

Quar	rter 1	Quar	rter 2	Quai	rter 3	Quai	
and Statisti	of Probability cs, Frequency ns and Graphs, iption	Rules, Discr	and Counting rete Probability s, The Normal		tributions, Intervals and e, Hypothesis	Proportions Variances,	wo Means, Two s, and Two Other Chi- ts, Correlation
August 12, 2019 -	October 11, 2019	October 21, 2019 – D	ecember 20, 2019	January 6, 2020	- March 13, 2020	March 23, 202	0 – May 22, 2020
S.ID.A.1	S.IC.A.3	S.CP.A.1	S.MD.B.10	S.MD.A.6		S.ID.B.10	
S.ID.A.2	S.IC.A.4	S.CP.A.2		S.MD.A.8		S.ID.B.11	
S.ID.A.3	S.IC.A.5	S.CP.A.3		S.MD.B.10		S.ID.B.12	
S.ID.A.4	S.IC.B.8	S.CP.B.4		S.IC.A.6		S.ID.B.13	
S.ID.A.5	S.IC.B.9	S.CP.B.5		S.IC.A.7		S.MD.A.8	
S.ID.A.6	S.IC.B.10	S.MD.A.1		S.IC.C.14		S.IC.B.12	
S.ID.A.7	S.IC.B.11	S.MD.A.2		S.IC.D.15			
S.ID.A.8	S.IC.C.13	S.MD.A.3		S.IC.D.16			
S.ID.A.9		S.MD.A.4		S.IC.D.17			
S.MD.B.9		S.MD.A.5		S.IC.E.18			
S.MD.B.10		S.MD.A.6		S.IC.E.19			
S.IC.A.1		S.MD.A.7a & b		S.IC.E.20			
S.IC.A.2		S.MD.A.8					



Quarter 3 Statistics

### 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?

80% of seniors will be college-or career-ready

90% of students will graduate on time

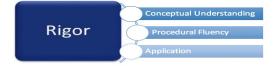
100%
of college-or career-ready
graduates enroll in
post-secondary opportunities

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**

Focus

Coherence



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 Sckills for Mathematical Proficency



Quarter 3 Statistics

### **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.



Quarter 3 Statistics

### **Topics Addressed in Quarter**

- Normal Distributions
- Confidence Intervals and Sample Size
- Hypothesis Testing

### **Overview**

In this quarter students finish their study of normal distributions 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 classify the type of errors that can occur during experiments and will be able to make decisions on the hypothesis based on their own analysis of the data. Students will also be exposed to the level of significance and how this affects a decision to accept or deny a hypothesis.

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUP	PPORT & RESOURCES	
Chapter 6 (Sections 3 & 4)  Normal Distributions  (Allow approximately 2 weeks for instruction, review, and assessment)				
Domain: Making Inferences and Justifying Conclusions  Cluster: Know the characteristics of well-designed studies.  S.IC.A.6 Describe the sampling distribution of	<ul> <li>Essential Question(s):</li> <li>How do all normal distributions relate to each other?</li> <li>How can we find examples of normal</li> </ul>	Elementary Statistics Textbook (Bluman) 6-3 Central Limit Theorem  Additional Resource(s)	Vocabulary (Sections 6-3 & 6-4) sampling distribution of sample means, Sampling error, standard error of the mean, central limit theorem, correction for continuity	
a statistic and define the standard error of a statistic.  S.IC.A.7 Demonstrate an understanding of the Central Limit Theorem.	distribution in real world scenarios?  Objective(s) The student will:	Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.)	Elementary Statistics Textbook (Bluman) Statistics Today, p. 350 Critical Thinking Challenges, p. 352	
Domain: Using Probability to Make Decisions Cluster: Understand the normal probability distribution.	<ul> <li>Use the Central Limit Theorem to solve problems involving sample means for large samples.</li> </ul>	Khan Academy: Central Limit Theorem  STatistics Education Web: Who Sends the  Most Text Messages (This lesson provides an informal introduction to concepts surrounding the Central Limit Theorem.)	Applying the Concepts, pp. 338, 346 Extending the Concepts, pp.340, 347 Data Projects, p. 397	



TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES
S.MD.B.10 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.	CONTENT	Task(s)  Statistics Applet-Sampling Distributions  Accelerated GSE Pre-Calculus Tasks: Unit 8: Inferences & Conclusions from Data  Colors of Skittles, p. 120 Pennies, p.142 The Gettysburg's Address, p. 156
Domain: Using Probability to Make Decisions Cluster: Understand and use discrete probability distributions. S.MD.A.6 Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.  Domain: Using Probability to Make Decisions Cluster: Understand the normal probability distribution. S.MD.B.10 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.	Essential Question(s):  How do all Normal distributions relate to each other?  How can we find examples of normal distribution in real world scenarios?  Objective(s) The student will:  Use the normal approximation to compute probabilities for a binomial variable	Elementary Statistics Textbook (Bluman) 6-4 The Normal Approximation to the Binomial Distribution  Additional Resource(s) Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.) Against All Odds Videos & Lessons: Normal Curves Against All Odds Videos & Lessons: Normal Calculations STatistics Education Web  Task(s) Statistics Applet: Normal to Binomial



TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUB	PORT & RESOURCES
IN STATE STANDARDS		Intervals and Sample Size	FORT & RESOURCES
	the contract of the contract o	·	
Domain: Making Inferences and Justifying Conclusions  Cluster: Make inferences about population parameters based on a random sample from that population.  S.IC.C.14 Use properties of point estimators, including biased/unbiased, and variability.  Domain: Making Inferences and Justifying Conclusions  Cluster: Understand and use confidence intervals.  S.IC.D.15 Understand the meaning of confidence level, of confidence intervals, and the properties of confidence intervals.  S.IC.D.16 Construct and interpret a large sample confidence interval for a proportion and for a difference between two proportions.  S.IC.D.17 Construct the confidence interval for a mean and for a difference between two means.  Domain: Using Probability to Make Decisions  Cluster: Understand and use discrete probability distributions.  S.MD.A.8 Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	<ul> <li>(Allow approximately 3 weeks for Essential Question(s):</li> <li>How do I interpret the margin of error of a confidence interval?</li> <li>How do I use a margin of error to find a confidence interval?</li> <li>Objective(s) The student will:</li> <li>Find the confidence interval for the mean when σ is known and sample size is large.</li> <li>Determine the minimum sample size for fining a confidence interval for the mean.</li> </ul>	Elementary Statistics Textbook (Bluman) 7-1 Confidence Intervals for the Mean When σ is Known  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	Vocabulary (Chapter 7): 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  Elementary Statistics Textbook (Bluman) Statistics Today, pp. 356, 395 Critical Thinking Challenges, p. 397 Speaking of Statistics, pp. 381, 385 Applying the Concepts, pp. 365, 373, 381, 390 Extending the Concepts, pp. 375, 383, 391 Data Projects, p. 397 TI-83/84 Step by Step, pp. 368, 376, 384, 391



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TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT &	RESOURCES
<b>Domain:</b> Making Inferences and Justifying Conclusions			
Cluster: Use distributions to make inferences about a data set.			
S.IC.E.20 Interpret the t-distribution and determine the appropriate degrees of freedom.			
<b>Domain:</b> Making Inferences and Justifying Conclusions			
Cluster: Make inferences and justify conclusions from sample surveys, experiments, and observational studies (CCSS) S.IC.B.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.			
Domain: Making Inferences and Justifying Conclusions Cluster: Understand and use confidence intervals. S.IC.D.15 Understand the meaning of confidence level, of confidence intervals, and	<ul> <li>Objective(s) The student will: <ul> <li>Find the confidence interval for the mean when σ is unknown and sample size is small.</li> </ul> </li> </ul>	Elementary Statistics Textbook (Bluman) 7-2 Confidence Intervals for the Mean When σ is Unknown  Additional Resource(s)  Elementary Statistics 7th edition Bluman	
the properties of confidence intervals.  S.IC.D.16 Construct and interpret a large sample confidence interval for a proportion and for a difference between two proportions.		(PowerPoints, Chapter PDF files, Solutions Manual, etc.)  Against All Odds Videos & Lessons	
S.IC.D.17 Construct the confidence interval for a mean and for a difference between two means.  Domain: Using Probability to Make Decisions		Understanding Confidence Intervals Video  STatistics Education Web	



TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES
	CONTENT	Task(s)
<b>Cluster:</b> Understand and use discrete probability distributions.		It Creeps. It Crawls. Watch Out For the Blob!
S.MD.A.8 Analyze decisions and strategies		
using probability concepts (e.g., product		
testing, medical testing, pulling a hockey goalie at the end of a game).		
goalle at the end of a game).		
Domain: Making Inferences and Justifying		
Conclusions		
Cluster: Make inferences and justify		
conclusions from sample surveys, experiments, and observational studies		
(CCSS) S.IC.B.4 Use data from a		
sample survey to estimate a population mean or proportion; develop a margin of error		
through the use of simulation models for		
random sampling.		
<b>Domain</b> : Making Inferences and Justifying Conclusions	Objective(s) The student will:	Elementary Statistics Textbook (Bluman)
Cluster: Understand and use confidence	Find the confidence interval for a	7-3 Confidence Intervals and Sample Size for Proportions
intervals.	proportion.	1 Toportions
S.IC.D.15 Understand the meaning of confidence level, of confidence intervals, and	Determine the minimum sample size for	Additional Resource(s)
the properties of confidence intervals.	finding a confidence interval for a proportion.	Elementary Statistics 7th edition Bluman
S.IC.D.16 Construct and interpret a large	p. op. c. d. c.	(PowerPoints, Chapter PDF files, Solutions
sample confidence interval for a proportion		Manual, etc.)
and for a difference between two proportions.  S.IC.D.17 Construct the confidence interval for		Against All Odds Videos & Lessons  STatistics Education Web
a mean and for a difference between two		STAUSTICS Education Web
means.		
		Task(s) What Percent of the Continental US is Within
Domain: Using Probability to Make Decisions		One Mile of a Road?



TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES
Cluster: Understand and use discrete probability distributions.  S.MD.A.8 Analyze decisions and strategies using probability concepts (e.g., product		
testing, medical testing, pulling a hockey goalie at the end of a game).		
<b>Domain</b> : Making Inferences and Justifying Conclusions		
Cluster: Make inferences and justify conclusions from sample surveys, experiments, and observational studies		
(CCSS) <u>S.IC.B.4</u> Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.		
<b>Domain</b> : Making Inferences and Justifying Conclusions	Objective(s) The student will:	Elementary Statistics Textbook (Bluman)
Cluster: Understand and use confidence intervals.	Find the confidence interval for a variance and a standard deviation using Chi-Square.	7-4 Confidence Intervals for Variances and Standard Deviations (OPTIONAL)
S.IC.D.15 Understand the meaning of confidence level, of confidence intervals, and	Gili-Square.	Additional Resource(s)
the properties of confidence intervals.  S.IC.D.16 Construct and interpret a large		Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions
sample confidence interval for a proportion and for a difference between two proportions.		Manual, etc.) Against All Odds Videos & Lessons
S.IC.D.17 Construct the confidence interval for a mean and for a difference between two		STatistics Education Web
means. <b>Domain</b> : Making Inferences and Justifying Conclusions		Task(s)  Accelerated GSE Pre-Calculus Tasks: Unit 8:  Inferences & Conclusions from Data  How Confident Are You? p. 177



TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUF	PORT & RESOURCES
<b>Cluster:</b> Use distributions to make inferences about a data set.			
S.IC.E.18 Apply the properties of a Chi-square distribution in appropriate situations			
in order to make inferences about a data set.			
Domain: Using Probability to Make Decisions			
Cluster: Understand and use discrete probability distributions.			
S.MD.A.8 Analyze decisions and strategies using probability concepts (e.g., product			
testing, medical testing, pulling a hockey goalie at the end of a game).			
<b>Domain</b> : Making Inferences and Justifying Conclusions			
Cluster: Make inferences and justify conclusions from sample surveys, experiments, and observational studies			
(CCSS) S.IC.B.4 Use data from a			
sample survey to estimate a population mean or proportion; develop a margin of error			
through the use of simulation models for random sampling.			
	Chapter 8 - Hy	l pothesis Testing	
	(Allow approximately 4 weeks for	instruction, review, and assessment)	
<b>Domain:</b> Making Inferences and Justifying Conclusions	Essential Question(s):  How do you use statistical ideas to test	Elementary Statistics Textbook (Bluman)	Vocabulary (Chapter 8): α (alpha) alternative, hypothesis β (beta) chi-
Cluster: Understand and evaluate random	assumptions about data?	8-1 Steps in Hypothesis Testing—Traditional	square test, critical or rejection region, critical
processes underlying statistical experiments	How are results of hypothesis testing	Method	value, hypothesis testing, left-tailed test, level of
processes underlying statistical experiments	How are results of hypothesis testing		significance, noncritical or nonrejection region, SCS 2018/2019



TH CTATE CTANDARDS	CONTENT	INCTRUCTIONAL CUR	DODT & DECOUDATA
TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUP	
(CCSS) S.IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.	<ul> <li>used for statistical inference?</li> <li>How do we test the differences between two population parameters?</li> </ul>	Additional Resource(s)  Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.)  Against All Odds Videos & Lessons	null hypothesis, one-tailed test, power of a test, <i>P</i> -value, research hypothesis, right-tailed test, statistical hypothesis, statistical test, test value, <i>t</i> test, two-tailed test, type I error, type II error, z test
Domain: Using Probability to Make Decisions Cluster: Understand and use discrete probability distributions. S.MD.A.8 Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	Objective(s): The student will:  Understand the definitions used in hypothesis testing.  State the null and alternative hypotheses.  State the five steps used in hypothesis testing.	Khan Academy: Simple Hypothesis Testing  STatistics Education Web	Elementary Statistics Textbook (Bluman) Statistics Today, pp. 400, 465 Critical Thinking Challenges, p. 467 Speaking of Statistics, pp. 414, 433 Applying the Concepts, pp. 412, 421, 433, 441, 453, 460 Extending the Concepts, pp. 424, 443
(Domain: Making Inferences and Justifying Conclusions  Cluster: Understand and evaluate random processes underlying statistical experiments  (CCSS) S.IC.A.1 Understand statistics as a	Objective(s): The student will:  Test means when σ is known and sample size is large, using a z-test.	Elementary Statistics Textbook (Bluman) 8-2 z-Test for a Mean  Additional Resource(s)  Elementary Statistics 7th edition Bluman	Data Projects, p. 468 TI-83/84 Step by Step, pp. 426, 436, 444, 456
process for making inferences about population parameters based on a random sample from that population.  Domain: Making Inferences and Justifying		(PowerPoints, Chapter PDF files, Solutions Manual, etc.)  Against All Odds Videos & Lessons  STatistics Education Web	
Conclusions  Cluster: Use distributions to make inferences about a data set.  S.IC.E.19 Apply the properties of the normal distribution in appropriate situations in order to make inferences about a data set.  Domain: Using Probability to Make Decisions			



TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES
Cluster: Understand and use discrete probability distributions.  S.MD.A.8 Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).  (CCSS) S.IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.  Domain: Making Inferences and Justifying Conclusions  Cluster: Use distributions to make inferences about a data set.  S.IC.E.19 Apply the properties of the normal distribution in appropriate situations in order to make inferences about a data set.  Domain: Using Probability to Make Decisions  Cluster: Understand and use discrete probability distributions.  S.MD.A.8 Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	The student will:  Test means when $\sigma$ is unknown and sample size is small, using a t-test.	Elementary Statistics Textbook 8-3 t-Test for a Mean  Additional Resource(s) Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.) Against All Odds Videos & Lessons STatistics Education Web
((CCSS) S.IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.  Domain: Making Inferences and Justifying Conclusions	The student will:  Test proportions, using a z-test.	Elementary Statistics Textbook 8-4 z Test for a Proportion  Additional Resource(s)  Elementary Statistics 7th edition Bluman



TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
Cluster: Use distributions to make inferences		(PowerPoints, Chapter PDF files, Solutions	
about a data set.		Manual, etc.)	
S.IC.E.19 Apply the properties of the normal distribution in appropriate situations in		Against All Odds Videos & Lessons	
order to make inferences about a data set.		STatistics Education Web	
<b>Domain:</b> Using Probability to Make Decisions		Task(s)	
Cluster: Understand and use discrete probability distributions.		I Always Feel Like Somebody's Watching Me Part I on Hypothesis Testing	
S.MD.A.8 Analyze decisions and strategies using probability concepts (e.g., product			
testing, medical testing, pulling a hockey goalie at the end of a game).			
(CCSS) S.IC.A.1 (See above)	The student will:	Elementary Statistics Textbook	
S.IC.E.19	Test variances or standard deviations	8-5 Chi Square Test for a Variance and a	
<u>S.MD.A.8</u>	using the chi-square test.	Standard Deviation (OPTIONAL)	
		Additional Resource(s)	
		Elementary Statistics 7th edition Bluman	
		(PowerPoints, Chapter PDF files, Solutions Manual, etc.)	
		Against All Odds Videos & Lessons	
		STatistics Education Web	
(CCSS) S.IC.A.1 (See above)	The student will:	Elementary Statistics Textbook	
S.IC.E.19	Explain the relationship between Type I and	8-6 Additional Topics Regarding Hypothesis	
<u>S.MD.A.8</u>	Type II errors and the power of a test.	Testing	
		Additional Resource(s)	
		Elementary Statistics 7th edition Bluman	



TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES
		(PowerPoints, Chapter PDF files, Solutions Manual, etc.)  Against All Odds Videos & Lessons  STatistics Education Web

Elementary Statistics 7th edition Bluman (Includes PowerPoints, Chapter PDF files, Solutions Manual, etc.)  Calculator  Con The Con Ten	tandards ommon Core Standards - Mathematics ommon Core Standards - Mathematics Appendix A the Mathematics Common Core Toolbox ommon Core Lessons ennessee Academic Standards for Mathematics uteractive Manipulatives tat Trek	Videos  Against All Odds Videos (with Study Guides) (A Video Series that introduces a statistical topic and illustrates it with a real-world example.)  Khan Academy  Additional Sites
	mStat.org pplet Collection	Statistics Teacher (https://www.statisticsteacher.org/)  (An online journal published by the American Statistical Association – National Council of Teachers of Mathematics Joint Committee on Curriculum in Statistics and Probability for Grades K-12.)  The Data and Story Library  Fed Stats  Bureau of Labor Statistics  Educational Statistics  NCTM Math Illuminations  United States Census Bureau  STatistics Education Web  Illustrative Math – Statistics & Probability Tasks  Mathematics Vision Project: Modeling Data  Georgia Standards of Excellence: Unit 9 Probability  Georgia Standards of Excellence: Unit 8: Inferences & Conclusions from Data  Edutoolbox (formerly TNCore)



TN ACT Information & Resources
ACT College & Career Readiness Mathematics Standards
SAT Connections
SAT Practice from Khan Academy

