

SIMULATION OF 50-50 USING A COMPUTER PROGRAM

Performance Standard 10C.H

Understand the difference between the outcome of the experiment and the outcome that they expected. This will be demonstrated through a computer program simulation.

- *Mathematical knowledge*: analyze outcome of probability experiment and compare theoretic and empirical results.
- *Strategic knowledge*: solve problem using systematic process.
- *Explanation*: explain completely what was done and why it was done.

Procedures

1. ***In order to determine, describe and apply probabilities of events (10C)***, provide students with sufficient learning opportunities to develop the following:
 - Discuss the difference in empirical and theoretical probability.
There is often a difference between what is expected (theoretical) versus what actually occurs (empirical). Computer software programs can often assist in quickly analyzing data to make probability determinations. This assessment aligns with Skill #58 from the Administrative Support Cluster occupational skill standards (Information Processing Activities/Key, process, print and store text and data information using integrated software) and Workplace Skill H4 (Solving Problems and Critical Thinking/ Employ reasoning skills.)
2. Provide students with the assessment task worksheet. It will ask the student to write a computer program in visual basic. Have students work individually.

Jenny completed a probability experiment by running a computer program she wrote that simulated flipping a coin 100 times. Jenny coded the program in visual basic and thought that it should give her 50-50 results. She obtained 52 heads and 48 tails from her program. She was disappointed with her results and thought she did something wrong. What would you say to Jenny? How would you explain what happened to her in terms of empirical and theoretical probability? Write your own visual basic program, and run it to further demonstrate this idea to Jenny.
3. Use the standard scoring rubric. Give each student a score in each of the three categories. A score of 4 indicates a complete description of the differences in empirical and experimental probability using correct terminology. A 3 represents nearly complete discussion that demonstrates the correct ideas, but they may not have communicated them clearly. A 2 indicates that students have some idea about how to answer the question but miss important points that affect their answers. A 1 generally shows little understanding in their discussion but at least shows some understanding of probability. A score of 0 generally reflects no understanding of probability.
4. Computation is not really a component of this task.
5. Solution should demonstrate clear understanding of theoretical and empirical probability results. Students may use charts to clarify their explanation.

Examples of Student Work

- [Meets](#)
- [Exceeds](#)

Time Requirements

- Two class period

Resources

- Copies of the “Simulation of 50-50 Using a Computer Program” task sheet
- Writing utensil
- Mathematics Rubric
- Access to a computer with visual basic software

NAME _____ DATE _____

SIMULATION OF 50-50 USING A COMPUTER PROGRAM

Student Task Sheet

Jenny completed a probability experiment by running a computer program she wrote that simulated flipping a coin 100 times. Jenny coded the program in visual basic and thought that it should give her 50-50 results. She obtained 52 heads and 48 tails from her program. She was disappointed with her results and thought she did something wrong.

What would you say to Jenny? How would you explain what happened to her in terms of empirical and theoretical probability? Write your own visual basic program, and run it to further demonstrate this idea to Jenny.

MATHEMATICS RUBRIC

NAME _____ DATE _____

- Exceeds standard (must receive a 4 in each area)
- Meets standard (must receive all 3's or a combination of 3's and 4's)
- Approaches standard (must receive all 2's or any combination which may include a 3 or a 4)
- Begins standard (has no 3's or 4's but not all 1's)
- Absent (has all 1's and 0's)

	Mathematical Knowledge	Strategic Knowledge	Explanation
4	<ul style="list-style-type: none"> • Wrote the right answer. • Used math words correctly to show understanding of how math works. • Worked it out with no mistakes. • Used the right math words and labeled the answers. 	<ul style="list-style-type: none"> • Identified all the important parts of the problem, and knew how they went together. • Showed all the steps used to solve the problem. 	<ul style="list-style-type: none"> • Wrote what was done and why it was done. • If a drawing was used, all of it was explained in writing.
3	<ul style="list-style-type: none"> • Knew how to do the problem, but made small mistakes. 	<ul style="list-style-type: none"> • Identified most of the important parts of the problem. • Showed most of the steps used to solve the problem. 	<ul style="list-style-type: none"> • Wrote mostly about what was done. • Wrote a little about why it was done. • If a drawing was used most of it was explained in writing.
2	<ul style="list-style-type: none"> • Understood a little, but made a lot of big mistakes. 	<ul style="list-style-type: none"> • Identified some of the important parts of the problem. • Showed some of the steps used to solve the problem. 	<ul style="list-style-type: none"> • Wrote some about what was done or why it was done but not both. • If a drawing was used, some of it was explained in writing.
1	<ul style="list-style-type: none"> • Tried to do the problem, but didn't understand it. 	<ul style="list-style-type: none"> • Identified almost no important parts of the problem. • Showed almost none of the steps used to solve the problem. 	<ul style="list-style-type: none"> • Wrote or drew something that didn't go with the answer. • Wrote an answer that was not clear.
0	<ul style="list-style-type: none"> • No answer attempted. 	<ul style="list-style-type: none"> • No strategy shown. 	<ul style="list-style-type: none"> • No written explanation.
Score			