i-Ready Classroom Mathematics

Algebra 1

Teacher Toolbox

Resource Sampler

Engaging Resources to Drive Student Learning

i-Ready Classroom Mathematics Algebra 1 includes a wealth of resources to meet the needs of all learners. The Teacher Toolbox resources are accessible through the Teacher Digital Experience via i-ReadyConnect.com.

Easily Access Algebra 1 Resources on the Teacher Toolbox:

- Activity Sheets
- Assessments *(Lesson Quizzes, Practice Tests, and Unit Assessments—Forms A and B)*
- Cumulative Practice
- Digital Math Tools Powered by Desmos
- Discourse Cards
- Enrichment Activities
- Family Letters
- Fluency and Skills Practice
- Implementation Support
- Math Center Activities *(On Level, Below Level, and Above Level)*
- Student Worktext PDFs
- PowerPoint® Slides *(Editable)*
- Teacher's Guide PDFs
- Tools for Instruction
- Unit Flow & Progression Videos
- Session Exit Tickets
- Desmos Graphing Calculator Quick Connects

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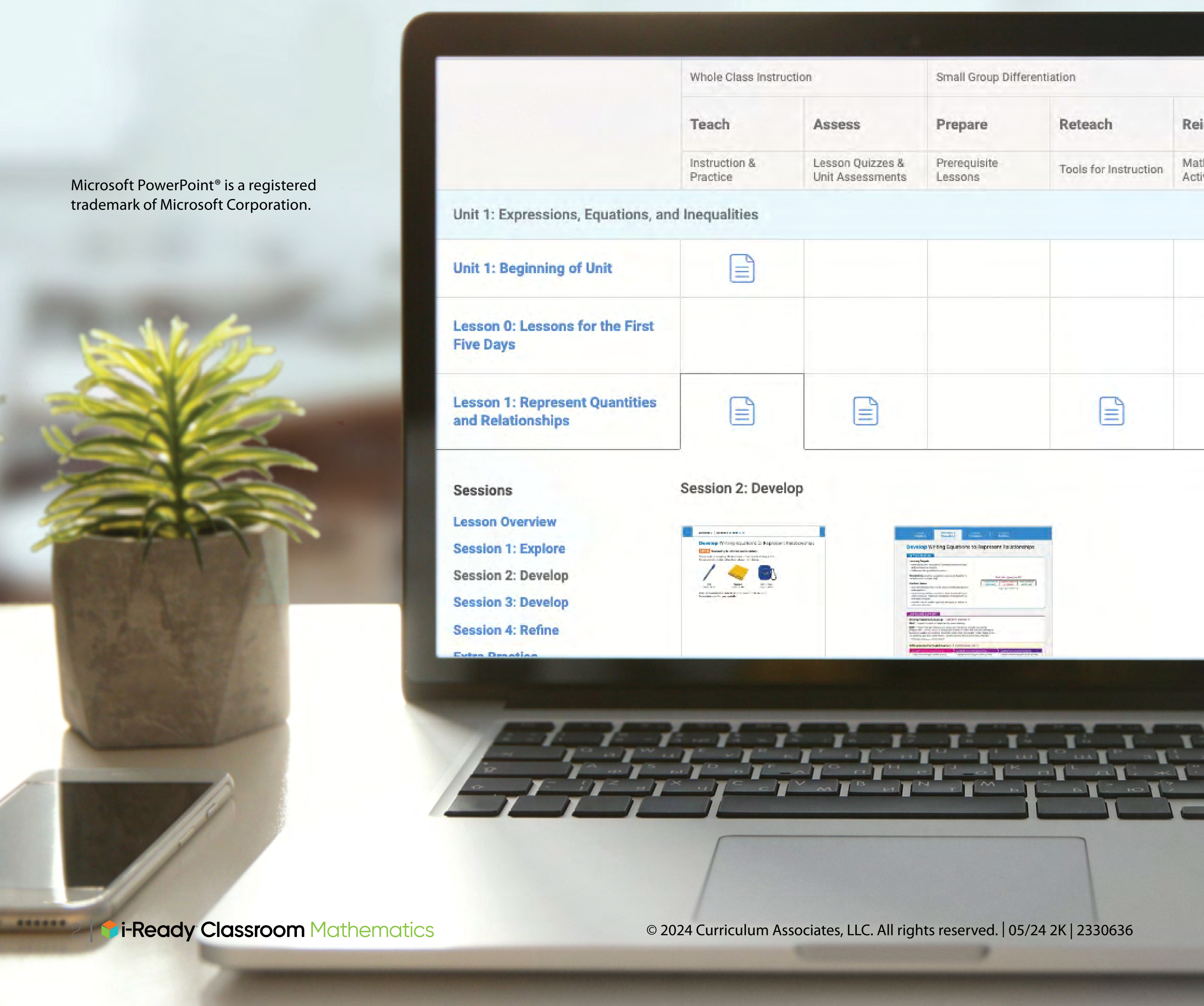


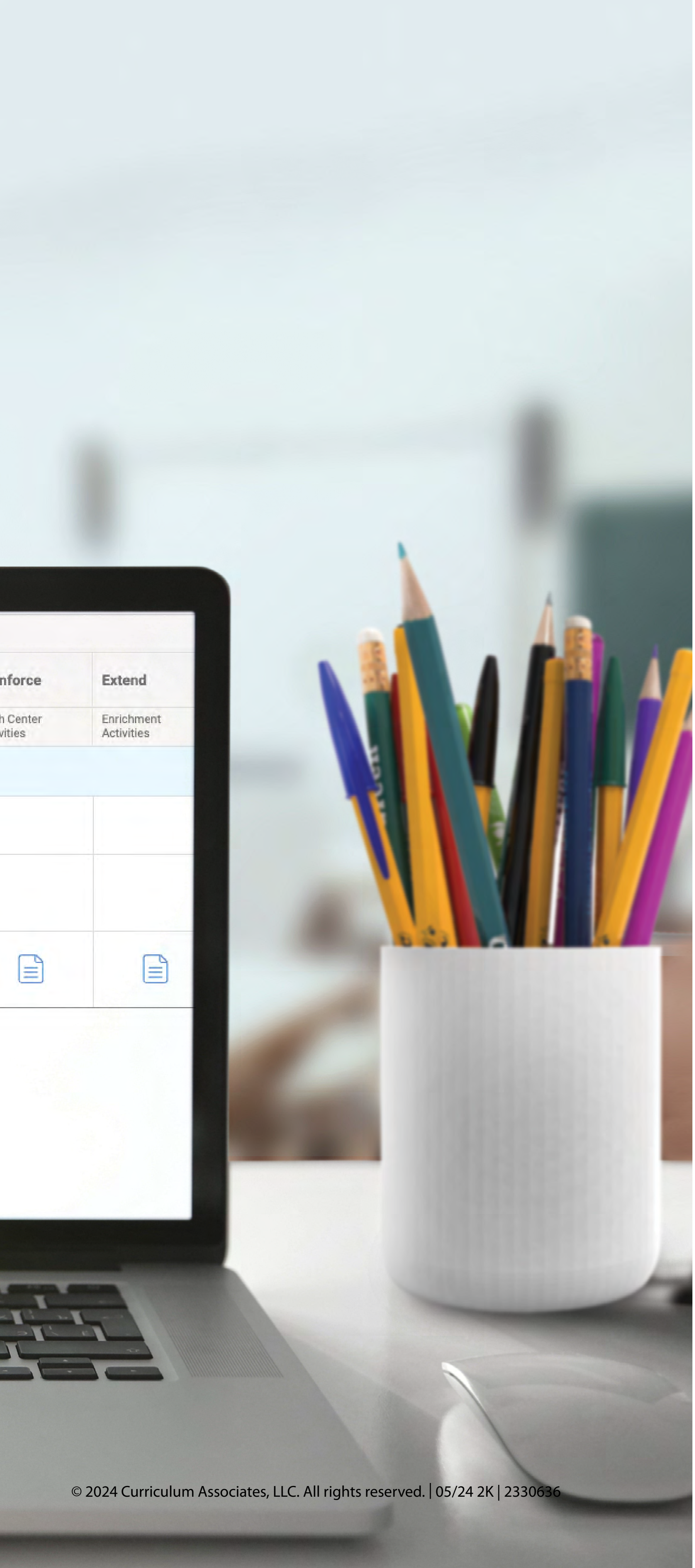
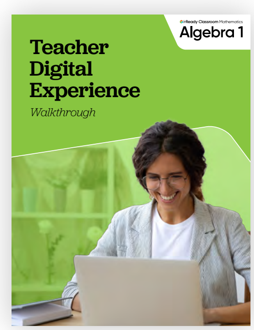


Table of Contents

This sampler includes some of the lesson- and unit-level resources available on Teacher Toolbox for **Unit 5: Polynomials and Quadratic Functions, Lesson 20: Graphs of Quadratic Functions.**

Check out the Teacher Digital Experience Walkthrough to see more digital resources!

Explore all Algebra 1 resources in your demo account. Review the Teacher Digital Experience Walkthrough to see how.



"I highly recommend the use of Teacher Toolbox beyond what words can even convey. Most importantly, the growth I see in students using the [Teacher] Toolbox resources is unmatched. And that's what matters!"

—Teacher, WA

Lesson-Level Resources

Lesson 20: Graphs of Quadratic Functions

Additional Practice

Differentiation

Assessment

Support

FLUENCY AND SKILLS PRACTICE | Name:

LESSON 20

Graphs of Quadratic Functions

➤ **The table of values represents the quadratic function $f(x) = x^2 - 12x + 27$. Use this information for problems 1–4.**

x	$f(x)$
3	0
4	−5
5	−8
6	−9
7	−8
8	−5

1. Identify the coordinates of the vertex of the graph of *f* and write an equation that represents the axis of symmetry.

2. Does the function have a maximum or a minimum at the vertex? Explain.

3. Determine $f(9)$ using the table. Explain how you know.

4. Graph function *f*.

➤ **Use the quadratic function $h(x) = -(x + 3)(x - 1)$ for problems 5–7.**

5. Complete the table and then graph function *h*.

x	$h(x)$
−4	
−3	
−2	
−1	
0	
1	
2	

6. What are the *x*-intercepts and *y*-intercept of the graph of the function?

7. Where is function *h* positive? Where is it negative?

FLUENCY AND SKILLS PRACTICE | Name:

LESSON 20

Graphs of Quadratic Functions *continued*

➤ **Use the quadratic function $g(x) = -x^2 + 4x - 8$ for problems 8–10.**

8 Complete the table for function g.

x	$g(x)$
0	
1	
2	
3	
4	
5	

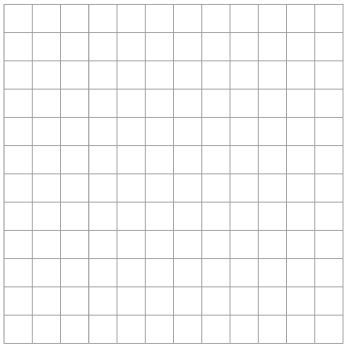
9 Does the graph of g open up or down? Explain how to use the equation or the table to determine which way the parabola opens.

10 What is the equation of the axis of symmetry for the graph of g? Explain how to use the equation or the table to write an equation for the axis of symmetry.

➤ **Use the quadratic function $w(x) = 3x(x - 2)$ for problems 11–13.**

11 Complete the table and graph function w.

x	$w(x)$
−1	
0	
1	
2	
3	



12 Identify each key feature of the graph of w:
- the vertex
- whether the parabola opens up or down
- the equation of the axis of symmetry
- the x-intercept(s) and y-intercept
- the intervals over which function values are increasing or decreasing

13 Rewrite the equation of $w(x)$ in standard form. Explain which key features of the graph of w you can determine looking only at the standard form of the equation.

Tools for Instruction

Graph a Quadratic Function Given in Vertex Form

Objective Graph a quadratic function given in vertex form using *a*, *h*, and *k*.	**Materials** copies of **Tables and Graphs of Quadratic Functions** (page 3)

Students have graphed linear and exponential functions, as well as quadratic functions given in factored form. In this activity, students graph quadratic functions given in vertex form. Students first examine tables of values and graphs to identify relationships between the vertex form equation and the graph. Then students use the relationships they identify to graph quadratic functions directly from the equation given in vertex form. Students must interpret the structure of the equation to understand its effect on the graph. Graphing quadratic functions given in vertex form will allow students to represent real-world examples of quadratic functions graphically, such as projectiles and parabolic curves.

Step by Step 15–20 minutes

1 Examine tables and graphs to identify *h* and *k*.

- Give the student a copy of **Tables and Graphs of Quadratic Functions** (page 3). Have them examine the table and graph for functions *f* and *g*.
- Ask: *What is the vertex of each function? How can you identify the vertex from the graph? What about from the table?* (The vertex of *f* is (2, −5). The vertex of *g* is (−4, −1). The vertex is the highest or lowest point of the parabola on the graph. The vertex is the ordered pair with the greatest or least *y*-value in the table if the *y*-values on either side of the ordered pair show symmetry.)
- Have the student input the *x*-value of each vertex into the equation of the matching function and evaluate. Ask: *What do you notice about the first term when you input the x-value of the vertex? What about the second term?* (The first term is equal to 0, which means the second term is the *y*-value.)
- Ask: *How can you use the equation to find the vertex?* (The *x*-value of the vertex is the number that makes the first term 0. The *y*-value of the vertex is the second term.)
- Display the equation for vertex form of a quadratic function, $f(x) = a(x - h)^2 + k$. Help the student make the connection that *h* is the *x*-value of the vertex and *k* is the *y*-value of the vertex.

Support English Learners Have students circle and label the vertex or values of the vertex in the equation, table, and graph for functions *f* and *g*.

2 Examine tables and graphs to identify the effect of *a*.

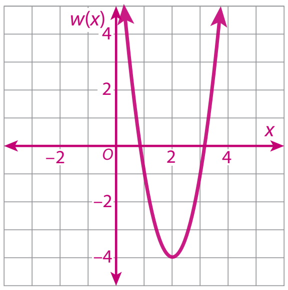
- Have students examine the equation, table and graph for functions *m* and *p* on **Tables and Graphs of Quadratic Functions** (page 3).
- Ask: *How are the equations for functions m and p similar and different from the equations for functions f and g?* (Function *m* has both values from function *f* and function *p* has both values from function *g*. Function *m* and *p* both have a coefficient in front of the first term that functions *f* and *g* do not have.)
- Ask: *How are the graphs of functions m and p affected by the additional coefficient?* (From the vertex, function *m* increases twice as quickly as function *f* and appears narrower. Function *p* is flipped over and changes half as quickly as function *g*, so it appears wider.)

Tools for Instruction

- Use technology to display more quadratic functions with the same vertices as functions *f* and *g* and different *a*-values. Use a variety of *a*-values greater than 1, between 0 and 1, and less than 0. Have the student observe how the different *a*-values seem to affect each graph.
- Display the vertex form equation $f(x) = a(x - h)^2 + k$ and have the student use their observations to explain how *a* might affect the graph of a function and why it makes sense. (The value of *a* stretches the graph and makes it narrower if *a* is greater than 1, compresses the graph and makes it wider if *a* is between 0 and 1, and flips the graph if *a* is negative. This makes sense because *a* makes the value of the first term greater, lesser, or negative which affects the *y*-values of the graph.)

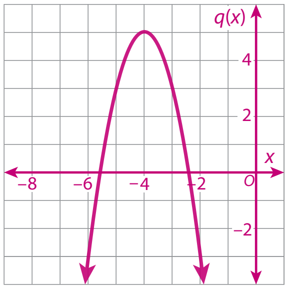
3 Graph a quadratic function given in vertex form.

- Give the student the function $w(x) = 3(x - 2)^2 - 4$. Have them use what they know to graph function *w* on a blank coordinate grid on **Tables and Graphs of Quadratic Functions** (page 3).
- Make sure the student locates the vertex at (2, −4) and graphs a function that increases by around 3 units when *x* is one unit greater or less than the *x*-value of the vertex.
- Ask: *How would the graph change if a was −3? What if h was −2?* (The parabola would point down. The vertex would be at (−2, −4).)



Check for Understanding

Have the student graph $q(x) = -2(x + 4)^2 + 5$ on a blank coordinate grid on **Tables and Graphs of Quadratic Functions** (page 3).



For the student who does not yet answer correctly, use the chart to help pinpoint where support may be needed.

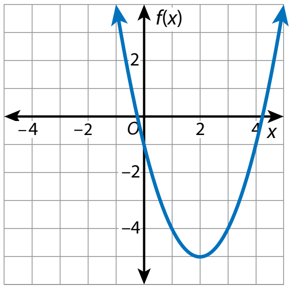
If you observe…	the student may…	Then try…
the student graphing a function with a vertex at (4, 5) or (−4, −5)	think that *h* and *k* both have the same sign or opposite sign as in the equation.	having the student input the *x*-value of their vertex into the function to see that the output is not the *y*-value of their vertex.
the student graphing a function that opens up	have not taken into account that *a* is negative.	having the student compare how their graph should appear compared to the graph of $r(x) = 2(x + 4)^2 + 5$ to notice the effect of the negative.
the student graphing a line or v-shape	have focused on the vertex and not considered what function type they were graphing.	having the student graph function *q* using a table of values to show the graph is a parabola.

Name____

Tables and Graphs of Quadratic Functions

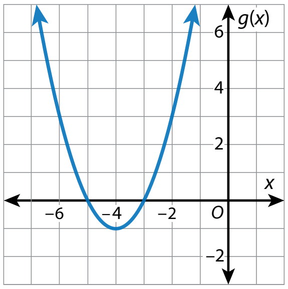
$f(x) = (x - 2)^2 - 5$

x	$f(x)$
−1	4
0	−1
1	−4
2	−5
3	−4
4	−1
5	4



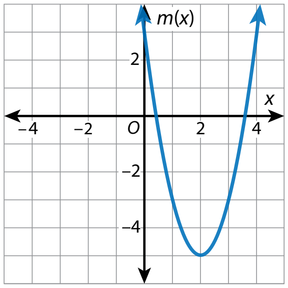
$g(x) = (x + 4)^2 - 1$

x	$g(x)$
−7	8
−6	3
−5	0
−4	−1
−3	0
−2	3
−1	8



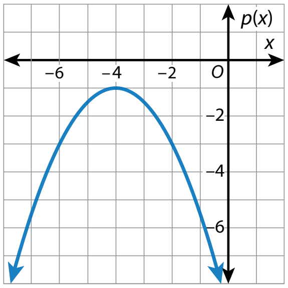
$m(x) = 2(x - 2)^2 - 5$

x	$m(x)$
−1	13
0	3
1	−3
2	−5
3	−3
4	3
5	13

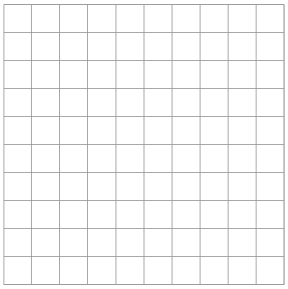


$p(x) = -0.5\,(x + 4)^2 - 1$

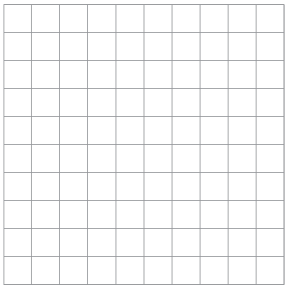
x	$p(x)$
−7	−5.5
−6	−3
−5	−1.5
−4	−1
−3	−1.5
−2	−3
−1	−5.5



$w(x) = 3(x - 2)^2 - 4$



$q(x) = -2(x + 4)^2 + 5$



CENTER ACTIVITY
LESSON 20

Names:

Use Vocabulary for Graphs of Quadratic Functions

What You Need

- Recording Sheet

What You Do

1. Read the problem on the **Recording Sheet**. Think about how to solve it.
2. Read the paragraphs that describe how to solve the problem.
   - Take turns choosing terms from the word bank to fill in the blanks.
   - Each term can be used more than once.
3. When complete, read the solution aloud. Check your answers and adjust as necessary.

KEEP IN MIND . . .
If you change your mind after you fill in additional blanks, go back and update previous responses.

Check Understanding

Identify the zeros of function $f(x) = -2(x - 1)(x + 3)$, and the x-intercepts, y-intercept, and vertex of the graph of function f. Then graph function f.

Go Further

Consider the graph of the function $f(x) = (x + 1)^2 - 4$. Change the function so that the graph is transformed in different ways:

- vertically stretched to make the parabola narrower
- vertically compressed to make the parabola wider
- translated right
- translated left
- translated up
- translated down

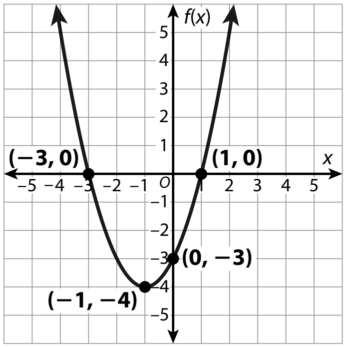
CENTER ACTIVITY
LESSON 20

Names: ____________________

Use Vocabulary for Graphs of Quadratic Functions *continued*

RECORDING SHEET

Fill in the blanks to describe the key features of the graph of the function $f(x) = x^2 + 2x - 3$.



The function is a second-degree polynomial function written in the form $f(x) = ax^2 + bx + c$ where $a \neq 0$, so it is a ____________ function.

Its graph is a u-shaped curve, called a ____________.

The factored form of the function, $f(x) = (x + 3)(x - 1)$, shows the ____________ of the function.

The ____________ can be applied to find the *x*-values of the points where the graph crosses the *x*-axis.

$0 = (x + 3)(x - 1)$

$0 = x + 3 \qquad 0 = x - 1$

$x = -3 \qquad x = 1$

So, the ____________ of function *f* are -3 and 1.

The ____________ of the function, $f(x) = (x + 1)^2 - 4$, shows that the ____________ of the parabola is $(-1, -4)$.

Because the graph opens up, the vertex is the ____________ value of the function, and $f(x)$ is ____________ for *x*-values less than -1, and ____________ for *x*-values greater than -1.

Using the *x*-value of the vertex, the equation of the ____________ is $x = -1$.

Word Bank

axis of symmetry
decreasing
factored form
increasing
maximum
minimum
parabola
quadratic
standard form
vertex form
vertex
Zero Product Property
zeros

ENRICHMENT ACTIVITY

Name:

LESSON 20

What Function Am I?

Your Challenge

➤ **Transform the graph of a quadratic functions to identify unknown functions.**

Each set of clues describes an unknown quadratic function. Use the clues to write the equation of the function in vertex form, make a table of values, and graph the function on the coordinate grid on the **Recording Sheet**. The graph of $f(x) = x^2$ is shown.

Unknown Function *g* Clues
- My graph is the graph of $f(x)$ translated 5 units left, and. . .
- my graph is the graph of $f(x)$ translated 4 units up.

What function am I?
$g(x) = (x + 5)^2 + 4$

What are some points on my graph?
Possible answer:

x	$g(x)$
−7	8
−6	5
−5	4
−4	5
−3	8

Unknown Function *h* Clues
- My graph is the graph of $f(x)$ reflected across the x-axis so my graph opens down, and. . .
- my graph is the graph of $f(x)$ translated 4 units down.

What function am I?
$h(x) = -x^2 - 4$

What are some points on my graph?
Possible answer:

x	$h(x)$
−2	−8
−1	−5
0	−4
1	−5
2	−8

Unknown Function *j* Clues
- My graph opens up, is the graph of $f(x)$ stretched vertically by a factor of 2, and. . .
- my graph is the graph of $f(x)$ translated 3 units right and 1 unit up.

What function am I?
$j(x) = 2(x - 3)^2 + 1$

What are some points on my graph?
Possible answer:

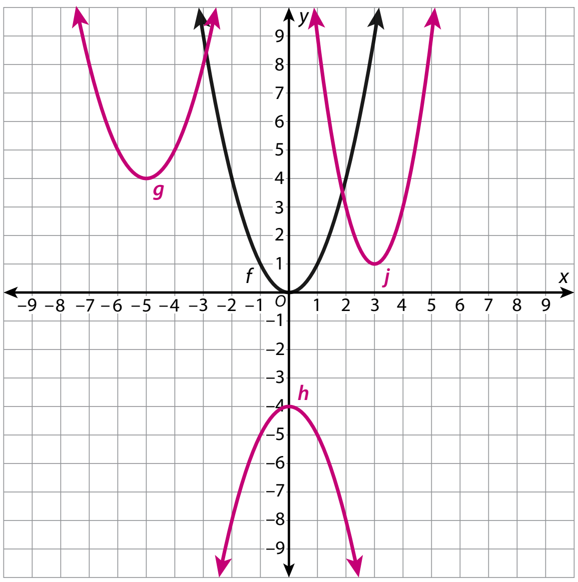
x	$j(x)$
1	9
2	3
3	1
4	3
5	9

ENRICHMENT ACTIVITY
LESSON 20

Name:

What Function Am I? *continued*

RECORDING SHEET



Digital Comprehension Checks will also be available beginning in the 2025–2026 school year.

LESSON 20 • QUIZ

Name:

1 The vertex of the graph of a quadratic function is $(4, -2)$. The graph passes through the point $(8, 6)$. Which point is also on the graph of the function?

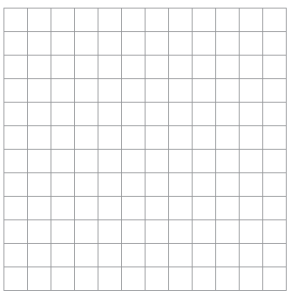
A $(-8, 6)$

B $(-4, -2)$

C $(2, 0)$

D $(0, 6)$

2 The equation $f(x) = (x - 1)(2x + 6)$ represents a quadratic function. Graph function f. Label the intercepts and the vertex.



3 A designer uses 52 ft of rope lighting to outline the rectangular floor of a room. The function $f(x) = x(26 - x)$ represents the area of the floor, in square feet, as a function of its length, x, in feet. Identify the zeros of the function. Explain what they mean in context.

LESSON 20 • QUIZ

Name:

4 The graph of $h(x) = (x + 3)^2 - 5$ is transformed from the graph of $g(x) = x^2 - 2$. Which statement describes how to transform the graph of function g to result in the graph of function h?

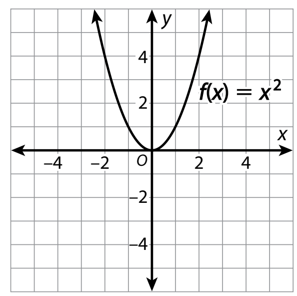
A Translate the graph 3 units left and 3 units down.

B Translate the graph 3 units left and 5 units down.

C Translate the graph 3 units right and 3 units down.

D Translate the graph 3 units right and 5 units down.

5 Identify the values a, h, and k for quadratic function $p(x) = -4(x - 2)^2 - 1$. Describe the transformations from the graph of $f(x) = x^2$ and graph function p.

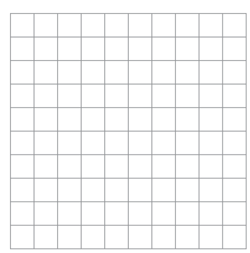


6 A basketball player throws a ball toward the basket. The height of the ball, in feet, from the floor is represented by the quadratic function b, where x is the time, in seconds, from the time the ball leaves the player's hands. The table shows values of $b(x)$.

x	$b(x)$
0	7.5
1	9.1
4	9.1
5	7.5
7.5	0

PART A

Graph function b.



PART B

Does a domain of all real numbers make sense in the context? Explain.

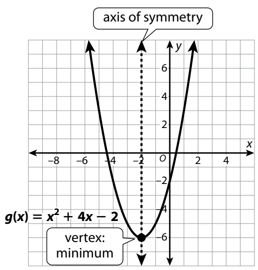
FAMILY LETTER
LESSON 20 • GRAPHS OF QUADRATIC FUNCTIONS

Dear Family,

➤ **In Lesson 20, your student will learn about quadratic functions and their equations and graphs.**

What will your student do in this lesson?

- Your student will learn that the graph of a **quadratic function** is a **parabola** that has an **axis of symmetry** that passes through a point called the **vertex**, whose *y*-coordinate is either a **maximum** (if the vertex is the highest point) or **minimum** (if the vertex is the lowest point) of the function.



- They will also graph a quadratic function from a table of values, from a verbal description, or from an equation given in factored form, **standard form**, or **vertex form**.

Standard Form	Vertex Form
$f(x) = ax^2 + bx + c$	$f(x) = a(x$
a, *b*, and *c* are constants and $a \neq 0$	*a*, *h*, and *k* are co

- They will identify the zeros of a quadratic function using the **Zero Pr** interpret zeros and other key features of a quadratic function or grap
- They will describe how a quadratic function in vertex form can be gr transformation of the parent function, $f(x) = x^2$, and graph the transf

Real-World Connections

Your student will encounter real-world examples of quadratic functions throughout this lesson. For example, students will see that quadratic fu model the paths of thrown objects, such as a bean bag that is tossed in They will also recognize parabolic shapes in sections of roller coaster tr

 ALGEBR

SESSION 1

Explore Graphs of Quadratic Functions

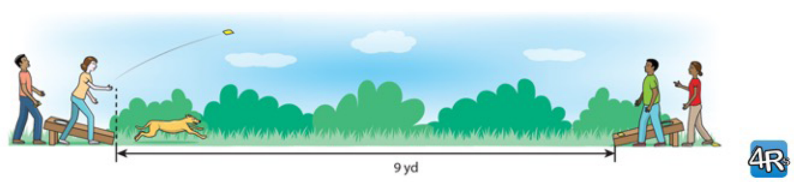
Learning Targets

- Identify key features of the graphs of quadratic functions.
- Graph a quadratic function from a table of values.

DISCUSS IT Compare class strategies

In a game of cornhole, players take turns tossing bean bags at a board with a hole. The goal is to have the bag land on the board or, for more points, go into the hole. A player tosses a bean bag from a spot that is 9 yards from the hole in the board. The path of the tossed bean bag is represented by the function $h(x) = -0.125x^2 + x + 1$, where *x* is the horizontal distance, in yards, from where the bean bag is tossed and $h(x)$ is the height of the bean bag above the ground in yards.

Will the bean bag go directly into the hole? Show how you know.



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Unit-Level Resources

Unit 5: Polynomials and Quadratic Functions

UNIT 5 Cumulative Practice Name:

Set 1 Write Sequences as Functions

Write an explicit formula for each sequence.

1. 25, 75, 125, 175 . . .

2. 4, 12, 36, 108, . . .

3. $f(1) = 5$
$f(n) = f(n - 1) \cdot \frac{1}{4}$ for $n \geq 2$

Write a recursive formula for each sequence.

4. 25, 75, 125, 175 . . .

5. 4, 12, 36, 108, 324, . . .

6. $f(n) = \frac{1}{3} + 30(n - 1)$

Set 2 Graph and Interpret Exponential Functions

Describe each exponential function modeled in the tables below.

1.

x	-2	-1	0	1	2
$r(x)$	2.5	10	40	160	640

Initial value:

Constant factor:

2.

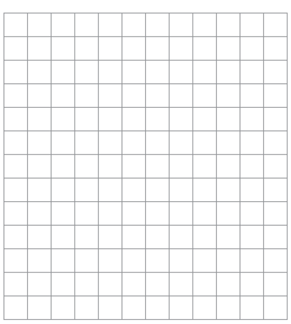
x	-2	-1	0	1	2
$t(x)$	1,000	200	40	8	1.6

Initial value:

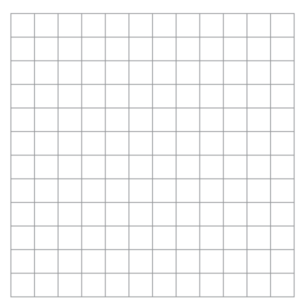
Constant factor:

Graph each function. Label the intercepts. Then determine if each function shows exponential growth or decay.

3. Function *d* models the fish population over *x* years.Initially had 100 fish, then 80, and then 64 fish the second year.



4. $j(x) = \frac{1}{5}(10)^x$



Set 3 Construct and Interpret Exponential Functions

For problems 1–4, use *x* as the independent variable to write an exponential function representing each situation.

1. function: *m*
   initial value: 80
   constant factor: 0.06

2. function *f* is the sequence:
   15, 75, 375, 1,875, . . .

3.

x	0	1
$g(x)$	1.5	3

4. The property values in a town increase at a rate 3% each year; a couple purchases a piece of property for $50,000. The value of the property is modeled by function *p*.

The exponential function $v(x) = 40{,}000(0.85)^x$ models the cost of a car over *x* years.

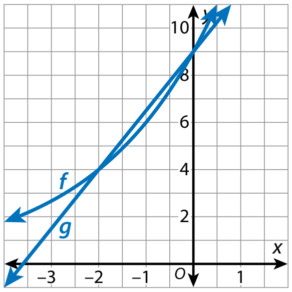
5. What does 40,000 represent in context?

6. What does 0.85 represent in context?

Set 4 Determine When Function Values Are Equal

For problems 1–3, determine all solutions to the equation $f(x) = g(x)$.

1.



2.

x	$f(x)$
−1	125
0	25
1	5
2	1
3	0.2

x	$g(x)$
−1	8
0	4
1	2
2	1
3	0.5

3. $f(x) = 10(2)^x$
   $g(x) = 80$

4. Function *f* represents the total amount saved when $100 is saved each year for *x* years. Function *g* represents the total amount saved when an initial amount of $300 is compounded annually at an annual interest rate of 2%. What functions can be graphed to determine when the amounts saved are equal?

UNIT 5 Cumulative Practice Name:

Set 5 Compare Linear and Exponential Growth

Determine whether each situation can be modeled by a linear or an exponential function.

1. A company provides an annual 2% cost of living raise to its employees.

2. Claro reads 2 books each month.

Each table shows values of a linear or exponential function. Find the constant rate of change or the constant percent rate of change for each.

3.

x	8	9	10
$h(x)$	40	20	0

4.

x	8	9	10
$p(x)$	40	20	10

Prove that the given functions grow by the same amount or factor over intervals of length 2.

5. $f(x) = 3(5)^x$

6. $g(x) = 3x - 5$

Set 6 Understand Rational Exponents

1. What is the value of x when $(3^2)^x = 3$?

2. What is the relationship between x and y when $(a^x)^y = a$?

For problems 3–5, rewrite each expression using rational exponents.

3. $\sqrt{7} =$

4. $\frac{1}{\sqrt[4]{5}} =$

5. $\sqrt{10^3} =$

For problems 6–8, evaluate each expression.

6. $8^{\frac{1}{3}} =$

7. $16^{-\frac{3}{2}} =$

8. $32^{\frac{3}{5}} =$

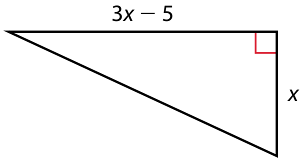
UNIT 5 • UNIT ASSESSMENT
FORM A

Name:

Form B is also available. Digital Comprehension Checks will be available for Forms A and B beginning in the 2025–2026 school year.

➤ **Solve the problems.**

1 Write an equation in standard form to represent the relationship between x and the area of the triangle $A(x)$. The area of a triangle is $A = \frac{1}{2}bh$.



2 The graph of $g(x) = x^2 + 5$ is translated 2 units right and 7 units down to form the graph of function h. What is an equation for function h?

A $h(x) = (x - 2)^2 - 2$

B $h(x) = (x + 2)^2 - 2$

C $h(x) = (x - 2)^2 - 7$

D $h(x) = (x + 2)^2 - 7$

3 Sareena sews squares together to make a blanket in rounds. She needs 1 square for 1 round, 9 squares for 2 rounds, 25 for 3 rounds, and so on. Write an equation to model the relationship between the number of rounds, n, and the total number of squares, $t(n)$. Then find the total number of squares Sareena needs to make a blanket with 8 rounds. Show your work.

4 A portion of a roller coaster track forms a parabola. The table shows the height above ground h, in feet, of the track x horizontal feet from the start of the section.

x	0	10	20	30	40	50
$h(x)$	40	20	8	4	8	20

Identify the vertex of the parabola. What does it mean in terms of the quantities?

5 Elena subtracts polynomial F from $-3x^2 + 4x - 2$. The difference is $-5x^2 + 4x + 6$. Which expression represents polynomial F?

A $-8x^2 - 8$

B $2x^2 - 8$

C $-8x^2 + 8x + 4$

D $2x^2 + 8x - 8$

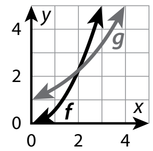
6 A ball bounces off a table to the floor. The function $h(t) = -16t^2 + 14t + 2$ represents the height above the floor, in feet, of the ball t seconds after it bounces off the table. How many seconds after the ball bounces off the table does it hit the floor? Show your work.

UNIT 5 • UNIT ASSESSMENT

Name:

FORM A continued

7 The graph shows exponential function *f* and quadratic function *g*. Use the graph to tell whether each statement is *True* or *False*.



a. Function *f* grows at a constant rate of change.	◯ True	◯ False
b. Function *g* grows at a constant rate of change.	◯ True	◯ False
c. From $x = 0$ to $x = 2$, $f(x) \leq g(x)$.	◯ True	◯ False
d. Eventually, $f(x)$ will exceed $g(x)$.	◯ True	◯ False

8 Destiny has enough boards to build a sandbox with a perimeter of 28 ft. The function $a(x) = x(14 - x)$ represents the area of the sandbox, in square feet, as a function of the length in feet, *x*, of the sandbox. Determine the zeros of the function and explain what they mean in the context of the situation.

9 Which quadratic functions share a zero with $f(x) = 4x^2 + 2x - 30$? Select all that apply.

A $a(x) = 2x^2 + 2x - 12$

B $b(x) = (4x + 10)(x - 3)$

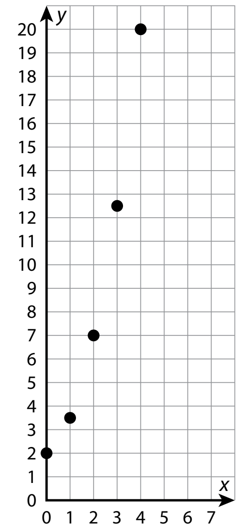
C $c(x) = -8x^2 - 4x + 60$

D $d(x) = (x - 3)^2$

E $e(x) = (2x - 5)(x + 4)$

Name:

10 Values of function f are shown in the scatterplot. What is the approximate relationship between x and y?



A constant

B linear

C quadratic

D exponential

11 Match each multiplication expression with its product.

a. $(2x^3 - 3)(x + 5)$ ____________

b. $(2x^2 - 3x + 5)(x^2 - 3)$ ____________

c. $(2x^2 + 3)(x^2 - x - 5)$ ____________

I. $2x^4 - 4x^2 - 9x - 15$

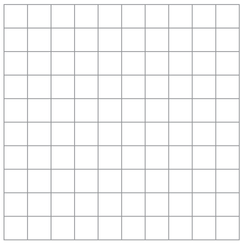
II. $2x^4 + 10x^3 - 3x - 15$

III. $2x^4 - 2x^3 - 7x^2 - 3x - 15$

IV. $2x^4 - 3x^3 - x^2 + 9x - 15$

V. $2x^4 + 10x^3 - 7x^2 - 3x - 15$

12 A football is dropped and kicked from a height of 3 feet above the ground. The ball reaches a maximum height of 12.8 feet after travelling 14 horizontal feet, and then lands 30 horizontal feet from where it was kicked.



PART A

Graph *f*(*x*), the height in feet of the football as it travels *x* horizontal feet.

PART B

What is the domain of the part of the graph that describes the real-world situation?

Name:

13 What is the degree of the product of the two polynomials below? Explain.

Polynomial *A*: $3x + 6$

Polynomial *B*: $-4x^3 - 2x + 7$

14 A stunt performer jumps from a cliff that is 35 feet above the ocean while filming a scene for an action movie. Her initial velocity is 6 feet per second. Which equation models the stunt performer's height above the ocean, *h*, in feet, as a function of time, *t*, in seconds?

A $h(t) = -16t^2 + 35t + 6$

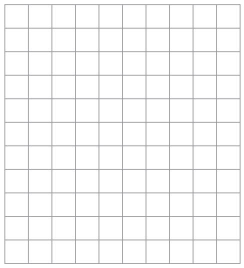
B $h(t) = 16t^2 + 35t + 6$

C $h(t) = -16t^2 + 6t + 35$

D $h(t) = 16t^2 + 6t + 35$

15 Simplify the expression $3(x^2y + 2x^2 - 4y + 6) + 4(x^2y - x^2 + 3y - 1)$. Show your work.

16 The equation $f(x) = -(x + 2)(2x - 4)$ represents a quadratic function. Graph $f(x)$.



17 Aiden makes and sells friendship bracelets. He uses quadratic functions to model the revenue, $r(d)$, he could earn when each bracelet is sold for d dollars. The equations below model this situation.

Equation *A*: $r(d) = -6(d - 3)(d - 11)$

Equation *B*: $r(d) = -6(d - 7)^2 + 96$

In equation A, what do the expressions $d - 3$ and $d - 11$ tell you about the situation? Select all that apply.

A If Aiden sells bracelets for \$0, his revenue will be −\$11.

B If Aiden sells bracelets for \$3, his revenue will be \$0.

C If Aiden sells bracelets for \$3, his revenue will be \$11.

D If Aiden sells bracelets for \$11, his revenue will be \$0.

E If Aiden sells bracelets for \$11, his revenue will be \$3.

18 Fill in each blank to make the equation true.

$4x^2 - \_\_\_\_\_\_\_\_ y^4 = (\_\_\_\_\_\_\_\_ + 8y^2)(2x + \_\_\_\_\_\_\_\_ y^2)$

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