South Carolina Mathematics

Statistical Modeling

Mathematical Process Standards MPS

1 Problem Solving MPS.PS

1a Make sense of problems and persevere in solving them strategically. MPS.PS.1

2 Representation & Communication MPS.RC

2a Explain ideas using precise and contextually appropriate mathematical language, tools, and models. MPS.RC.1

3 Connections MPS.C

3a Demonstrate a deep and flexible conceptual understanding of mathematical ideas, operations, and relationships while making real-world connections. MPS.C.1

4 Analyze & Justify MPS.AJ

4a Use critical thinking skills to reason both abstractly and quantitatively MPS.AJ.1

5 Structure & Patterns MPS.SP

5a Identify and apply regularity in repeated reasoning to make generalizations. MPS.SP.1

Data, Probability, and Statistical Reasoning SM.DPSR

1 Communicate using descriptive and inferential statistics by collecting, critiquing, analyzing, and interpreting real-world data. SM.DPSR.1

1a Calculate and interpret z-scores as a measure of relative standing to standardize units. SM.DPSR.1.1

1b Approximate percentages using the Empirical Rule and z-scores for normally distributed data. SM.DPSR.1.2

1c Using simulations taken from a given population, model sample-to-sample variability in sampling distributions of a statistic. SM.DPSR.1.3

1d Construct and compare confidence intervals of different models to make conclusions about reliability given a margin of error. SM.DPSR.1.4

1e Summarize and evaluate reports based on data for appropriateness of study design, analysis methods, and statistical measures used. SM.DPSR.1.5

2 Formulate investigative statistical questions that can be answered using data. SM.DPSR.2

- 2a Formulate investigative statistical questions about a population using samples taken from the population. SM.DPSR.2.1
- 2b Formulate comparative and associative investigative statistical questions for surveys and observational studies to compare two or more groups or to investigate the association of two or more variables. SM.DPSR.2.2
- 2c Formulate comparative and associative investigative statistical questions for experiments to compare two or more groups or to investigate the association of two or more variables. SM.DPSR.2.3
- 2d Formulate inferential investigative statistical questions regarding association and prediction. SM.DPSR.2.4
- 2e Formulate investigative statistical questions for two variables. SM.DPSR.2.5

3 Design and implement a plan to collect data to address the investigative statistical question. SM.DPSR.3

- 3a Apply an appropriate data-collection plan when collecting data for the investigative statistical question of interest. SM.DPSR.3.1
- 3b Distinguish between sample surveys, observational studies, and experiments. SM.DPSR.3.2
- 3c Design sample surveys, experiments, and observational studies using statistical methods. SM.DPSR.3.3
- 3d Differentiate between random selection and random assignment and identify their impact on generalizing. SM.DPSR.3.4
- 3e Examine potential sources and effects of bias and confounding variables. SM.DPSR.3.5
- 3f Describe and comply with the ethical use of data. SM.DPSR.3.6
- 3g Identify when data can be generalized to a target population. SM.DPSR.3.7

4 Use appropriate graphical and numerical methods to analyze data. SM.DPSR.4

- 4a Describe quantitative and categorical data. SM.DPSR.4.1
- 4b Summarize and describe relationships between two variables. SM.DPSR.4.2
- 4c Describe the relationship between two quantitative variables by interpreting correlation (r) and a least-square regression line (using technology). SM.DPSR.4.3
- 4d Assess the fit of a linear model by plotting and analyzing residuals, including the squares of the residuals, to improve its fit. SM.DPSR.4.4
- 4e Calculate and interpret the p-value for a population proportion and/or population mean. SM.DPSR.4.5
- 4f Use simulated sampling distributions to describe the sample to-sample variability of sample statistics. SM.DPSR.4.6
- 4g Use simulations to investigate associations between two categorical variables and to compare groups. SM.DPSR.4.7

5 Interpret the results of the analysis by making connections to the investigative statistical question. SM.DPSR.5

- 5a Use statistical evidence from analyses to answer investigative statistical questions. SM.DPSR.5.1
- 5b Determine the possible impact of extreme data points, missing values, or incorrect values on the results. SM.DPSR.5.2
- 5c Use and interpret the p-value to determine whether the estimate for a population parameter is reasonable. SM.DPSR.5.3
- 5d Interpret a given margin of error corresponding to an estimate of a population parameter. SM.DPSR.5.4
- 5e Explain the impact of multiple variables on one another. SM.DPSR.5.5