

THS Curriculum Unit Mathematics

Course: Algebra II B

Grade: 12th

Unit Names (s): Chapter 7: Exponential and Logarithmic Functions

Essential Questions:

- How will you graph and use exponential growth functions? [7.1]
- What does the graph of an exponential growth function look like? [7.1]
- How will you graph and use exponential decay functions? [7.2]
- What does the graph of an exponential decay function look like? [7.2]
- How will you use functions involving the natural base e ? [7.3]
- When is the natural base e useful? [7.3]
- How will you evaluate logarithms and graph logarithmic functions? [7.4]
- What is the relationship between exponential and logarithmic functions? [7.4]
- How do you rewrite logarithmic functions? [7.5]
- How can you use a calculator to evaluate a logarithm when the base is not 10 or e ? [7.5]
- How will you solve exponential and logarithmic equations? [7.6]
- Why do logarithmic equations sometimes have extraneous solutions? [7.6]
- What are the steps to writing exponential and power functions? [7.7]

Suggested Time Frame: 6-7 Weeks

Common Core Standards Covered:

- CC.9-12.F.IF.7- Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* [7.1],[7.2],[7.3],[7.4]
- CC.9-12.F.IF.7c- Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. [7.1],[7.2],[7.3],[7.4]
- CC.9-12.F.BF.3- Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, ... and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. [7.4]
- CC.9-12.F.BF.5(+)- Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. [7.5]
- CC.9-12.F.LE.4- For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a , c , and d are numbers and the base is 2, 10, or e ; evaluate the logarithm using technology.* [7.6]
- CC.9-12.F.LE.2- Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).* [7.7]

Materials Used: (textbooks, websites, videos, etc...)

- McDougal Littell Algebra 2, Houghton Mifflin Harcourt On Core Mathematics: Algebra 2, Holt McDougal Larson Algebra 2, Pearson Algebra 2: Common Core.

Major Themes/ Concepts:

- Graphing Exponential Growth Functions [7.1]
- Graphing Exponential Decay Functions [7.2]
- Using Functions Involving e [7.3]
- Evaluating Logarithms and Graphing Logarithmic Functions [7.4]
- Applying Properties of Logarithms [7.5]
- Solving Exponential and Logarithmic Equations [7.6]
- Writing and Applying Exponential and Power Functions [7.7]

Assessments:

- Pre and Post tests, mini-homework quiz 7.1, mini-homework quiz 7.2, quiz 7.1-7.3, mini-homework quiz 7.3, mini-homework quiz 7.4, quiz 7.4-7.6, mini-homework quiz 7.5, mini-homework quiz 7.6, mini-homework quiz 7.7, chapter 7 test. Subject to change. Additional assessments may be added. Marking period multiple choice practice questions.

THS Curriculum Unit Mathematics

Course: Algebra II B

Grade: 12th

Unit Names (s): Chapter 6: Rational Exponents and Radical Functions

Essential Questions:

- How will you evaluate n th roots and study rational exponents? [6.1]
- What is the relationship between n th roots and rational exponents? [6.1]
- How will you simplify expressions involving rational exponents? [6.2]
- How are the properties of rational exponents related to the properties of integer exponents? [6.2]
- How can you perform operations with functions? [6.3]
- What operations can be performed on a pair of functions to obtain a third function? [6.3]
- What are the steps to finding inverse functions? [6.4]
- How do you graph square root and cube root functions? [6.5]
- What do the graphs of square root and cube root functions look like? [6.5]
- How do you solve radical equations? [6.6]
- Why is it necessary to check every apparent solution of a radical equation in the original equation? [6.6]

Suggested Time Frame: 7 Weeks

Common Core Standards Covered:

- CC.9-12.N.RN.1- Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. [6.1]
- CC.9-12.N.RN.2- Rewrite expressions involving radicals and rational exponents using the properties of exponents. [6.2]
- CC.9-12.F.BF.1- Write a function that describes a relationship between two quantities.* [6.3]
- CC.9-12.F.BF.1b- Combine standard function types using arithmetic operations. [6.3]
- CC.9-12.F.BF.1c(+)- Compose functions. [6.3]
- CC.9-12.F.BF.4 – Find inverse functions. [6.4]
- CC.9-12.F.BF.4a- Solve an equation of the form $f(x)=c$ for a simple function f that has an inverse and write an expression for the inverse.[6.4]
- CC.9-12.F.BF.4b(+)- Verify by composition that one function is the inverse of another.[6.4]
- CC.9-12.F.BF.4c(+)- Read values of an inverse function from a graph or a table, given that the function has an inverse. [6.4]
- CC.9-12.F.BF.4d(+)- Produce an invertible function from a non-invertible function by restricting the domain.[6.4]
- CC.9-12.F.IF.7- Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* [6.5]
- CC.9-12.F.IF.7b- Graph square root... cube root....functions...* [6.5]
- CC.9-12.A.REI.2- Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. [6.6]

Materials Used: (textbooks, websites, videos, etc...)

- McDougal Littell Algebra 2, Houghton Mifflin Harcourt On Core Mathematics: Algebra 2, Holt McDougal Larson Algebra 2, Pearson Algebra 2: Common Core.

Major Themes/ Concepts:

- Evaluating n th roots and using rational exponents. [6.1]
- Applying properties of rational exponents.[6.2]
- Performing function operations and composition. [6.3]
- Using inverse functions.[6.4]
- Graphing square root and cube root functions. [6.5]
- Solving radical equations.[6.6]

Assessments:

- Mini-homework quiz 6.1, mini-homework quiz 6.2, quiz 6.1-6.2, mini-homework quiz 6.3, mini-homework quiz 6.4, quiz 6.3-6.4, mini-homework quiz 6.5, mini-homework quiz 6.6, quiz 6.5-6.6, chapter 6 test. Subject to change. Additional assessments may be added. Marking period multiple choice practice questions.

THS Curriculum Unit Mathematics

Course: Algebra II B

Grade: 12th

Unit Names (s): Chapter 6: Rational Exponents and Radical Functions

Essential Questions:

- How will you evaluate n th roots and study rational exponents? [6.1]
- What is the relationship between n th roots and rational exponents? [6.1]
- How will you simplify expressions involving rational exponents? [6.2]
- How are the properties of rational exponents related to the properties of integer exponents? [6.2]
- How can you perform operations with functions? [6.3]
- What operations can be performed on a pair of functions to obtain a third function? [6.3]
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- How do you graph square root and cube root functions? [6.5]
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- How do you solve radical equations? [6.6]
- Why is it necessary to check every apparent solution of a radical equation in the original equation? [6.6]

Suggested Time Frame: 7 Weeks

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- CC.9-12.F.BF.1- Write a function that describes a relationship between two quantities.* [6.3]
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- CC.9-12.F.BF.4 – Find inverse functions. [6.4]
- CC.9-12.F.BF.4a- Solve an equation of the form $f(x)=c$ for a simple function f that has an inverse and write an expression for the inverse.[6.4]
- CC.9-12.F.BF.4b(+)- Verify by composition that one function is the inverse of another.[6.4]
- CC.9-12.F.BF.4c(+)- Read values of an inverse function from a graph or a table, given that the function has an inverse. [6.4]
- CC.9-12.F.BF.4d(+)- Produce an invertible function from a non-invertible function by restricting the domain.[6.4]
- CC.9-12.F.IF.7- Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* [6.5]
- CC.9-12.F.IF.7b- Graph square root... cube root....functions...* [6.5]
- CC.9-12.A.REI.2- Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. [6.6]

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- Evaluating n th roots and using rational exponents. [6.1]
- Applying properties of rational exponents.[6.2]
- Performing function operations and composition. [6.3]
- Using inverse functions.[6.4]
- Graphing square root and cube root functions. [6.5]
- Solving radical equations.[6.6]

Assessments:

- Mini-homework quiz 6.1, mini-homework quiz 6.2, quiz 6.1-6.2, mini-homework quiz 6.3, mini-homework quiz 6.4, quiz 6.3-6.4, mini-homework quiz 6.5, mini-homework quiz 6.6, quiz 6.5-6.6, chapter 6 test. Subject to change. Additional assessments may be added. Marking period multiple choice practice questions.

THS Curriculum Unit Mathematics

Course: Algebra II B

Grade: 12th

Unit Names (s): Chapter 7: Exponential and Logarithmic Functions

Essential Questions:

- How will you graph and use exponential growth functions? [7.1]
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- CC.9-12.F.BF.3- Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, ... and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. [7.4]
- CC.9-12.F.BF.5(+)- Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. [7.5]
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- CC.9-12.F.LE.2- Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).* [7.7]

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- Applying Properties of Logarithms [7.5]
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- Writing and Applying Exponential and Power Functions [7.7]

Assessments:

- Pre and Post tests, mini-homework quiz 7.1, mini-homework quiz 7.2, quiz 7.1-7.3, mini-homework quiz 7.3, mini-homework quiz 7.4, quiz 7.4-7.6, mini-homework quiz 7.5, mini-homework quiz 7.6, mini-homework quiz 7.7, chapter 7 test. Subject to change. Additional assessments may be added. Marking period multiple choice practice questions.

THS Curriculum Unit Mathematics

Course: Algebra II B

Grade: 12th

Unit Name(s): Chapter 8: Rational Functions

Essential Questions:

- How will you use inverse and joint variation models? [8.1]
- What are the differences between direct, inverse, and joint variation? [8.1]
- How do you graph rational functions? [8.2]
- What does the graph of the rational function $y = \frac{a}{x-h} + k$ look like? [8.2]
- How do you graph rational functions with higher-degree polynomials? [8.2-8.3]
- What are the steps for graphing a general rational function? [8.2-8.3]
- How do you multiply and divide rational expressions? [8.4]
- What are the steps for multiplying and dividing rational expressions? [8.4]
- How do you add and subtract rational expressions? [8.5]
- What are the steps for adding or subtracting expressions with different denominators? [8.5]
- What are the steps for solving rational equations? [8.6]

Suggested Time Frame: 6-7 Weeks

Common Core Standards Covered:

- CC.9-12.A.CED.2- Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.* [8.1]
- CC.9-12.F.IF.7d(+)- Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.* [8.2], [8.3]
- CC.9-12.A.APR.7(+)- Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; ... multiply, and divide rational expressions. [8.4], [8.5]
- CC.9-12.A.REI.2- Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. [8.6]

Materials Used: (textbooks, websites, videos, etc...)

- McDougal Littell Algebra 2, Houghton Mifflin Harcourt On Core Mathematics: Algebra 2, and Holt McDougal Larson Algebra 2.

Major Themes/ Concepts:

- Modeling Inverse and Joint Variation
- Graphing Simple Rational Functions
- Graphing General Rational Functions
- Multiplying and Dividing Rational Expressions
- Adding and Subtracting Rational Expressions
- Solving Rational Equations

Assessments:

- Mini-homework quiz 8.1, mini-homework quiz 8.2, quiz 8.1-8.3, mini-homework quiz 8.3, mini-homework quiz 8.4, quiz 8.4-8.5, mini-homework quiz 8.5, mini-homework quiz 8.6, chapter 8 test.