

SECOND TERM E-LEARNING NOTE

SUBJECT: MATHEMATICS

CLASS: SS 1

SCHEME OF WORK

WEEK	TOPIC
1.	Quadratic Equation by (a) Factorization (b) Completing the square method
2.	General Form of Quadratic Equation leading to Formular Method $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ from $ax^2 + bx + c = 0$
3.	Solutions of Quadratic Equation by Graphical Methods: (a) Reading the Roots from the Graph (b) Determination of the Minimum and Maximum Values (c) Line of Symmetry.
4.	Idea of Sets: (a) Universal Sets, Finite and Infinite Sets, Empty Set, Subset (b) Idea of Notation for Union and Intersection of Sets
5.	Complements of Sets: (a) Disjoints of Null. (b) Venn Diagram and its Use in Solving Problems Involving two and three Sets Relation to Real Life Situations.
6.	Review of the First Half Term's Work and Periodic Test
7.	Trigonometric Ratios (a) Sine, Cosine, Tangent of Acute Angles (b) Use of Tables of Trigonometric Ratios (c) Determination of Length of Chord (d) Using Trigonometric Ratios (e) Graph of Sine and Cosine for Angles $0^\circ \leq x$
8.	(a) Application of Sine, Cosine and Tangent, Simple Problems with Respect to Right Angle Triangles. (b) Angles of Elevation and Depression (c) Bearing and Distances of Places Strictly Application of Trigonometric Ratio.
9.	(a) Introduction of Circle and its Properties (b) Calculation of Length of Arc and Perimeter of a Sector (c) Area of Sectors and Segments. Area of triangles
10.	Logic (a) Simple True and False Statements (b) Negative and Contra Positive of Simple Statement. (c) Antecedents, Consequence and Conditional Statement (implication)

REFERENCE BOOK

- New General Mathematics SSS 1 M.F. Macrae et al
- WABP Essential Mathematics For Senior Secondary Schools 1 A.J.S Oluwasanmi

WEEK ONE

Topic: Quadratic equation by (a) Factorization (b) Completing the square method

Quadratic Equations

A quadratic equation contains an equal sign and an unknown raised to the power 2. For example:

$$2x^2 - 5x - 3 = 0$$

$$n^2 + 50 = 27n$$

$$0 = (4a - 9)(2a + 1)$$

$$49 = k^2$$

Are all quadratic equations.

Discussion: can you see why

$0 = (4a - 9)(2a + 1)$ is a quadratic equation?

One of the main objectives of the chapter is to find ways of solving quadratic equations, i.e. finding the value(s) of the unknown that make the equation true.

Solving Quadratic Equations

One way of solving quadratic equation is to apply the following argument to a quadratic expression that has been factorized.

If the product of two numbers is 0, then one of the numbers (or possibly both of them) must be 0. For example,

$$3 \times 0 = 0, 0 \times 5 = 0 \text{ and } 0 \times 0 = 0$$

In general, if $a \times b = 0$

Then either $a = 0$

Or $b = 0$

Or both a and b are 0

Example 1

Solve the equation $(x - 2)(x + 7) = 0$.

If $(x - 2)(x + 7) = 0$

Then either $x - 2 = 0$ or $x + 7 = 0$

$$x = 2 \text{ or } -7$$

Example 2

Solve the equation $d(d - 4)(d + 6) = 0$.

$(3a + 2)(2a - 7) = 0$, then any one of the four factors of the LHS may be 0,

i.e $d = 0$ or $d - 4 = 0$ or $d + 6 = 0$ twice.

$\Rightarrow d = 0, 4$ or -6 twice.

EVALUATION

Solve the following equations.

1. $3d^2(d - 7) = 0$

2. $(6 - n)(4 + n) = 0$

3. $A(2 - a)^2(1 + a) = 0$

Solving quadratic equations using factorization method

The LHS of the quadratic equation $m^2 - 5m - 14 = 0$ factorises to give $(m + 2)(m - 7) = 0$.

Example 1

Solve the equation $4y^2 + 5y - 21 = 0$

$$4y^2 + 5y - 21 = 0$$

$$\Rightarrow (y + 3)(4y - 7) = 0$$

$$\Rightarrow \text{either } y + 3 = 0 \quad \text{or} \quad 4y - 7 = 0$$

$$y = -3 \quad \text{or} \quad 4y = 7$$

$$y = -3 \quad \text{or} \quad y = 7/4$$

$$y = -3 \quad \text{or} \quad 1\frac{3}{4}$$

check: by substitution:

if $y = -3$

$$4y^2 + 5y - 21 = 36 - 15 - 21 = 0$$

If $y = 1\frac{3}{4}$,

$$\begin{aligned} 4y^2 + 5y - 21 &= 4 \times 7/4 \times 7/4 + 5 \times 7/4 - 21 \\ &= \frac{49}{4} + \frac{35}{4} - 21 = 0 \end{aligned}$$

Example 2

Solve the equation $m^2 = 16$

Rearrange the equation.

$$\text{If } m^2 = 16$$

$$\text{Then } m^2 - 16 = 0$$

Factorise (difference of two squares)

$$(m - 4)(m + 4) = 0$$

$$\text{Either } m - 4 = 0 \quad \text{or} \quad m + 4 = 0$$

$$m = +4 \quad \text{or} \quad m = -4$$

$$m = \pm 4$$

EVALUATION

Solve the following quadratic...