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 1: Equations and Inequalities**  **(Allow 2 weeks for instruction, review, and assessment)** | | |
| Optional Section | * Optional Section: Time not allocated in pacing guide. | Section 1-1: Expressions and Formulas  Resources/Activities  <http://map.mathshell.org/lessons.php?unit=9225&collection=8&redir=1> |
| Optional Section | * Optional Section: Time not allocated in pacing guide. | Section 1-2: Classify Real, Complex, and Imaginary Numbers  Resources/Activities  <http://myhandbook.info/class_number.html>  <http://www.chilimath.com/algebra/intro/numb/classifying-real-numbers.html>  <https://www.khanacademy.org/math/pre-algebra/order-of-operations/rational-irrational-numbers/v/introduction-to-rational-and-irrational-numbers> |
| A2.A.REI.A.1  Understand solving equations as a process of reasoning and explain the reasoning.  A2.A.CED.A.1  Create equations that describe numbers or relationships. | * 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. * Create equations and inequalities in one variable and use them to solve problems.   For A2.A.REI.A.1  Tasks are limited to square root, cube root, polynomial, rational, and logarithmic functions.  For A2.A.CED.A.1  Include equations arising from linear, quadratic, rational, and exponential functions. Tasks have a real-world content. | Section 1-3: Solving Equations  Resources/Activities  <http://map.mathshell.org/lessons.php?unit=9215&collection=8&redir=1> |
| Optional Section | Optional Section | Section 1-4: Solving Absolute Value Equations |
| A2.A.CED.A.1  Create equations that describe numbers or relationships. | * Create equations and inequalities in one variable and use them to solve problems.   For A2.A.CED.A.1  Include equations arising from linear, quadratic, rational, and exponential functions.  Tasks have a real-world content. | Section 1-5: Solving Inequalities |
| Optional Content | * Optional Section | Section 1-6: Solving Compound and Absolute Value Inequalities |
| **Domain** | **Content Standard/Scope & Clarifications** | **Content & Tasks** |
| **Chapter 2 - Linear Relations and Functions**  **(Allow 2 weeks for instruction, review, and assessment)** | | |
| A2.F.IF.A.1  Interpret functions that arise in applications in terms of the context.  A2.F.IF.B.3  Analyze functions using different representations. | * 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. \* * Graph functions expressed symbolically and show key features of the graph, by hand and using technology.\*  1. Graph square root, cube root and piecewise defined functions, including step functions and absolute value functions. 2. Graph polynomial functions, identifying zeros when suitable factorizations are available and showing end behavior. 3. Graph exponential and logarithmic functions, showing intercepts and end behavior.   For A2.F.IF.A.1  Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior.   1. Tasks have a real-world context. 2. Tasks may involve square root, cube root, polynomial, exponential, and logarithmic functions.   For A2.F.IF.B.3  Tasks are limited to square root and cube root functions. The other functions are assessed in Algebra 1. | Section 2-1: Relations and Functions  Resources/Activities  [Domain Representations.](http://illuminations.nctm.org/LessonDetail.aspx?id=L621)  <http://map.mathshell.org/lessons.php?unit=9200&collection=8&redir=1> |
| A2.F.IF.A.1  Interpret functions that arise in applications that arise in applications, in terms of the context. | * For a function that models the 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.   For A2.F.IF.A.1  Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior.  i) Tasks have a real-world context.  ii) Tasks may involve square root, cube root, polynomial, exponential, and logarithmic functions. | Section 2-2: Linear Relations and Functions  Resources/Activities  <http://map.mathshell.org/lessons.php?unit=9260&collection=8&redir=1> |
| A2.F.IF.A.2  Interpret functions that arise in applications in terms of the context.  A2.F.LE.A.1  Construct and compare linear, quadratic, and exponential models and solve problems. | * Calculate and interpret the average rate of change of a function (represented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. * Construct linear functions and exponential functions, including arithmetic and geometric sequences, given a graph, a table, a description of a relationship, or input-output pairs.   For A2.F.IF.A.2  i) Tasks have a real-world context  ii) Tasks may involve square root, cube root, polynomial, exponential, and logarithmic functions.  For A2.F.LE.A.1  There are not assessment limits for this standard. The entire standard is assessed in this course. | Section 2-3: Rate of Change and Slope  Resources/Activities  <http://www.regentsprep.org/regents/math/algebra/AC1/Rate.htm>  <http://www.glencoe.com/sec/math/msmath/mac04/course2/add_lesson/rate_of_change_mac2.pdf>.  <http://www.virtualnerd.com/pre-algebra/linear-functions-graphing/rate-of-change-slope/rate-of-change/rate-of-change-two-points-graph> |
| A2.F.LE.A.1  Construct and compare linear, quadratic, and exponential models and solve problems.  A2.F.IF.A.2  Interpret functions that arise in applications in terms of the context.  A2.F.IF.B.4  Analyze functions using different representations. | * Construct linear functions and exponential functions, including arithmetic and geometric sequences, given a graph, a table, a description of a relationship, or input-output pairs. * Calculate and interpret the average rate of change of a function (represented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. * Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.  1. Know and use the properties of exponents to interpret expressions for exponential functions.   For A2.F.IF.A.2  i) Tasks have a real-world context  ii) Tasks may involve square root, cube root, polynomial, exponential, and logarithmic functions. | Section 2-4: Writing Linear Equations  <http://www.mathplanet.com/education/algebra-1/formulating-linear-equations/writing-linear-equations-using-the-slope-intercept-form>  <http://www.algebra-class.com/word-problems.html> |
| A2.S.ID.B.2  Summarize, represent, and interpret data on two categorical and quantitative variables.  A2.N.Q.A.1  Reason quantitatively and use units to solve problems. | * Represent data on two quantitative variables on a scatterplot, and describe how the variables are related. * Identify, interpret, and justify appropriate quantities for the purpose of descriptive reasoning. | Section 2-5: Scatter Plots and Lines of Regression  Resources/Activities  <https://www.illustrativemathematics.org/HSS-ID.B.6> |
| A2.A.CED.A.1  Create equations that describe numbers or relationships.  A2.F.IF.B.3  Analyze functions using different representations.  A2.F.IF.B.5  Analyze functions using different representations. | * Create equations and inequalities in one variable and use them to solve problems. * Graph functions expressed symbolically and show key features of the graph by hand and using technology. * Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).   For A2.A.CED.A.1  Include equations arising from linear, quadratic, rational, and exponential functions.  Tasks have a real-world content.  For A2.F.IF.B.3  Tasks are limited to square root and cube root functions. The other functions are assessed in Algebra 1.  For A2.F.IF.B.5  Tasks may involve polynomial, exponential, and logarithmic functions. | Section 2-6: Special Functions  Piecewise Functions Piecewise Functions |
| A2.F.BF.B.3  Build new functions from existing functions. | * Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), 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.   For A2.F.BF.B.3  i)Tasks may involve polynomial, exponential, and logarithmic functions.  ii)Tasks may involve recognizing even and odd functions. | Section 2-7: Parent Functions and Transformations |
| A2.A.CED.A.1  Create equations that describe numbers or relationships.  A2.F.IF.B.3  Analyze functions using different representations.  A2.F.IF.B.5  Analyze functions using different representations | * Create equations and inequalities in one variable and use them to solve problems. * Graph functions expressed symbolically and show key features of the graph, by hand and using technology.  1. Graph square root, cube root, and piecewise defined functions, including step functions and absolute value functions. 2. Graph polynomial functions, identifying zeros when suitable factorizations are available and showing end behavior. 3. 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 A2.A.CED.A.1  Include equations arising from linear, quadratic, rational, and exponential functions.  Tasks have a real-world content.  For A2.F.IF.B.5  Tasks may involve polynomial, exponential, and logarithmic functions.  For A2.F.IF.B.3  Tasks are limited to square root and cube root functions. The other functions are assessed in Algebra 1. | Section 2-8: Graphing Linear and Absolute Value Inequalities |
| **Domain** | **Content Standard/Scope & Clarifications** | **Content & Tasks** |
| **Chapter 3 - Systems of Equations and Inequalities**  **(Allow 2 weeks for instruction, review, and assessment)** | | |
| A2.A.REI.C.4  Solve systems of equations.  A2.A.CED.A.1  Create equations that describe numbers or relationships.  A2.A.REI.D.6  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 solutions approximately, using technology \*  A2.F.IF.A.1  Interpret functions that arise in applications in terms of the context. | * Write and solve a system of linear equations in context. * Create equations and inequalities in one variable and use them to solve problems. * 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 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.   For A2.A.CED.A.1  Include equations arising from linear, quadratic, rational, and exponential functions.  Tasks have a real-world content.  For A2.F.IF.A.1  Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior.  i) Tasks have a real-world context.  ii) Tasks may involve square root, cube root, polynomial, exponential, and logarithmic functions.  For A2.A.REI.C.4  When solving algebraically, tasks are limited to systems of at most three equations and three variables. With graphic solutions, systems are limited to only two variables.  For A2.A.REI.D.6  Include 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 3-1: Solving Systems of Equations by Graphing |
| A2.A.REI.C.4  Solve systems of equations.  A2.A.CED.A.1  Create equations that describe numbers or relationships.  A2.A.REI.D.6  Represent and solve equations graphically. | * Write and solve a system of linear equations in context. * Create equations and inequalities in one variable and use them to solve problems. * 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.CED.A.1  Include equations arising from linear, quadratic, rational, and exponential functions.  Tasks have a real-world content.  For A2.A.REI.C.4  When solving algebraically, tasks are limited to systems of at most three equations and three variables. With graphic solutions, systems are limited to only two variables.  For A2.A.REI.D.6  Include 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 3-2: Solving Systems of Equations Algebraically  \*When solving algebraically, tasks are limited to systems of at most three equations and three variables.  \*Students may also be shown how to solve systems of equations using the RREF (reduced row echelon form) of a matrix in the graphing calculator. |
| A2.A.REI.D.6  Represent and solve equations graphically.  A2.A.REI.C.4  Solve systems of equations. | * 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. * Write and solve a system of linear equations in context.   For A2.A.REI.C.4  When solving algebraically, tasks are limited to systems of at most three equations and three variables. With graphic solutions, systems are limited to only two variables.  For A2.A.REI.D.6  Include 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 3-3: Solving systems of Inequalities by Graphing |

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| **Domain** | **Content Standard/Scope & Clarifications** | **Content & Tasks** |
| **Chapter 5 Part 1 – Quadratic Functions and Relations**  **(Allow 3 weeks for instruction, review, and assessment)** | | |
| A2.F.IF.A.1  Interpret functions that arise in applications in terms of the context.  A2.A.REI.D.6  Represent and solve equations graphically.  A2.F.IF.B.3  Analyze functions using different representations. | * 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. * 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.IF.A.1  Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior.  i) Tasks have a real-world context.  ii) Tasks may involve square root, cube root, polynomial, exponential, and logarithmic functions.  For A2.A.REI.D.6  Include 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.  For A2.F.IF.B.3  Tasks are limited to square root and cube root functions. The other functions are assessed in Algebra 1. | Section 5-1: Graphing Quadratic Functions |
| A2.F.IF.A.1  Interpret functions that arise in applications in terms of the context.  A2.A.REI.D.6  Represent and solve equations graphically.  A2.F.IF.B.5  Analyze functions using different presentations.  A2.F.IF.B.3  Analyze functions using different representations.  A2.A.APR.A.2  Understand the relationship between zeros and factors of polynomials. | * 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. * 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. * Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). * Graph functions expressed symbolically and show key features of the graph, by hand and using technology. * Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.   For A2.F.IF.A.1  Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior.  i) Tasks have a real-world context.  ii) Tasks may involve square root, cube root, polynomial, exponential, and logarithmic functions.  For A2.A.REI.D.6  Include 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.  For A2.F.IF.B.5  Tasks may involve polynomial, exponential, and logarithmic functions.  For A2.F.IF.B.3  Tasks are limited to square root and cube root functions. The other functions are assessed in Algebra 1. | Section 5-2: Solving Quadratic Equations by Graphing |

\* Indicates Modeling.

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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> |