



Curriculum and Instruction – Mathematics

Quarter 3

Applied Mathematical Concepts

Quarter 1	Quarter 2	Quarter 3	Quarter 4
Linear Programming, Organizing and Interpreting Data, Data Descriptions	Probability and Counting Rules, Probability Distributions	Normal Probability Distribution, Confidence Intervals, Financial Mathematics	Financial Mathematics (cont.), Logic, Boolean Algebra
August 12, 2019 – October 11, 2019	October 21, 2019 – December 20, 2019	January 6, 2020 – March 13, 2020	March 23, 2020 – May 22, 2020
AM.A.LP.A.1	AM.D.CR.A.1	AM.D.ND.A.1	AM.G.L.A.1
AM.A.LP.A.2	AM.D.CR.A.2	AM.D.ND.A.2	AM.G.L.A.2
AM.A.LP.B.3	AM.D.CR.A.3	AM.D.CI.A.1	AM.G.L.A.3
AM.A.LP.B.4	AM.D.CR.A.4	AM.D.CI.A.2	AM.G.L.A.4
AM.D.ID.A.1	AM.D.CR.A.5	AM.D.CI.A.3	AM.G.L.B.5
AM.D.ID.A.2	AM.D.CR.B.7	AM. A. PS. A.1	AM.G.L.B.6
AM.D.ID.A.3	AM.D.CR.B.8	AM.N.NQ.A.1	AM.G.L.B.7
AM.D.ID.A.4	AM.D.CR.B.9	AM.N.NQ.A.2	AM.G.L.B.8
AM. A. PS. A.1	AM.D.CR.B.10	AM.N.NQ.A.3	AM.A.LB.A.1
AM.D.CR.B.10	AM.D.ID.A.4	AM.N.NQ.A.4	AM.A.LB.A.2
	AM.D.ID.A.5	AM.N.NQ.B.5	AM.A.LB.B.3
	AM.D.ID.A.6	AM.N.NQ.B.6	AM.A.LB.B.4
	AM.D.ID.A.7	AM.N.NQ.B.7	AM.N.NQ.C.9
	AM. A. PS. A.1	AM.N.NQ.B.8	AM.N.NQ.C.10
		AM.N.NQ.C.9	AM.D.CI.A.1
		AM.N.NQ.C.10	AM.D.CI.A.2
			AM.D.CI.A.3



Curriculum and Instruction – Mathematics

Quarter 3

Applied Mathematical Concepts

Introduction

Destination 2025, Shelby County Schools’ 10-year strategic plan, is designed not only to improve the quality of public education, but also to create a more knowledgeable, productive workforce and ultimately benefit our entire community.

What will success look like?



In order to achieve these ambitious goals, we must collectively work to provide our students with high quality, college and career ready aligned instruction. The Tennessee State Standards provide a common set of expectations for what students will know and be able to do at the end of a grade. The State of Tennessee provides two sets of standards, which include the Standards for Mathematical Content and The Standards for Mathematical Practice. The Content Standards set high expectations for all students to ensure that Tennessee graduates are prepared to meet the rigorous demands of mathematical understanding for college and career. The eight Standards for Mathematical Practice describe the varieties of expertise, habits of mind, and productive dispositions that educators seek to develop in all students. The Tennessee State Standards also represent three fundamental shifts in mathematics instruction: **focus, coherence and rigor**.

Instructional Shifts for Mathematics



Throughout this curriculum map, you will see resources as well as links to tasks that will support you in ensuring that students are able to reach the demands of the standards in your classroom. In addition to the resources embedded in the map, there are some high-leverage resources around the content standards and mathematical practice standards that teachers should consistently access. For a full description of each, click on the links below.





How to Use the Maps

Overview

An overview is provided for each quarter and includes the topics, focus standards, intended rigor of the standards and foundational skills needed for success of those standards.

Your curriculum map contains four columns that each highlight specific instructional components. Use the details below as a guide for information included in each column.

Tennessee State Standards

TN State Standards are located in the left column. Each content standard is identified as Major Content or Supporting Content (for Algebra I, Algebra II & Geometry only). A key can be found at the bottom of the map.

Content

This section contains learning objectives based upon the TN State Standards. Best practices tell us that clearly communicating measurable objectives lead to greater student understanding. Additionally, essential questions are provided to guide student exploration and inquiry.

Instructional Support & Resources

District and web-based resources have been provided in the Instructional Support & Resources columns. You will find a variety of instructional resources that align with the content standards. The additional resources provided should be used as needed for content support and scaffolding. The inclusion of vocabulary serves as a resource for teacher planning and for building a common language across K-12 mathematics. One of the goals for Tennessee State Standards is to create a common language, and the expectation is that teachers will embed this language throughout their daily lessons.



Topics Addressed in Quarter

- Normal Probability Distribution
- Confidence Intervals and Sample Size
- Financial Mathematics

Overview

In this quarter students study normal probability distribution and continue to have the opportunity to apply concepts of probability and statistics to real-world situations. Students determine confidence intervals to begin to hypothesize if a large enough sample size has been taken to closely reflect the true mean of the population. Students conclude the quarter with the study of financial mathematics which includes interest, annuities, amortizations, loans, financial decision-making and other real-world problems involving finance.

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
Normal Probability Distribution (Allow approximately 2 weeks for instruction, review, and assessment)			
<p>Domain: Normal Probability Distribution</p> <p>Cluster: Work with the normal distribution in real-world situations.</p> <p>AM.D.ND.A.1 Calculate the mean (expected value) and standard deviation of both a random variable and a linear transformation of a random variable.</p> <p>AM.D.ND.A.2 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.</p>	<p>Essential Question(s):</p> <ul style="list-style-type: none"> • How do all Normal distributions relate to each other? • How can we find examples of normal distribution in real world scenarios? • How does the z-score relate to the standard normal distribution? <p>Objective(s) The student will:</p> <ul style="list-style-type: none"> • Identify distributions as symmetric or skewed. • Identify the properties of a normal distribution. • Find the area under the standard normal distribution, given various z values. 	<p>Elementary Statistics Textbook (Bluman)</p> <p>6-1 The Normal Distribution 6-2 Applications of the Normal Distribution 6-3 The Central Limit Theorem 6-4 The Normal Approximation to the Binomial Distribution</p> <p>Additional Resource(s)</p> <p>Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.)</p> <p>Khan Academy: The Normal Distribution Khan Academy: Binomial Distribution</p>	<p>Vocabulary (Chapter 6) central limit theorem, correction for continuity, negatively or left-skewed distribution, normal distribution, positively or right-skewed distribution, sampling distribution of sample means, sampling error, standard error of the mean, standard normal distribution, symmetric distribution, z value</p> <p>Elementary Statistics Textbook (Bluman) <i>Statistics Today</i>, pp. 300, 350 <i>Critical Thinking Challenges</i>, p. 352 <i>Applying the Concepts</i>, pp. 311, 324, 338, 346 <i>Extending the Concepts</i>, pp.313, 340, 347 <i>Data Projects</i>, pp. 353, 397</p>



Curriculum and Instruction – Mathematics

Quarter 3

Applied Mathematical Concepts

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	<ul style="list-style-type: none"> Find probabilities for a normally distributed variable by transforming it into a standard normal variable. Find specific data values for given percentages, using the standard normal distribution. Use the Central Limit Theorem to solve problems involving sample means for large samples. How do all Normal distributions relate to each other? 	<p>Against All Odds Videos & Lessons: Normal Curves</p> <p>Against All Odds Videos & Lessons: Normal Calculations</p> <p>Against All Odds Videos & Lessons: Checking Assumption of Normality</p> <p>Khan Academy: Central Limit Theorem</p> <p>Task(s)</p> <p>Task: Statistics - Cents & Central Limit Theorem</p> <p>Statistics Applet-Sampling Distributions</p> <p>Statistics Applet: Normal to Binomial</p> <p>TI Activities: Normal Distribution</p> <p>TI Activity: Intro to the Central Limit Theorem</p> <p>Accelerated GSE Pre-Calculus Tasks: Unit 8: Inferences & Conclusions from Data</p> <p><i>Colors of Skittles</i>, p. 120</p> <p><i>Pennies</i>, p.142</p> <p><i>The Gettysburg's Address</i>, p. 156</p>	
<p>Confidence Intervals and Sample Size (Allow approximately 3 weeks for instruction, review, and assessment)</p>			
<p>Domain: Understand and Use Confidence Intervals</p> <p>Cluster: Work with confidence intervals in real-world situations.</p> <p>AM.D.CI.A.1 Understand the meaning of confidence level, of confidence intervals, and the properties of confidence intervals.</p> <p>AM.D.CI.A.2 Construct and interpret a large sample confidence interval for a</p>	<p>Essential Question(s):</p> <ul style="list-style-type: none"> How do you extend the idea of estimating a parameter to allow for uncertainty? How do I interpret the margin of error of a confidence interval? How do I use a margin of error to find a confidence interval? How does sample size raise the 	<p>Elementary Statistics Textbook (Bluman)</p> <p>7-1 Confidence Intervals for the Mean When σ is Known</p> <p>7-2 Confidence Intervals for the Mean When σ is Unknown</p> <p>7-3 Confidence Intervals and Sample Size for Proportions</p>	<p>Vocabulary (Chapter 7):</p> <p>chi-square distribution, confidence interval, confidence level, consistent estimator, degrees of freedom, estimation, estimator, interval estimate, maximum error of the estimate, point estimate, proportion, relatively efficient, estimator, t distribution, unbiased estimator</p>



Curriculum and Instruction – Mathematics

Quarter 3

Applied Mathematical Concepts

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<p>proportion and for a difference between two proportions. AM.D.CI.A.3 Construct the confidence interval for a mean and for a difference between two means.</p> <p>Domain: Problem Solving Cluster: Apply problem solving techniques to real-world situations. AM.A. PS.A.1 Apply problem solving strategies to real-world situations. <i>Strategies include, but are not limited to: making orderly lists or tables, drawing diagrams, considering simpler problems, looking for patterns, working backwards, guess and check, using logical reasoning, etc.</i></p>	<p>confidence level for the true mean?</p> <p>Objective(s): The student will:</p> <ul style="list-style-type: none"> Find the confidence interval for the mean when σ is known and sample size is large. Determine the minimum sample size for finding a confidence interval for the mean. Find the confidence interval for the mean when σ is unknown and sample size is small. Find the confidence interval for a proportion. Determine the minimum sample size for finding a confidence interval for a proportion. Find the confidence interval for a variance and a standard deviation using Chi-Square. 	<p>7-4 Confidence Intervals for Variances and Standard Deviations</p> <p>Additional Resource(s) Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.) Against All Odds Videos & Lessons: Confidence Intervals Khan Academy: Confidence Intervals Stat Trek Statistics Education Web Stats Modeling the World</p> <p>Task(s) Accelerated GSE Pre-Calculus Tasks: Unit 8: Inferences & Conclusions from Data <i>How Confident Are You? p.177</i> TI-Activities: Confidence Intervals</p>	<p>Elementary Statistics Textbook (Bluman) <i>Statistics Today</i>, pp. 356, 395 <i>Critical Thinking Challenges</i>, p. 397 <i>Speaking of Statistics</i>, pp. 381, 385 <i>Applying the Concepts</i>, pp. 365, 373, 381, 390 <i>Extending the Concepts</i>, pp. 375, 383, 391 <i>Data Projects</i>, p. 397 <i>TI-83/84 Step by Step</i>, pp. 368, 376, 384, 391</p>

Financial Mathematics

(Allow approximately 4 weeks for instruction, review, and assessment; Note that 1-2 weeks at the beginning of 4th quarter is allocated for any topic not completed during this period.)

<p>Domain: Financial mathematics Cluster: Use financial mathematics to solve problems. AM.N.NQ.A.1 Define interest, compound interest, annuities, sinking funds, amortizations, annuities, future value, and present value.</p>	<p>Essential Question(s):</p> <ul style="list-style-type: none"> How do the economic, social, and political climates as well as personal skills play a role in the level of individual financial risk and impact spending and other financial decisions? What constitutes a wise financial 	<p>Advanced Algebra & Trigonometry (Coburn) 4.3 Logarithms and Logarithmic Functions 4.5 Applications from Business, Finance and Science 11.1 Sequences and Series 11.2 Arithmetic Sequences</p>	<p>Important Terms & Concepts (TN Finite Math, Chapter 9) Amortization, annual percentage rate, annual percentage yield, annuitization, annuity, bond, common stock, compound interest, current yield, depreciation, dividend, future value, interest, notes, present value, present value of</p>
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Curriculum and Instruction – Mathematics

Quarter 3

Applied Mathematical Concepts

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<p>AM.N.NQ.A.2 Recognize the importance of applying a financial model to business.</p> <p>AM.N.NQ.A.3 Determine future value and present value of an annuity.</p> <p>AM.N.NQ.A.4 Determine the amortization schedule for an annuity and a home mortgage.</p> <p>AM.N.NQ.B.5 Apply financial mathematics to depreciation schedules.</p> <p>AM.N.NQ.B.6 Solve contextual problems involving financial decision-making.</p> <p>AM.N.NQ.B.7 Apply arithmetic and geometric sequences to simple and compound interest, annuities, loans, and amortization.</p> <p>AM.N.NQ.B.8 Solve problems in mathematics of finance involving compound interest using exponential and logarithmic techniques.</p> <p>AM.N.NQ.C.9 Know when to use transcendental functions to accomplish various application purposes such as predicting population growth</p> <p>AM.N.NQ.C.10 Use orders of magnitude estimates for determining an appropriate model for a contextual situation.</p> <p>Domain: Problem Solving Cluster: Apply problem solving techniques to real-world situations. AM.A. PS.A.1 Apply problem solving strategies to real-world situations. <i>Strategies include, but are not limited to: making orderly lists or tables, drawing diagrams, considering simpler problems, looking for patterns, working backwards, guess and check, using logical reasoning, etc.</i></p>	<p>decision, and how do you make educated choices about spending? What are the elements or criteria for a solid financial plan?</p> <ul style="list-style-type: none"> • What do individuals need to know in order to make informed decisions about incurring debt? • Why is it important to understand the value, features, and planning process associated with saving and investing? How does someone choose the best investment and/or savings options to achieve financial security? <p>Objective(s): The student will:</p> <ul style="list-style-type: none"> • Solve financial problems that involve simple interest. • Solve problems involving compound interest. • Find the future value of an annuity, and the amount of payments to a sinking fund. • Find the future value of an annuity, and an installment payment on a loan. • Solve real-world problems involving the mathematics of finance. 	<p>11.3 Geometric Sequences</p> <p>Algebra & Trigonometry (Blitzer)</p> <p>4.4 Exponential and Logarithmic Functions 4.5 Exponential Growth and Decay; Modeling Data</p> <p>11.1 Sequences and Summation Notation 11.2 Arithmetic Sequences 11.3 Geometric Sequences and Series</p> <p>Tennessee Finite Math Textbook (Maki & Thompson)</p> <p>9-1 Interest Math Lab: Continuously Compounded Interest (p.322) 9-2 The Present Value of Future Payments 9-3 Time Payment, Amortization, and Mortgages 9-4 Evaluating Investment Options and Financial Decision Making</p> <p>Chapter 9 – The Finance of Mathematics</p> <p>9.1 Interest 9.2 Annuities and Future Value 9.3 Present Value of an Annuity; Amortization</p> <p>Additional Resource(s)</p> <p>Khan Academy: Orders of Magnitude Example 1 Khan Academy: Orders of Magnitude Example 2 Khan Academy: Sequences & Series Khan Academy: Finance and Capital Markets</p>	<p>an annuity, purchase at a premium, at a discount, or at par, redemption date, redemption value or face value, return on investment, simple interest, sinking fund, stated interest rate, stock split, straight-line method, sum of a geometric series, yield to maturity</p>



Curriculum and Instruction – Mathematics

Quarter 3

Applied Mathematical Concepts

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		<p> Khan Academy: Interest Basics Khan Academy: Compound Interest Basics Khan Academy: e and Compound Interest Khan Academy: Credit Cards & Loans Finite Math Assessments Financial Math Lessons Georgia Virtual Learning (Mathematics of Finance) Khan Academy: Introduction to Present Value Khan Academy: Present Value 2 Khan Academy: present Value 3 Khan Academy: Present Value 4 Khan Academy: Amortized Loans Khan Academy: Mortgage Loans </p> <p> Foundations U (Activities, Tools, Articles) </p> <p> Comap - A Course in Financial Mathematics <i>(request access at</i> http://www.comap.com/FloydVest/index.html <i>)</i> </p> <p> This is a free course in financial mathematics for upper high school and undergraduate students, with emphasis on personal finance. </p> <p> Financial Math Financial Math Comprehensive Curriculum Units 1- 5 Black Line Masters Financial Math Units 6-10 5 Black Line Masters Financial Math </p>



Curriculum and Instruction – Mathematics

Quarter 3

Applied Mathematical Concepts

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		<p>Task(s)</p> <p>Math Vision Project: Linear and Exponential Functions</p> <p><i>Task 5: Getting Down to Business</i></p> <p>GSE Algebra II/ Advanced Math: Unit 5 Exponential and Logarithmic Functions</p> <p><i>How Does Your Money Grow? p. 86</i></p>	

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Curriculum and Instruction – Mathematics

Quarter 3

Applied Mathematical Concepts

RESOURCE TOOLKIT

<p>Textbook Resources</p> <p>Advanced Algebra & Trigonometry (Coburn)</p> <p>Algebra & Trigonometry (Blitzer)</p> <p>Advanced Mathematical Concepts</p> <p>Elementary Statistics Textbook (Bluman)</p> <p>Stats Modeling the World</p> <p>Tennessee Finite Math (Maki & Thompson)</p>	<p>Standards</p> <p>Common Core Standards - Mathematics</p> <p>Common Core Standards - Mathematics Appendix A</p> <p>http://www.ccsstoolbox.org/</p> <p>Common Core Lessons</p> <p>Tennessee Mathematics Standards</p>	<p>Videos</p> <p>Khan Academy</p> <p>Illuminations (NCTM)</p> <p>Discovery Education</p> <p>The Futures Channel</p> <p>The Teaching Channel</p> <p>Teachertube.com</p> <p>FiniteHelp Lecture Videos</p> <p>Against All Odds Videos (with Study Guides) (A Video Series that introduces a statistical topic and illustrates it with a real-world example)</p>
<p>Calculator</p> <p>Texas Instruments Education</p> <p>TI-Nspired</p> <p>TICommonCore.com</p> <p>http://www.casioeducation.com/educators</p>	<p>Interactive Manipulatives</p> <p>Stat Trek</p> <p>Rossmanchance.com</p> <p>ACT & SAT</p> <p>TN ACT Information & Resources</p> <p>ACT College & Career Readiness Mathematics Standards</p> <p>ACT Academy</p> <p>SAT Connections</p> <p>SAT Practice from Khan Academy</p>	<p>Additional Sites</p> <p>MathBits (scroll down for Statistics 1 & 2)</p> <p>NCTM Math Illuminations</p> <p>Wolfram Math World</p> <p>Statistics Education Web</p> <p>Stat Trek</p> <p>Accelerated GSE Pre-Calculus Tasks: Unit 8: Inferences & Conclusions from Data</p> <p>Math Vision Project: Linear and Exponential Functions</p> <p>GSE Algebra II/ Advanced Math: Unit 5 Exponential and Logarithmic Functions</p>