

Game Show!

Utah Secondary Mathematics Core Curriculum Standards

Writing the results of a probability experiment as a fraction, ratio, decimal, or percentage, comparing experimental results with theoretical probability, comparing results of a probability experiment, displaying data, calculating the probability of an event, making approximate predictions using theoretical probability and proportions, collecting and interpreting data

GAISE Guidelines for Assessment and Instruction in Statistics Education

Level B Understanding – formulate questions, collect data, analyze data, and interpret the results

Teacher generated question – How does probability change with added information?

Student generated questions – What strategy has the best chances of winning a prize?

Learning Outcomes

- Students become interested in statistics
- Students understand how to collect and interpret probabilities
- Students create and conduct a statistical investigation

Specific Skills

- Students collect and record data
- Students analyze results
- Students compute and compare probabilities

Materials Needed

- One die
- Prizes (suggestion: 100 Grand[®] candy bars)

Directions

In character as a game show host, explain the rules of the game to the students: There are three boxes with one containing a prize. (Roll a die to decide which box contains the prize, without showing the students). A lucky contestant will go up to the front of the class and choose one of the boxes. Next, pick one of the boxes that does *not* contain the prize and remove it. Then ask the student to make a final choice by either staying with his or her original choice, or switching to the other box. Have an equal number of students use each strategy with at least 12 students using each strategy. For each student, record whether or not he or she won the prize. Display the data and discuss the results.

Created for the American Statistical Association Meeting Within a Meeting Program (2008) for Middle School Teachers

Box With Prize	Box Chosen By Student	Box Taken Away	Win If Switched Box	Win If Stayed With Original
1	2	3	Yes	No
1	2	3	Yes	No
2	2	1	No	Yes
3	3	2	No	Yes
1	2	3	Yes	No
2	1	3	Yes	No
1	1	2	No	Yes
2	3	1	Yes	No
2	3	1	Yes	No
3	2	1	Yes	No
3	2	1	Yes	No
2	2	3	No	Yes

Proportion of Wins = 8/12 4/12

Prompt the students to generate and answer data analysis questions.

How often did the student win the prize using each strategy?

What was the probability of winning if the student switched boxes?

What was the probability of winning if the student stayed with his or her original choice?

Was it better to stay with the original choice or to switch to the other box?

Explain why the switching strategy increases the probability of winning from 1/3 to 2/3. Point out that removing a box that is known to not contain the prize adds information relevant to the choice the student faces.