Anthony Wayne Local Schools
Course of Study
Statistics

Anthony Wayne Local Schools Mathematics Belief Statements

All Generals will experience an innovative and engaging curriculum with instruction that is personalized, promotes creativity and application, and provides real-world experiences that facilitate deeper learning.

AWLS believes Mathematics instruction should:

- identify skill gaps for individual students and work to close them
- include engaging learning activities where all learners can grow through productive struggle.
- develop strong number sense with the ability to manipulate numbers and perform mental math with an emphasis on subitizing
- provide scenarios where real world problems help to provide a path towards being future ready students.
- develop strong mathematical modeling and reasoning skills that continually build on prior knowledge.
- encourage students to be risk takers, demonstrate resilience and grit, while solving complex mathematical problems.
- encourage flexibility, creativity, and communication while working collaboratively with peers.
- include consistent and cohesive academic vocabulary through all grade-levels that is utilized by both teachers and students

Statistics Course Description:

This course will study the techniques used to facilitate the collection, organization, presentation, analysis, and interpretation of data. Both descriptive and inferential statistics will be covered. Topics such as measures of central tendency, measures of variation, probability, sampling techniques, normal distributions, and hypothesis testing will be explored. A graphing calculator is required for this course, preferably the TI 83 Plus or the TI 84.

Domain/ Conceptual Category	Standard	
Statistics and Probability	S.ID.1	**Summarize, represent, and interpret data on a single count or measurement variable.** **S.ID.1** Represent data with plots on the real number line (dot plots, histograms, and box plots) in the context of real-world applications using the GAISE model.★
Statistics and Probability	S.ID.2	**Summarize, represent, and interpret data on a single count or measurement variable.** **S.ID.2** In the context of real-world applications by using the GAISE model, use statistics appropriate to the shape of the data distribution to compare center (median and mean) and spread (mean absolute deviationG, interquartile rangeG, and standard deviation) of two or more different data sets. ★
Statistics and Probability	S.ID.3	**Summarize, represent, and interpret data on a single count or measurement variable.** **S.ID.3** In the context of real-world applications by using the GAISE model, interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★
Statistics and Probability	S.ID.4	**Summarize, represent, and interpret data on a single count or measurement variable.** **S.ID.4** Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.★
Statistics and Probability	S.ID.5	**Summarize, represent, and interpret data on two categorical and quantitative variables.** **S.ID.5** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.★
Statistics and Probability	S.ID.6	**Summarize, represent, and interpret data on two categories and quantitative variables** **S.ID.6** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.★ **a.** Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions, or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.* (A2, M3) **b.** Informally assess the fit of a function by discussing residuals. (A2, M3) **c.** Fit a linear function for a scatterplot that suggests a linear association. (A1, M1)

Statistics and Probability	S.IC.1	**Understand and evaluate random processes underlying statistical experiments.** **S.IC.1** Understand statistics as a process for making inferences about population parameters based on a random sample from that population.★
Statistics and Probability	S.IC.2	**Understand and evaluate random processes underlying statistical experiments.** **S.IC.2** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*★
Statistics and Probability	S.IC.3	**Make inferences and justify conclusions from sample surveys, experiments, and observational studies.** **S.IC.3** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.★
Statistics and Probability	S.IC.4	**Make inferences and justify conclusions from sample surveys, experiments, and observational studies.** **S.IC.4** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.★
Statistics and Probability	S.IC.5	**Make inferences and justify conclusions from sample surveys, experiments, and observational studies.** **S.IC.5** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between sample statistics are statistically significant.★
Statistics and Probability	S.IC.6	**Make inferences and justify conclusions from sample surveys, experiments, and observational studies.** **S.IC.6** Evaluate reports based on data.★
Statistics and Probability	S.CP.1	**Understand independence and conditional probability, and use them to interpret data.** **S.CP.1** Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).★
Statistics and Probability	S.CP.2	**Understand independence and conditional probability, and use them to interpret data.** **S.CP.2** Understand that two events A and B are independent if and only if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.★

Statistics and Probability	S.CP.3	**Understand independence and conditional probability, and use them to interpret data.** **S.CP.3** Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.★
Statistics and Probability	S.CP.4	**Understand independence and conditional probability, and use them to interpret data.** **S.CP.4** Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*★
Statistics and Probability	S.CP.5	**Understand independence and conditional probability, and use them to interpret data.** **S.CP.5** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*★
Statistics and Probability	S.CP.6	**Use the rules of probability to compute probabilities of compound events in a uniform probability model.** **S.CP.6** Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.★
Statistics and Probability	S.CP.7	**Use the rules of probability to compute probabilities of compound events in a uniform probability model.** **S.CP.7** Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.★
Statistics and Probability	S.CP.8	**Use the rules of probability to compute probabilities of compound events in a uniform probability model.** (+) **S.CP.8** Apply the general Multiplication Rule in a uniform probability modelG, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.★ (G, M2)
Statistics and Probability	S.CP.9	**Use the rules of probability to compute probabilities of compound events in a uniform probability model.** **S.CP.9** (+) Use permutations and combinations to compute probabilities of compound events and solve problems.★ (G, M2)

Statistics and Probability	S.MD.1	**Calculate expected values, and use them to solve problems.** **S.MD.1** (+) Define a random variableG for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distributionG using the same graphical displays as for data distributions.★
Statistics and Probability	S.MD.2	**Calculate expected values, and use them to solve problems.** **S.MD.2** (+) Calculate the expected valueG of a random variable; interpret it as the mean of the probability distribution.★
Statistics and Probability	S.MD.3	**Calculate expected values, and use them to solve problems.** **S.MD.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.*★
Statistics and Probability	S.MD.4	**Calculate expected values, and use them to solve problems.** **S.MD.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?*★
Statistics and Probability	S.MD.5	**Use probability to evaluate outcomes of decisions.** **S.MD.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.*
Statistics and Probability	S.MD.6	**Use probability to evaluate outcomes of decisions.** **S.MD.6** (+) Use probabilities to make fair decisions, e.g., drawing by lots, using a random number generator.★