

keep scrolling to get a sneak peak!

This set of guided notes will walk Algebra 2 students through modeling polynomial functions. All you need to do is print & make copies for your students!

# MODELING POLYNOMIAL FUNCTIONS

## Algebra 2 Guided Notes

**MODELING POLYNOMIAL FUNCTIONS**

Property of Finite Differences: If a polynomial function  $y = f(x)$  has degree  $n$ , then the  $n$ th differences of the function values for equally-spaced  $x$ -values are constant.

Directions: Use finite differences to determine the degree of the data. Then use your graphing calculator to find the polynomial function.

x	1	2	3	4
y	1	4	10	20

**MODELING POLYNOMIAL FUNCTIONS**

Using Cubic Regression

Steps for Performing Cubic Regression with a Graphing Calculator:

- Step 1: STAT → EDIT → Enter
- Step 2: Enter your data into the table
- Step 3: STAT → CALC → 6: CubicReg
- Step 4: Write your equation in the form:  $y = ax^3 + bx^2 + cx + d$

Directions: The table below shows the total US biomass energy consumption in British thermal units, or Btus) in the year  $t$ , where  $t = 1$  corresponds to the year 2000. Write a cubic regression model for the data.

x	1	2	3	4	5	6	7	8
y	2622	2701	2807	3010	3117	3267	3493	3866

a) Write the equation of the cubic regression model.

b) Use the equation to predict the total US biomass energy consumption in the year 2010.

**Answer key included**



# why do you need this?



It's simple and done-for-you! Just print and make copies!



Students can work on essential Algebra 2 skills.

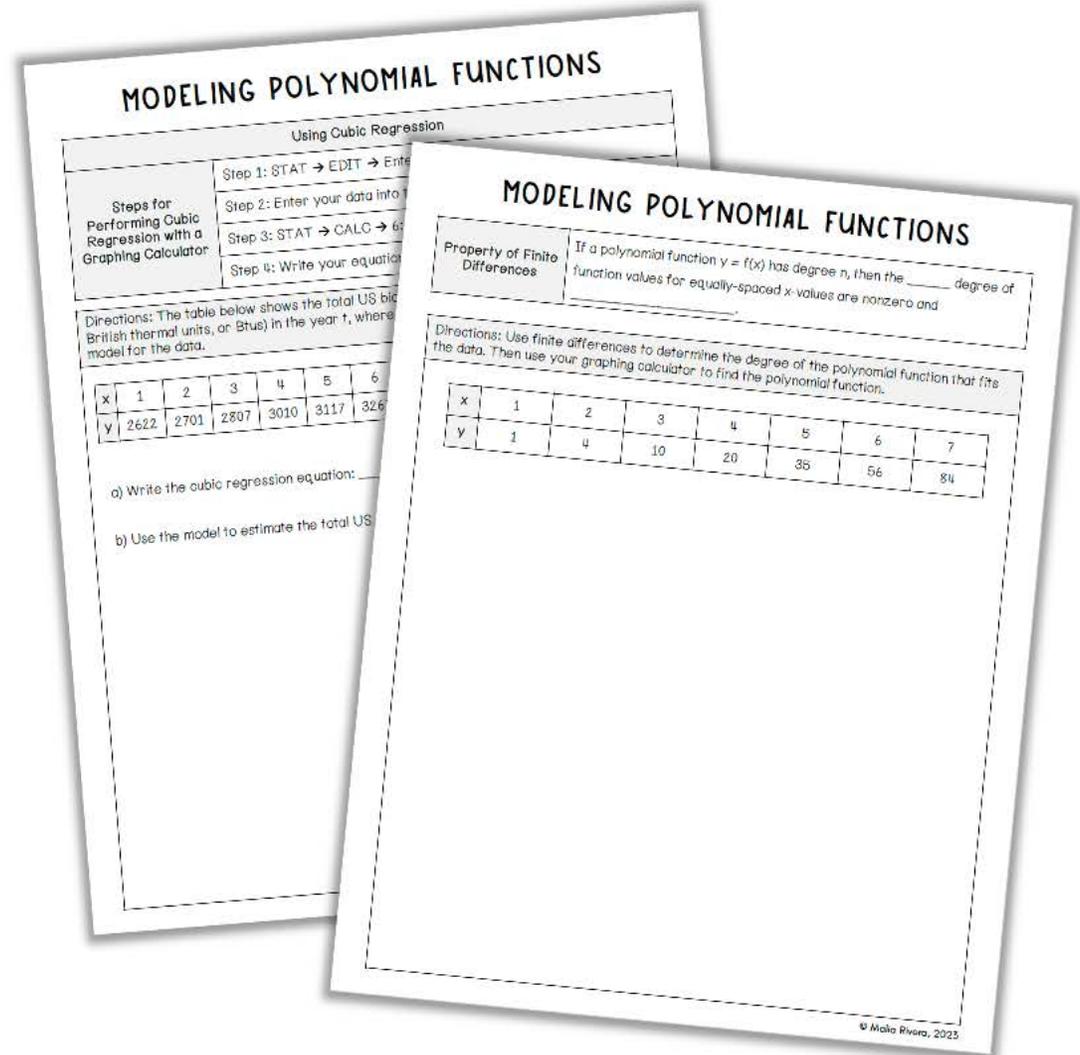


Aligns to CCSS, TEKS, and VA SOLs!

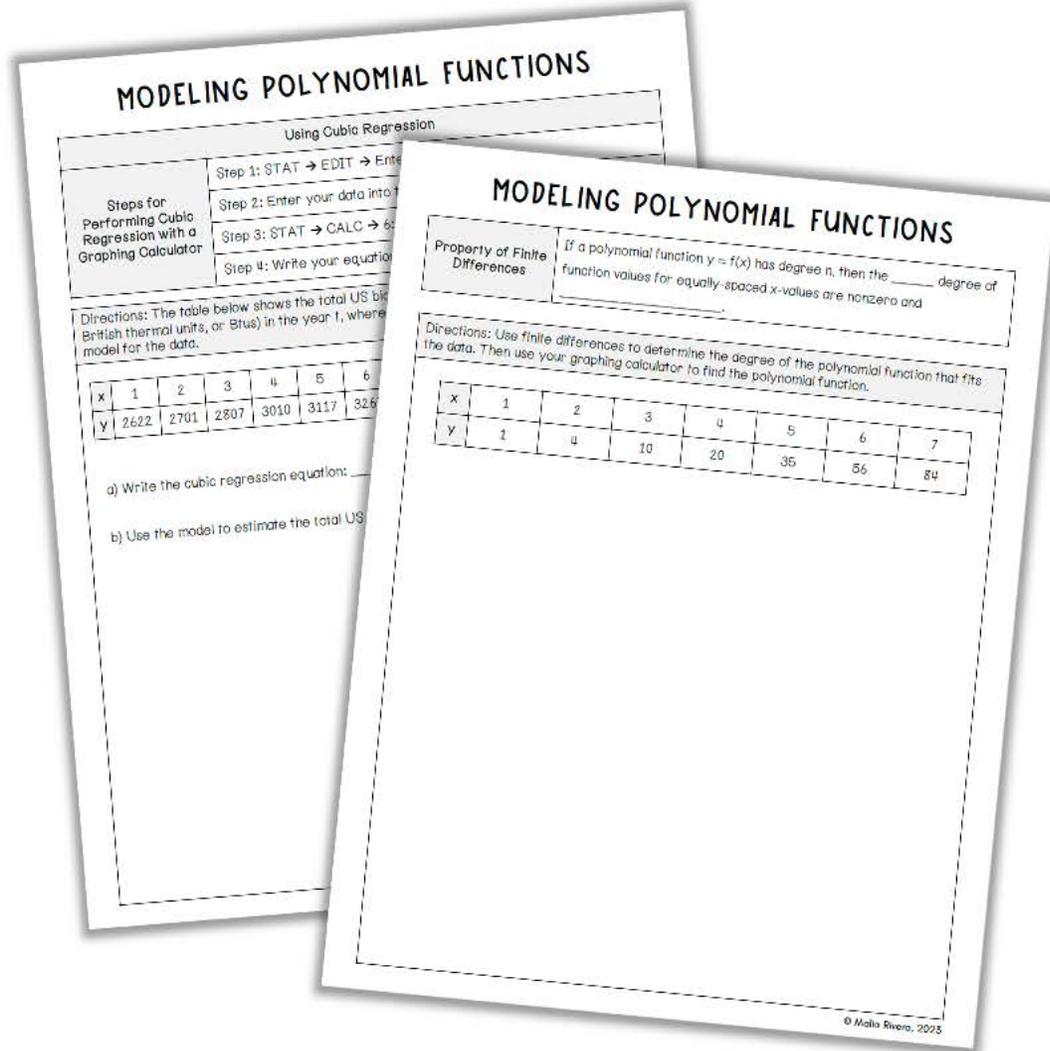


Suggested and detailed answer keys are included for you!

# Algebra 2 Guided Notes Modeling Polynomial Functions



# Algebra 2 Guided Notes: Modeling Polynomial Functions *includes:*



- ✓ 2 pages of guided notes
- ✓ Property of Finite Differences to Model Polynomial Functions
- ✓ Cubic Regression Using a Graphing Calculator

# Algebra 2 Guided Notes: Modeling Polynomial Functions *includes:*



Detailed answer keys

**MODELING POLYNOMIAL FUNCTIONS**

Using Cubic Regression

Steps for Performing Cubic Regression with a Graphing Calculator	Step 1: STAT → EDIT → Enter
	Step 2: Enter your data into the table
	Step 3: STAT → CALC → 6: Cubic
	Step 4: Write your equation in the window

Directions: The table below shows the total US biomass (in British thermal units, or Btus) in the year  $t$ , where  $t = 1$  corresponds to the year 2000. Use the data to write a cubic regression model for the data.

x	1	2	3	4	5	6	7
y	2622	2701	2807	3010	3117	3267	3420

a) Write the cubic regression equation:  $y \approx -2x^3 + 12x^2 + 18x + 2622$

b) Use the model to estimate the total US biomass in the year 2014.  $2014 \rightarrow x = 14$   $f(14) = -2.55(14)^3 + 12(14)^2 + 18(14) + 2622$   
 $f(14) \approx 4200$

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**MODELING POLYNOMIAL FUNCTIONS**

Property of Finite Differences: If a polynomial function  $y = f(x)$  has degree  $n$ , then the  $n^{\text{th}}$  degree of function values for equally-spaced  $x$ -values are nonzero and constant.

Directions: Use finite differences to determine the degree of the polynomial function that fits the data. Then use your graphing calculator to find the polynomial function.

x	1	2	3	4	5	6	7
y	1	4	10	20	35	56	84

First difference:  $4-1=3$ ,  $10-4=6$ ,  $20-10=10$ ,  $35-20=15$ ,  $56-35=21$ ,  $84-56=28$

Second difference:  $6-3=3$ ,  $10-6=4$ ,  $15-10=5$ ,  $21-15=6$ ,  $28-21=7$

Third difference:  $4-3=1$ ,  $5-4=1$ ,  $6-5=1$ ,  $7-6=1$

Since the third difference yields nonzero constants, then the data can be modeled using a cubic function.

## Check out what *other teachers* are saying:



"This was great practice for my Algebra II students after I presented the lesson. Next Year, I may use them as notes."

- Vonda B.



"Great resource for what we were currently covering in precalc!"

- Megan M.



"I used this in conjunction with another document, but this would have worked fine on its own. The students found it much easier to understand the concept using these guided notes."

- Cheryl W.

You may also enjoy ...

# SIMPLIFYING RADICAL EXPRESSIONS

Algebra 2 Guided Notes

**SIMPLIFYING RADICAL EXPRESSIONS**

The index will tell you how many factors are needed. Ex: 6<sup>th</sup> root = 6 factors

- No radicals have perfect nth powers as factors other than the index.
- No radicals contain fractions.
- No radicals are in the denominator of fractions.

radical in simplest form.

2.  $\sqrt[3]{128}$       3.  $\sqrt[3]{320}$   
 $\sqrt[3]{64 \cdot 2}$        $\sqrt[3]{32 \cdot 5}$   
 $\sqrt[3]{64} \cdot \sqrt[3]{2}$        $\sqrt[3]{32} \cdot \sqrt[3]{5}$   
 $4 \cdot \sqrt[3]{2}$        $2 \sqrt[3]{5}$

Answer key included

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# RATIONAL EXPONENTS

Algebra 2 Guided Notes

**RATIONAL EXPONENTS & RADICAL EXPRESSIONS**

Converting between radical expressions and rational exponents

Radical Form	Rational Exponent Form
$\sqrt{16}$	$16^{\frac{1}{2}}$
$(\sqrt{4})^3$	
$\sqrt[3]{64}$	$25^{\frac{1}{2}}$
$(\sqrt[3]{4})^3$	$\frac{2}{83}$

Properties of Rational Exponents

Property	Definition
Product of Powers	
Power of a Power	
Power of a Product	
Negative Exponent	
Zero Exponent	
Quotient of Powers	
Power of a Quotient	

Directions: Use the properties of rational exponents to simplify each expression.

- $(6^{1/2} \cdot 4^{1/3})^2$
- $(4^5)^{-3/5}$

Answer key included

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# RADICAL OPERATIONS

Algebra 2 Guided Notes

**RADICAL OPERATIONS**

Subtracting radicals: You can only add and subtract like radicals. This is when the radical has the same index and radicand.

Simplify each expression completely.

$\sqrt{8} + 3\sqrt{2}$   
 $= 2\sqrt{2} + 3\sqrt{2}$   
 $= 5\sqrt{2}$

$\sqrt[3]{60} - \sqrt[3]{15}$   
 $= \sqrt[3]{4 \cdot 3 \cdot 5} - \sqrt[3]{3 \cdot 5}$   
 $= \sqrt[3]{4} \cdot \sqrt[3]{3 \cdot 5} - \sqrt[3]{3 \cdot 5}$   
 $= \sqrt[3]{4} \cdot \sqrt[3]{15} - \sqrt[3]{15}$

Properties of Radical Expressions

Property	Definition
Product Property	$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$
Quotient Property	$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$ , $b \neq 0$

Directions: Write the expression in simplest radical form.

- $\frac{4\sqrt{5}}{\sqrt{2}}$
- $\frac{3\sqrt{12}}{\sqrt{3}}$

Answer key included

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Check out the *year-long bundle!*

# ALGEBRA 2 GUIDED NOTES Year-Long Bundle

**TRANSFORMATIONS OF FUNCTIONS**

Type of Transformation	f(x) Notation
Reflection	$-f(x)$
Vertical Dilation	$af(x)$ $0 <  a  < 1$ $ a  > 1$
Horizontal Dilation	$f(bx)$ $0 <  b  < 1$ $ b  > 1$
Vertical Translation	$f(x) + k$

**LINEAR REGRESSION**

**SCATTER PLOT**  
Definition: A graph of \_\_\_\_\_ points that are \_\_\_\_\_

**SCATTER PLOT RELATIONSHIPS**

**LINE OF BEST FIT**  
Definition: A line that \_\_\_\_\_ as close as possible to all \_\_\_\_\_

**LINEAR REGRESSION**  
Definition: A linear model that is used to \_\_\_\_\_ between two variables.

**LINEAR INTERSECTIONS**  
Estimating Slope: \_\_\_\_\_  
Slope: \_\_\_\_\_  
Y-intercept: \_\_\_\_\_

**GRAPHING QUADRATIC TRANSFORMS**

Reflection over the x-axis: \_\_\_\_\_

**COMPOSITION OF FUNCTIONS**

Definition: To make the \_\_\_\_\_ another function.

Things to remember:

- Always start with the \_\_\_\_\_ the function on the \_\_\_\_\_
- Tag does not always equal \_\_\_\_\_

$(f \circ g)(x) = \dots$  is also \_\_\_\_\_

$g(x) = 2x + 3$  and  $f(x) = x^2$ , find  $(f \circ g)(x)$

$g(x) = 2x + 3$  and  $f(x) = x^2$ , find  $(f \circ g)(x)$

**COMPOUND INEQUALITIES**

A compound inequality has two separate inequalities joined by \_\_\_\_\_

The graph of the \_\_\_\_\_ is the \_\_\_\_\_

$x > 3$

**POLYNOMIAL FUNCTION CHARACTERISTICS**

Multiplicities	Touch	Inflection

**RELATIVE EXTREMA (Minimum or Maximum)**  
Points on the graph that help to describe the \_\_\_\_\_ of a function. They are also called \_\_\_\_\_ or \_\_\_\_\_

**INCREASING INTERVALS**  
The interval between \_\_\_\_\_ y-values \_\_\_\_\_ as the x-value \_\_\_\_\_

**DECREASING INTERVALS**  
The interval between \_\_\_\_\_ y-values \_\_\_\_\_ as the x-value \_\_\_\_\_

**POSITIVE INTERVALS**  
Intervals where \_\_\_\_\_

**PROPERTIES OF RATIONAL EXPONENTS & RADICALS**

Property	Properties of Rational Exponents
Product of Powers	Definition
Power of a Power	
Power of a Product	
Negative Exponent	
Zero Exponent	
Quotient of Powers	
Power of a Quotient	

Directions: Use the properties of rational exponents to simplify \_\_\_\_\_

**Answer key included**

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hey there!

My name is Malia and I'm passionate about making learning and practicing math fun. I love creating engaging math resources for my students and I hope your students enjoy these Modeling Polynomial Functions guided notes for Algebra 2 that can be used all year long!

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