Tennessee Mathematics Standards

Approved July 30, 2010

Statistics
#3136

Standard 1 – Mathematical Processes

Course Level Expectations

CLE 3136.1.1 Use mathematical language, symbols, definitions, proofs and counterexamples correctly and precisely in mathematical reasoning.
CLE 3136.1.2 Apply and adapt a variety of appropriate strategies to problem solving, including testing cases, estimation, and then checking induced errors and the reasonableness of the solution.
CLE 3136.1.3 Develop inductive and deductive reasoning to independently make and evaluate mathematical arguments and construct appropriate proofs; include various types of reasoning, logic, and intuition.
CLE 3136.1.4 Move flexibly between multiple representations (contextual, physical, written, verbal, iconic/pictorial, graphical, tabular, and symbolic), to solve problems, to model mathematical ideas, and to communicate solution strategies.
CLE 3136.1.5 Recognize and use mathematical ideas and processes that arise in different settings, with an emphasis on formulating a problem in mathematical terms, interpreting the solutions, mathematical ideas, and communication of solution strategies.
CLE 3136.1.6 Employ reading and writing to recognize the major themes of mathematical processes, the historical development of mathematics, and the connections between mathematics and the real world.
CLE 3136.1.7 Use technologies appropriately to develop understanding of abstract mathematical ideas, to facilitate problem solving, and to produce accurate and reliable models.

Check for Understanding (Formative/Summative Assessment)
- ✓ 3136.1.1 Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
- ✓ 3136.1.2 Select and use appropriate statistical methods to analyze data.
- ✓ 3136.1.3 Compute statistics and analyze data using various statistical tools, with appropriate technology.
- ✓ 3136.1.4 Analyze data/statistical analysis from newspaper and other sources.

Standard 2 – Exploring Data

Course Level Expectations

CLE 3136.2.1 Understand histograms, parallel box plots, and scatterplots, and use them to compare display data.
CLE 3136.2.2 Summarize distributions of univariate data
CLE 3136.2.3 Explore bivariate data
CLE 3136.2.4 Explore categorical data

Check for Understanding (Formative/Summative Assessment)
- ✓ 3136.2.1 Understand the term 'variable' and differentiate between the data types: measurement, categorical, univariate and bivariate.
- ✓ 3136.2.2 Compute basic statistics and understand the distinction between a statistic and a parameter.
- ✓ 3136.2.3 For univariate measurement data, be able to display the distribution, describe its shape; select and calculate summary statistics.
- ✓ 3136.2.4 For bivariate measurement data, be able to display a scatterplot and describe its shape; use technological tools to determine regression equations and correlation coefficients.
- ✓ 3136.2.5 Display and discuss bivariate data where at least one variable is categorical.
- ✓ 3136.2.6 Recognize how linear transformations of univariate data affect shape, center, and spread.
- ✓ 3136.2.7 Identify trends in bivariate data; find functions that model the data and that transform the data so that they can be modeled.
- ✓ 3136.2.8 Analyze the effect of changing units on summary measures
- ✓ 3136.2.9 Construct and analyze frequency tables and bar charts

Standard 3 – Sampling & Experimentation

Course Level Expectations

CLE 3136.3.1 Understand the differences among various kinds of studies and which types of inferences can be legitimately drawn from each.
CLE 3136.3.2 Select a method to collect data and plan and conduct surveys and experiments.
CLE 3136.3.3 Analyze results and make conclusions from observational studies, experiments, and surveys.

Check for Understanding (Formative/Summative Assessment)
- ✓ 3136.3.1 Compare census, sample survey, experiment, and observational study.
- ✓ 3136.3.2 Describe the role of randomization in surveys and experiments.
- ✓ 3136.3.3 Demonstrate an understanding of bias in sampling.
- ✓ 3136.3.4 Compare and use sampling methods, including simple random sampling, stratified random sampling, and cluster sampling.
- ✓ 3136.3.5 Know the characteristics of well-designed studies.

✓ 3136.3.6 Design and conduct a statistical experiment to study a problem, then interpret and communicate the outcomes.
✓ 3136.3.7 Test hypotheses using appropriate statistics.

Standard 4 – Anticipating Patterns

Course Level Expectations:

CLE 3136.4.1 Understand and apply basic concepts of probability.
CLE 3136.4.2 Design appropriate probability models.
CLE 3136.4.3 Understand the normal distribution.
CLE 3136.4.4 Describe the sampling distribution of a statistic and define the standard error of a statistic.

Check for Understanding (Formative/Summative Assessment)
✓ 3136.4.1 Demonstrate an understanding of the Law of Large Numbers (Strong and Weak).
✓ 3136.4.2 Demonstrate an understanding of the addition rule, the multiplication rule, conditional probability, and independence.
✓ 3136.4.3 Design a simulation of random behavior and probability distributions.
✓ 3136.4.4 Analyze discrete random variables and their probability distributions, including binomial and geometric.
✓ 3136.4.5 Calculate the mean (expected value) and standard deviation of both a random variable and a linear transformation of a random variable.
✓ 3136.4.6 Demonstrate an understanding of the Central Limit Theorem.

Standard 5 – Statistical Inference

Course Level Expectations

CLE 3136.5.1 Develop and evaluate inferences and predictions that are based on data.
CLE 3136.5.2 Understand and use confidence intervals.

Check for Understanding (Formative/Summative Assessment)
✓ 3136.5.1 Use properties of point estimators, including biased/unbiased, and variability.
✓ 3136.5.2 Understand the meaning of confidence level, of confidence intervals, and the properties of confidence intervals.
✓ 3136.5.3 Describe individual performances in terms of percentiles, z-scores, and t-scores.
✓ 3136.5.4 Construct and interpret a large sample confidence interval for a proportion and for a difference between two proportions.
✓ 3136.5.5 Construct the confidence interval for a mean and for a difference between two means.

- ✓ 3136.5.6 Apply the properties of a Chi-square distribution in appropriate situations in order to make inferences about a data set.
- ✓ 3136.5.7 Apply the properties of the normal distribution in appropriate situations in order to make inferences about a data set.
- ✓ 3136.5.8 Interpret the t-distribution and determine the appropriate degrees of freedom.