Do Placebos Kill Minotaurs?

Formulating Statistical Hypotheses and Hypothesis Testing

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Grade Level	11th – 12th Grade	**Time Frame**	3-4 class period(s)
Course	AP Statistics	**Duration**	180 minutes

Essential Question

How do we formulate hypotheses, and more importantly, how do we test them once we have them?

Summary

In this lesson, students will explore the concepts of statistical hypotheses by looking at what a statistical hypothesis is, how they are formed, and some methods of testing them. Once they have been introduced to the basic concepts, they will be able to apply these concepts by playing Potions!, a digital game-based learning (DGBL) module, followed by a chance to extend what they've learned by applying the concepts to a real-world question. This lesson includes optional modifications for distance learning. Resources for use in Google Classroom are included.

Snapshot

Engage

Use the Examples and Non-examples Strategy to gauge the current understanding of students about what a hypothesis is and how you determine if an experiment supports a hypothesis or not.

Explore

Students play the first two levels of the Potions! DGBL module as a further introduction and chance to apply the concepts they've learned so far.

Explain

Students use the DOK Question Stems learning strategy to develop deeper thinking about the concepts they've learned and compare their understanding of those concepts.

Extend

Students extend their understanding of the concepts by playing the third and fourth studies in the Potions! DGBL module.

Evaluate

Students evaluate understanding using the Strategy Harvest learning strategy.

Standards

Common Core State Standards for Mathematics (High School — Statistics and Probability)

CCSS.Math.Content.HSS-IC.A: Understand and evaluate random processes underlying statistical experiments
CCSS.Math.Content.HSS-IC.A.1: Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
CCSS.Math.Content.HSS-IC.A.2: Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.
CCSS.Math.Content.HSS-IC.B: Make inferences and justify conclusions from sample surveys, experiments, and observational studies
CCSS.Math.Content.HSS-IC.B.3: Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
CCSS.Math.Content.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.
CCSS.Math.Content.HSS-IC.B.5: Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
CCSS.Math.Content.HSS-IC.B.6: Evaluate reports based on data.

Next Generation Science Standards (Grades 9, 10, 11, 12)

HS-ETS1-4: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Oklahoma Academic Standards for Mathematics (Grades 9, 10, 11, 12)

A1.D.1.1: Describe a data set using data displays, describe and compare data sets using summary statistics, including measures of central tendency, location, and spread. Know how to use calculators, spreadsheets, or other appropriate technology to display data and calculate summary statistics.
A1.D.2.3: Calculate experimental probabilities by performing simulations or experiments involving a probability model and using relative frequencies of outcomes.
A1.D.2.4: Apply probability concepts to real-world situations to make informed decisions.

Attachments

- DOK Question Stems—Do Placebos Kill Minotaurs - Spanish.docx
- DOK Question Stems—Do Placebos Kill Minotaurs - Spanish.pdf
- DOK Question Stems—Do Placebos Kill Minotaurs.docx
- DOK Question Stems—Do Placebos Kill Minotaurs.pdf
- Game Portal Guide_v1.2.pdf
- Potions Teacher Guide—Do Placebos Kill Minotaurs.pdf
- Strategy Harvest Worksheet—Do Placebos Kill Minotaurs - Spanish.docx
- Strategy Harvest Worksheet—Do Placebos Kill Minotaurs - Spanish.pdf
- Strategy Harvest Worksheet—Do Placebos Kill Minotaurs.docx
- Strategy Harvest Worksheet—Do Placebos Kill Minotaurs.pdf

Materials

Resources

- K20 Center. (n.d.). DOK question stems. Strategies. https://learn.k20center.ou.edu/strategy/170
- K20 Center. (n.d.). Examples and non-examples. Strategies. https://learn.k20center.ou.edu/strategy/163
- K20 Center. (n.d.). Google classroom. Tech Tools. https://learn.k20center.ou.edu/tech-tool/628
- K20 Center. (n.d.). Potions!. LEARN lesson. https://learn.k20center.ou.edu/game/1005
- K20 Center. (n.d.). Quizlet. Tech Tools. https://learn.k20center.ou.edu/tech-tool/666
- K20 Center. (n.d.). Strategy harvest. Strategies. https://learn.k20center.ou.edu/strategy/135https