



Algebra 2

Unit 1: Quadratics Revisited

References

Textbook Connection:
HMH Georgia Analytic
Geometry Text: Unit 5

Every student will
receive a text copy
and access to the
online textbook
resource:

<http://my.hrw.com/>

Helpful Links:

- Lesson on Complex Numbers:
<http://www.purplemath.com/modules/complex.htm>

- Lesson on Computing Polynomials:
<http://www.purplemath.com/modules/polymult.htm>

- Lesson on Rational Exponents:
<http://www.themathpage.com/Alg/rational-exponents.htm>

- Lesson on Operations on Complex Numbers:
<https://www.khanacademy.org/math/algebra2/introduction-to-complex-numbers-algebra-2/the-complex-numbers-algebra-2/v/complex-number-intro>

Dear Parents,

In this unit students will:

- Define rational exponents
- Rewrite expression involving radicals and rational exponents
- Define the imaginary number i
- Define complex numbers
- Operate with complex numbers
- Understand that the basic properties of numbers continue to hold with expressions involving exponents.

Concepts Students will Use & Understand

- Extend the properties of exponents to rational exponents.
- Rewrite expressions involving radicals & rational exponents.
- Use properties of rational & irrational numbers to find the sum and product.
- Perform arithmetic operations with complex numbers.
- Find the conjugate of a complex number to find quotients of complex numbers

Vocabulary

- **Complex number:** A complex number is the sum of a real number and an imaginary number (a number whose square is a real number less than zero), i.e. an expression of the form $a + bi$, where a and b are real numbers and i is the *imaginary unit*, satisfying $i^2 = -1$.
- **Exponential functions:** A function of the form $y = a \cdot b^x$ where $a > 0$ and either $0 < b < 1$ or $b > 1$.
- **n th roots:** The number that must be multiplied by itself n times to equal a given value. The n th root can be notated with radicals and indices or with rational exponents, i.e. $x^{1/3}$ means the cube root of x .
- **Polynomial function** A **polynomial function** is defined as a function, $f(x) = a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \dots + a_{n-2}x^2 + a_{n-3}x^1 + a_n$, where the coefficients are real numbers.
- **Rational exponents:** For $a > 0$, and integers m and n , with $n > 0$,
 $a^{\frac{m}{n}} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$; $a^{m/n} = (a^{1/n})^m = (a^m)^{1/n}$.
- **Rational expression:** A quotient of two polynomials with a non-zero denominator.
- **Rational number:** A number expressible in the form a/b or $-a/b$ for some fraction a/b . The rational numbers include the integers.
- For further help:
<http://intermath.coe.uga.edu/dictionary/homepg.asp>
<http://www.amathsdictionaryforkids.com/>

Sample Practice Problems

Example 1

Combine like terms: $(2+3i)+(7+i)$

Answer: $9+4i$

Example 2

Find the conjugate & calculate the quotient: $\frac{(2+5i)}{(5+2i)}$

Answer: $\frac{20}{29} + \frac{21}{29}i$

Example 3

Find the y-coordinate for the following: $y = 2(x-4)^2 - 5$ for $x = 2$.

Answer: $y = 3$

Example 4

Give the value of the discriminant of the equation $4x^2 - 8x = -4$

- A) 0
- B) 1
- C) -128
- D) 128

Example 5

Graph. Identify zeros, intervals of increase, intervals of decrease, vertex and axis of symmetry.

$$f(x) = x^2 + 6x + 5$$

Vertex: _____ $(-3, -4)$

Axis of symmetry: _____ $x = -3$

Zeros: _____ $-1, 5$

Interval of increase: _____ $x > -3$

Interval of decrease: _____ $x < -3$

