Texas Mathematics

Statistics

Adopted 2015

Mathematical process standards

1. The student uses mathematical processes to acquire and demonstrate mathematical understanding S.9-12.1

(A) apply mathematics to problems arising in everyday life, society, and the workplace S.9-12.1.A

(B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution S.9-12.1.B

(C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems S.9-12.1.C

(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate S.9-12.1.D

(E) create and use representations to organize, record, and communicate mathematical ideas S.9-12.1.E

(F) analyze mathematical relationships to connect and communicate mathematical ideas S.9-12.1.F

(G) display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication S.9-12.1.G

Statistical process sampling and experimentation

2. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study S.9-12.2

(A) compare and contrast the benefits of different sampling techniques, including random sampling and convenience sampling methods S.9-12.2.A

(B) distinguish among observational studies, surveys, and experiments S.9-12.2.B

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	(C) analyze generalizations made from observational studies, surveys, and experiments S.9-12.2.C
	(D) distinguish between sample statistics and population parameters S.9-12.2.D
	(E) formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions S.9-12.2.E
	(F) communicate methods used, analyses conducted, and conclusions drawn for a data-analysis project through the use of one or more of the following: a written report, a visual display, an oral report, or a multi-media presentation S.9-12.2.F
	(G) critically analyze published findings for appropriateness of study design implemented, sampling methods used, or the statistics applied S.9-12.2.G
Variability	**3.** The student applies the mathematical process standards when describing and modeling variability S.9-12.3
	(A) distinguish between mathematical models and statistical models S.9-12.3.A
	(B) construct a statistical model to describe variability around the structure of a mathematical model for a given situation S.9-12.3.B
	(C) distinguish among different sources of variability, including measurement, natural, induced, and sampling variability S.9-12.3.C
	(D) describe and model variability using population and sampling distributions S.9-12.3.D
Categorical and quantitative data	**4.** The student applies the mathematical process standards to represent and analyze both categorical and quantitative data S.9-12.4
	(A) distinguish between categorical and quantitative data S.9-12.4.A
	(B) represent and summarize data and justify the representation S.9-12.4.B
	(C) analyze the distribution characteristics of quantitative data, including determining the possible existence and impact of outliers S.9-12.4.C
	(D) compare and contrast different graphical or visual representations given the same data set S.9-12.4.D
	(E) compare and contrast meaningful information derived from summary statistics given a data set S.9-12.4.E
	(F) analyze categorical data, including determining marginal and conditional distributions, using two-way tables S.9-12.4.F

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Probability and random variables	**5.** The student applies the mathematical process standards to connect probability and statistics S.9-12.5
	(A) determine probabilities, including the use of a two-way table S.9-12.5.A
	(B) describe the relationship between theoretical and empirical probabilities using the Law of Large Numbers S.9-12.5.B
	(C) construct a distribution based on a technology-generated simulation or collected samples for a discrete random variable S.9-12.5.C
	(D) compare statistical measures such as sample mean and standard deviation from a technology-simulated sampling distribution to the theoretical sampling distribution S.9-12.5.D
Inference	**6.** The student applies the mathematical process standards to make inferences and justify conclusions from statistical studies S.9-12.6
	(A) explain how a sample statistic and a confidence level are used in the construction of a confidence interval S.9-12.6.A
	(B) explain how changes in the sample size, confidence level, and standard deviation affect the margin of error of a confidence interval S.9-12.6.B
	(C) calculate a confidence interval for the mean of a normally distributed population with a known standard deviation S.9-12.6.C
	(D) calculate a confidence interval for a population proportion S.9-12.6.D
	(E) interpret confidence intervals for a population parameter, including confidence intervals from media or statistical reports S.9-12.6.E
	(F) explain how a sample statistic provides evidence against a claim about a population parameter when using a hypothesis test S.9-12.6.F
	(G) construct null and alternative hypothesis statements about a population parameter S.9-12.6.G
	(H) explain the meaning of the p-value in relation to the significance level in providing evidence to reject or fail to reject the null hypothesis in the context of the situation S.9-12.6.H
	(I) interpret the results of a hypothesis test using technology-generated results such as large sample tests for proportion, mean, difference between two proportions, and difference between two independent means S.9-12.6.I
	(J) describe the potential impact of Type I and Type II Errors S.9-12.6.J

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Bivariate data

7. **The student applies the mathematical process standards to analyze relationships among bivariate quantitative data** S.9-12.7

(A) **analyze scatterplots for patterns, linearity, outliers, and influential points** S.9-12.7.A

(B) **transform a linear parent function to determine a line of best fit** S.9-12.7.B

(C) **compare different linear models for the same set of data to determine best fit, including discussions about error** S.9-12.7.C

(D) **compare different methods for determining best fit, including median-median and absolute value** S.9-12.7.D

(E) **describe the relationship between influential points and lines of best fit using dynamic graphing technology** S.9-12.7.E

(F) **identify and interpret the reasonableness of attributes of lines of best fit within the context, including slope and y-intercept** S.9-12.7.F