9

Mathematics

Quarter 1 - Module 1: Illustrating and Solving Quadratic Equations

AIRs - LM

Mathematics 9
Alternative Delivery Mode
Quarter 1 - Module 1: Illustrating and Solving Quadratic Equations
Second Edition, 2021

Development Team of the Module

Authors: Leian Gretel D. Nerida and Jocelyn G. Lopez
Editor: SDO La Union, Learning Resource Quality Assurance Team
Content Reviewers: Philip R. Navarette and Jocelyn G. Lopez
Language Reviewers: Teresa A. Villanueva and Cleofe M. Lacbao
Illustrator: Ernesto F. Ramos Jr. and Christian Bautista
Design and Layout: Dana Kate J. Pulido

Management Team:

Atty. Donato D. Balderas Jr.
Schools Division Superintendent
Vivian Luz S. Pagatpatan, Ph D
Assistant Schools Division Superintendent
German E. Flora, Ph D, *CID Chief*
Virgilio C. Boado, Ph D, *EPS in Charge of LRMS*
Erlinda M. Dela Peňa, Ph D, *EPS in Charge of Mathematics*
Michael Jason D. Morales, *PDO II*
Claire P. Toluyen, *Librarian II*

Printed in the Philippines by: _____

Department of Education – SDO La Union
Office Address: Flores St. Catbangen, San Fernando City, La Union
Telefax: 072 – 205 – 0046
Email Address: launion@deped.gov.ph

9

Mathematics

Quarter 1 - Module 1: Illustrating and Solving Quadratic Equations

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

Target

Let's start this module by assessing your knowledge of the different mathematics concepts previously studied and your skills in performing mathematical operations. These knowledge and skills will help you in understanding quadratic equations. As you go through this lesson, think of this important question*: "How are quadratic equations used in solving real-life problems and in making decisions?"* To find the answer, perform each activity. If you find any difficulty in answering the exercises, seek the assistance of your teacher, peers or refer to the modules you have gone over earlier.

After going through this module, you are expected to attain the following objectives:

Learning Competencies

- Illustrates quadratic equations **(M9AL-Ia-1)**
- Solves quadratic equations by extracting square roots, factoring, completing the square and by using the quadratic formula **(M9AL-Ia-2.1)**

Subtasks

1. Define quadratic equations;
2. Write a quadratic equation in standard form and identify the values of a, b, and c;
3. Find the solutions of the given quadratic equations using any of the method in solving quadratic equation; and
4. Formulate a quadratic equation to represent the given real-life situations.

Before going on, check how much you know about this topic. Answer the pre-assessment on a separate sheet of paper.

Pre-Assessment

Directions. Find out how much you already know about this module. Choose the letter of the correct answer and write it on a separate sheet of paper.

1. Which of the following is a polynomial equation of degree two that can be written in the form $ax^2 + bx + c = 0$, where a, b, and c are real numbers and $a \neq 0$?
   A. Exponential Equation
   B. Linear Equation
   C. Polynomial Equation
   D. Quadratic Equation

2. Which of the following is a quadratic equation?
   A. $5m^2 + 2x - 3$
   B. $2r - 4 = 1$
   C. $x^2 - 2x + 3 = 0$
   D. $7x^2 - 7x < 3$
3. Which of the following situations illustrates quadratic equations?
   A. Find two numbers whose sum is 35 and difference is 23.
   B. Suppose you are 14 years old. What is your target rate (in beats per minute)?
   C. The square of a number is added to three times of a number and the sum is 15.
   D. Nica is 4 years younger than Kyle. Four years later, Kyle will be twice as old as Nica.
4. Which of the following quadratic equations illustrates the given situation: *The area of a rectangular lot is 40 square meters, and its length is three meters more than its width?*
   A. $40x^2 = 3x + x$
   B. $40x^2 = x - 3x$
   C. $40x^2 = 3 + x$
   D. $40x^2 = 3x - x$
5. Which of the following is the factored form of $x^2 - 25$?
   A. $(x - 5)(x - 5)$
   B. $(x - 5)(x + 5)$
   C. $x(x + 25)$
   D. $x(x - 25)$
6. If $xy = 0$, then $x = 0$ or $y = 0$ where both x and y are real numbers. What property is being illustrated?
   A. Addition Property
   B. Multiplication Property
   C. Square Root Property
   D. Zero Product Property
7. Which of the following quadratic equation can be factored by extracting the square root?
   A. $x^2 - 4 = 0$
   B. B. $x^2 + 1 = 0$
   C. $x^2 + 3x + 2 = 0$
   D. $x^2 + 3x - 18 = 0$
8. Using factoring, what is the value of x in the quadratic equation $x^2 + 7x = 8$?
   A. {-7, 1}
   B. {-7, -1}
   C. {-8, 1}
   D. {-8, -1}
9. What must be added to $x^2 - 4x +$ _____ to make it a perfect square trinomial?
   A. 2
   B. 4
   C. 8
   D. 16
10. Which of the following is a perfect square trinomial?
   A. $x^2 + 10x + 25$
   B. $x^2 + 10x - 25$
   C. $x^2 - 5x + 25$
   D. $x^2 + 10x + 5$

11. Find the solutions of quadratic equation $b^2 - 8b - 9 = 0$ by completing the square.
    A. 1, -9
    B. -1, 9
    C. 2, -4
    D. -2, 4
12. What are the roots of the quadratic equation $x^2 + 5x = -6$?
    A. 2, 3
    B. -1, 6
    C. 3, -4
    D. -2, -3
13. Given the quadratic equation $x^2 + 9x = 12$, what is the value of c?
    A. 9
    B. -9
    C. 12
    D. -12
14. In solving $2x^2 = -3(x + 2)$ using quadratic formula, what is the first thing to consider?
    A. Identify the value of a, b and c.
    B. Rewrite the equation in general form.
    C. Divide both sides by a common factor.
    D. Substitute the values of a, b, and c in the quadratic formula.
15. What are the roots of $x^2 - 6x + 2 = 0$ using quadratic formula?
    A. $2 \pm\sqrt{5}$
    B. $3 \pm\sqrt{7}$
    C. $\pm\sqrt{5}$
    D. $\pm\sqrt{7}$

Were you able to answer all the questions? If not, don't worry because the next activity will help you better understand the lesson.

Jumpstart

Activity 1: Put Me In!

Directions: Below are different equations. If the equation is linear, write LE otherwise write NL.

1. $x^2 - 2x + 3 = 0$
2. $2s - 5 = 0$
3. $3r^2 + 5r + 12 = 0$
4. $8k - 6 = 1$
5. $6t + 7 = 0$

Process Questions:

a. Which of the given equations are linear?
b. How do you describe linear equations?
c. Which of the equations are not linear, why?
d. What common characteristics do these equations have?

Activity 2: Solve Me!

Direction: Find the solution/s of each of the following equations.

1. $x + 7 = 12$
2. $t - 4 = 10$
3. $-5x = 35$
4. $x - 10 = -2$
5. $x^2 - 4 = 0$

Process Questions:

a. What type of equations are the following?
b. How did you solve each equation?
c. What mathematics concepts or principles did you apply to come up with the solution of each equation?
d. Which equations did you find difficult to solve? Why?

Discover

Quadratic comes from the Latin word "quadratus" which means "square". A quadratic equation is any equation that can be rearranged in standard form as $ax^2 + bx + c = 0$ where a, b, and c represent known numbers, and $a \neq 0$.

A quadratic equation is an equation of the second degree, which contains at least one term that is squared.

In the equation $ax^2 + bx + c = 0$, **ax^2** is the *quadratic term*, **bx** is the *linear term*, and **c** is the *constant term*. For example, in the equation $3x^2 + 4x + 6 = 0$, the *quadratic term* is **$3x^2$**, the *linear term* is **4x** and the **constant term** is **6** where the value **of a = 3, b = 4 and c = 6.**

Example 1:

$2x^2 + 6x + 4 = 0$ is a quadratic equation in standard form with a = 2, b = 6, and c = 4.

Example 2:

$x^2 - 5x = 0$ is a quadratic equation. However, it is not written in standard form.

This one is a little tricky:

- What is the value of **a**?
  Well, **a=1** as we don't usually write "$1x^2$"
- **b** = -5
- And where is **c**?
  Well, **c = 0**, so it is not shown

The **Standard form** of a quadratic equation is **$ax^2 + bx + c = 0$** like examples 1 and 2**.** But sometimes, a quadratic equation doesn't look like that.

Example 3:

$4x^2 - 3x = -1$ is a quadratic equation. However, it is not written in standard form. To transform it to its standard form, we can use transposition method by transferring the constant term to the other side of the equation as shown below.

$$4x2 - 3x = -1 \longrightarrow 4x2 - 3x + 1 = 0$$

The standard form of $4x^2 - 3x = -1$ is $4x^2 - 3x - 1 = 0$, where $a = 4$, $b = -3$, and $c = -1$.

Solving Quadratic Equations Using the Four Methods

A. Extracting Square Roots

Quadratic equations that can be written in the form $x^2 = k$ can be solved by applying the following properties:

1. If $k > 0$, then $x^2 = k$ has two real solutions or roots: $x = \pm \sqrt{k}$.
2. If $k = 0$, then $x^2 = k$ has one real solution or root: $x = 0$
3. If $k < 0$, then $x^2 = k$ has no real solutions or roots.

The method of solving quadratic equation $x^2 = k$ is called extracting square roots.

Example 1: Find the solutions of the equations $x^2 - 16 = 0$

Write the equation in the form $x^2 = k$

$$x^2 - 16 = 0 \longrightarrow x^2 - 16 + 16 = 0 + 16$$
$$x^2 = 16$$
$$x^2 = \pm \sqrt{16}$$
$$x = \pm 4$$

To check, substitute these values in the original equation.

For $x = 4$:	For $x = -4$:
$x^2 - 16 = 0$	$x^2 - 16 = 0$
$4^2 - 16 = 0$	$(-4)^2 - 16 = 0$
$16 - 16 = 0$	$16 - 16 = 0$
$0 = 0$	$0 = 0$

Both values of x satisfy the given equation. So the equation $x^2 - 16 = 0$ is true when $x = 4$ or when $x = -4$.

Answer: The equation $x^2 - 16 = 0$ has two solutions: $x = 4$ or $x = -4$

Example 2: Solve the equation $m^2 = 0$

Since m^2 equals 0, then the equation has only one solution.
That is, $m^2 = \sqrt{0}$
$m = 0$

To check: $m^2 = 0$
$0^2 = 0$
$0 = 0$

Answer: The equation $m^2 = 0$ has one solution: $m = 0$

Example 3: Find the roots of the equation $s^2 + 9 = 0$

Write the equation in the form $x^2 = k$.
$s^2 + 9 = 0 \longrightarrow s^2 + 9 - 9 = 0 - 9$
$s^2 = \sqrt{-9}$

Since $k = -9$ and it is less than 0, then the equation $s^2 = -9$ has no real solution or root. There is no real number when squared gives – 9.

B. Factoring

To understand more about factoring, let's study the following examples.

Steps on how to solve a quadratic equation by factoring:
1. Move all the terms of the equation in the left side if necessary. In this case, the other side must be zero.
2. Combine the similar terms in the left side.
3. Factor the left side of the equation.
4. Equate each factor that holds the unknown variable to zero.
5. Solve the equated form.

Example 1: $4x^2 = 6x$

Solution:

$4x^2 = 6x$
$4x^2 - 6x = 6x - 6x$ Subtract 6x from both sides
$4x^2 - 6x = 0$
$2x(2x - 3) = 0$ Factor by GCF (GCF is 2x)

$2x = 0$ $\quad 2x - 3 = 0$ Use the Zero Product Property
$x = 0$ $\quad x = \frac{3}{2}$

*The solutions are **0** and **3/2**.*

Example 2: $x^2 - 3x = 18$

Solution:

$x^2 - 3x = 18$

$x^2 - 3x - 18 = 18 - 18$

$(x + 3)(x - 6) = 0$ Factor the trinomial.

$x + 3 = 0$ $\quad$ $x - 6 = 0$ Use the Zero Product Property

$x = -3$ $\quad$ $x = 6$ Solve each equation

The solutions are ***-3*** *and* ***6****.*

Example 3: $9x^2 - 4 = 0$

Solution:

$9x^2 - 4 = 0$

$(3x + 2)(3x - 2) = 0$ Factor the equation

$3x + 2 = 0$ $\quad$ $3x - 2 = 0$ Use the Zero Product Property

$x = -2/3$ $\quad$ $x = 2/3$ Solve each equation

The solutions are ***-2/3*** *and* ***2/3****.*

C. Completing the Square

These are the steps in completing the square.

1. Place the constant term on the right side of the equation. All the terms with unknowns are on the left side.
2. The numerical coefficient of x^2 should be 1. Divide each term of the equation with the numerical coefficient of x^2 if necessary.
3. To get the constant term needed to complete the square, get the numerical coefficient of x, divide it by 2 and square it. Add the result to both sides of the equation.
4. Factor the perfect square trinomial. Values will be obtained for the right side
5. Extract the square root from both sides. Two values will be obtained for the right side of the equation.
6. Equate the linear expressions to each of the two values.
7. Solve each of the resulting linear equations.
8. Check your answer by substituting to the original equation.

Example: Solve $x^2 - 8x - 9 = 0$ *by completing the square.*

Solution:

$x^2 - 8x - 9 = 0$ Original equation

$x^2 - 8x - 9 + 9 = 0 + 9$ Add 9 to both sides

$x^2 - 8x = 9$

$x^2 - 8x + (4)^2 = 9 + (4)^2$

$x^2 - 8x + 16 = 9 + 16$ Add 16 to both sides. The right side is a perfect square trinomial.

Note: To get the constant that will complete the square, take the coefficient of x, divide it by 2, then square it.

$x^2 - 8x + 16 = 25$

$(x - 4)^2 = 25$ Factor the trinomial square.

$x - 4 = \sqrt{25}$ Extract the square root of both sides.

$x - 4 = \pm 5$

$x - 4 = 5$ $\quad$ $x - 4 = -5$ Equate the linear expressions to each of the two values. Solve each of the resulting linear equation.

$x = 9$ $\quad$ $x = -1$

*The solutions are **9** and -**1**.*

Checking:

For x = -1	For x = 9
$x^2 - 8x - 9 = 0$	$x^2 - 8x - 9 = 0$
$(-1)^2 - 8(-1) - 9 = 0$	$(9)^2 - 8(9) - 9 = 0$
$1 + 8 - 9 = 0$	$81 - 72 - 9 = 0$
$0 = 0$	$0 = 0$

D. Using the Quadratic Formula

In solving quadratic equation of the form $ax^2 + bx + c = 0$ where $a \neq 0$ use the formula:

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

Example 1: Find the solution of the equation $x^2 + 2x - 8 = 0$.

$x^2 + 2x - 8 = 0 \longrightarrow a = 1; b = 2; c = -8$

Substitute the values of a, b, and c in the quadratic formula.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \longrightarrow x = \frac{-2 \pm \sqrt{(2)^2 - 4(1)(-8)}}{2(1)}$$

Simplify the result.

$$x = \frac{-2 \pm \sqrt{(2)^2 - 4(1)(9)}}{2(1)} \longrightarrow x = \frac{-2 \pm \sqrt{4 + 32}}{2}$$

$$x = \frac{-2 \pm \sqrt{36}}{2}$$

$$x = \frac{-2 \pm 6}{2}$$

$$x = \frac{-2 + 6}{2} = \frac{4}{2} \quad ; \quad x = \frac{-2 - 6}{2} = \frac{-8}{2}$$

$x = 2$ $\quad$ $x = -4$

*The equation $x^2 + 2x - 8 = 0$ has two solutions: **x = 2** and **x = -4***

Example 2: Find the solutions of the equation $2x^2 + 3x = 27$ using the quadratic formula.

Write the equation in standard form.

$$2x^2 + 3x = 27 \longrightarrow 2x^2 + 3x - 27 = 0$$

Determine the values of a, b and c.

$$2x^2 + 3x - 27 = 0 \longrightarrow a = 2;\ b = 3;\ c = -27$$

Substitute the values of a, b, and c in the quadratic formula.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \longrightarrow x = \frac{-3 \pm \sqrt{(3)^2 - 4(2)(-27)}}{2(2)}$$

Simplify the result.

$$x = \frac{-3 \pm \sqrt{(3)^2 - 4(2)(-27)}}{2(2)} \longrightarrow x = \frac{-3 \pm \sqrt{9 + 216}}{4}$$

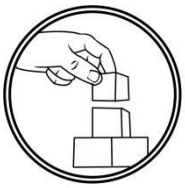
$$x = \frac{-3 \pm \sqrt{225}}{4}$$

$$x = \frac{-3 \pm 15}{4}$$

$$x = \frac{-3 + 15}{4} = \frac{12}{4} \quad ; \quad x = \frac{-3 - 15}{4} = \frac{-18}{4}$$

$$x = 3 \qquad x = \frac{-9}{2}$$

The equation $2x^2 + 3x - 27 = 0$ has two solutions: $\boldsymbol{x = 3}$ *and* $\boldsymbol{x = \frac{-9}{2}}$.



Explore

Activity 3: Set Me to Your Standard!

Directions: Write each quadratic equation in standard form, $\mathbf{ax^2 + bx + c = 0}$ then identify the values of **a, b and c.**

1. $5x^2 + 6x = 3$ a = _____ b= _____ c=_____
2. $3x(x + 2) = 6$ a = _____ b= _____ c = _____
3. $(x + 4)(x - 6) = 15$ a = _____ b= _____ c = _____

Activity 4:

***Direction*:** Find the solutions of the following quadratic equations using the best method.

1. $x^2 + 7x = 0$
2. $6s^2 + 18s = 0$
3. $x^2 - 2x = 3$
4. $s^2 - 121 = 0$
5. $x^2 - 10x + 25 = 0$

Activity 5: Let's Explore to Discover!

Directions: Read the situation carefully, then answer the questions below.

We are facing a great challenge nowadays because of the COVID-19 pandemic. So your adviser took advantage of the situation. She planned to have an activity entitled "Gulayan sa Bakuran." She asked each of you to make a layout of a rectangular garden whose area is 2000 cm^2. She specified that the length of the rectangular garden must be 100 cm more than its width.

Length = 100 cm more than its width

Area = 2000cm^2	Width = x

Questions:

1. If x represents the width of the rectangular garden, how would you represent the length?
   Answer: Width = x
   Length = ____
2. How would you represent the area of the rectangular garden? (Hint: formula for the area of a rectangle is **A = lw**).
   Given: A = 2000
3. What are the dimensions of the rectangular garden?

Deepen

Activity 6: Dig Deeper!

Direction: Answer the following questions.

1. How are quadratic equations different from linear equations?
2. How do you write quadratic equations in standard form? Give at least three (3) examples.
3. These are the values of a, b, and c that Maria and Juan got when they expressed $6 - 5x = 2x^2$ in standard form.
   Maria: a = 2; b = 5; c = -6
   Juan: a = -2; b = -5; c = 6
   Who got the correct values of a, b and c? Justify your answer.
4. Do you agree that the equation $4 - 5x = 2x^2$ can be written in standard form in two different ways? Justify your answer?

Gauge

Post-Assessment:

Directions. Find out how much you already know about this module. Choose the letter of the correct answer and write it on a separate sheet of paper.

1. What is the degree of a quadratic equation?
   A. 0
   B. 1
   C. 2
   D. 3
2. Which of the following is a quadratic equation?
   A. $7x^2 + x - 1$
   B. $x^2 - 4x + 1 = 0$
   C. $2r - 4 = 1$
   D. $8x^2 - 7x > 3$
3. In the quadratic equation $5x^2 - x + 1 = 0$, which is the quadratic term?
   A. $5x^2$
   B. $-x$
   C. 0
   D. 1
4. What are the values of a. b, and c in the quadratic equation $x^2 - 5x - 1 = 0$?
   A. a = 1, b = -5, c = -1
   B. a = 1, b = 5, c = 0
   C. a = 1, b = 5, c = -1
   D. a = 1, b = -5, c = 1
5. What is the standard form of the quadratic equation $2x (x + 1) = (x - 2) (x - 2)$?
   A. $3x^2 - 6x - 4 = 0$
   B. $3x^2 - 6x - 4 = 0$
   C. $x^2 + 6x - 4 = 0$
   D. $x^2 + 6x + 4 = 0$
6. How many solutions does the equation $x^2 = c$, where $c > 0$ have?
   A. no real solution
   B. one
   C. two
   D. either a or b
7. What is the solution set of the quadratic equation $x^2 + 16 = 0$?
   A. (2, 4)
   B. (2,-4)
   C. (-2,4)
   D. no real roots
8. What is the solution set of quadratic equation $2x^2 + 8x - 10 = 0$ by completing the square?
   A. (1, -5)
   B. (-1, 5)
   C. (-1, -5)
   D. (1, 5)

9. The (x + 3)(x – 3) is a factored form of equation _____. Which of the following will complete the statement?
   A. $x^2 - 3$
   B. $x^2 - 9$
   C. $2x^2 - 9$
   D. $x^2 + 32$
10. What are the roots of the quadratic equation $x^2 + 5x = -6$?
   A. 2, 3
   B. -1, 6
   C. 3, -4
   D. -2, -3
11. Solve $4x^2 - 80 = 0$ by extracting the square root.
   A. ± 5
   B. $\pm 5\sqrt{2}$
   C. ± 2
   D. $\pm 2\sqrt{5}$
12. Find the roots of $x^2 = 8x + 4$ using the quadratic formula.
   A. $-4 \pm \sqrt{5}$
   B. $4 \pm 2\sqrt{5}$
   C. $4 \pm \sqrt{5}$
   D. $-4 \pm 2\sqrt{5}$
13. What is the solution set of $6x^2 - 24x = -24$?
   A. {2, 2}
   B. {3,4}
   C. {2, 3}
   D. {2,6}
14. What is the factored form of $x^2 + 10x + 25 = 0$?
   A. $(x - 5)^2$
   B. $(x + 2)(x + 5)$
   C. $(x + 5)^2$
   D. $(x - 2)(x + 5)$
15. The area of the lot of Mr. Hufana is in the equation $2x^2 + 6x = -3$. What are the dimensions of the lot?
   A. $\frac{-3 \pm \sqrt{3}}{2}$
   B. $\frac{3 \pm \sqrt{3}}{2}$
   C. $\frac{2 \pm \sqrt{3}}{2}$
   D. $\frac{-2 \pm \sqrt{3}}{2}$

References

Books

Bryant, Merden L.Leonides E. Bulalayao, Melvin M. Callanta, Jerry D. Cruz, Richard F. De Vera, Gilda T. Garcia, Sonia E. Javier, Roselle A. Lazaro, Bernadeth J. Mesterio, and Rommel Hero A. Saladino. *Mathematics Grade 9 Learner's Module*, First Edition 2014, Reprinted 2017, Department of Education.

Dugopolski, Mark. 2006. *Elementary and Intermediate Algebra 2nd Edition.*MC GrawHill.New York City

Dignadice, Anne D. *Wizard Mathematics, Intermediate Algebra Worktext II* by Mathematics Grade 9 Learner's Material, First Edition, 2014 Learners' Manual, K to 12 Grade 9 Mathematics Teacher's Guide, K to 12 Basic Education Curriculum

Morgan, F. M., & Paige, B. L. (n.d.). *Algebra 2.* pp 98-102 .America: Henry Holt and Company.

Oronce, Orlando A. and Marilyn O. Mendoza. *Worktext in Mathematics for Second Year High School E-Math ,Intermediate Algebra* Rex Book Store Inc. 2007.

Oronce, Orlando & Marilyn O. Mendoza, *E-Math Worktext in Grade 9 Mathematics*, First Edition, Reprinted March 2008, 2002 Basic Education Curriculum

Pantoja, Sarah Pamela N., Shiela Ann D. San Juan, and Sergio D. Custodio. *Interactive Mathematics 9,* Copyright 2015 by Innovative Educational Materials, Inc., Edited by Joselito P. Bulaclac, K to 12 Basic Education Curriculum.

Website

"Assessment", accessed on September 24, 2020
file:///D:/Summative%20Test/Summative%20Test%20for%20Quadratic%20Equations2.pdf

"Quadratic Equations", accessed September 23, 2020
https://www.toppr.com/guides/maths/quadratic-equations/introduction-to-quadratic-equations/
https://www.mathsisfun.com/algebra/quadratic-equation.html

"Real-life Situations", accessed September 24, 2020
https://sciencing.com/everyday-examples-situations-apply-quadratic-equations-10200.html

"Square Roots", accessed September 25, 2020
https://www.mathsisfun.com/square-root.html
https://www.coursehero.com/file/37800346/math-9-lm-draft-3242014pdf/

For inquiries or feedback, please write or call:

Department of Education – SDO La Union
Curriculum Implementation Division
Learning Resource Management Section
Flores St. Catbangen, San Fernando City La Union 2500
Telephone: (072) 607 - 8127
Telefax: (072) 205 - 0046
Email Address:
launion@deped.gov.ph
lrm.launion@deped.gov.ph