5

$\mathcal{Z}$est for $\mathcal{P}$rogress
$\mathcal{Z}$eal of $\mathcal{P}$artnership

MATHEMATICS
4th QUARTER – Module 9:
EXPERIMENTAL PROBABILITY

Name of Learner: _____

Grade & Section: _____

Name of School: _____
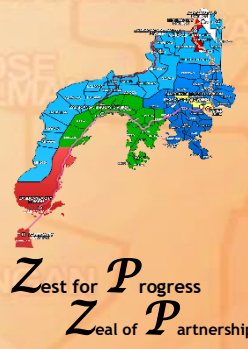
JANUARY
Makugihon

FEBRUARY
Mahigugmaon

MARCH
Matinabangon

APRIL
Matinahuron

MAY
Mahapsay og Malinawon

JUNE
Maabtik og Masunod sa Ihsaktong Oras

JULY
Mauntigo og Maabilidad

AUGUST
Maginhunahunaon para sa Uban

SEPTEMBER
Madaginoton

OCTOBER
Matinud-anon

NOVEMBER
Masaligan

DECEMBER
Maalampuon

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 4 - Module 9: Experimental Probability
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Introductory Message

This Self – Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge of lessons in each SLM. This will tell you if you need to proceed with completing this module or if you need to ask your facilitator or your teacher's assistance for a better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you with your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instruction carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answer the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

This module was written as an aid in the basic statistics lesson of the fourth quarter of grade 5 mathematics. It covers the key concepts of Experimental Probability.

This module was designed to cater to the academic needs of diverse learners in achieving and improving the twin goals of mathematics in basic education levels which are critical thinking and problem-solving. The language used recognizes the vocabulary level of grade 5 students. The lessons followed developmentally sequenced teaching and learning processes to meet the curriculum requirement.

After going through this module, you are expected to:
- analyze data attained from chance using experiments involving letter cards (A to Z) and number cards (0 to 20) (M5SP-IV-16); and
- solve routine and non-routine problems involving experimental probability. (M5SP-IVj17)

Believe that learning can continue amidst the health crisis. Good luck, stay safe, and God bless.

Directions: Choose the letter that corresponds to the correct answer. Write your answer on a separate sheet.

1. What do you call the ratio of the number of times an event occurs to the number of trials?
   A. Experimental Probability
   B. Theoretical Probability
   C. Ratio
   D. Experiment

2. Amanda used a standard deck of 52 cards and selected cards at random. She recorded the card that she picked, and then replaced the card. The results are shown below.

CARD	FREQUENCY
Hearts	7
Diamonds	9
Spades	11
Clubs	3

   Based on the results, what is the experimental probability of selecting a heart?
   A. $\frac{1}{10}$
   B. $\frac{7}{30}$
   C. $\frac{3}{10}$
   D. $\frac{11}{30}$

3. What is the experimental probability of selecting a diamond?
   A. $\frac{1}{10}$
   B. $\frac{7}{30}$
   C. $\frac{3}{10}$
   D. $\frac{11}{30}$

4. Suppose you roll a die labeled J, O, Y, F, U, and L ten times. Three of those times, you get a J. What is the experimental probability of rolling a J?
   A. $\frac{7}{3}$
   B. $\frac{1}{3}$
   C. $\frac{1}{10}$
   D. $\frac{3}{10}$

5. A card was drawn 15 times from a deck of 26 letter cards (from A to Z). What is the experimental probability that a vowel is drawn?
   A. $\frac{1}{3}$
   B. $\frac{3}{5}$
   C. $\frac{1}{15}$
   D. $\frac{2}{15}$

What's In
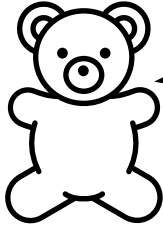
Can you still remember what experimental probability is?

Experimental probability is the ratio of the number of times an event occurs to the total number of trials or times the activity is performed. It is also calculated by dividing the number of successful events by the total number of events.

What's New

ACTIVITY   LET'S DO THIS!

Directions: Complete the table below. Refer to the situation besides the table. Write your answers on a separate sheet.

Toss a cube with letters {S, E, N, S, E, S} at least 6 times. Letter S appeared three times. Find the experimental probability of getting S, E and N.

OUTCOME	NUMBER OF TIMES APPEARED	EXPERIMENTAL PROBABILITY
S	3	
E	2	
N	1	

What is It

A **Experimental Probability**

An **Experimental Probability** is a ratio between the number of times the event occurs and the total number of trials.

When a cube with letters S, E, N, S, E, and S on its faces is tossed once, there are six total outcomes, and the possible outcomes are tossing an S, E, N, S, E, or S.

$$Probability\ of\ tossing\ letter = \frac{number\ of\ times\ the\ event\ occurs}{total\ number\ of\ trials}$$

$Probability\ of\ tossing\ an\ \boldsymbol{S} = \frac{3}{6}$ → favorable outcome {S, S, S}
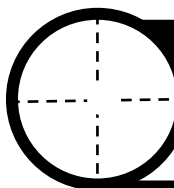
→ Total possible outcomes {S, E, N, S, E, S}

Therefore, the experimental probability of getting S is $\frac{3}{6}$ or $\frac{1}{2}$.

$Probability\ of\ tossing\ an\ \boldsymbol{E} = \frac{2}{6}$ → favorable outcome {E, E}

→ Total possible outcomes {S, E, N, S, E, S}

Therefore, the experimental probability of getting E is $\frac{2}{6}$ or $\frac{1}{3}$.

$Probability\ of\ tossing\ an\ \boldsymbol{N} = \frac{1}{6}$ → favorable outcome {N}

→ Total possible outcomes {S, E, N, S, E, S}

Therefore, the experimental probability of getting N is $\frac{1}{6}$.

NOTE

Favorable Outcome – is the desired result.
Possible Outcome – is the probable results of an experiment.

What's More

ACTIVITY **LET'S DO THIS!**

Directions: Do the activity below. Refer to the instructions and write the correct answers on a separate sheet.

a. Toss a coin at least 10 times. Record the results in the table. (Write answers in fraction form and reduce to lowest terms if possible.)

OUTCOME	NUMBER OF TRIALS	EXPERIMENTAL PROBABILITY
Heads		
Tails		

b. What do you think would happen if you performed more trials?

c. What strategy can we use to solve the problem?

What is It

A Solving Routine Word Problems

Let us read and understand the problem below.

> **Problem 1**. Faye rolls two dice 100 times and records the sum of the numbers on the top faces. Which sum occurred least often? Which sum occurred most often? What is the experimental probability of getting a sum less than 5?

ROLLING TWO DICE										
Outcome (sum)	2	3	4	5	6	7	8	9	10	11	12
No. Of times it happened	2	4	6	8	12	14	17	13	11	9	4

UNDERSTAND

a. What is asked?
- Which sum occurred the least?
- Which sum occurred most often?
- What is the experimental probability of getting a sum less than 5?

b. What are the given facts?
- The result of Faye's experiment is shown in the table.

PLAN

a. What strategy can we use to solve the problem?
- Analyzing the given situation and applying the formula could help us solve the problem.

SOLVE

- Based on the table given, it is evident that the sum which occurred least often is 2 since it only happened twice.
- Based on the table, it is recorded the sum which occurred most often is 8 since it happened 17 times.
- Out of 100 trials, a sum less than 5 happened 12 times.

$$\frac{Number\ of\ times\ a\ sum\ of\ less\ than\ 5\ happened}{Total\ number\ of\ trials} = \frac{2+4+6}{100} = \frac{12}{100} = \frac{3}{25}$$

ANSWER

- The experimental probability of getting a sum less than 5 is $\frac{3}{25}$.

CHECK

● Analyzing the situation given and applying the formula properly will make our answer correct.

B **Solving Non- Routine Word Problems**

On the other hand, non-routine word problems are problems very different from routine word problems. Non-routine word problems require sets of strategies to solve them because this kind of problem does not have a direct path to the solution.

Let us try to answer this non-routine problem.

Problem 2. It rained 2 out of the last 12 days in March. If this trend continues, how many rainy days would you expect in April?

Find the experimental probability of a rainy day.

$$P(event) = \frac{number\ of\ times\ the\ event\ occurs}{total\ number\ of\ trials}$$

It rains 2 days

$$P(rain) = \frac{2}{12} = \frac{1}{6}$$

There is a total of 12 days

To make a prediction, multiply the probability of a rainy day to the number of days in April.

$$\frac{1}{6} \times \frac{30}{1} = \frac{30}{6}\ or\ 5$$

*You can predict that there will be 5 rainy days in the month of April.

What's More

Directions: Read and solve the problem using Experimental Probability. Write your answer on a separate sheet of paper.

A supervisor of the canning factory makes a random check on the finished product of the cans of sardines produced, of the 500 cans of sardines, 20 are found to be defective.

A. What is the experimental probability that a can of sardines is defective?

B. Predict the number of defective cans of sardines in a batch of 1000 pieces.

What I Have Learned

Directions: Fill in the correct word to connect the ideas and form the concept that you have learned today.

The **1.** _____ is a mathematical way of describing how likely it is that something will happen. A **2.** _____ is the outcome of interest and **3.** _____ is the result upon experiment.

We can solve Routine word problems by following the steps in problem-solving; **4.**_____, _____, _____, _____.

To solve a **5.** _____ word problem using experimental probability, analyze the situation given, and apply the formula properly to make our answer correct.

What I Can Do

ACTIVITY **MATH CHALLENGE**

Directions: Read and solve the problem using experimental probabilities. Write your answers on a separate sheet of paper.

Suppose you attempt to make 20 free throws in a basketball game. The result of the experiment is as follows.

| 0	0	1	0	1	1	1	0	1	1
1	1	0	0	1	1	1	0	1	0

Legend: 0 = missed throw
1 = made the free throw

QUESTION: What is the experimental probability of making a free throw?

Assessment

Directions: Choose the letter that corresponds to your answer. Write your answer on a separate sheet.

1. A bag contains 10 red marbles, 8 yellow marbles and 2 black marbles. Ronna took a marble and returned it. After 10 trials, a red marble was picked 6 times. Find the experimental probability of getting a red marble.

   A. $\frac{1}{2}$ B. $\frac{2}{3}$ C. $\frac{3}{5}$ D. $\frac{4}{6}$

2. A coin was tossed 50 times, the head appeared 15 times. Find the experimental probability of getting the heads.

   A. $\frac{1}{2}$ B. $\frac{2}{3}$ C. $\frac{3}{10}$ D. $\frac{6}{10}$

3. A box contains 25 blue marbles, 20 red marbles, and 30 green marbles. Take a marble from the box. Note and record the color of the marbles and return the marbles. What is the experimental probability if the total number of red marbles picked is 35 out of 150 trials?

   A. $\frac{35}{75}$ B. $\frac{7}{30}$ C. $\frac{20}{75}$ D. $\frac{7}{15}$

4. In 31 tries, Eli beat Janine 11 times. What is the probability that Janine won?

   A. $\frac{13}{11}$ B. $\frac{15}{11}$ C. $\frac{20}{31}$ D. $\frac{21}{31}$

5. In a classroom there are 100 pupils, of whom 40 are boys, 30 wear glasses. If one student from the class is randomly selected, what is the probability that the student will be a girl who does not wear glasses?

   A. $\frac{2}{9}$ B. $\frac{4}{15}$ C. $\frac{6}{19}$ D. $\frac{9}{20}$

Answer Key

What's More: Lesson 1
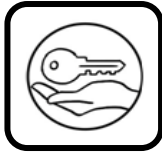
Answers may vary

What I Know:

1. a   2. b   3. c
4. c   5. a

What's New:

$S = \frac{3}{6}$ or $\frac{1}{2}$, $E = \frac{2}{6}$ or $\frac{1}{3}$, $N = \frac{1}{6}$

What I Have Learned

1. Experimental probability
2. Favorable outcome
3. Possible outcome
4. Understand, plan, solve, check
5. Non-routine

What's More: Lesson 2

A. the experimental probability that a can of sardines is defective is $\frac{20}{500}$ or $\frac{1}{25}$

B. The Experimental probability that a can of sardines is defective in a batch of 1000 pieces is $\frac{40}{1000}$ or $\frac{1}{25}$

Assessment:

1. C   2. C   3. B
4. C   5. D

What I Can Do:

The Experimental probability of making a freethrow is $\frac{12}{20}$ or $\frac{3}{4}$.

References:

Angelina P. Lumbre and Alvin C. Ursua, et al.,21st Century MATHletes Grade 5, Vibal Group,Inc, 2016,363-368.

Adriano M. Taruc and Paulino T. Gureng, Realistic Math Worktext Grade 6,2nd Edition, Sibs Publishing House, Inc. March 2007, 464-473.

I AM A FILIPINO
by Carlos P. Romulo

I am a Filipino – inheritor of a glorious past, hostage to the uncertain future. As such, I must prove equal to a two-fold task – the task of meeting my responsibility to the past, and the task of performing my obligation to the future.

I am sprung from a hardy race – child many generations removed of ancient Malayan pioneers. Across the centuries, the memory comes rushing back to me: of brown-skinned men putting out to sea in ships that were as frail as their hearts were stout. Over the sea I see them come, borne upon the billowing wave and the whistling wind, carried upon the mighty swell of hope – hope in the free abundance of the new land that was to be their home and their children's forever.

This is the land they sought and found. Every inch of shore that their eyes first set upon, every hill and mountain that beckoned to them with a green and purple invitation, every mile of rolling plain that their view encompassed, every river and lake that promised a plentiful living and the fruitfulness of commerce, is a hollowed spot to me.

By the strength of their hearts and hands, by every right of law, human and divine, this land and all the appurtenances thereof – the black and fertile soil, the seas and lakes and rivers teeming with fish, the forests with their inexhaustible wealth in wild and timber, the mountains with their bowels swollen with minerals – the whole of this rich and happy land has been for centuries without number, the land of my fathers. This land I received in trust from them, and in trust will pass it to my children, and so on until the world is no more.

I am a Filipino. In my blood runs the immortal seed of heroes – seed that flowered down the centuries in deeds of courage and defiance. In my veins yet pulses the same hot blood that sent Lapulapu to battle against the alien foe, that drove Diego Silang and Dagohoy into rebellion against the foreign oppressor.

That seed is immortal. It is the self-same seed that flowered in the heart of Jose Rizal that morning in Bagumbayan when a volley of shots put an end to all that was mortal of him and made his spirit deathless forever; the same that flowered in the hearts of Bonifacio in Balintawak, of Gregorio del Pilar at Tirad Pass, of Antonio Luna at Calumpit, that bloomed in flowers of frustration in the sad heart of Emilio Aguinaldo at Palanan, and yet burst forth royally again in the proud heart of Manuel L. Quezon when he stood at last on the threshold of ancient Malacanang Palace, in the symbolic act of possession and racial vindication. The seed I bear within me is an immortal seed.

It is the mark of my manhood, the symbol of my dignity as a human being. Like the seeds that were once buried in the tomb of Tutankhamen many thousands of years ago, it shall grow and flower and bear fruit again. It is the insigne of my race, and my generation is but a stage in the unending search of my people for freedom and happiness.

I am a Filipino, child of the marriage of the East and the West. The East, with its languor and mysticism, its passivity and endurance, was my mother, and my sire was the West that came thundering across the seas with the Cross and Sword and the Machine. I am of the East, an eager participant in its struggles for liberation from the imperialist yoke. But I know also that the East must awake from its centuried sleep, shake off the lethargy that has bound its limbs, and start moving where destiny awaits.

For I, too, am of the West, and the vigorous peoples of the West have destroyed forever the peace and quiet that once were ours. I can no longer live, a being apart from those whose world now trembles to the roar of bomb and cannon shot. For no man and no nation is an island, but a part of the main, and there is no longer any East and West – only individuals and nations making those momentous choices that are the hinges upon which history revolves. At the vanguard of progress in this part of the world I stand – a forlorn figure in the eyes of some, but not one defeated and lost. For through the thick, interlacing branches of habit and custom above me I have seen the light of the sun, and I know that it is good. I have seen the light of justice and equality and freedom, my heart has been lifted by the vision of democracy, and I shall not rest until my land and my people shall have been blessed by these, beyond the power of any man or nation to subvert or destroy.

I am a Filipino, and this is my inheritance. What pledge shall I give that I may prove worthy of my inheritance? I shall give the pledge that has come ringing down the corridors of the centuries, and it shall be compounded of the joyous cries of my Malayan forebears when first they saw the contours of this land loom before their eyes, of the battle cries that have resounded in every field of combat from Mactan to Tirad Pass, of the voices of my people when they sing:

"I am a Filipino born to freedom, and I shall not rest until freedom shall have been added unto my inheritance—for myself and my children and my children's children—forever."