

Tennessee's State Mathematics Standards | Statistics

	Domain	Cluster	Standard
Exploring Data	Interpreting Categorical and Quantitative Data (S-ID)	Understand, represent, and use univariate data.	<ol style="list-style-type: none"> Understand the term 'variable' and differentiate between the data types: measurement, categorical, univariate and bivariate. Understand histograms, parallel box plots, and scatterplots, and use them to display and compare data. Summarize distributions of univariate data. Compute basic statistics and understand the distinction between a statistic and a parameter. For univariate measurement data, be able to display the distribution, describe its shape; select and calculate summary statistics. Recognize how linear transformations of univariate data affect shape, center, and spread. Analyze the effect of changing units on summary measures. Construct and analyze frequency tables and bar charts. Describe individual performances in terms of percentiles, z-scores, and t-scores.
		Understand, represent, and use bivariate data.	<ol style="list-style-type: none"> Explore categorical data. Display and discuss bivariate data where at least one variable is categorical. For bivariate measurement data, be able to display a scatterplot and describe its shape; use technological tools to determine regression equations and correlation coefficients. Identify trends in bivariate data; find functions that model the data and that transform the data so that they can be modeled.
Probability	Conditional Probability and the Rules of Probability (S-CP)	Understand and apply basic concepts of probability.	<ol style="list-style-type: none"> Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). Use permutations and combinations to compute probabilities of compound events and solve problems. Demonstrate an understanding of the Law of Large Numbers (Strong and Weak).
		Use the rules of probability to compute probabilities of compound events in a uniform probability model.	<ol style="list-style-type: none"> Demonstrate an understanding of the addition rule, the multiplication rule, conditional probability, and independence. Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)$, and interpret the answer in terms of the model.

Probability Distributions

Domain	Cluster	Standard
Using Probability to Make Decisions (S-MD)	Understand and use discrete probability distributions.	<ol style="list-style-type: none"> 1. Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions. 2. Calculate the expected value of a random variable; interpret it as the mean of the probability distribution. 3. Design a simulation of random behavior and probability distributions. 4. Analyze discrete random variables and their probability distributions, including binomial and geometric. 5. Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. <i>For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.</i> 6. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. <i>For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?</i> 7. Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. <ol style="list-style-type: none"> a. Find the expected payoff for a game of chance. <i>For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.</i> b. Evaluate and compare strategies on the basis of expected values. <i>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.</i> 8. Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). 9. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).
	Understand the normal probability distribution.	<ol style="list-style-type: none"> 10. Calculate the mean (expected value) and standard deviation of both a random variable and a linear transformation of a random variable. 11. 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.

Sampling and Experimentation

Domain	Cluster	Standard
Making Inferences and Justifying Conclusions (S-IC)	Know the characteristics of well-designed studies.	<ol style="list-style-type: none"> 1. Understand the differences among various kinds of studies and which types of inferences can be legitimately drawn from each. 2. Compare census, sample survey, experiment, and observational study. 3. Describe the role of randomization in surveys and experiments. 4. Demonstrate an understanding of bias in sampling. 5. Describe the sampling distribution of a statistic and define the standard error of a statistic. 6. Demonstrate an understanding of the Central Limit Theorem.
	Design and conduct a statistical experiment to study a problem, then interpret and communicate the outcomes.	<ol style="list-style-type: none"> 7. Select a method to collect data and plan and conduct surveys and experiments. 8. Compare and use sampling methods, including simple random sampling, stratified random sampling, and cluster sampling. 9. Test hypotheses using appropriate statistics. 10. Analyze results and make conclusions from observational studies, experiments, and surveys. 11. Evaluate reports based on data.
	Make inferences about population parameters based on a random sample from that population.	<ol style="list-style-type: none"> 12. Develop and evaluate inferences and predictions that are based on data. 13. Use properties of point estimators, including biased/unbiased, and variability.
	Understand and use confidence intervals.	<ol style="list-style-type: none"> 14. Understand the meaning of confidence level, of confidence intervals, and the properties of confidence intervals. 15. Construct and interpret a large sample confidence interval for a proportion and for a difference between two proportions. 16. Construct the confidence interval for a mean and for a difference between two means.
	Use distributions to make inferences about a data set.	<ol style="list-style-type: none"> 17. Apply the properties of a Chi-square distribution in appropriate situations in order to make inferences about a data set. 18. Apply the properties of the normal distribution in appropriate situations in order to make inferences about a data set. 19. Interpret the t-distribution and determine the appropriate degrees of freedom.