available here: https://player.vimeo.com/video/476642212.

Video 6

Video 'VLS Alg1U4V6 Piecewise and Absolute Value Functions (Lessons 12–14)' available here: https://player.vimeo.com/video/481507696.

Video 7

Video 'VLS Alg1U4V7 Inverse Functions (Lessons 15–17)' available here: https://player.vimeo.com/video/481766959.

Connecting to Other Units

- *Coming soon*

Family Support Materials

Introduction to Exponential Functions

In this unit, your student is introduced to exponential relationships. Earlier, your student studied what mathematicians call linear relationships, where they start with a quantity and add or subtract the same amount repeatedly. In an exponential relationship, they start with a quantity and multiply by the same amount repeatedly.

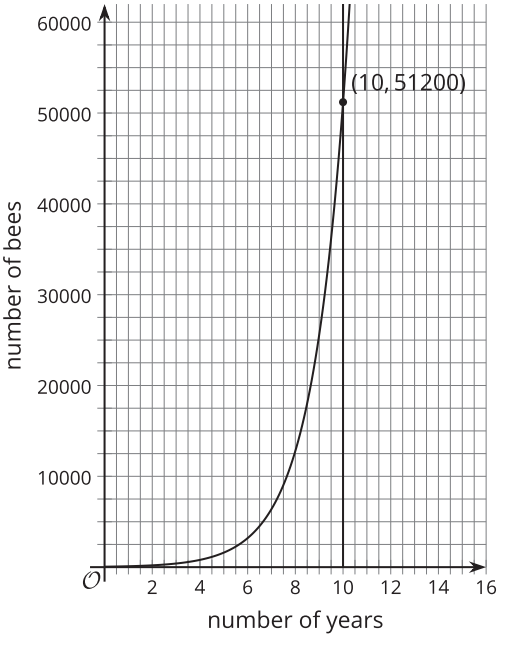
Exponential relationships are represented by equations in the form $y = a \cdot b^x$, where a is the quantity you start with, b is the growth factor that you are going to multiply it by, and x is how many times you are going to multiply by b. If b is bigger than 1, the amount is growing and if b is less than 1, the amount is shrinking. When b is equal to 1, the amount is staying the same.

If you start with 50 bees in your apiary (bee garden), and the number of bees doubles each year, how many bees would you have in 5 years? Let y represent the number of bees and x represent time in years. The starting amount is 50 bees and the multiplier is 2.

$$\begin{aligned} y &= a \cdot b^x \\ &= 50 \cdot 2^5 \\ &= 50 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \\ &= 1{,}600 \text{ bees after 5 years} \end{aligned}$$

While multiplication works well for a situation like this, where we are multiplying by 2 five times, a graph can be a useful tool. If you wanted to know how many bees you would have in 10 years, you could graph $y = 50 \cdot 2^x$ and see how many bees there are in 10 years.

Graphing is especially helpful when looking a long way into the future or when you want to know when something will happen, like when the bee population will reach 1 million.



Here is a task to try with your student: Florida is having a problem with a toxic green algae that is floating on their waterways, contaminating the water and killing the marine life. Kiran lives on a small lake in south Florida. One day he noticed the algae floating on a

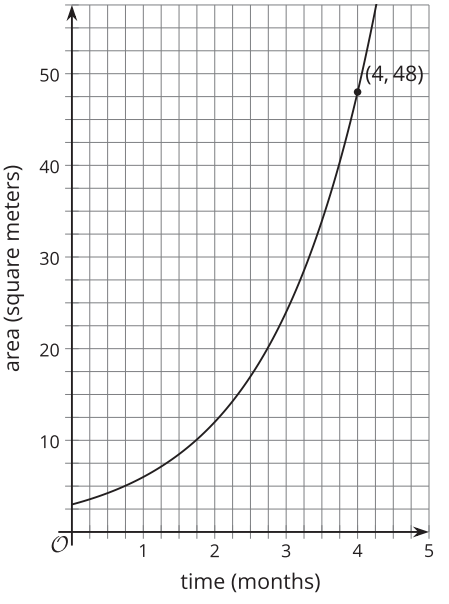
3 square meter area of the lake. A month later, the algae had doubled in size, growing to 6 square meters.

1. If the doubling pattern continues, how many square meters of the lake will be covered in algae in 4 months?

2. If the surface area of the lake is about 1,500 square meters, after how many months will the entire lake be covered?

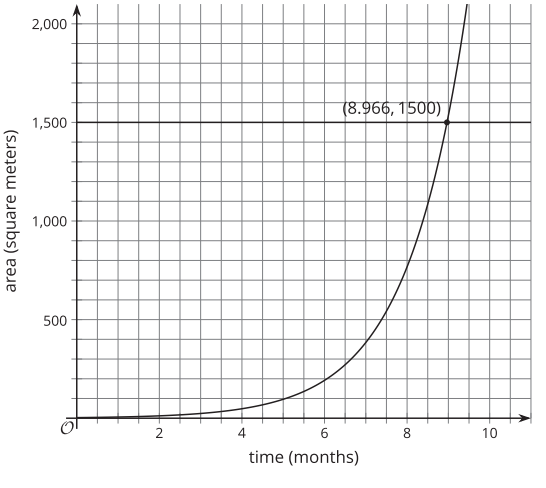
Solution: 1. This can be solved using a variety of strategies. You could use a table, an equation, or a graph.

time (months)	area (square meters)
0	3
1	6
2	12
3	24
4	48



Let x represent the time in months and y represent the area in square meters. $y = 3 \cdot 2^x$. Substitute 4 for x and solve for y, which yields 48.

2. Just as with part A, there are several strategies for finding when the algae will cover the whole lake. Extending the graph, adding the graph of $y = 1{,}500$, and finding where they intersect is a nice way to find the month. In just under 9 months, the algae will cover 1,500 square meters of the lake.



Video Lesson Summaries

Here are the video lesson summaries for Algebra 1, Unit 5: Introduction to Exponential Functions. 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 5: Introduction to Exponential Functions	Vimeo	YouTube
Video 1: Exponential Relationships (Lessons 3–7)	Link	Link
Video 2: Defining Exponential Functions (8–10, 20)	Link	Link
Video 3: Graphs of Exponential Functions (Lessons 11–13, 19)	Link	Link
Video 4: Percent Growth and Decay (Lessons 15-18)	Link	Link

Video 1

Video 'VLS Alg1U5V1 Exponential Relationships (Lessons 3–7)' available here: https://player.vimeo.com/video/491271815.

Video 2

Video 'VLS Alg1U5V2 Defining Exponential Functions (8–10, 20)' available here: https://player.vimeo.com/video/493388118.

Video 3

Video 'VLS Alg1U5V3 Graphs of Exponential Functions (Lessons 11–13, 19)' available here: https://player.vimeo.com/video/497405524.

Video 4

Video 'VLS Alg1U5V4 Percent Growth and Decay (Lessons 15-18)' available here: https://player.vimeo.com/video/499694602.

Connecting to Other Units

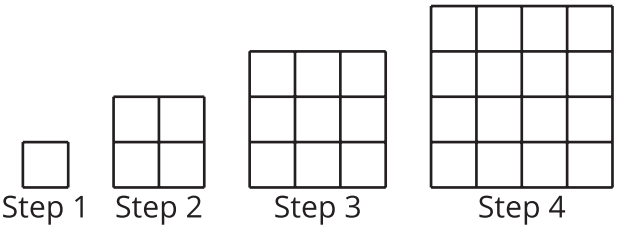
- *Coming soon*

Family Support Materials

Introduction to Quadratic Functions

In this unit, students learn about quadratic functions. Earlier, they learned about linear functions that grow by repeatedly adding or subtracting the same amount and exponential functions that grow by repeatedly multiplying by the same amount.

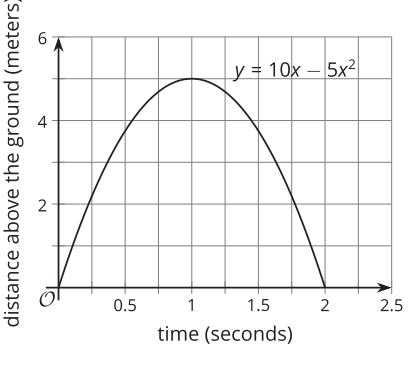
Quadratic functions also change in a predictable way. Here, the number of small squares in each step is increasing by 3, then 5, then 7, and so on. How many squares are in Step 10? How many in Step n?



Here is a table that shows the pattern.

step number	1	2	3	4	10	n
number of small squares	1	4	9	4×4 or 16	10×10 or 100	$n \times n$ or n^2

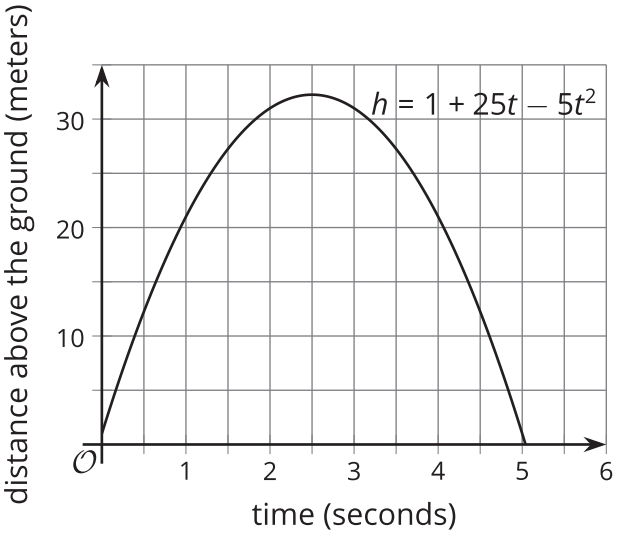
In this unit, students will also learn about some real-world situations that can be modeled by quadratic functions. For example, when you toss a ball up in the air, its distance above the ground as time passes can be modeled by a quadratic function. Study the graph. The ball starts on the ground because the height is 0 when time is 0. The ball lands back on the ground after 2 seconds. After 1 second, the ball is 5 meters in the air.



Both of the following expressions give the ball's distance above the ground: $5x(2 - x)$ and $10x - 5x^2$, where x represents the number of seconds since it was thrown. Quadratic expressions are most recognizable when you can see the "squared term," $-5x^2$, as shown in $10x - 5x^2$.

Your student will learn even more about quadratics in the next unit.

Here is a task to try with your student:
The equation $h = 1 + 25t^2 - 5t^2$ models the height in meters of a model rocket t seconds after it is launched in the air. Here is a graph representing the equation.



1. What was the height of the rocket above the ground at the time it was launched?

2. How high did it go up in the air?

3. When did the rocket land back on the ground?

Solution:

1. 1 meter

2. about 32 meters

3. a little more than 5 seconds after launch

Video Lesson Summaries

Here are the video lesson summaries for Algebra 1, Unit 6: Introduction to Quadratic Functions. 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 6: Introduction to Quadratic Functions	Vimeo	YouTube
Video 1: Introducing Quadratic Functions (Lessons 2–4)	Link	Link
Video 2: Building Quadratic Functions (5–7)	Link	Link
Video 3: Working With Quadratic Expressions (Lessons 8–9)	Link	Link
Video 4: Graphing Quadratic Equations (Lessons 10–11)	Link	Link
Video 5: Graphing Standard Form (Lessons 12, 14)	Link	Link
Video 6: Vertex Form (Lessons 15-17)	Link	Link

Video 1

Video 'VLS Alg1U6V1 Introducing Quadratic Functions (Lessons 2–4)' available here: https://player.vimeo.com/video/505710306.

Video 2

Video 'VLS Alg1U6V2 Building Quadratic Functions (5–7)' available here: https://player.vimeo.com/video/513428116.

Video 3

Video 'VLS Alg1U6V3 Working With Quadratic Expressions (Lessons 8–9)' available here: https://player.vimeo.com/video/509050677.

Video 4

Video 'VLS Alg1U6V4 Graphing Quadratic Equations (Lessons 10-11)' available here: https://player.vimeo.com/video/513430731.

Video 5

Video 'VLS Alg1U6V5 Graphing Standard Form (Lessons 12, 14)' available here: https://player.vimeo.com/video/516771964.

Video 6

Video 'VLS Alg1U6V6 Vertex Form (Lessons 15-17)' available here: https://player.vimeo.com/video/516774619.

Connecting to Other Units

- *Coming soon*

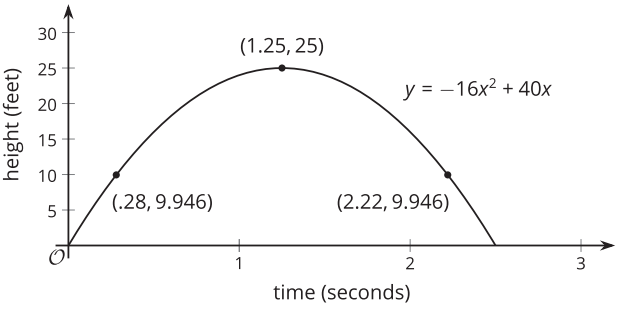
Family Support Materials

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 equation 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 $(3 - 1)^2 = (1)^2$, 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)	Link	Link
Video 2: Factored Form (6–10)	Link	Link
Video 3: Completing the Square (Lessons 11–15)	Link	Link
Video 4: The Quadratic Formula (Lessons 16–18)	Link	Link
Video 5: Rational and Irrational Solutions (Lessons 19–21)	Link	Link
Video 6: Vertex Form (Lessons 22-24)	Link	Link

Video 1

Video 'VLS Alg1U7V1 Solutions to Quadratic Equations (Lessons 1–5)' available here: https://player.vimeo.com/video/505710306.

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.

Connecting to Other Units

- *Coming soon*