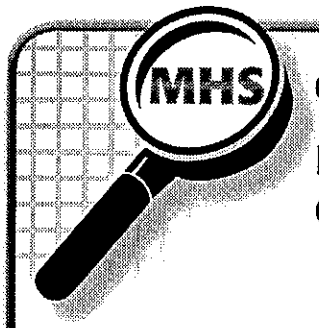

CLASSROOM INVESTIGATION:

EXPLORING THE TWO TYPES OF PROBABILITIES

In this investigation you will perform a few experiments which will allow you to compare two types of probabilities: experimental probability versus the theoretical probability of an outcome's occurrence.

LEARNING GOALS

By completing this lesson you will

- Perform an experiment and record your results
- Calculate the experimental probability of independent events
- Calculate the theoretical probability of independent events
- Compare and contrast experimental and theoretical probability of independent events

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We will be investigating properties of probability. Fill in the blanks below recalling the vocabulary from this chapter:

Experimental _____ refers to the likelihood of an event occurring, based on the results of an _____.

_____ probability provides the likelihood of an event occurring, based on calculations.

An outcome is a possible result of a _____.The number of times a certain outcome occurs is called an _____.

Events which do not affect one another are called _____.

1. Calculate the theoretical probability of each outcome. Remember that theoretical probability is found by calculating the ratio:

$$\frac{\textit{the number of ways in which the event occurs}}{\textit{total number of equally likely outcomes}}$$

a. Getting heads in one coin toss _____

b. Getting heads on both tosses when a coin is tossed twice _____

c. Rolling a 5 with one die _____

d. Rolling a 5 first, then a 3, when a die is rolled twice _____

e. Selecting one red card from a well shuffled deck of cards _____

2. Ensure that you have a coin in your group and identify its HEADS and TAILS.

a. Take turns tossing the coin, so that each person tosses the coin twice and the trial is repeated a total of 15 times. Record the results of each person's tosses in the table below.

Name of person tossing	Result of tosses	Check if two heads showed up
TOTALS:		

b. Calculate the experimental probability of getting heads on both tosses. Use the entries from the last row in your table above. Recall that experimental probability is found by calculating the ratio

$$\frac{\textit{the number of times the event occurred}}{\textit{the number of trials}}$$

_____

3. Ensure that your group has a die which has all faces clearly labelled so that all six numbers are visible.

a. Take turns rolling the die, so that each person rolls the die twice, and the trial is repeated 15 times. Record the results of each person's rolls in the table below.

Name of person rolling	Result of rolls	Check if 5 followed by 3 rolled
TOTALS:		

b. Calculate the experimental probability of rolling a 5 on the first roll, followed by a 3 on the second roll. Use the entries from the last row in your table above.

Recall that experimental probability is found by calculating the ratio

$$\frac{\textit{the number of times the event occurred}}{\textit{the number of trials}}$$

4. Compare your result in question (1d) with (3b). Are the probability values equal or not?

_____

5. Count the number of cards in your deck, there should be _____ cards. Now count the number of red cards (hearts and diamonds) in the deck. There should be _____ red cards, because _____ of the cards in the deck are red and _____ are black. Shuffle the cards and place them face down.

a. Take turns drawing (selecting)a card from the deck, so that the trial is repeated 15 times. Record the results of each person's card in the table below.

Name of person drawing	Card drawn	Check if red card drawn
TOTALS:		

b. Calculate the experimental probability of drawing a red card from a deck of cards. Use the entries from the last row in your table above. Recall that experimental probability is found by calculating the ratio

$$\frac{\textit{the number of times the event occurred}}{\textit{the number of trials}}$$

_____

6. Compare your result in question (1e) with (5b). Are the probability values equal or not?

7. Compare your results in question (1b) with (2b). Are the probability values equal or not?

8. Compare your experimental probability values to those of your classmates and discuss your observations.

OBSERVATIONS: **When a small number of trials takes place, theoretical and experimental probability values are _____ always _____.**

_____ probability is faster to evaluate.

9. Why do you think sometimes different values occur when dealing with experimental and theoretical probabilities?

10. When do you think the two types of probabilities will be equal?

11. Identify independent events in the work completed in this investigation.