Using the JMP Scripting Language to Teach Sampling and Inference for the Proportion*
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Sampling Distribution
Problem: In a survey of introductory statistics students, 729 out of 2068 (35.25%) students stated they had blue eyes. If 35% of all introductory statistics students have blue eyes, how will the proportion of students with blue eyes vary from sample to sample in samples of size 200?

Questions: What is the population and its proportion? What is the sample? How will the sample proportion change from sample to sample? How is this change related to the sample size and population proportion?

Confidence Interval
Problem: In a Gallop Poll taken June 16 – 18, 2009, 58% of 1504 adults (aged 18 or older) surveyed nationwide stated they approved of the job performance of President Obama. What is the 95% confidence interval for the proportion of all adults nationwide that approved of the job performance of President Obama?

Questions: What does the word “confidence” mean? What effect does the percentage of confidence have on the confidence interval?

Hypothesis Test
Problem: The cracking rate of ingots used in manufacturing airplanes is 20%. A new process is designed to lower the proportion of cracked ingots. In a sample of 400 ingots, 18% of them cracked. Did the new process actually lower the proportion of cracked ingots?

Questions: What is a p-value? What effect does the alpha level have on the percentage of rejected null hypotheses?

Investigations:
- Sampling Variability
- Distribution of Sample Proportions
  - Center – Mean of Sample Proportions
  - Spread – Std. Dev. of Sample Proportions
  - Shape – Normal Quantile Plot of Sample Proportions
- Effect of Assumptions on Distribution of Sample Proportions

Investigations:
- Sampling Variability
- Variability of Confidence Interval
- Effect of Confidence Level on Confidence Interval
- Coverage Rate vs. Confidence Level of Confidence Intervals
- Effect of Assumptions on Coverage Rate of Confidence Intervals

Investigations:
- Sampling Variability
- Variability and Distribution of Test Statistic
- Variability of P-values
- Meanings of P-value and Type I Error Rate
- Effect of Assumptions on Percentage of Rejected Null Hypotheses

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