

Unit Topic: Inference for Categorical Data: Chi-Square

Grade level: AP Stats

Length of lesson: 5 days

Stage 1 – Desired Results

Content Standard(s):

- 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.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
- HSS.ID.B.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.
- HSS.ID.B.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
- 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 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.CP.A.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").

Understanding (s)/goals

Students will understand:

- Given that variation may be random or not, conclusions are uncertain.
- The chi-square distribution may be used to model variation.
- Significance testing allows us to make decisions about hypotheses within a particular context.

Essential Question(s):

- How does increasing the degrees of freedom influence the shape of the chi-square distribution?
- Why is it inappropriate to use statistical inference to justify a claim that there is no association between variables?

Student objectives (outcomes):

Students will be able to:

- State appropriate hypotheses and compute the expected counts and chi-square test statistic for a chi-square test for goodness of fit.
- State and check the Random, 10%, and Large Counts conditions for performing a chi-square test for goodness of fit.
- Calculate the degrees of freedom and P-value for a chi-square test for goodness of fit.
- Perform a chi-square test for goodness of fit.
- Conduct a follow-up analysis when the results of a chi-square test are statistically significant.
- State appropriate hypotheses and compute the expected counts and chi-square test statistic for a chi-square test based on data in a two-way table.
- State and check the Random, 10%, and Large Counts conditions for a chi-square test based on data in a two-way table.
- Calculate the degrees of freedom and P-value for a chi-square test based on data in a two-way table.
- Perform a chi-square test for homogeneity
- Perform a chi-square test for independence.
- Choose the appropriate chi-square test in a given setting.

Stage 2 – Assessment Evidence**Performance Task(s):****Other Evidence:**

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Stage 3 – Learning Plan**Learning Activities:**