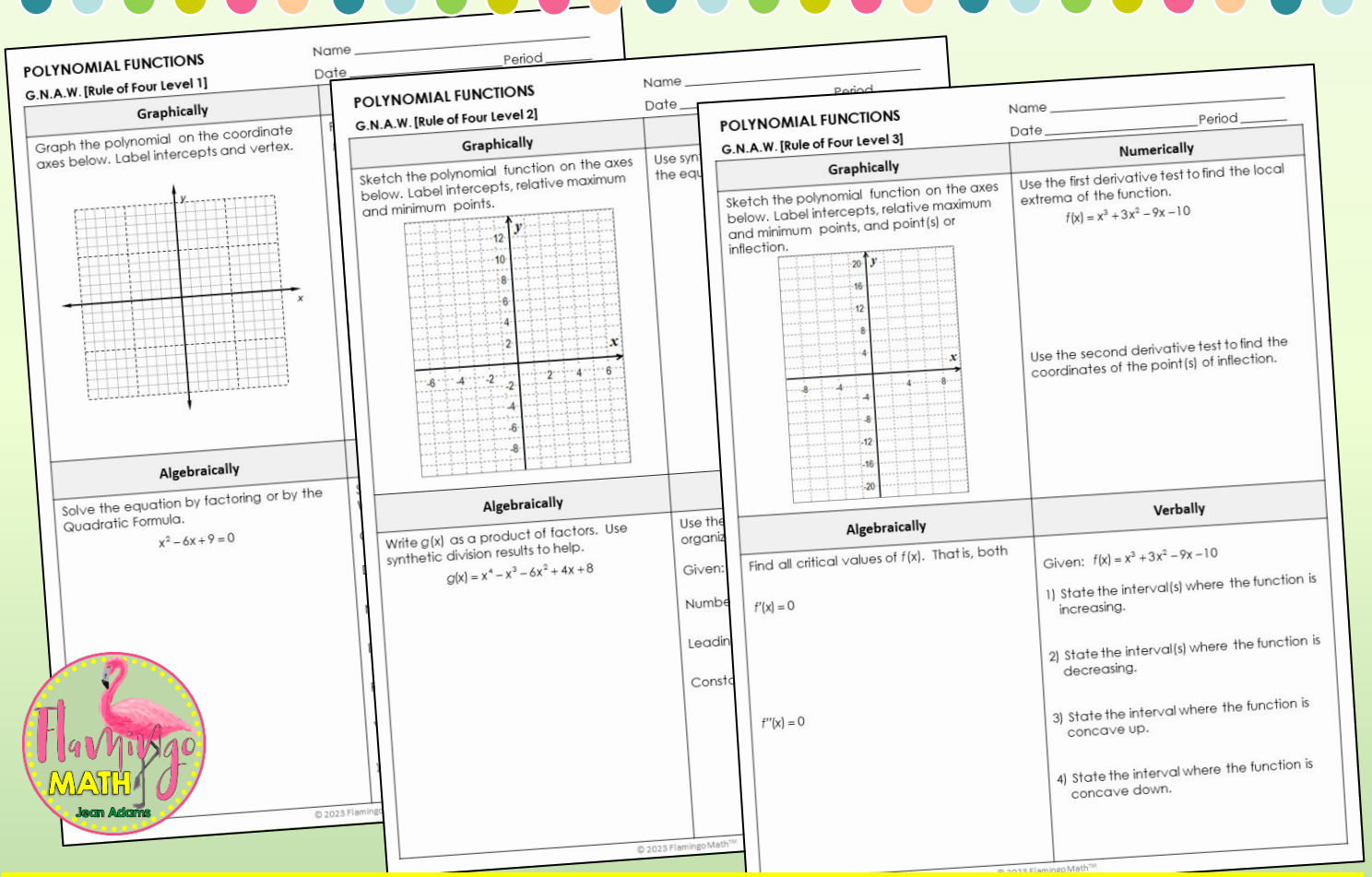
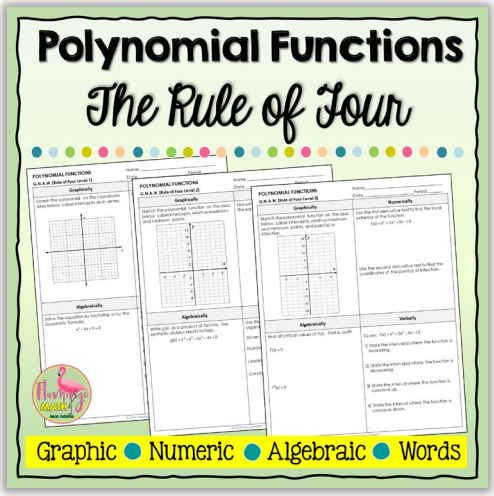
Polynomial Functions

The Rule of Four



Graphic • Numeric • Algebraic • Words

Polynomial Functions GNAW Activity



KEY CONCEPTS/TOPICS:

Three levels of GNAW – The Rule of Four Approach to analyze polynomial functions in multiple representations. *Graphically, numerically, algebraically, and verbally*.

Product Overview

G.N.A.W. on Polynomial Functions

The Rule of Four approach to analyzing functions is sometimes known by the acronym GNAW. ***Graphically, Numerically, Algebraically, and Verbally*** (Words).

There are three levels of this Polynomial GNAW Activity for you to use.

LEVEL 1:
This is appropriate for an **Algebra 1 (first course)** where students are beginning to make connections to polynomials and the language.

LEVEL 2:
The rigor for this GNAW activity is geared toward **Algebra 2 Honors or Pre-Calculus** students.

LEVEL 3:
This last level will meet the needs of your **Calculus** students as they practice applications of the derivative for polynomials.

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GNAW on Polynomial Functions

Objective: In this FREE G.N.A.W. Activity you will have three levels of question sets for Algebra 1-2, Precalculus, and Calculus student to explore problems that can be represented *graphically, numerically, analytically, and verbally*. They will make connections among these representations. There are four different versions.

HOW TO USE THIS ACTIVITY:

- ❑ Students can work on the activity in groups of 4 where each person is responsible for one block and the group turns in one paper.
- ❑ Students can work on their own question within the group and discuss concepts to complete their unique prompt. (Teacher generates unique questions. Not in the scope of this free product.)
- ❑ Students work on the assignment alone.

What is GNAW and the Rule of Four?

The "Rule of Four" or G.N.A.W. Approach is a method of thinking about mathematics in order to make connections through multiple representations of our mathematical thinking. Students should be able to represent mathematics in graphic, numeric, algebraic, and verbal formats. G.N.A.W.

Why should you use the GNAW approach?

By implementing this process into your classes, students will gain a deeper understanding of the mathematics. The Rule of Four helps students connect and validate concepts and techniques.

How can you use the Rule of Four?

Teachers can model this approach during instructional time to set the "tone" for expected thinking and reasoning. Then, give your students many chances to practice the techniques. It is also important that students learn to make connections between the different representations.

Please visit my store for more engaging task card activities.

POLYNOMIAL FUNCTIONS

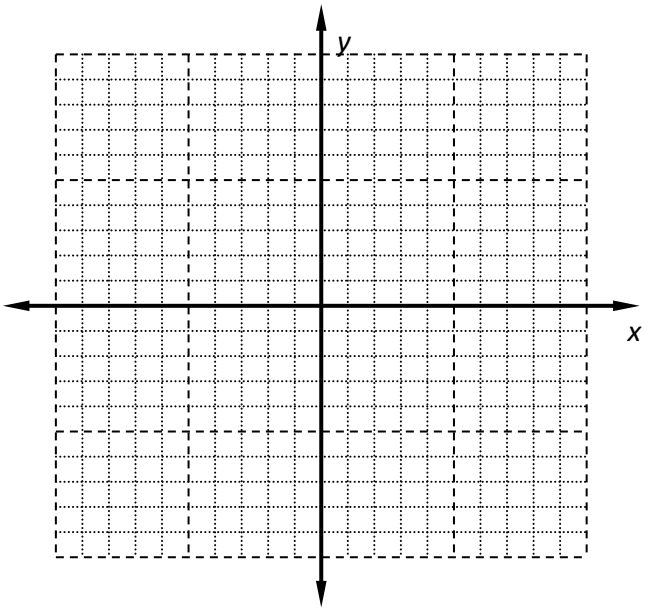
G.N.A.W. [Rule of Four Level 1]

Name _____

Date _____ Period _____

Graphically

Graph the polynomial on the coordinate axes below. Label intercepts and vertex.



Numerically

Find a table of values for the function

$f(x) = x^2 - 6x + 9$

x	$f(x) = x^2 - 6x + 9$	***y***

Algebraically

Solve the equation by factoring or by the Quadratic Formula.

$$x^2 - 6x + 9 = 0$$

Verbally

Sometimes zeros will occur more than once. We call these repeated zeros.

Given: $f(x) = x^2 - 6x + 9$

Degree: _____

Number of Zeros: _____

Domain: _____

Range: _____

Vertex: _____ [Max] or [Min]

y-intercept: _____

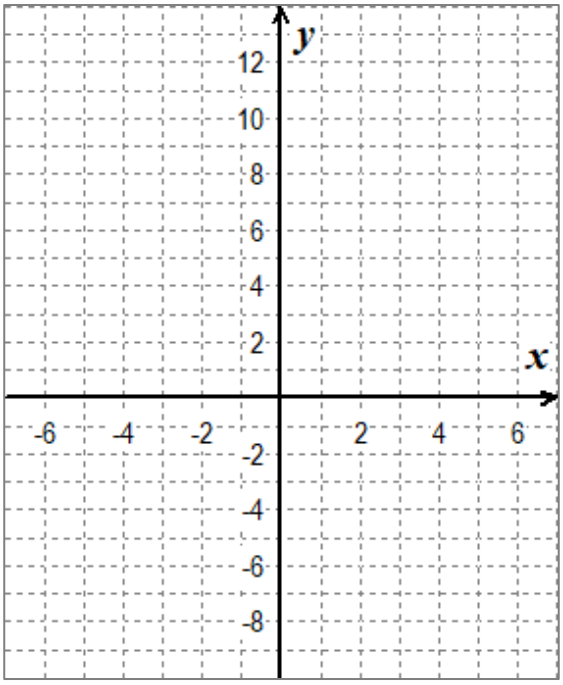
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POLYNOMIAL FUNCTIONS

G.N.A.W. [Rule of Four Level 2]

Name _____

Date _____ Period _____

Graphically	**Numerically**
Sketch the polynomial function on the axes below. Label intercepts, relative maximum and minimum points.  	Use synthetic division to find rational zeros of the equation: $x^4 - x^3 - 6x^2 + 4x + 8 = 0$
Algebraically	**Verbally**
Write $g(x)$ as a product of factors. Use synthetic division results to help. $g(x) = x^4 - x^3 - 6x^2 + 4x + 8$	Use the Rational Root Theorem to make an organized list of potential rational zeros. Given: $g(x) = x^4 - x^3 - 6x^2 + 4x + 8$ Number of Zeros: _____ Leading Coefficient: _____ Constant term: _____ ***POSSIBLE RATIONAL ZEROS:***

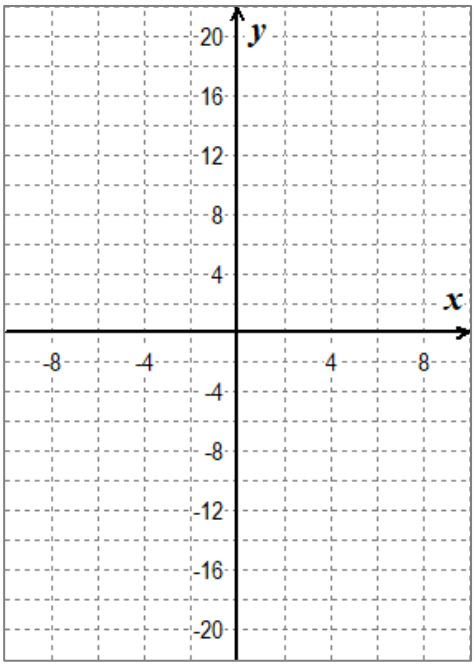
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POLYNOMIAL FUNCTIONS

G.N.A.W. [Rule of Four Level 3]

Name _____

Date _____ Period _____

Graphically	**Numerically**
Sketch the polynomial function on the axes below. Label intercepts, relative maximum and minimum points, and point(s) or inflection.  	Use the first derivative test to find the local extrema of the function. $f(x) = x^3 + 3x^2 - 9x - 10$ Use the second derivative test to find the coordinates of the point(s) of inflection.
Algebraically	**Verbally**
Find all critical values of $f(x)$. That is, both $f'(x) = 0$ $f''(x) = 0$	Given: $f(x) = x^3 + 3x^2 - 9x - 10$ 1) State the interval(s) where the function is increasing. 2) State the interval(s) where the function is decreasing. 3) State the interval where the function is concave up. 4) State the interval where the function is concave down.

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My goal is to help you bring balance into your teacher life by providing relevant content, engaging activities, and comprehensive assessments for your high-stakes math course.

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