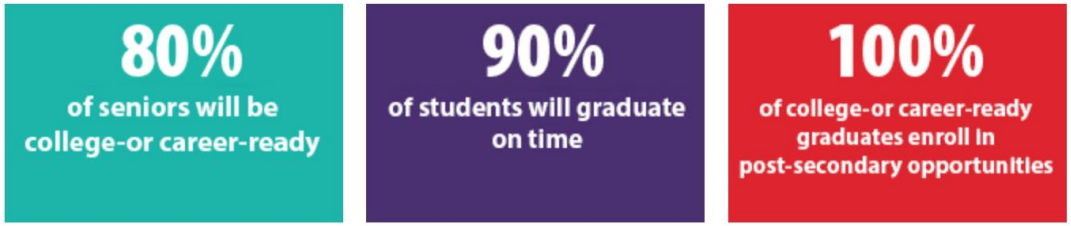
Quarter 1	Quarter 2	Quarter 3	Quarter 4
Linear Programming, Organizing and Interpreting Data, Data Descriptions	Probability and Counting Rules, Probability Distributions	Normal Probability Distribution, Confidence Intervals, Financial Mathematics	Financial Mathematics (cont.), Logic, Boolean Algebra
August 6 2018 – October 5, 2018	October 15, 2018 – December 19, 2018	January 7, 2019 – March 8, 2019	March 18, 2019 – May 23, 2019
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

Tennessee Academic Standards for Mathematics

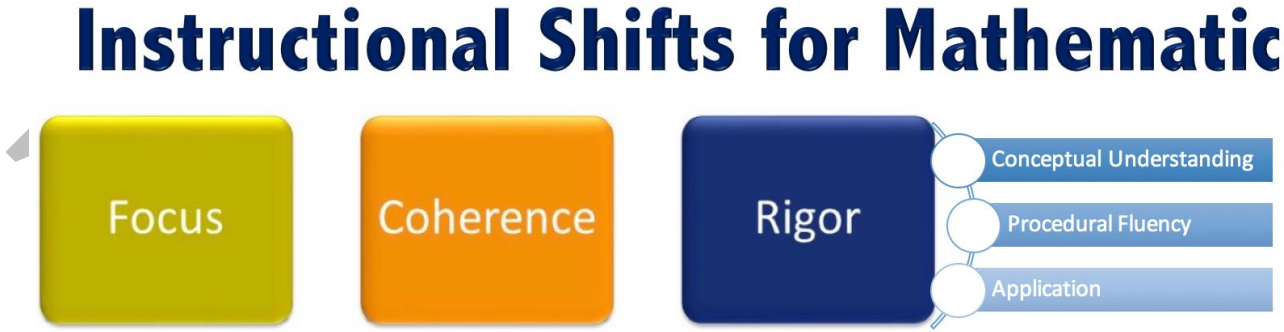
Introduction

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**.



Tennessee Academic Standards for Mathematics

The **Standards for Mathematical Practice** describe varieties of expertise, habits of minds and productive dispositions that mathematics educators at all levels should seek to develop in their students. These practices rest on important National Council of Teachers of Mathematics (NCTM) "processes and proficiencies" with longstanding importance in mathematics education. Throughout the year, students should continue to develop proficiency with the eight Standards for Mathematical Practice. The following are 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 them.
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.

This curriculum map is designed to help teachers make effective decisions about what mathematical content to teach so that ultimately our students can reach Destination 2025. 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.

Tennessee Mathematics Content Standards

Standards for Mathematical Practice

Literacy Skills for Mathematical Proficency

Tennessee Academic Standards for Mathematics

Structure of the Standards

Structure of the TN State Standards include:

- **Content Standards** - Statements of what a student should know, understand, and be able to do.
- **Clusters** - Groups of related standards. Cluster headings may be considered as the big idea(s) that the group of standards they represent are addressing. They are therefore useful as a quick summary of the progression of ideas that the standards in a domain are covering and can help teachers to determine the focus of the standards they are teaching.
- **Domains** - A large category of mathematics that the clusters and their respective content standards delineate and address. For example, Number and Operations – Fractions is a domain under which there are a number of clusters (the big ideas that will be addressed) along with their respective content standards, which give the specifics of what the student should know, understand, and be able to do when working with fractions.
- **Conceptual Categories** – The content standards, clusters, and domains in the 9th-12th grades are further organized under conceptual categories. These are very broad categories of mathematical thought and lend themselves to the organization of high school course work. For example, Algebra is a conceptual category in the high school standards under which are domains such as Seeing Structure in Expressions, Creating Equations, Arithmetic with Polynomials and Rational Expressions, etc.

Tennessee Academic Standards for Mathematics

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.

Tennessee Academic Standards for Mathematics

Topics Addressed in Quarter

- **Probability and Counting Rules**
- **Probability Distributions**

Overview

In this quarter students extend their work in probability and statistics by applying statistics ideas to real-world situations. They link classroom mathematics and statistics to everyday life, work, and decision-making, by applying these standards in modeling situations. They choose and use appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. First, students review/understand some common notation and terminology for sets and set operations which is helpful in explaining and understanding probability. Three key methods for counting particular elements of a set are partitions, tree diagrams, and the multiplication principle. The basic concepts of probability are expanded and further explained including probability experiments, sample spaces, the addition and multiplication rules, and the probabilities of complementary events. Students learn the rule for counting, the differences between permutations and combinations, and how to figure out how many different combinations for specific situations exist. Students will also investigate methods to study experiments for which partial advance information about outcomes is known, so methods to determine probabilities are developed.

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
Probability and Counting Rules **(Allow approximately 5 weeks for instruction, review, and assessment)**			
Domain: Counting and Combinatorial Reasoning **Cluster**: Apply probability and counting principles to real-world situations. **AM.D.CR.A.1** Use permutations, combinations, and the multiplication principle to solve counting problems. **AM.D.CR.A.2** Design and interpret simple experiments using tree-diagrams, permutations, and combinations. **AM.D.CR.A.3** Apply counting principles to probabilistic situations involving equally likely outcomes.	**Essential Question(s):** • How to use the laws of probability and simulation to make informed decisions? • How can large numbers based on a pattern be efficiently calculated to form probabilities? • How can you model a simulation to represent a real life situation? • How does theoretical probability relate to empirical probability? • How do mutually exclusive events affect probability calculations?	Elementary Statistics Textbook (Bluman) 4-1 Sample Spaces and Probability 4-2 The Addition Rules for Probability 4-3 The Multiplication Rules and Conditional Probability 4-4 Counting Rules Tennessee Finite Math (Maki & Thompson) 1.1 Review of Sets and Set Operations 1.2 Venn Diagrams and Partitions 1.3 Sizes of Sets	**Vocabulary/terms and concepts** Elementary Statistics Textbook (Bluman) classical probability, combination, complement of an event, compound event, conditional probability, dependent events, empirical probability, equally likely events, event, fundamental counting rule, independent events, law of large numbers, mutually exclusive events, outcome, permutation, probability, probability experiment, sample space, simple event, subjective probability, tree diagram, Venn diagrams Tennessee Finite Math (Maki & Thompson) (Chapter 1)

Tennessee Academic Standards for Mathematics

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
AM.D.CR.A.4 Solve counting problems by using Venn diagrams and show relationships modeled by the Venn diagram. **AM.D.CR.A.5** Use permutations and combinations to compute probabilities of compound events and solve problems. **Domain**: Organize and Interpret Data **Cluster:** Analyze data from multiple viewpoints and perspectives. **AM.D.ID.A.4** Calculate and interpret statistical problems using measures of central tendency and graphs. **AM.D.ID.A.5** Calculate expected value, e.g., to determine the fair price of an investment. **AM.D.ID.A.6** Analyze survey data using Venn diagrams. **AM.D.ID.A.7** Evaluate and compare two investments or strategies, where one investment or strategy is safer but has lower expected value. Include large and small investments and situations with serious consequences. **Domain**: Counting and Combinatorial Reasoning **Cluster:** Use combinatorial reasoning to solve real-world problems. **AM.D.CR.B.9** Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). **AM.D.CR.B.10** Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	• How do I represent and calculate payoff values in a game of chance? • How do I use expected values to make decisions? **Objective(s)** The student will: • Determine sample spaces and find the probability of an event using classical probability or empirical probability. • Explain what is meant by the Law of Large Numbers. • Find the probability of compound events using the addition rule of probability. • Find the probability of compound events using the multiplication rule of probability. • Find the conditional probability of an event. • Discuss the concept of independence. • Find the total number of outcomes in a sequence of events using the fundamental counting rule. • Find the number of ways that ***r*** objects can be selected from ***n*** objects, using the permutation rule. • Find the number of ways that ***r*** objects can be selected from ***n*** objects, without regard to order, using the combination rule.	1.4 Sets of Outcomes and Trees 2.1 Probabilities, Events, and Equally Likely Outcomes 2.2 Counting Arrangements: Permutations 2.3 Counting Partitions: Combinations 2.4 Computing Probabilities by Using Equally Likely Outcomes 3.1 Probability Measures: Axioms, and Properties 3.2 Conditional Probability and Independence 3.3 Stochastic Processes and Trees 3.4 Bayes Probabilities 3.5 Bernoulli Trials Stats Modeling the World Part IV – Randomness and Probability (Chapters 7- 10) **Additional Resource(s)** Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.) FiniteHelp Video- 2.1 FiniteHelp Video- 2.2 FiniteHelp Video- 2.3 FiniteHelp Video- 2.4 Finite Help Against All Odds Video -Introduction to Probability	Cartesian product, complement, De Morgan's law, disjoint sets, element, empty set, experiment, intersection, multiplication principle, number of elements in a set, pairwise disjoint, partition, partition principle, sample space, set, set equality, subset, tree diagram, union, universal set, Venn diagram (Chapter 2) Assignment of probabilities, binomial coefficients, combination principle, deductive method of assigning probabilities, dependent events, equally likely outcomes, equiprobable measures, event, experiment, mutually exclusive events, performance, permutation, permutation principle, probability of an event, probability of E, probability measure, relative frequency method of assigning probabilities, simple event, weight (Chapter 3) Axioms of a probability measure, Bayes probabilities, Bayes' Theorem, Bernoulli process, Bernoulli trial, conditional probability, equiprobable measure, independence, probability measure, properties of a probability measure, probabilities on trees, stochastic process **Elementary Statistics Textbook (Bluman)** *Statistics Today,* pp. 182, 245 *Critical Thinking Challenges*, p. 248 *Speaking of Statistics,* p. 240 *Applying the Concepts,* pp. 195, 203, 220, 232, 239 *Extending the Concepts,* pp.198, 207, 224, 235 *Data Projects*, p. 248 *TI-83/84 Step by Step*, pp. 207, 235	

Tennessee Academic Standards for Mathematics

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
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. *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.*	• Find the probability of an event using the counting rules.	(Against All Odds is a Video Series that introduces a statistical topic and illustrates it with a real-world example. There is a Student Guide that has guiding questions as students view the video.) Khan Academy: Probability **http://www.chino.k12.ca.us/Page/14848** Stat Trek **STatistics Education Web** Khan Academy: The Counting Principle **Task(s)** Law of Large Numbers Accelerated GSE Pre-Calculus Tasks- Unit 9: Probability (a collection of tasks/lessons)	**Tennessee Finite Math (Maki & Thompson)** **Section Exercise Sets,** pp.7-8; 13-14; 19-21; 27-29; 40-42; 47-49;.55-57; 60-61 **Chapter Exercises,** pp.30-31; 62-63
Probability Distributions **(Allow approximately 4 weeks for instruction, review, and assessment)**			
Domain: Counting and Combinatorial Reasoning **Cluster**: Apply probability and counting principles to real-world situations. **AM.D.CR.A.1** Use permutations, combinations, and the multiplication principle to solve counting problems. **AM.D.CR.A.2** Design and interpret simple experiments using tree-diagrams, permutations, and combinations. **AM.D.CR.A.3** Apply counting principles to probabilistic situations involving equally likely outcomes. **AM.D.CR.A.4** Solve counting problems by using Venn diagrams and show relationships modeled by the Venn diagram. **AM.D.CR.A.5** Use permutations and combinations to compute probabilities of	**Essential Question(s):** • What probability distribution patterns occur in real life situations? • How do you distinguish when to use the three distributions (Poisson, binomial, geometric)? • How do you apply your understanding of probability distribution to determine examples of it? **Objective(s):** The student will: • Construct a probability distribution for a random variable.	**Elementary Statistics Textbook (Bluman)** 5-1 Probability Distributions 5-2 Mean, Variance, Standard Deviation, and Expected Value 5-3 The Binomial Distribution 5-4 Other Types of Distributions 14-3 Simulation Techniques and Expected Value **Tennessee Finite Math (Maki & Thompson)** 4.1 Random Variables and Probability Density Functions 4.2 Expected Values and Standard Deviations of Random Variables	**Vocabulary** Binomial distribution, binomial experiment, discrete probability distribution, expected value, hypergeometric distribution, multinomial distribution, Poisson distribution, random variable Simulation technique, Monte Carlo method **Elementary Statistics Textbook (Bluman)** *Statistics Today*, pp. 252, 269, 295 *Critical Thinking Challenges*, p. 296 *Speaking of Statistics*, p.256, *Applying the Concepts*, pp. 276, 289 *Extending the Concepts,* pp. 259, 268, 279 *Data Projects*, p. 297

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
compound events and solve problems. **Domain**: Organize and Interpret Data **Cluster:** Analyze data from multiple viewpoints and perspectives. **AM.D.ID.A.4** Calculate and interpret statistical problems using measures of central tendency and graphs. **AM.D.ID.A.5** Calculate expected value, e.g., to determine the fair price of an investment. **AM.D.ID.A.6** Analyze survey data using Venn diagrams. **AM.D.ID.A.7** Evaluate and compare two investments or strategies, where one investment or strategy is safer but has lower expected value. Include large and small investments and situations with serious consequences. **Domain**: Counting and Combinatorial Reasoning **Cluster:** Use combinatorial reasoning to solve real-world problems. **AM.D.CR.B.7** Discuss the various examples and consequences of innumeracy; consider poor estimation, improper experimental design, inappropriate comparisons, and scientific notation comparisons. **AM.D.CR.B.8** Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. ***a.*** Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food*	• Find the mean, variance, standard deviation, and expected value for a discrete random variable. • Construct a probability distribution for a random variable using a simulation. • Find the expected value of the simulation. • Find the exact probability for **X** successes in ***n*** trials of a binomial experiment. • Find the mean, variance, and standard deviation for the variable of a binomial distribution. • Find the probabilities for outcomes of variables, using Poisson, hypergeometric, and multinomial distributions.	4.3 Normal Random Variables and the Normal Approximation to the Binomial Calculator Exercise; Graph a Normal Distribution, p.135 Stats Modeling the World **Additional Resource(s)** Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.) Against All Odds Video- Probability Models Against All Odds Video – Random Variables Against All Odds Video – Binomial Distributions Khan Academy: Discrete and continuous random variables and probability models Khan Academy-: Summarizing Spread of Distributions Video Overview of Discrete Probability Distributions Examples of Discrete Probability Distributions Stat Trek **ST**atistics **E**ducation **W**eb	*TI-83/84 Step by Step*, pp. 269, 281, 291 **Tennessee Finite Math (Maki & Thompson)** Approximation method, binomial random variable, density function, expected value, expected value of a binomial random variable, mean, normal approximation to a binomial random variable, normal random variable, random variable, standard deviation, standard normal curve, standard normal random variable, variance, variance of a binomial random variable **Tennessee Finite Math (Maki & Thompson)** **Section Exercise Sets,** pp.112-114; 121-123; 143-144 **Chapter Exercises,** pp.145-147

Tennessee Academic Standards for Mathematics

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
restaurant. ***b.*** Evaluate and compare strategies on the basis of expected values. *For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.* **AM.D.CR.B.9** Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). **AM.D.CR.B.10** Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game). **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. *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.*			

RESOURCE TOOLBOX		
Textbook Resources Advanced Algebra & Trigonometry (Coburn) Algebra & Trigonometry (Blitzer) **Elementary Statistics Textbook (Bluman)** Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.) Stats Modeling the World Tennessee Finite Math (Maki & Thompson)	**Standards** Common Core Standards - Mathematics Common Core Standards - Mathematics Appendix A http://www.ccsstoolbox.org/ Common Core Lessons Tennessee Mathematics Standards	**Videos** Khan Academy Illuminations (NCTM) Discovery Education The Futures Channel The Teaching Channel Teachertube.com FiniteHelp Lecture Videos APStats Guy Against All Odds Videos (with Study Guides) (A Video Series that introduces a statistical topic and illustrates it with a real-world example)
Calculator Texas Instruments Education TI-Nspired http://www.atomiclearning.com/ti_84 TICommonCore.com http://www.casioeducation.com/educators	**Interactive Manipulatives** Stat Trek Rossmanchance.com **ACT** TN ACT Information & Resources ACT College & Career Readiness Mathematics Standards	**Additional Sites** NCTM Math Illuminations Math is Fun Wolfram Math World Stat Trek **ST**atistics **E**ducation **W**eb Accelerated GSE Pre-Calculus Tasks: Unit 9-Probability http://www.edutoolbox.org/tntools (formerly tncore.org)

Tennessee Academic Standards for Mathematics