

Mathematics Standard
Catalina Foothills School District
High School: Statistics/Discrete Mathematics

Statistics and Discrete Mathematics is a rigorous study of statistics and discrete mathematics topics. It is designed to be beneficial to students who are interested in pursuing studies/careers in a variety of areas, including the social sciences, medical fields, business, and economics. Students will study key components of statistics such as frequency distributions, data description, probability distributions, confidence intervals, and hypothesis testing. The discrete mathematics units taught during second semester include the mathematics of voting, fair division, and graph theory. This course will prepare students for AP Statistics and/or future college level coursework in statistics.

Standards for Statistics/Discrete Mathematics

STATISTICS AND PROBABILITY: Making Inferences and Justifying Conclusions (S-IC)	
P.S-IC.B.3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
P.S-IC.B.4	Use data from a random sample to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
P.S-IC.B.5	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
P.S-IC.B.6	Evaluate reports based on data.
STATISTICS AND PROBABILITY: Conditional Probability and the Rules of Probability (S-CP)	
P.S-CP.B.9	Use permutations and combinations to compute probabilities of compound events and solve problems.
STATISTICS AND PROBABILITY: Using Probability to Make Decisions (S-MD)	
P.S-MD.A.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.
P.S-MD.A.2	Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.
P.S-MD.A.3	Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated. Find the expected value. 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.
P.S-MD.A.4	Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically. Find the expected value. 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?
P.S-MD.B.5	Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. a. Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant. b. Evaluate and

	compare strategies on the basis of expected values. 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.
P.S-MD.B.6	Use randomization to make fair decisions based on probabilities.
P.S-MD.B.7	Analyze decisions and strategies using probability concepts.
Contemporary Mathematics: Discrete Mathematics (CM-DM)	
P.CM-DM.A.1	Study the following topics related to vertex-edge graph: Euler circuits, Hamilton circuits, shortest path, vertex coloring, and adjacency matrices.
P.CM-DM.A.2	Understand, analyze, and apply vertex-edge graphs to model and solve problems related to paths, circuits, networks, and relationships among a finite number of elements, in real-world and abstract settings.
P.CM-DM.A.3	Devise, analyze, and apply algorithms for solving vertex-edge graph problems.
P.CM-DM.A.4	Extend work with adjacency matrices for graphs, such as interpreting row sums and using the n th power of the adjacency matrix to count paths of length n in a graph.
Discrete Mathematics: Voting Methods	
CFSD.CM-DM.A.5	Use election theory techniques to analyze election data.
CFSD.CM-DM.A.6	Use weighted voting techniques to decide voting power within a group.
Discrete Mathematics: Fair Division	
CFSD.CM-DM.A.7	Analyze and describe the issue of fair division. Apply fair division techniques to continuous and discrete cases.
STANDARDS FOR MATHEMATICAL PRACTICE	
HS.MP.1	Make sense of problems and persevere in solving them.
HS.MP.2	Reason abstractly and quantitatively.
HS.MP.3	Construct viable arguments and critique the reasoning of others.
HS.MP.4	Model with mathematics.
HS.MP.5	Use appropriate tools strategically.
HS.MP.6	Attend to precision.
HS.MP.7	Look for and make use of structure.
HS.MP.8	Look for an express regularity in repeated reasoning.