# LEARNING ACTIVITY

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

**Subject** *(Check or choose from below.)*_____

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

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

- ☐ Concept Notes
- ☐ Skills: Exercise / Drill
- ☐ Laboratory Report
- ☐ Illustration
- ☐ Formal Theme
- ☐ Informal Theme
- ☐ Others: _____

**Activity Title:** The Rational Roots Theorem

**Learning Target:** To predict and state the possible rational roots of a polynomial.

**References:** *(Author, Title, Pages)*

1) http://www.trans4mind.com/personal_development/mathematics/polynomials/rationalRootsTheorem.htm
2) V.G. Baja and M.V. Bernido, CVIF Learning Activities

The rational roots theorem is used to check whether a polynomial has rational roots or zeros.

**<u>The Rational Roots Theorem</u>**

The polynomial equation, $a_n x^n + a_{n-1}x^{(n-1)} + \ldots + a_2x^2 + a_1x + a_0 = 0$, has rational roots $({}^{p}/_{q})$ if $p$ and $q$ are integers, and $p$ is a factor of $(\pm a_0)$ while $q$ is a factor of $(\pm a_n)$.

The theorem tells us that the possible rational roots of a polynomial written in the standard form can be predicted using the **ratio of all the factors of the last term** and **all the factors of the coefficient of the first term**. The factors can be positive or negative.

**Example:** Consider $x^3 + x^2 - 4x - 4 = 0$.

**Solution:**

The last term is $-4$.

The factors of $-4$ are $\pm1, \pm2, \pm4$. (These are the $p$ integers.)

The coefficient of the first term of the given polynomial is 1. (This is the $q$ integer.)

The ratio ${}^{p}/_{q}$ gives us the result: $\pm1, \pm2, \pm4$. Note that because $q$ is 1 we have, for the possible rational roots, $\frac{p}{q} = \frac{1}{1} = 1, \frac{2}{1} = 2$, and so on…

**Exercises:**

1. How many rational roots are there for the equation in the example above?
2. What is the degree of the polynomial in the example?
3. Check which of the possible rational roots are really roots of the polynomial by substituting in the polynomial. Then see whether the polynomial will reduce to zero.