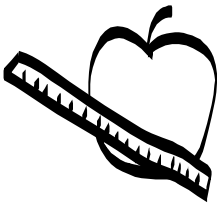


6: Quarter, Nickel, Dime...

OBJECTIVES

Students will systematically collect, organize and describe data, and will then make inferences and a convincing argument based on data analysis.

MATERIALS

- "Coin Cards" handout
- "Coin Graph" worksheet
- Envelopes (1 per student)
- Chart paper
- Markers
- Tape

PREPARATIONS

- Make copies of the "Coin Cards" handout (1 per pair).
- Make copies of the "Coin Graph" worksheet (1 per student).
- Create a class graph on chart paper that looks similar to the "Coin Graph" worksheet.

GROUPING

- Whole class
- Pairs

CLASS TIME

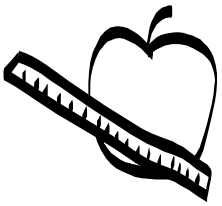
Two 45- to 60-minute sessions

CONNECTIONS

- Mathematics
- Science

TERMS AND CONCEPTS

- Probability
- Statistics
- Data

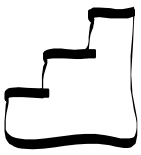


Collecting and Describing Data

BACKGROUND KNOWLEDGE

Students should have a basic knowledge of:

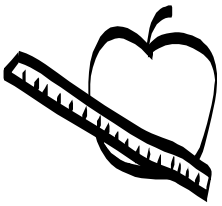
- Coin values
- Creating an organized list
- Constructing and interpreting a bar graph
- Chance/probability



STEPS

Session 1

1. Tell students that they will be working in pairs to play the game "Nickel, Quarter, and Dime." The rules of the game are as follows:
   - Each player has an envelope containing slips of paper featuring a nickel, a quarter and a dime.
   - On the count of three, each player places one of the three papers randomly on the table.
   - A quarter wins over a dime, a dime wins over a nickel, a nickel wins over a quarter.
2. Divide the class into pairs. Give each pair a "Coin Graph" worksheet and a "Coin Cards" handout. Give each student an envelope.
3. Instruct the students to cut out the coin cards and each place a picture of a nickel, a quarter, and a dime into their own envelope.
4. Ask the students to decide who will be Player A and B and write their names on the appropriate line on the "Coin Graph" worksheet.
5. Tell the students that after each round of the game, they will mark their "Coin Graph" worksheet to show who won that round. Students will mark any ties in a third column labeled "Ties."
6. Have each pair play the game 18 times.
7. Ask the pairs to total the number of wins for each player on their worksheet in the appropriate blank.
8. When the pairs finish, have each group note which column (for their rounds of play) contained the most "wins" (Player A, B, or Ties).
9. Display a class graph. Instruct the winning student from each pair to record one mark in the appropriate column on this graph. In the event of a tie, have each student in the pair place a mark in their own graph column.
10. After each group has recorded their information, have the class review the data collected, and make inferences about probability. Were the number of wins for Player A and Player B approximately the same after 18 rounds of play?



Quarter, Nickel, Dime...

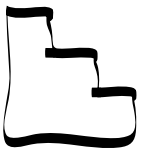
Session 2

1. Ask students to work together (in their pairs) to answer the following questions. As you discuss the questions, discuss how they might approach answering them, and explain unknown vocabulary.
   - Make an organized list of the possible outcomes for a round of play in this game.
   - How many possible outcomes are there for each round of play? (9)
   - How many of these outcomes would be wins for player A? (3)
   - What is the probability that player A will win in any round? (3/9=1/3)

   Note: Explain that probability means favorable outcomes/possible outcomes.
   - How many of these outcomes would be wins for player B? (3)
   - Find the probability that B will win in any round. (3/9)
   - Do you think the game is fair? Do both players have an equal probability of winning in any round? (yes)
2. Review the answers as a class, and have the students predict what would happen if they continued playing the game. Students should mention that the results for players A and B should continue to stay fairly even.

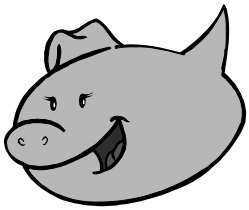
ENRICHMENT/EXTENSIONS

- Create a class center where students can continue to test the results of this activity. Move the class chart into this center, and allow students to record the winners on the class chart.
- Alter the number of players or coins used in the activity to see how the results will change.
- Have the students conduct another exploration where they determine the probability of getting "heads" or "tails" when flipping a quarter.



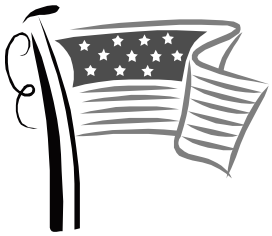
DIFFERENTIATED LEARNING OPTION

Have students work with partners who can model the game.

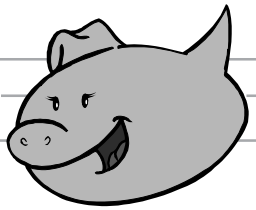


HPC CONNECTION

Invite your students to gather even more data using the coins in their pockets. Test out the Teacher Feature, "Location, Location, Location" that's available in the Teacher section of HPC, to see whether a particular mintmark is more likely to appear on the coins in your area of the country. (http://www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/TF_Location-Location.cfm)



Coin Graph



Student Wins

18			
17			
16			
15			
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1			

Player A _____ Player B _____ Ties _____

Total Wins _____ Total Wins _____ Total Wins _____

Coin Cards