9

Mathematics

Quarter 1 – Module 6

- **Models Real-Life Situations Using Quadratic Functions &**
- **Represent A Quadratic Function using:**
    a. **Table of Values,**
    b. **Graph, and**
    c. **Equation.**

DepED
DEPARTMENT OF EDUCATION

Introductory Message

Welcome to the **Mathematics 9** on **Models Real-Life Situations Using Quadratic Functions & Represent A Quadratic Function using: a.) Table of Values; b.) Graph; and c.) Equation.**

This module was designed to provide you with opportunities for guided and independent learning at your own pace and time. You will be enabled to process the contents of the learning resource while being an active learner.

This module has the following parts and corresponding icons:

 ***What I Know*** *(Pre-Test)*	This part includes an activity that aims to check what you already know about the lesson to take.
 ***What I Need to Know*** *(Objectives)*	This will give you an idea of the skills or competencies you are expected to learn in the module.
 ***What's In*** *(Review/ Springboard)*	This is a brief drill or review to help you link the current lesson with the previous one.
 ***What's New*** *(Presentation of the Lesson)*	In this portion, the new lesson will be introduced to you in various ways; a story, a song, a poem, a problem opener, an activity, or a situation.
 ***What is It*** *(Discussion)*	This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.
 ***What's More*** *(Application)*	This section provides activities which will help you transfer your new knowledge or skill into real life situations or concerns.
 ***What I Need To Remember*** *(Generalization)*	This includes key points that you need to remember.
 ***What I Can Do*** *(Enrichment Activities)*	This comprises activities for independent practice to solidify your understanding and skills of the topic.
 ***Assessment*** *(Post Test)*	This is a task which aims to evaluate your level of mastery in achieving the learning competency.
 ***Answer Key***	This contains answers to the following: • What I Know • What's In • What's More

At the end of this module, you will also find:

References	This is the list of all sources used in developing this module.

The following are some reminders in using this module:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer *What I Know* before moving on to the other activities included in this module.
3. Read the instructions carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and in checking your answers.
5. Finish the task at hand before proceeding to the next.
6. Return this module to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone.

We hope that through this material, you will experience a meaningful learning and gain a deep understanding of the relevant competencies. You can do it!

About the Module

This module was designed and written with you in mind. It is here to help you master about Models Real-Life Situations Using Quadratic Functions & Represent A Quadratic Function using a.) Table of Values, b.) Graph, and c.) Equation. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students.

After going through this module, you are expected to:

1. Identfiy Models of Real-Life Situations Using Quadratic Functions
2. Represent A Quadratic Function using:
   a.) Table of Values,
   b.) Graph, and
   c.) Equation.

What I Know (Pre-Test)

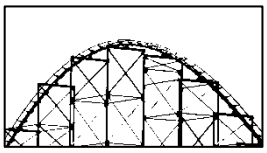
Instructions: Read and analyze each item carefully. Choose the letter of the correct answer. Write your chosen answer on a separate sheet of paper. If the answer is not found among the given choices, write your own answer.

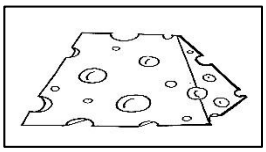
1. It is the standard form of quadratic function.

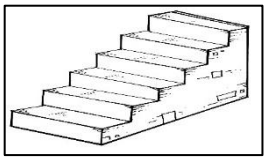
A. $f(x) = ax^2 + bx + c$ C. $f(x) = (x - h)(x - h)$

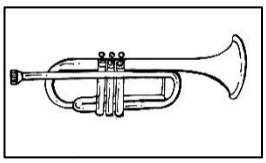
B. $f(x) = a(x - h)^2 + k$ D. $f(x) = (ax + c)(bx + d)$

2. Which of the following model's real-life situation using quadratic function?

A. 

C. 

B. 

D. 

3. All the following statements models real-life situation using quadratic function, **except one**:

A. Area of a Square C. Perimeter of a School

B. Firing a Cannon D. A shape of a Christmas Bell

4. A student is riding a bicycle going straight to the school. Does the statement model's quadratic function in real-life situation?

A. Yes C. Maybe

B. No D. Undecided

5. Find difference at the second level of y values of the given table of values below.

x	-1	0	1	2	3
y	-2	0	4	10	18

A. 1 B. 2 C. 3 D. 4

6. Identify if the given table of values shows quadratic function.

x	-2	-1	0	1	2
y	8	4	2	4	8

A. Yes C. Maybe

B. No D. Undecided

7. When can you say that a table of values represent quadratic function?

A. The first differences are equal.

B. The second differences are equal.

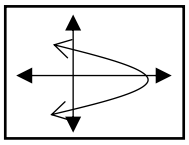
C. The third differences are equal.

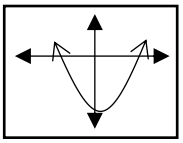
D. The fourth differences are equal.

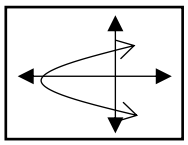
8. It is the graph of a quadratic function.

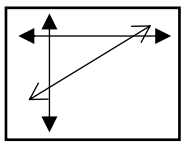
A. Straight line B. Zigzag C. Parabola D. Oval

9. Which of the following graphs represent quadratic function?

A. 

C. 

B. 

D. 

10. What is the value of the coefficient "a" when the graph of quadratic function opens upward?

A. $a > 0$ B. $a < 0$ C. $a = 0$ D. $a \neq 0$

11. It is a vertical line that passes through the vertex that divides the graph into two equal parts.

A. Roots C. Vertex

B. Parabola D. Axis of symmetry

12. An equation of a quadratic function with no linear term and a constant.

A. $f(x) = ax^2$ C. $f(x) = ax^2 + bx$

B. $f(x) = ax^2 + c$ D. $f(x) = ax^2 + bx + c$

13. An equation of a quadratic function when the value of k is zero.

A. $f(x) = 9x^2$ C. $f(x) = 9(x - 10)^2$

B. $f(x) = 9x^2 + 11$ D. $f(x) = 9(x - 10)^2 + 11$

14. Which of the following is **NOT** part of the group?

A. $f(x) = x^2(6x + 7)$ C. $f(x) = (x - 5)(x^2 - 5)$

B. $f(x) = (x + 2)(3x^2 + 4)$ D. $f(x) = 9(x - 10)^2 + 11$

15. Which of the following statements represents quadratic function?

A. Equation with negative exponents.

B. Equation with radical expressions.

C. Equation in which the degree is not 2.

D. Equation that can be transformed to a quadratic equation.

Lesson 6.1

Models Real-Life Situations Using Quadratic Functions

What I Need to Know

At the end of this lesson, you are expected to:

- Identfiy Models of Real-Life Situations Using Quadratic Functions

What's In

Instructions: Fill- in the blanks to complete the definition of Quadratic Equation. Use a separate sheet to write your answer.

A Quadratic equation is an _____ in a form of _____, where in the _____ should always be equal to 2, in which the value of a, b and c are _____ and ____≠ 0.

What's New

Do you know how this bridge applies Mathematical concept? The bridge that you see in the picture is one example of real-life situations using quadratic function.

What is a quadratic function?

A Quadratic Function is a function f defined by an equation in the form of $y = ax^2 + bx + c$ where a, b and c are real numbers and $a \neq 0$.

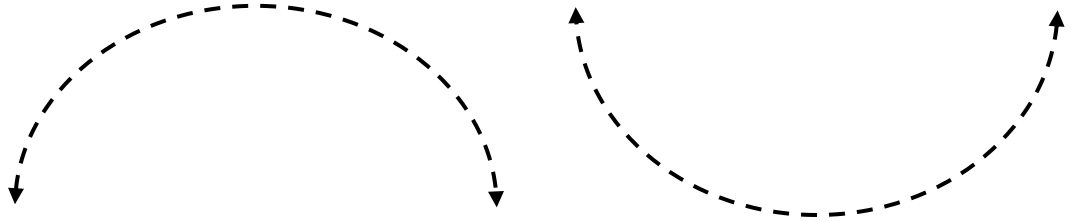
Quadratic Function can also be written in the form $f(x) = ax^2 + bx + c$. In which, ("*f(x)*" is read as "*f of x*" or "*function of x*")

Is a quadratic function the same as quadratic equation? No, because a quadratic function has two variables such as the independent variable(x) and the dependent variable(y) while a quadratic equation focuses only on one variable.

Thus, Quadratic functions are used in many types of real-life situations such as: throwing a basketball, firing cannons, archery and many more.

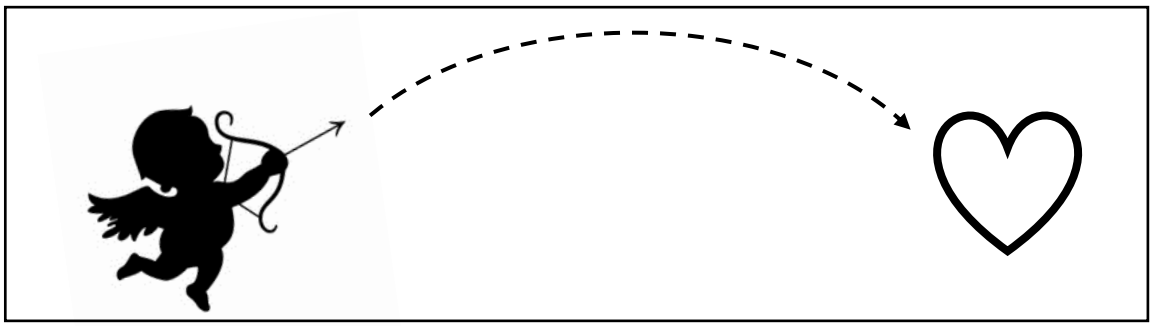
What Is It

How do you know that quadratic function is applied in a real-life situation? Try to connect the broken lines.



A curve line is form by connecting the broken lines. These curves can be referred to as “sad curve” and a “smiling curve”. These curves are very important in identifying whether quadratic function is used in a real-life situation just like the bridge presented in the previous activity. Any object, places, situation, etc. can show either of these curves in quadratic function. You only need to identify which of these curves exist when presented. These curves also known as “U-shaped” and “inverted U-shaped”.

Another thing to consider is the situation that shows an equation that has a degree of 2. Another example is an object that you need to find the area or surface area of any geometric figures.



What about this cupid shooting a heart? Does it show quadratic function? Yes or No? Why?

What’s More

Activity 6.1: Analyze each item carefully. Write **Yes** on your answer sheet if the item represents Quadratic Function and **No** when does not.

1. Area of a rectangular lot
2. Firing a missile
3. Throwing a stone
4. Height of building
5. Diving from a platform
6. Shape of a satellite
7. Christmas bells
8. Circumference of a coin
9. The profit of a bicycle shop
10. Volume of water jar

What I Need To Remember

- Quadratic Function is a function f defined by an equation of the form of $y = ax^2 + bx + c$ where a, b and c are real numbers and $a \neq 0$.
- Quadratic Function can also be written in the form $f(x) = ax^2 + bx + c$.
- Quadratic Function has independent variable and dependent variable.
- Real-life situations that use quadratic equation can be identified when it shows a "U shaped" or an inverted "U-shaped" curve when presented.

Lesson 6.2

Represent Quadratic Function using Table of Values

What I Need to Know

At the end of this lesson, you are expected to:

• Identify the given Table of Values represent Quadratic Function.

What's In

A table of values is a list of numbers that are used to substitute one variable, such as within an equation of a line and other functions, to find the value of the other variable, or missing number.

Specifically, table of values uses numbers for x that will find y, then the y numbers are described as a function of x, or f(x), since the x values resulted in the y numbers listed.

Here are some examples of the table of values of a linear function.

1. $f(x) = 5x + 15$

x	-2	-1	0	1	2
y	5	10	15	20	25

5 5 5 5

$10 - 5 = 5$
$15 - 10 = 5$
$20 - 15 = 5$
$25 - 20 = 5$

2. $f(x) = 3x + 9$

x	-2	-1	0	1	2
y	3	6	9	12	15

3 3 3 3

$6 - 3 = 3$
$9 - 6 = 3$
$12 - 9 = 3$
$15 - 12 = 3$

What's New

What do you think makes the previous table of values a linear function? The answer is that the first differences of y values are equal.

By definition, A linear function is written as $y = mx + b$, where the constant m is the slope of the line, and the b is the y-intercept while quadratic function is a function defined by an equation of the form of $y = ax^2 + bx + c$ where a, b and c are real numbers and $a \neq 0$. It can also be written in the form $f(x) = ax^2 + bx + c$.

As you can see in the definition of linear function and quadratic function, both functions have two variables such as x and y variables. These are the variables that are needed in making a table of values.

Which means that a quadratic function can be represented using table of values. If the first differences of y values of linear function are equal, what about if the table of values is a quadratic function?

What Is It

Unlike linear function, to determine if the table of values represents a quadratic function, the second differences in the y values must be equal. How do you do it? Here's an example.

$$f(x) = x^2 - 5x + 6$$

x	-2	-1	0	1	2	3
y	20	12	6	2	0	0

Subtract the left values of y to its right values. For example, 20 is the left value of 12 while 12 is the right value of 20. So,

$12 - 20 = -8$ $\quad\quad$ $0 - 2 = -2$

$6 - 12 = -6$ $\quad\quad$ $0 - 0 = 0$

$2 - 6 = -4$

x	-2	-1	0	1	2	3
y	20	12	6	2	0	0

First Differences: -8 -6 -4 -2 0

Second Differences: 2 2 2 2

-8, -6, -4, 2 and 0 are just the values of the first differences. What we are going to do next is to solve for the second differences, the same rules apply in subtracting the values. Subtract the left values of y to its right values. So,

-6 – (-8)	-4 – (-6)	-2 – (-4)	0 – (-2)
-6 + 8 = **2**	-4 + 6 = **2**	-2 + 4 = **2**	0 + 2 = **2**

Based on our computations, the value of the second differences is 2. Therefore, the given table of values represent a quadratic function.

Here is another example.

$$f(x) = 2x^2 + 4$$

x	-2	-1	0	1	2	3
y	12	6	4	6	12	22

First Differences: -6, -2, 2, 6, 10

Second Differences: **4**, **4**, **4**, **4**

Solutions:

First differences	**Second differences**
$6 - 12 = -6$	$-2 - (-6) = -2 + 6 =$ **4**
$4 - 6 = -2$	$2 - (-2) = 2 + 2 =$ **4**
$6 - 4 = 2$	$6 - 2 =$ **4**
$12 - 6 = 6$	$10 - 6 =$ **4**
$22 - 12 = 10$	

Since the second differences are equal, therefore the given table of values represents quadratic function.

Are you now ready to do it in your own? Then, proceed and answer the next activity.

What's More

Activity 6.2: Analyze each item carefully. Write **Yes** on your answer sheet if the item represents Quadratic Function and determine the value of the second difference in *y*. But if not a quadratic function, write **No.**

1.

x	-1	0	1	2	3	4
y	-14	-8	0	10	22	36

2.

x	-5	-4	-3	-2	-1	0
y	1	5	9	13	17	21

3.

x	0	1	2	3	4	5
y	5	10	15	20	25	30

4.

x	-1	0	1	2	3	4
y	5	0	-1	2	9	20

5.

x	-3	-2	-1	0	1	2
y	15	10	7	6	7	10

What I Need To Remember

- The Table of Values represents a quadratic function when the second differences in *y values* are equal.
- Subtract the left values to the right values of the *y values* to get the differences. Repeat it twice to get the second differences.

Lesson 6.3

Represent Quadratic Function using Graph

What I Need To Know

At the end of this lesson, you are expected to:

- Identify the given Graph used to represent Quadratic Function.

What's In

Previously, we learned that a quadratic function can be represented in a table of values. Just like the table below.

$$f(x) = x^2 - 8x + 15$$

x	1	2	3	4	5	6	7
y	8	3	0	-1	0	3	8

Mr. John asked his brother Lloyd to convert these values to ordered pairs. How would his brother do it? Below is the work of brother Lloyd. Can you help him finish his job in writing the ordered pair in the table?

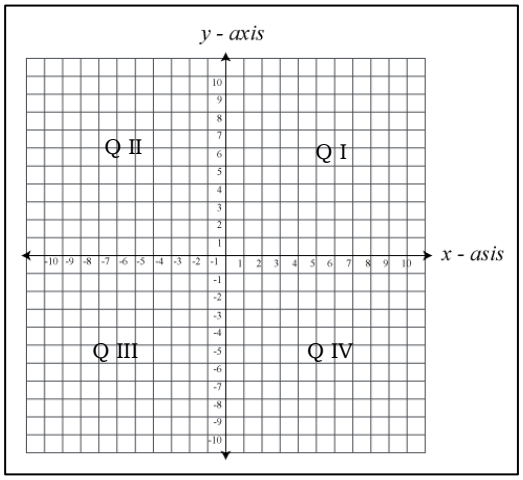
X	y
1	8
2	3
3	0
4	-1
5	0
6	3
7	8

Ex.

ORDERED PAIR
(1,8)

Were you able to help brother Lloyd in writing the ordered pair in the table? If so, what is the use of these ordered pairs?
These ordered pairs are used to make a graph in *a Cartesian Plane.*

The Cartesian plane was created by René Descartes to help people identify where something was located on a map or a graph. It uses a relationship between two variables.

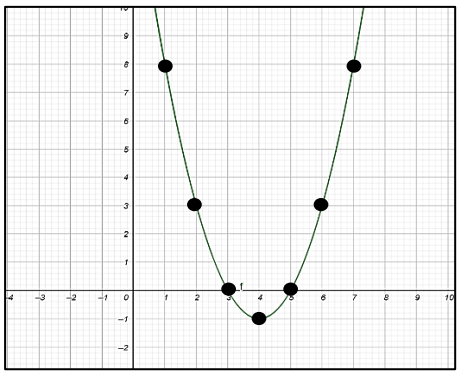


The x-axis, which is horizontal, and the y-axis, which is vertical. Using these axes, we can describe any point in the plane using an ordered pair of numbers.

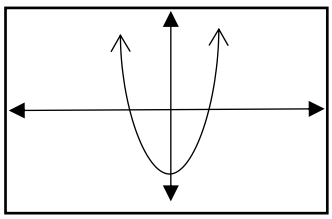
The Cartesian plane is divided into four quadrants. These are numbered from I to IV, starting with the upper right and going around counterclockwise.

What's New

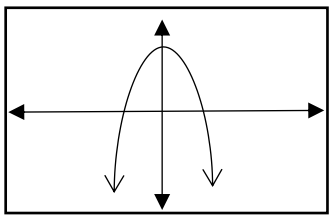
The ordered pairs of Lloyd in the previous activity are (1,8), (2,3), (3,0), (4, -1), (5,0), (6,3), (7,8). Did you happen to have the same answers? If yes, then let's checked if he was able to plot the ordered pairs correctly. Below is his graph, please observed the plotting of the points and the shape of the graph.



Is the graph correct? If so, face a mirror and make a smiley face ☺. If you did, then You and Brother Lloyd are both correct. But how will you know if a graph is a quadratic function? Below are the two faces of the graph of a quadratic function that you need to observe and remember.



(U-shaped/ Smiley face)



(Inverted U-shaped/ Sad face)

Any graphs that show similar faces of these two graphs are considered quadratic functions. And if not, that graph is not a quadratic function.

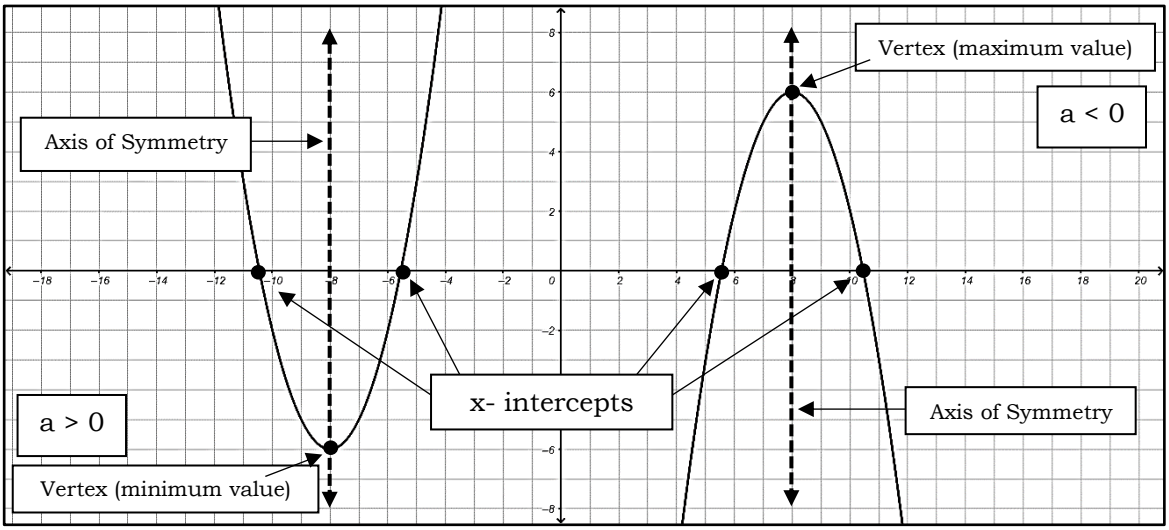
What Is It

Do you want to know more about the graph of a quadratic function?

What is the graph of a quadratic function?

- The graph of a quadratic function is a U-shaped curve called a **parabola**.
- The sign on the coefficient *a* of the quadratic function affects whether the graph opens upward or downward. If *a<0 or negative integers*, the graph opens downward and if *a>0 or positive integers,* the graph opens upward.
- The extreme point (maximum or minimum) of a parabola is called the vertex, and the axis of symmetry is a vertical line that passes through the vertex that divides the graph into two equal parts.

- The *x*-intercepts are the points at which the parabola crosses the *x*-axis. If they exist, the *x*-intercepts represent the zeros, or roots, of the quadratic function.



What's More

Activity 6.3: Analyze each item carefully. Write **Yes** on your answer sheet if the item represents Quadratic Function and **No** when it is not.

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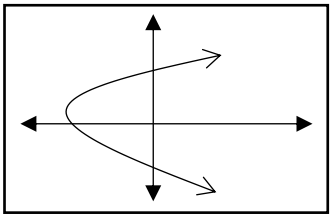

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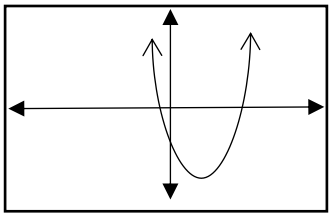

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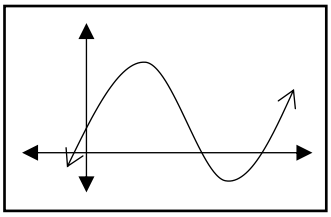

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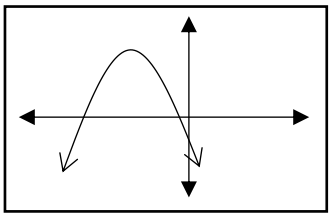

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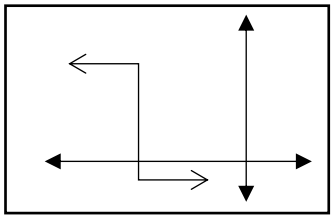

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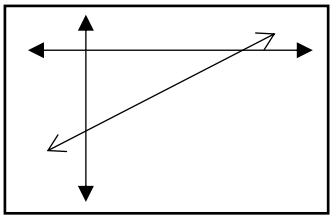

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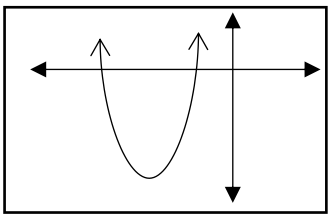

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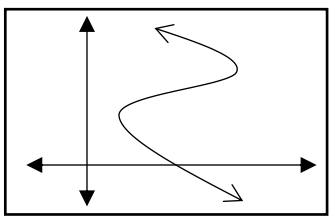

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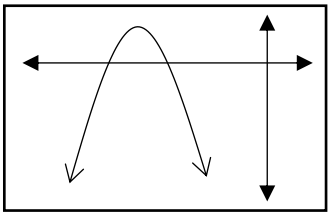
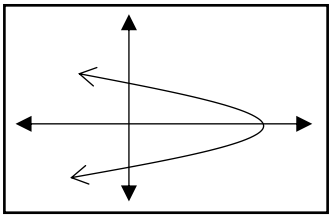
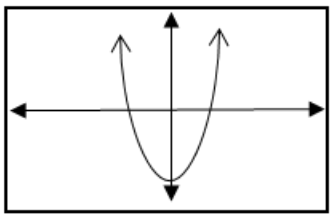


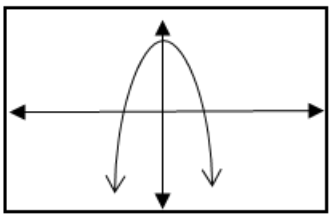
10.


What I Need To Remember

- The graph of a quadratic function is called a **parabola**.
- The sign on the coefficient a of the quadratic function affects whether the graph opens upward or downward. If $a<0$, the graph opens downward and if $a>0$ the graph opens upward.
- The two faces of the graph of quadratic function.



If $a>0$, the graph opens upward



If $a<0$, the graph opens downward

Lesson 6.4

Represent Quadratic Function using Equation

What I Need To Know

At the end of this lesson, you are expected to:

- Identify the given Equation used to represent Quadratic Function.

What's In

Quadratic functions are members of the family of polynomials. The table below shows the first four members of the family.

Polynomial functions	Type
$y = ax + b, \quad a \neq 0$	Linear Function
$y = ax^2 + bx + c, \quad a \neq 0$	Quadratic Function
$y = ax^3 + bx^2 + cx + d, \quad a \neq 0$	Cubic Function
$y = ax^4 + bx^3 + cx^2 + dx + e, \quad a \neq 0$	Quartic Function

What's New

The table below shows a Quadratic Function as part of the family of polynomial functions which has a degree of 2. It can be written in the standard form $f(x) = ax^2 + bx + c$, where *a, b, c* are real numbers and $a \neq 0$.

Quadratic Function can also be written in the form $f(x) = a(x-h)^2 + k$ by using completing the square, this form is known as the vertex form of quadratic equation, where the vertex is (h, k). See the solution below.

Standard quadratic function	$y = ax^2 + bx + c$
Move the constant c over to the other side.	$y - c = ax^2 + bx$
Factor out whatever is multiplied on the squared term.	$y - c = a\left[\left(x^2 + \frac{b}{a}x\right)\right]$
Make room on the left-hand side and put a copy of "a" in front of this space. Take half of the coefficient of the *x*-term (divide it by two) (and don't forget its sign!); square this and add it *inside the parentheses* on both sides.	$y - c + a(\_\_\_\_\_) = a\left[\left(x^2 + \frac{b}{a}x + \_\_\_\_\_\right)\right]$ $\frac{b}{2a} \longrightarrow \frac{b^2}{4a^2}$ $y - c + a\left(\frac{b^2}{4a^2}\right) = a\left(x^2 + \frac{b}{a}x + \frac{b^2}{4a^2}\right)$
Multiply through the parentheses on the left.	$y - c + \frac{b^2}{4a} = a\left(x^2 + \frac{b}{a}x + \frac{b^2}{4a^2}\right)$
Simplify on the left (converting to common denominators, if necessary), and convert to squared form on the right.	$y - \frac{4ac}{4a} + \frac{b^2}{4a} = a\left(x^2 + \frac{b^2}{2a}\right)^2$
Move the loose numbers back over to the right-hand side.	$y = a\left(x^2 + \frac{b^2}{2a}\right)^2 + \frac{4ac}{4a} - \frac{b^2}{4a}$
Simplify;	$y = a\left[x - \left(-\frac{b}{2a}\right)\right]^2 + \frac{4ac - b^2}{4a}$
Convert to Vertex form. Let $h = -\frac{b}{2a}$; $k = \frac{4ac-b^2}{4a}$	$y = a(x-h)^2 + k$ or $f(x) = a(x-h)^2 + k$

Therefore, if the quadratic function is in standard form, used the formula for h and k to solve for the vertex.

$$h = -\frac{b}{2a} \qquad \text{and} \qquad k = \frac{4ac-b^2}{4a}$$

Note: *y* is the same as *f(x)*

What Is It

Aside from the standard form and the vertex form, a quadratic function can also be written in different ways. The table below shows the other forms of a quadratic functions, where the value of a, b, c are real numbers and $a \neq 0$.

Forms of Quadratic Function	**Example**	**Description**
$f(x) = ax^2 + bx + c$	$f(x) = x^2 + 2x + 3$	A quadratic function in Standard form.
$f(x) = ax^2$	$f(x) = 4x^2$	A quadratic function with No linear term and a constant. A quadratic function when the value of h and k is zero.
$f(x) = ax^2 + bx$	$f(x) = 5x^2 + 6x$	A quadratic function with No constant
$f(x) = ax^2 + c$	$f(x) = 14x^2 + 15$	A quadratic function with No linear term.
$f(x) = a(x - h)^2 + k$	$f(x) = 9(x - 10)^2 + 11$	A quadratic function in vertex form.
$f(x) = a(x - h)^2$	$f(x) = 12(x - 13)^2$	A quadratic function when the value of k is zero.
$f(x) = ax^2 + k$	$f(x) = 7x^2 + 8$	A quadratic function when the value of h is zero.
$f(x) = x(ax + b)$ $f(x) = (ax + c)(bx + d)$ $f(x) = (x - h)(x - h)$	$f(x) = x(6x + 7)$ $f(x) = (x + 2)(3x + 4)$ $f(x) = (x - 5)(x - 5)$	Other forms of function that are transformable to quadratic function, also known as the factored form.
Note: The highest exponent of a quadratic function is 2 but cannot be found directly when the function is in the form of functions that are transformable to quadratic function or factored form.		
When to say that it is not a quadratic function: • Equation in which the degree is not 2. • Equation that cannot be transformed to a quadratic equation. • Equation with negative exponents. • Equation with radical expressions.		

What's More

Activity 6.4: Analyze each item carefully. Write **Yes** on your answer sheet if the item represents Quadratic Function and **No** when does not.

1. $f(x) = 4x^{-2}$
2. $f(x) = 3x^2$
3. $f(x) = x^2 - 9$
4. $f(x) = (x-6)^2 + 7$
5. $f(x) = x^2 - 2x + 5$
6. $f(x) = \sqrt{12(x-13)^2}$
7. $f(x) = x + 10$
8. $f(x) = -2x + x^2 + 5$
9. $f(x) = (2x-7)(3x+2)$
10. $f(x) = x^3 + 3x^2$

What I Need To Remember

Quadratic functions can be represented in an equation with following forms:

Standard form

- $f(x) = ax^2 + bx + c$, where the value of a, b, c are real numbers and $a \neq 0$

Other forms:

- $f(x) = ax^2$
- $f(x) = ax^2 + bx$
- $f(x) = ax^2 + c$

- **Vertex form**
  - $f(x) = a(x-h)^2 + k$, where the vertex is (h, k)

  Other forms:
  - $f(x) = ax^2$
  - $f(x) = a(x-h)^2$
  - $f(x) = ax^2 + k$
- **Factored form**
  - $f(x) = x(ax + b)$
  - $f(x) = (ax + c)(bx + d)$
  - $f(x) = (x-h)(x-h)$

What I Can Do

Instructions: Do what is asked in each box and explain why your example represent a Quadratic Function. Use long size bond paper.

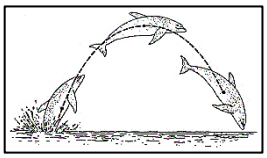
Box #1 Illustrate a real-life example of Quadratic Function	**Box #2** Show a Table of Values that represent Quadratic Function.
Box #3 Draw a graph that represent a Quadratic Function.	**Box #4** Write an equation the represent a Quadratic Function.

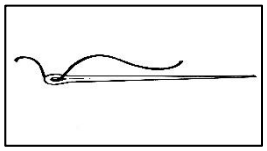
RUBRICS		
CONTENT (25 points)	**ACCURACY (15 POINTS)**	**NEATNESS (10 POINTS)**
25 Point when all given examples are correct	15 Points when all explanations are correct	10 Points when the sizes of the boxes are equal, no erasure and no writings outside the box.
23 points when 1 example is wrong.	13 points when 1 explanation is wrong.	8 Points when 1 box has different size, has erasure, or has writings outside it.
21 points when 2 examples are wrong.	11 points when 2 explanations are wrong.	6 Points when 2 boxes have different sizes, has erasure, or has writings outside them.
19 points when 3 examples are wrong.	9 points when 3 explanations are wrong.	4 Points when 3 boxes have different sizes, has erasure, or has writings outside them.
17 points when all examples are wrong.	7 points when all explanations are wrong.	2 Points when all boxes have different sizes, has erasure, or has writings outside them.

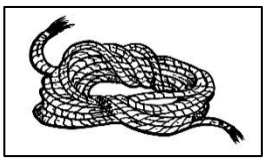
Assessment (Post Test)

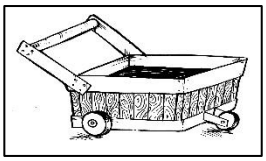
Instructions: Read and analyze each item carefully. Choose the letter of the correct answer. Write your chosen answer on a separate sheet of paper. If the answer is not found among the given choices, write your own answer.

1. Which of the following model's real-life situation using quadratic function?

A. 

B. 

C. 

D. 

2. Which of the following statements models real-life situation using quadratic function?

A. A vertical line
B. Bamboo sticks
C. Perimeter of a mall
D. Throwing a basketball

3. It is the vertex form of quadratic function.

A. $f(x) = ax^2 + bx + c$
B. $f(x) = a(x-h)^2 + k$
C. $f(x) = (x-h)(x-h)$
D. $f(x) = (ax+c)(bx+d$

4. A diver is diving from a platform as practice for the coming SEA games 2020. Does the statement model's real-life situation use quadratic function?

A. Yes
B. No
C. Maybe
D. Undecided

5. Find difference at the second level of y values of the given table of values below.

x	-2	-1	0	1	2
y	9	0	-3	0	9

A. 3 B. 4 C. 5 D. 6

6. Identify if the given table of values shows quadratic function.

x	-2	-1	0	1	2
y	5	7	9	11	13

A. Yes
B. No
C. Maybe
D. Undecided

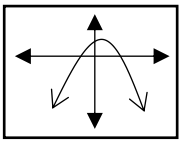
7. How many times do you need to find the differences of y in the table of values to identify if it represents quadratic function?

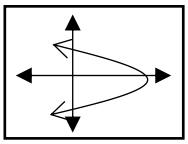
A. Once
B. Twice
C. Three times
D. Four times

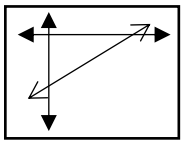
8. It is a U-shaped curve or an inverted U-shaped curve of a graph.

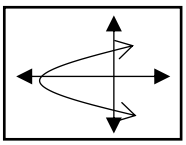
A. Parabola B. Smileys C. Roots D. Oval

9. Which of the following graphs represent quadratic function?

A. 

C. 

B. 

D. 

10. What is the value of the coefficient "a" when the graph of quadratic function opens downward?

A. $a > 0$ B. $a < 0$ C. $a = 0$ D. $a \neq 0$

11. The extreme point (maximum or minimum) of a parabola.

A. Roots
B. Parabola
C. Vertex
D. Axis of symmetry

12. An equation of a quadratic function with no constant.

A. $f(x) = ax^2$
B. $f(x) = ax^2 + c$
C. $f(x) = ax^2 + bx$
D. $f(x) = ax^2 + bx + c$

13. An equation of a quadratic function when the value of h is zero.

A. $f(x) = 3x^2$
B. $f(x) = 3x^2 + 11$
C. $f(x) = 3(x-4)^2$
D. $f(x) = 3(x-4)^2 + 5$

14. Which of the following is **NOT** part of the group?

A. $f(x) = x(6x+7)$
B. $f(x) = (x+7)(8x^2+9)$
C. $f(x) = (x-6)(x-6)$
D. $f(x) = 10(x-11)^2 + 12$

15. Which of the following is **NOT** a form of quadratic function?

A. Standard form
B. Vertex form
C. Factored form
D. Root form

Answer Key

Remember: This portion of the module contains all the answers. Your **HONESTY** is required.

Answers to What's In on Page 6

1. Equation
2. $ax^2+bx+c=0$
3. Degree
4. Real Numbers
5. *a*

Activity 7.1

1. Yes
2. Yes
3. Yes
4. No
5. Yes
6. Yes
7. Yes
8. No
9. Yes
10. No

Activity 7.2

1. Yes, 2
2. No
3. No
4. No
5. Yes, 2

Activity 7.3

1. No
2. Yes
3. No
4. Yes
5. No
6. No
7. Yes
8. No
9. Yes
10. No

Activity 7.4

1. No
2. Yes
3. Yes
4. Yes
5. Yes
6. No
7. No
8. Yes
9. Yes
10. No

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Congratulations!

You are now ready for the next module. Always remember the following:

1. Make sure every answer sheet has your
   - *Name*
   - *Grade and Section*
   - *Title of the Activity or Activity No.*
2. Follow the date of submission of answer sheets as agreed with your teacher.
3. Keep the modules with you and return them at the end of the school year or whenever face-to-face interaction is permitted.