

keep scrolling to get a
sneak peak!

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

FACTORING POLYNOMIALS

Algebra 2 Guided Notes

FACTORING POLYNOMIALS

-20

$$3x^4 + 9x^3 - 2x^2 - 6x$$

omials

81

$$3z^8 + 15z^5 + 18z^2$$



polynomial $f(x)$ has a factor _____ if an

FACTORING POLYNOMIALS

Directions: Factor each polynomial completely by taking out the

$$3y^5 - 48y^3$$

5m

Special Factoring Patterns

Sum of Two Cubes

$$a^3 + b^3 =$$

Difference of Two Cubes

$$a^3 - b^3 =$$

CRummy CRummy SOPS Method for Sum & Difference

CR

CR

S

Answer key included

Directions:

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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 Factoring Polynomials

FACTORIZING POLYNOMIALS

Directions: Factor each polynomial completely by taking out the greatest common factor.

$3y^5 - 48y^3$	$5m^4 + 30m^3 + 45m^2$
----------------	------------------------

Special Factoring Patterns

Sum of Two Cubes	$a^3 + b^3 =$
Difference of Two Cubes	$a^3 - b^3 =$

CRummy CRummy SOPS Method for Sum & Difference of Two Cubes

CR	CR	S	O
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Directions: Factor each polynomial completely.

$64x^3 + 1$	
$27x^3 - 8$	

FACTORIZING POLYNOMIALS

Factoring by Grouping

$y^3 + 5y^2 - 4y - 20$	$3x^4 + 9x^3 - 2x^2 - 6x$
------------------------	---------------------------

Factoring Quartic Polynomials

$16x^4 - 81$	$3z^8 + 15z^5 + 18z^2$
--------------	------------------------

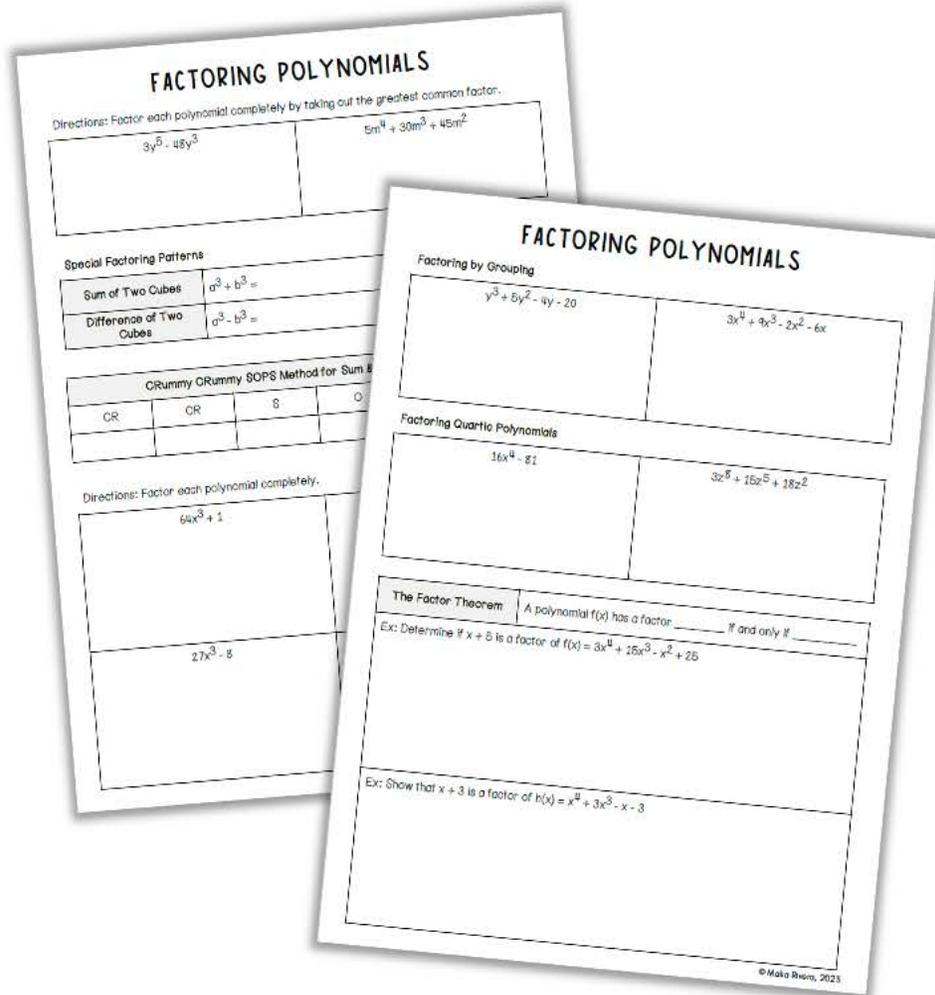
The Factor Theorem A polynomial $f(x)$ has a factor _____ if and only if _____

Ex: Determine if $x + 5$ is a factor of $f(x) = 3x^4 + 15x^3 - x^2 + 25$

Ex: Show that $x + 3$ is a factor of $h(x) = x^4 + 3x^3 - x - 3$

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Algebra 2 Guided Notes: Factoring Polynomials *includes:*



- ✓ 2 pages of guided notes
- ✓ Factoring Out the GCF
- ✓ Sum and Difference of Two Cubes
- ✓ Factoring by Grouping
- ✓ Factoring Quartic Polynomials
- ✓ Factoring Polynomials of Higher Degree
- ✓ The Factor Theorem

Algebra 2 Guided Notes: Factoring Polynomials *includes:*

✓ Detailed answer keys

CCSS: HSA-SSE.A.1a, HSA-SSE.B.3, HSA-SSE.B.3a

TEKS: A2.7.D, A2.7.E

VA SOL: EO.All.1c

FACTORING POLYNOMIALS

Directions: Factor each polynomial completely by taking out the greatest common factor.

$3y^5 - 48y^3$
 $3y^3(y^2 - 16)$ ← Diff of perfect squares!
 $3y^3(y-4)(y+4)$

Special Factoring Patterns

Sum of Two Cubes	$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$
Difference of Two Cubes	$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

CRummy GRummy SOPS Method for

CR	CR	S
cube root of a^3	cube root of b^3	square of a

Directions: Factor each polynomial completely.

$a^3 = 64x^3$ $b^3 = 1$ $64x^3 + 1$
 cr cr S O P S
 $(4x+1)(16x^2 - 4x + 1)$

$a^3 = 27x^3$ $b^3 = 8$ $27x^3 - 8$
 cr cr S O P S
 $(3x-2)(9x^2 + 6x + 4)$

FACTORING POLYNOMIALS

Factoring by Grouping

$(y^3 + 5y^2)(-4y - 20)$
 $y^2(y+5) - 4(y+5)$
 $(y+5)(y^2-4)$
 $(y+5)(y-2)(y+2)$

$3x^4 + 9x^3 - 2x^2 - 6x$
 $x(3x^3 + 9x^2 - 2x - 6)$
 $x(3x^2(x+3) - 2(x+3))$
 $x(x+3)(3x^2-2)$

Factoring Quartic Polynomials

$16x^4 - 81$
 $(4x^2-9)(4x^2+9)$
 $(2x-3)(2x+3)(4x^2+9)$

$3z^8 + 15z^5 + 18z^2$
 $3z^2(z^6 + 5z^3 + 6)$
 $3z^2(z^3+3)(z^3+2)$

The Factor Theorem A polynomial $f(x)$ has a factor $x-k$ if and only if $f(k) = 0$

Ex: Determine if $x+5$ is a factor of $f(x) = 3x^4 + 15x^3 - x^2 + 25$

$-5 \mid 3 \quad 15 \quad -1 \quad 0 \quad 25$
 $\quad \downarrow \quad + \quad - \quad + \quad -$
 $\quad \quad -15 \quad +0 \quad +5 \quad -25$
 $\quad \quad \quad 3 \quad 0 \quad -1 \quad 5 \quad 0$

yes, $x+5$ is a factor of $f(x) = 3x^4 + 15x^3 - x^2 + 25$

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 ...

SOLVING POLYNOMIAL EQUATIONS

Algebra 2 Guided Notes

SOLVING POLYNOMIAL EQUATIONS

Polynomial equation by factoring.
 $0 = 2x^3 - 12x^2 + 18x$

$12n^2 + 48n = -n^3 - 64$

SOLVING POLYNOMIAL EQUATIONS

The Rational Root Theorem

If a polynomial function has a rational solution of $f(x) = 0$ has the form $\frac{p}{q}$, then p is a factor of the constant term and q is a factor of the leading coefficient.

The rational root theorem helps to find all of the actual solutions, you must check the values from the list of possible rational roots.

Ex: Find the real solutions of $x^3 - 8x^2 + 11x + 20 = 0$.

Answer key included



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THE FUNDAMENTAL THEOREM OF ALGEBRA

Algebra 2 Guided Notes

THE FUNDAMENTAL THEOREM OF ALGEBRA

If $f(x)$ is a polynomial of degree n where $n > 0$, then $f(x) = 0$ has at least one solution in the set of complex numbers.

If $f(x)$ is a polynomial of degree n where $n > 0$, then $f(x) = 0$ has exactly n solutions in the complex number system, counting multiplicities.

Descartes's Rule of Signs

The number of positive real zeros of a polynomial function is at most the number of sign changes in the polynomial or less than this by an even number.

The number of negative real zeros of a polynomial function is at most the number of sign changes in the polynomial or less than this by an even number.

Directions: Determine the possible numbers of positive real zeros, negative real zeros, and imaginary zeros.

$f(x) = x^6 - 2x^5 + 3x^4 - 10x^3 - 6x^2 - 8x - 8$

$g(x) = x^3 + 3x^2 + 16x + 48$

$f(x) = x^5 + x^3 - 1$

Answer key included



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CHARACTERISTICS OF POLYNOMIAL FUNCTIONS

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POLYNOMIAL FUNCTION CHARACTERISTICS

Zeros: k is a zero of the polynomial function $f(x)$ if and only if $f(k) = 0$.

Factors: $(x - k)$ is a factor of the polynomial function $f(x)$ if and only if k is a zero of $f(x)$.

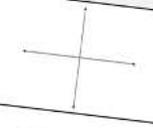
Solutions: k is a solution (or root) of the polynomial equation $f(x) = 0$ if and only if k is a zero of the polynomial function $f(x)$.

X-Intercepts: If k is a real number, then k is an x-intercept of the polynomial function $f(x)$ if and only if k is a zero of $f(x)$.

Algebraic Definition of Even Functions: A function $f(x)$ is an even function if $f(x) = f(-x)$ for all x in the domain of f .

Algebraic Definition of Odd Functions: A function $f(x)$ is an odd function if $f(x) = -f(-x)$ for all x in the domain of f .

Multiplicities

Cross		Touch	
			

Relative Extrema (Minimum or Maximum): Points on the graph that help to determine the shape of the function. They are also called local extrema.

Increasing Intervals: The interval between two x-values where the function is increasing.

Decreasing Intervals: The interval between two x-values where the function is decreasing.

Positivity: The interval between two x-values where the function is positive.

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 _____

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

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

COMPOUND INEQUALITIES

Compound inequality has two separate inequalities joined by _____

Graph of a compound inequality with "and" is the _____ of the graphs of the inequalities.

$x > -8$

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: $1. (y^{1/2} \cdot y^{1/3})^2$

ANSWER KEY INCLUDED



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 Factoring Polynomials guided notes for Algebra 2 that can be used all year long!

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