

UbD Algebra 2 - Statistical Inferences

Time Frame: 16 Lessons	Unit 7: Statistical Inferences	Course Name: Algebra 2
Stage 1: Desired Results		
Established Goal(s)	Transferable Skills	
Standards Addressed: HSG-GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. HSS-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. HSS-IC.A.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? HSS-IC.B.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. HSS-IC.B.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of	<i>Students will be able to independently use their learning to...</i> ● apply statistical inferences, mathematical knowledge, skill, and reasoning to solve real-world problems. ● apply statistics to make predictions based on data from prior events. ● develop clear and effective communication. ● increase self-direction. ● develop creative and practical problem-solving. ● become responsible and involved citizens. ● develop informed and integrative thinking.	
	Meaning Understandings <i>Students will understand that...</i> ● (in spoken and written language) what it means to be random in the context of statistics. ● (orally and in writing) what it means to select at random. ● they can apply statistics as a process for making inferences about population parameters based on data from a statistical study. ● probabilities from simulations may differ from expected probabilities. ● they can use data to critique (orally and in writing) mathematical claims based on a model in different cases. ● they can use data from a random sample to determine an estimate for a population proportion.	Essential Questions ● How can we use advanced algebraic techniques to model and solve real-world problems? ● How do we use algebraic concepts to model and solve problems related to data analysis and statistics, including regression analysis and hypothesis testing? ● How has algebra developed over time, and how has it contributed to our understanding of mathematics and the natural world?

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error through the use of simulation models for random sampling. HSS-IC.B.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. HSS-IC.B.6 Evaluate reports based on data. HSS-ID.A.1 Represent data with plots on the real number line (dot plots, histograms, and box plots). HSS-ID.A.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. HSS-ID.A.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.	● they can generalize that a greater sample size usually leads to a smaller margin of error.	Acquisition <i>Students will know...</i> ● how to describe the different purposes for each type of study design (survey, observational study, or experimental study). ● that the way I choose a sample matters, and that random samples have less bias. ● how to calculate a relative frequency and create a relative frequency histogram. ● that a normal curve is defined using the mean and standard deviation. ● how to calculate a proportion of a set of data that matches a shaded area in a histogram. ● how to use the mean and standard deviation of a normally distributed data set to estimate intervals when given a proportion. ● how to use the mean and standard deviation of a normally distributed data set to estimate proportions. ● how to estimate the margin of error using the mean and standard deviation. ● how to estimate the margin of error using standard deviation. ● that a larger margin of error means more variability, and one should be less confident in their estimate of the population mean. ● that a smaller margin of error means more variability, and I can be more confident in my estimate of the population mean. <i>Students will be able to...</i> ● decide if a study is good or bad based on evidence. ● understand that different samples from the same population can still have different statistics. ● recognize the difference between a survey, observational study, or experimental study. ● understand why randomization is important in the design of a study. ● understand that sample means and proportions can be representative of the overall population. ● understand that sample means and proportions vary. ● understand why it's important to be skeptical of data that seems unfair. ● use mathematical evidence to find the difference between when outcomes are unfair or due to random chance. ● justify a mathematical claim using evidence ● recognize the patterns of proportions that occur in distributions that are approximately normal in shape. ● use the standard deviation to describe the variability in a distribution. ● describe a distribution using the characteristics of its shape, center, and spread. ● understand that my choice of the design for a study will impact what questions I can answer. ● recognize the difference between a survey, observational study, or experimental study Mathematical Practices: ● make sense of problems and persevere in solving them. ● reason abstractly and quantitatively.
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- construct viable arguments and critique the reasoning of others.
- model with mathematics.
- use appropriate tools strategically.
- attend to precision.
- look for and make use of structure.
- look for and express regularity in repeated reasoning.