

Statistics

Making Inferences & Justifying Conclusion **MI**

Surveys, Experiments, & Observational Data: Students make inferences and justify conclusions from sample surveys, experiments, and observational studies.

- 1 Estimate a population mean or proportion from a sample survey; develop a margin of error through the use of simulation models for random sampling. **S.MI.1**
- 2 Calculate the standardized test statistic and p-value for a test about a population proportion and a population mean; determine if the sample data provides convincing evidence against a parameter claim. **S.MI.2**
- 3 Compare two treatment groups in an experiment and determine if the difference in parameters is significant by calculating the standardized test statistics and p-value. **S.MI.3**

Conditional Probability & Rules of Probability **RP**

Compute Probability of Compound Events: Students use the rules of probability to compute probabilities of compound events.

- 1 Determine unions or intersections of events in a sample space; determine complements of events. **S.RP.1**
- 2 Identify the two components that make up a legitimate probability model/distribution. **S.RP.2**

Independence & Conditional Probability: Students understand and use independence and conditional probability to interpret data.

- 3 Determine if two events, A and B, are independent when given the probabilities of A and B. **S.RP.3**
- 4 Calculate and use conditional probabilities to determine if events are independent. **S.RP.4**
- 5 Create and analyze two-way frequency tables of data to calculate marginal, joint, and conditional probabilities. **S.RP.5**
- 6 Using a two-way table, determine if two events are independent. **S.RP.6**
- 7 Explain conditional probability and independence using everyday language in a variety of real-world contexts. **S.RP.7**
- 8 Find the conditional probability of A given B, $P(A|B)$, and interpret the answer in terms of the model, including two-way frequency tables and Venn diagrams. **S.RP.8**
- 9 Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ and interpret the answer. **S.RP.9**
- 10 Identify whether or not two events are mutually exclusive / disjoint. **S.RP.10**

- 11 Apply the general Multiplication Rule, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$ and interpret the answer. [S.RP.11](#)
 - 12 Compute the probability of compound events and solve problems using combinations, permutations, Venn Diagrams, and Tree Diagrams. [S.RP.12](#)
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Use Probability to Make Decisions [PMD](#)

Expected Values: Students calculate and use expected values of random variables to solve problems.

- 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. [S.PMD.1](#)
 - 2 Calculate the expected value for a discrete random variable; describe the expected value as the mean or typical value of the probability distribution in context. [S.PMD.2](#)
 - 3 Create a probability distribution of a discrete random variable using theoretical probabilities and use the probability distribution to calculate the probability of an event. [S.PMD.3](#)
 - 4 Create a probability distribution for a discrete random variable using experimental or observational data; calculate the expected value. [S.PMD.4](#)
 - 5 Use probability density models such as the normal curve and uniform density curve to model real-world data; calculate probabilities of continuous random variables using these models. [S.PMD.5](#)
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Outcomes of Decisions: Students evaluate outcomes of decisions using probability.

- 6 Analyze the costs and benefits of possible outcomes of making a decision by assigning probabilities to particular payoff values of a discrete random variable and calculate expected values. [S.PMD.6](#)
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Collecting Data & Data Bias [CD](#)

Data Collection: Students explore best practices of collecting data while identifying possible sources of bias in data collection methods.

- 1 Describe how to take a simple random sample using technology or a random number table. [S.CD.1](#)
 - 2 Use randomization strategies to ensure random selection processes are fair. [S.CD.2](#)
 - 3 Understand that certain types of sampling methods may lead to bias, such as convenience and voluntary samples. [S.CD.3](#)
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Displaying & Describing Distributions of Data [DD](#)

Data Representation: Students represent raw data in tabular and graphical form to describe features of the data and summarize trends.

- 1 Distinguish between categorical and quantitative data. [S.DD.1](#)
- 2 Determine if there is an association between two quantitative variables using the correlation coefficient and scatter plots. [S.DD.2](#)
- 3 Model real-world data using least squares regression techniques. [S.DD.3](#)