

## GIRLS VS. BOYS – WHY ISN'T IT 50-50?

### Performance Standard 10C.H

Understand the difference between the outcome of the experiment, and the outcome that they expected:

- *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.  
Family and Consumer Sciences classes in child development and parenting include information about genetics and the role of probability when combining chromosomes from the mother and the father. The study of X and Y chromosomes in the determination of sex, is an opportunity to discuss empirical and theoretical probability. This assessment aligns with the National Standards for Family and Consumer Sciences Education – Human Development 12.0 (Analyze factors that impact human growth and development.)
2. Provide students with the assessment task worksheet. Have students work individually.  
Jenny is studying genetics. She has learned that the sex of a child is determined by the contribution of an X or a Y chromosome by the father. As she studies further, she begins to wonder if, based solely on probability, there is a 50 – 50 chance of conceiving a boy or a girl. Jenny completes a probability simulation to determine the sex of a child by flipping a coin 100 times (heads for a girl, tails for a boy.) She obtained 52 heads and 48 tails. She was disappointed in her results and thought she had done something wrong. When asked why she was disappointed, she said that she thought it should have come out 50-50. What would you say to Jenny? How would you explain what happened to her in terms of empirical and theoretical probability?
3. Use the standard scoring rubric. Give each student a score in each of the three categories. A score of 4 should indicate complete description of the differences in empirical and experimental probability using correct terminology. A 3 should represent nearly complete discussion that demonstrates the correct ideas, but they may not have communicated them clearly. A 2 should indicate 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

- One class period

### Resources

- Copies of the “Girls VS. Boys – Why Isn’t It 50-50?” task sheet
- Writing utensil
- Mathematics Rubric

NAME \_\_\_\_\_ DATE \_\_\_\_\_

### **GIRLS VS. BOYS - WHY ISN'T IT 50-50?**

#### Student Task Sheet

Jenny is studying genetics. She has learned that the sex of a child is determined by the contribution of an X or a Y chromosome by the father. As she studies further, she begins to wonder if, based solely on probability, there is a 50 – 50 chance of conceiving a boy or a girl. Jenny completes a probability simulation for determining the sex of a child by flipping a coin 100 times (heads for a girl, tails for a boy). She obtained 52 heads and 48 tails. She was disappointed in her results and thought she had done something wrong. When asked why she was disappointed, she said that she thought it should have come out 50-50.

What would you say to Jenny? How would you explain what happened to her in terms of empirical and theoretical probability?

## 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)

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