Bartlett City School's Algebra II instructional maps are standards-based maps driven by the TN Standards and implemented using a variety of educational resources.

Algebra II builds on earlier experiences with linear equations and functions. The genre of functions expands to include polynomial, exponential, rational, and radical examples. Attention is given to inverses, composition of functions, and families of graphs. The instructional approach should provide opportunities for students to work together collaboratively and cooperatively while implementing technology as they solve routine and non-routine problems. Justifications, written and oral, should continue to be part of regular instruction.

The Tennessee State Standards will prepare students with essential knowledge and skills to compete in an increasingly global environment. These standards emphasize thinking, problem solving, and creativity through next generation assessments that go beyond multiple-choice tests to increase college and career-readiness among Tennessee students.

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council’s report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy).

Throughout the year, students should continue to develop proficiency with the Eight Standards for Mathematical Practice:

**1. Make sense of problems and persevere in solving them.**

**2. Reason abstractly and quantitatively.**

**3. Construct viable arguments and critique the reasoning of others.**

**4. Model with mathematics.**

**5. Use appropriate tools strategically.**

**6. Attend to precision.**

**7. Look for and make use of structure.**

**8. Look for and express regularity in repeated reasoning.**

These practices should become the natural way in which students come to understand and do mathematics and integrated into daily instruction, depending on the content to be understood or on the problem to be solved.

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| **Domain**  |  **Content Standard/Scope & Clarifications**  | **Content & Tasks** |
|  **Chapter 7: Inverses, Radical Functions, and Relations** **(Allow 3 weeks for instruction, review, and assessment)** |
| A2.F.BF.A.1Build a function that models a relationship between two quantities. | * Write a function that describes a relationship between two quantities.
1. Determine an explicit expression, a recursive process, or steps for calculation from a context.
2. Combine standard function types using arithmetic operations.

For A2.F.BF.A.1For example, given cost and revenue functions, create a profit function.For A2.F.BF.A.1a 1. Tasks have a real-world context.
2. Tasks may involve linear functions, quadratic functions, and exponential functions.
 | Section 7-1: Operations on Functions |
| A2.F.BF.B.4Build new functions from existing functions. | * Find inverse functions.
1. Find the inverse of a function when the given function is one-to-one.
 | Section 7-2: Inverse Functions and Relations |
| A2.A.REI.A.1Understand solving equations as a process of reasoning and explain the reasoning.A2.A.REI.A.2Understand solving equations as a process of reasoning and explain the reasoning. | * Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct viable argument to justify a solution method.
* Solve rational and radical equations in one variable, and identify extraneous solutions when they exist.

A2.A.REI.A.1Tasks are limited to square root, cube root, polynomial, rational, and logarithmic functions. | Section 7-3: Square Root Functions and Inequalities |
| A2.N.RN.A.1Extend the properties of exponents to rational exponents.A2.N.RN.A.2Extend the properties of exponents to rational exponents. | * 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.
* Rewrite expressions involving radicals and rational exponents using the properties of exponents.

A2.N.RN.A.1For example, we define $5^{\frac{1}{3}}$ to be the cube root of 5 because we want $\left(5^{\frac{1}{3}}\right)^{3}=5^{\left(\frac{1}{3}\right)3}$ to hold, so $5^{\left(\frac{1}{3}\right)3}$must equal 5. | Section 7-4: Nth Roots |
| A2.N.RN.A.1Extend the properties of exponents to rational exponents.A2.N.RN.A.2Extend the properties of exponents to rational exponents. | * Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a annotation for radicals in terms of rational exponents.
* Rewrite expressions involving radicals and rational exponents using the properties of exponents.

A2.N.RN.A.1For example, we define $5^{\frac{1}{3}}$ to be the cube root of 5 because we want $\left(5^{\frac{1}{3}}\right)^{3}=5^{\left(\frac{1}{3}\right)3}$ to hold, so $5^{\left(\frac{1}{3}\right)3}$must equal 5. | Section 7-5: Operations with Radical Expressions |
| A2.N.RN.A.1Extend the properties of exponents to rational exponents.A2.N.RN.A.2Extend the properties of exponents to rational exponents. | * Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for annotation for radicals in terms of rational exponents.
* Rewrite expressions involving radicals and rational exponents using the properties of exponents.

A2.N.RN.A.1For example, we define $5^{\frac{1}{3}}$ to be the cube root of 5 because we want $\left(5^{\frac{1}{3}}\right)^{3}=5^{\left(\frac{1}{3}\right)3}$ to hold, so $5^{\left(\frac{1}{3}\right)3}$must equal 5. | Section 7-6: Rational Exponents |
| **Domain**  |  **Content Standard/Scope & Clarifications**  | **Content & Tasks** |
| **Chapter 8 – Exponential and Logarithmic Functions and Relations****(Allow 3 weeks for instruction, review, and assessment)** |
|  A2.A.REI.D.6Represent and solve equations graphically.A2.F.LE.A.1Construct and compare linear, quadratic, and exponential models and solve problems.A2.F.LE.A.2Construct and compare linear, quadratic, and exponential models and solve problems.A2.F.LE.B.3Interpret expressions for functions in terms of the situation they model.A2.F.IF.A.1Interpret functions that arise in applications in terms of the context.A2.F.IF.A.2Interpret functions that arise in applications in terms of the context. | * Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x) ; find the approximate solutions using technology.
* Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a table, a description of a relationship, or input-output pairs.
* For exponential models, express as a logarithm the solution to $ab^{ct}=d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.
* Interpret the parameters in a linear or exponential function in terms of a context.
* For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
* Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

For A2.A.REI.D.6Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.Tasks may involve any of the function types mentioned in the standard.A2.F.LE.B.3 For example, the equation $y=5000(1.06)^{x}$models the rising population of a city with 5000 residents when the annual growth rate is 6 percent. What will be the effect on the equation if the city’s growth rate was 7 percent instead of 6 percent?A2.F.IF.A.1Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior.Tasks have a real-world context.Tasks may involve square root, cube root, polynomial, exponential, and logarithmic functions.A2.F.IF.A.2Tasks have a real-world context.Tasks may involve polynomial, exponential, and logarithmic functions. | Section 8-1: Graphing Exponential Functions |
| A2.F.LE.A.2Construct and compare linear, quadratic, and exponential models and solve problems.A2.F.LE.B.3Interpret expressions for functions in terms of the situation they model.A2.A.CED.A.1Create equations that describe numbers or relationships.A2.A.SSE.B.2Use expressions in equivalent forms to solve problems.A2.F.IF.B.4Analyze functions using different representations. | * For exponential models, express as a logarithm the solution to $ab^{ct}=d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.
* Interpret the parameters exponential function in terms of a context.
* Create exponential equations and inequalities in one variable and use them to solve problems.
* Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Use the properties of exponents to rewrite expressions for exponential functions.
* Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Know and use the properties of exponents to interpret expressions for exponential functions.

A2.F.LE.B.3 For example, the equation $y=5000(1.06)^{x}$models the rising population of a city with 5000 residents when the annual growth rate is 6 percent. What will be the effect on the equation if the city’s growth rate was 7 percent instead of 6 percent?A2.A.CED.A.1 and A2.A.SSE.B.2Tasks have a real-world context.A2.A.SSE.B.2For example, the expression $1.15^{t}$ can be rewritten as $(\left(1.15\right)^{\frac{1}{12}})^{12t}$ $≈$ $(1.012)^{12t}$ to reveal that the approximate equivalent monthly interest rate is 1.2% if the annual rate is 15%.Tasks are limited to exponential expressions with rational or real exponents.A2.F.IF.B.4For example, identify percent rate of change in functions such as $y=2^{x}$, $y= \left(\frac{1}{2}\right)^{x}$, $y=2^{-x}$, $y= \left(\frac{1}{2}\right)^{-x}$ | Section 8-2: Solving exponential equations and inequalities |
| A2.F.IF.B.3Analyze functions using different representations.A2.F.IF.B.5Analyze functions using different representations.A2.F.IF.A.1Interpret functions that arise in application in terms of the context.A2.F.IF.A.2Interpret functions that arise in applications in terms of the context.A2.F.LE.A.2Construct and compare linear, quadratic, and exponential models and solve problems. A2.A.REI.D.6Represent and solve equations graphically. | * Graph functions expressed symbolically and show key features of the graph, by hand and using technology. c. Graph exponential and logarithmic functions, showing intercepts and end behavior.
* Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
* For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
* Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
* For exponential models, express as a logarithm solution to $ab^{ct}=d$ where a, c, and d are numbers and the base $b$ is 2, 10, or $e$; evaluate the logarithm using technology.
* Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x) ; find the approximate solutions using technology.

For A2.F.BF.B.31. Tasks may involve polynomial, exponential, and logarithmic functions.
2. Tasks may involve recognizing even and odd functions.

For A2.F.IF.B.5Tasks may involve polynomial, exponential, and logarithmic functions.A2.F.IF.A.1Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior.Tasks have a real-world context.Tasks may involve square root, cube root, polynomial, exponential, and logarithmic functions.A2.F.IF.A.2Tasks have a real-world context.Tasks may involve polynomial, exponential, and logarithmic functions.For A2.A.REI.D.6Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.Tasks may involve any of the function types mentioned in the standard. | Section 8-3: Logarithms and Logarithmic Functions. |
| A2.A.CED.A.2Create equations that describe numbers or relationships.A2.A.REI.A.1Understand solving equations as a process of reasoning and explain the reasoning. | * Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
* Explain each step in solving an equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

For A2.A.CED.A.21. Tasks are limited to square root, cube root, polynomial, rational, and logarithmic functions.
2. Tasks have a real-world context.

For A2.A.REI.A.1Tasks are limited to square root, cube root, polynomial, rational, and logarithmic functions. | Section 8-4: Solving Logarithmic Equations and InequalitiesA2.A.CED.A.2Tasks are limited to square root, cube root, polynomial, rational, and logarithmic functions.Tasks have a real-world context.A2.A.REI.A.1Tasks are limited to square root, cube root, polynomial, rational, and logarithmic functions. |
| A2.F.IF.B.5Analyze functions using different representations.A2.F.LE.A.2Construct and compare linear, quadratic, and exponential models and solve problems. | * Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
* For exponential models, express as a logarithm solution to $ab^{ct}=d$ where a, c, and d are numbers and the base $b$ is 2, 10, or $e$; evaluate the logarithm using technology.

For A2.F.IF.B.5Tasks may involve polynomial, exponential, and logarithmic functions. | Section 8-5: Properties of Logarithms  |
| A2.F.IF.B.5Analyze functions using different representations.A2.F.LE.A.2Construct and compare linear, quadratic, and exponential models and solve problems. | * Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
* For exponential models, express as a logarithm solution to $ab^{ct}=d$ where a, c, and d are numbers and the base $b$ is 2, 10, or $e$; evaluate the logarithm using technology.

For A2.F.IF.B.5Tasks may involve polynomial, exponential, and logarithmic functions. | Section 8-6: Common Logarithms  |
| A2.F.IF.B.5Analyze functions using different representations.A2.F.LE.A.2Construct and compare linear, quadratic, and exponential models and solve problems. | * Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
* For exponential models, express as a logarithm solution to $ab^{ct}=d$ where a, c, and d are numbers and the base $b$ is 2, 10, or $e$; evaluate the logarithm using technology.

For A2.F.IF.B.5Tasks may involve polynomial, exponential, and logarithmic functions. | Section 8-7: Base e and Natural Logarithms |
| **Domain**  |  **Content Standard/Scope & Clarifications**  | **Content & Tasks** |
| **Chapter 9 – Rational Functions and Relations****(Allow 3 weeks for instruction, review, and assessment)** |
|  A2.A.APR.C.4 Rewrite rational expressions. | * Rewrite rational expressions in different forms.
 | Section 9-1: Multiplying and Dividing Rational Expressions |
|  A2.A.APR.C.4 Rewrite rational expressions. | * Rewrite rational expressions in different forms.
 | Section 9-2: Adding and Subtracting Rational Expressions |
|  A2.A.REI.D.6 Represent and solve equations  graphically.  | * Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the approximate solutions using technology.

For A2.A.REI.D.6Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.Tasks may involve any of the function types mentioned in the standard. | Section 9-4: Graphing Rational Functions |
| A2.A.REI.A.1 Understand solving equations as a process  of reasoning and explain the reasoning.A2.A.REI.A.2Understand solving equations as a process of reasoning and explain the reasoning. | * Explain each step in solving an equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
* Solve rational and radical equations in one variable, and identify extraneous solutions when they exist.

A2.A.REI.A.1Tasks are limited to square root, cube root, polynomial, rational, and logarithmic functions. | Section 9-6: Solving Rational Equations |

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| **RESOURCE TOOLBOX:**Khan Academy<https://www.khanacademy.org/math/algebra2>West Texas A & M Virtual Math Lab<http://www.wtamu.edu/academic/anns/mps/math/mathlab/>Free Kuta Worksheets:<http://kutasoftware.com/>COMPASS LEARNING ODYSSEY <https://www.thelearningodyssey.com/>TEACHER TUBE VIDEO TUTORING:<http://www.teachertube.com/> MATH TV VIDEO TUTORING: [http://www.mathtv.com/videos\_by\_topic#](http://www.mathtv.com/videos_by_topic)CONNECTED SITE:<http://connected.mcgraw-hill.com/connected/login.do>HOTMATH.COM <http://hotmath.com/help/bookindexes/hollidaytn212/index.html> GLENCOE PRACTICE QUIZ: <http://glencoe.mcgraw-hill.com/sites/0078884829/sitemap.html?resource=selfcheckquizzes> GLENCOE PRACTICE TEST: <http://glencoe.mcgraw-hill.com/sites/0078884829/sitemap.html?resource=chaptertest> GLENCOE STANDARDIZED PRACTICE TEST: <http://glencoe.mcgraw-hill.com/sites/0078884829/sitemap.html?resource=standardizedtestpractice>GLENCOE PERSONAL TUTOR VIDEO: <http://glencoe.mcgraw-hill.com/sites/0078884829/sitemap.html?resource=personaltutor> | **ADDITIONAL TASK RESOURCES:**<http://map.mathshell.org/materials/tasks.php?taskid=265&subpage=apprentice><http://www.utdanacenter.org/k12mathbenchmarks/tasks/tasks.php><http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm> <http://www.dlt.ncssm.edu/algebra/HTML/09.htm> **TECHNOLOGY-GRAPHING CALCULATORS:**<http://www.ti-mathnspired.com> <http://education.ti.com/educationportal/activityexchange/activity> <http://www.internet4classrooms.com/eoc_algebra2.htm><http://illuminations.nctm.org/> <http://www.stemresources.com/><http://cuacs8.mck.ncsu.edu/mathsampleitems/main.html> <http://www.ilovemath.org/index.php?option=com_docman> <http://mathbits.com/MathBits/TISection/Openpage.htm> <http://mathbits.com/MathBits/TeacherResources/Algebra2/Algebra2.htm> |