LA IMMACULADA CONCEPCION SCHOOL
Junior High School Department

FIRST UNIT COVERAGE

Mathematics 9 **Supplementary Module No. 1**

Name: | | | | | | | | | | | | | | | | | | | | | | |

Year/Grade: _____ **Section:** _____

Teacher _____ **Date:** _____

TOPIC: QUADRATIC EQUATION

Quadratic Equation is a second-degree equation. In standard form, a quadratic equation is given by $ax^2 + bx + c = 0$, where a, b and c are real numbers, and $a \neq 0$.

For a quadratic equation written in standard form, the first term ax^2 is called the *quadratic term*, bx is the *linear term*, and c is the *constant term*.

Quadratic equations may be written in various forms. The following equations are quadratic since each can be written in the form $ax^2 + bx + c = 0$:

Equation	**Standard Form, $a > 0$**	**Description**
$3x^2 - 23x = 8$	$3x^2 - 23x - 8 = 0$ $a = 3, b = -23, c = -8$	Complete quadratic equation
$2x^2 = 9$	$2x^2 - 9 = 0$ $a = 2, b = 0, c = -9$	Incomplete quadratic equation
$4x(x + 2) = 0$	$4x^2 + 8x = 0$ $a = 4, b = 8, c = 0$	Complete quadratic equation

If the quadratic equation contains both the quadratic and linear term, it is called *complete quadratic equation*, while if it contains only the quadratic term or where $b = 0$, it is called *incomplete* or *pure quadratic equation.*

To solve a quadratic equation means to find the values of x which satisfy the equation, i. e., to find the roots or solutions.

Examples:

Write each quadratic equation in standard form and determine a, b, and c.

1. $5x^2 = 7$

Solution:

$5x^2 = 7$
$5x^2 - 7 = 0$ Write in standard form
$a = 5, b = 0, c = -7$ Incomplete quadratic equation

2. $8x(x - 2) = -16x$

Solution:

$8x(x - 2) = -16x$
$8x^2 - 16x = -16x$ Multiply and combine like terms.
$8x^2 = 0$ Write in standard form.
$a = 8,\ b = 0, c = 0$ Incomplete quadratic equation.

3. $\frac{x}{2} - \frac{3}{x} = 8$

Solution:

$\frac{x}{2} - \frac{3}{x} = 8$
$2x\left(\frac{x}{2} - \frac{3}{x}\right) = 8(2x)$ Multiply both sides by the LCD 3x.

$x^2 - 6 = 16x$	Apply the distributive property.
$x^2 - 16x - 6 = 0$	Write in standard form.
$a = 1,\ b = -16, c = -6$	Complete quadratic equation.

References: Intermediate Algebra by Elmor F. Leonor
E-math 9 by Orlando A. Oronce and Marilyn O. Mendoza

Exercises

A. Determine whether each of the following equations is quadratic or not.

1. $x(x-1) = 5(x-3) + x^2$

2. $2x + 3 = x^2 + 3x + 4$

3. $\frac{x+4}{3x} = x + 5$

4. $\frac{2x+1}{1-2x} = \frac{5x-38}{14}$

5. $\frac{2x-2}{4x} = \frac{x+6}{2x+3}$

6. $x^2 = x + 4$

7. $3x - 4 = x + 1$

8. $-6x^2 - 7 = 8x - 1$

9. $x - 2x^2 = 1 + x^5$

10. $-x^2 + 7x - 10 + 4x^4 = -10x^2 - 7x + 8$

B. Rewrite each of the given quadratic equations in standard form and identify the values of a, b, and c.

11. $24x^2 + 6 = 24x$

12. $2x(x + 6) = 22x$

13. $(x + 1)(x + 2) = 30$

14. $4x^2 = 32x - 64$

15. $(y + 2)^2 - 49 = 0$

16. $(x - 1)^2 = 4$

17. $-18x^2 + 3x = -3(3x - 9)$

18. $(x + 2)^2 - 2(x + 2) - 8 = 0$

19. $2(y^2 - 2y) = 5$

20. $5 + \frac{1}{x} - \frac{1}{x^2} = 0$