LEARNING AS ONE NATION
Expanded Project

Math 10_22

JHS LEARNING ACTIVITY

Name: _____ **Grade/Score:** _____
Grade and Section: _____ **Date:** _____

Subject *(Check or choose from below.)*

- ☐ Religion/Values Education
- ☐ Natural Sciences
- ☐ Araling Panlipunan
- ☐ Filipino
- ☐ English
- ☐ Math
- ☐ TLE / ICT
- ☐ MAPEH
- ☐ HGP _____

Type of Activity *(Check or choose from below.)*

- ☐ Concept Notes
- ☐ Skills: Exercise / Drill
- ☐ Performance Task
- ☐ Illustration
- ☐ Formal Theme
- ☐ Informal Theme
- ☐ Others: _____

Activity Title: Solving Polynomial Equation

Learning Target: To solve a polynomial equation.

References: *(Author, Title, Pages)*
F. B. Orines, et al., Next Century Mathematics, pp. 114-116
V. J. A. Dublin, CVIF Learning Activities

A value of the variable which satisfies a polynomial equation is called a **root of the polynomial equation.**

Example: Determine if the given value of x is a root of the given equation.

$$x^2 + 9x + 20 = 0; \text{ given } x = -5$$

Solution: Let $P(x) = x^2 + 9x + 20$

$$\begin{aligned} P(-5) &= (-5)^2 + 9(-5) + 20 \\ &= 25 - 45 + 20 \\ &= 0 \end{aligned}$$

Since $P(-5) = 0$, then $(x + 5)$ is a factor of $P(x)$. Hence, $x = -5$ is a root of the equation $x^2 + 9x + 20 = 0$.

Example: Find the roots of the polynomial equation, $x^4 - 8x^2 + 7 = 0$.

Solution: The given equation can be expressed in quadratic form by letting $z = x^2$. The equation can now be expressed as $z^2 - 8z + 7 = 0$.

By factoring, we have, $z^2 - 8z + 7 = (z - 7)(z - 1) = 0$.

Then solve for z,

$$z - 7 = 0 \qquad \text{or} \qquad z - 1 = 0$$
$$z = 7 \qquad\qquad\qquad z = 1$$

If $z = 7$ and $z = x^2$,

$$x^2 = 7$$
$$\sqrt{x^2} = \sqrt{7}$$
$$x = \pm\sqrt{7}$$

If $z = 1$ and $z = x^2$,

$$x^2 = 1$$
$$\sqrt{x^2} = \sqrt{1}$$
$$x = \pm 1$$

Therefore the four roots of the polynomial equation, $x^4 - 8x^2 + 7 = 0$ are given by the values of $\sqrt{7}, -\sqrt{7}, 1$ and -1.

Exercise: Determine the roots of the following polynomial equations.

a) $11x - 22 = 0$
b) $x^2 + 4x - 32 = 0$
c) $2x^3 - 5x^2 - 14x + 8 = 0$
d) $x^4 - 10x^2 + 9 = 0$