JANUARY
Makugihon
FEBRUARY
Mahigugmaon
MARCH
Matinabangon
APRIL
Matinahuron
MAY
Mahigmay og Matinguhaon
JUNE
Maabtik og Musunod sa Iskwilitang Oras
JULY
Maantigo og Maabilidad
AUGUST
Maginhunahunaon para sa Uban
SEPTEMBER
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OCTOBER
Matinud-anon
NOVEMBER
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DECEMBER
Maalampuon

Republic of the Philippines
Department of Education
Regional Office IX, Zamboanga Peninsula

6

Zest for Progress
Zeal of Partnership

MATHEMATICS

4th QUARTER – Module 9: APPLICATION PROBLEM ON PROBABILITY

Name of Learner: _____

Grade & Section: _____

Name of School: _____

Mathematics – Grade 6
Alternative Delivery Mode
Quarter 4 - Module 9: Application Problem on Probability
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Development Team of the Module

Writer:		**Maria Kathryn O. Osario**
Editors:		**Rozel J. Lubrica**
		Alhidri I. Hairal
Layout Artist:		**Abdurauf J. Baldomero**
Reviewers:	**EPS Mathematics**	**Vilma A. Brown, Ed. D.**
	School Head	**Raponzel B. Manalo**
Management Team:	**SDS**	**Roy C. Tuballa, EMD, JD, CESO VI**
	ASDS	**Jay S. Montealto, CESO VI**
	ASDS	**Norma T. Francisco, DM, CESE**
	EPS Mathematics	**Vilma A. Brown, Ed. D.**
	EPS LRMS	**Aida F. Coyme, Ed. D.**

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Department of Education – Region IX, Zamboanga Peninsula
Office Address: Tiguma, Airport Road, Pagadian City
Telefax: (062)- 215 – 3751; 991-5975
E-mail Address: region9@deped.gov.ph

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 on 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 using this SLM or any difficulty in answering 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 to guide Grade 6 learners in understanding basic statistics lessons, particularly on how to solve routine and non-routine problems involving Theoretical and Experimental Probability (**M6SP-IVj-24)**. Furthermore, this module used the 4 Step Plan (Understand, Plan, Solve, and Check and Look Back) strategy in solving different word problems.

This module was designed to develop the learners' critical thinking and problem-solving skills, which is the primary goal of the K-12 Mathematics curriculum. The activities were designed to suit the level of grade 6 learners.

May you be able to transfer your learnings in this module to your day-to-day activities. Continue learning. God bless and keep safe.

What I Know

Directions: Read each question carefully. Choose the letter of the correct answer. Write your answer on a separate sheet.

1. Jacob wants to determine the probability of a die to show five for 35 times when it is rolled 100 times. What is the experimental probability that the die will show what Jacob wanted to find out?

   A. $\frac{5}{35}$ B. $\frac{7}{20}$ C. $\frac{5}{100}$ D. $\frac{35}{100}$

2. Hannah and Reevah played rock, paper, and scissors. After 25 tries, Hannah beat Reevah 15 times. What is the probability that Reevah won?

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

3. A bag contains 12 red pens, 8 blue pens, and 4 pink pens. Find the theoretical probability of getting a blue pen.

   A. $\frac{1}{2}$ B. $\frac{1}{6}$ C. $\frac{1}{8}$ D. $\frac{1}{3}$

4. Carlo studied the cards with the following letters:

S	T	A	Y

S	A	F	E

   One card was picked from a well-shuffled 8 letter cards. What is the theoretical probability that Carlo will **NOT** be able to pick a card with the letter S in it?

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

5. A set of cards includes 20 green cards, 10 red cards, and 5 blue cards. What is the probability that a card chosen at random is blue?

   A. $\frac{6}{7}$ B. $\frac{5}{7}$ C. $\frac{1}{7}$ D. $\frac{1}{35}$

What's In

ACTIVITY **THINK AND SHARE**

Examine the weather today, is there a chance that it will rain?

The chances of an event happening are called the *probability of that event.* If there is no chance that it will rain today, we say the probability is zero. However, if we are very sure, we say the probability is 100%. The probability of an event is a number describing the chance that the event will occur, with this number from 0 to 1. Events that are most likely to happen have a probability greater than $\frac{1}{2}$. Those that are unlikely to happen have probabilities close to zero.

What's New

ACTIVITY **GUESS WHAT?**

Directions: Read the poem below and answer the question that follows.

TRY
By: Neel Trivedi

Try. You might lose.
Try. You might win.
Try. You might barely take a step.
Try. You might run a marathon.
Try. You might laugh.
Life's outcomes ALWAYS
Have a probability of 50-50.
You'll never know for sure unless you
TRY.

QUESTION:
What is the poem all about?

What is It

A Theoretical Probability

Theoretical probability refers to the number of ways that an event can occur. Mathematically, theoretical probability can be determined by dividing the number of favorable outcomes by the number of possible outcomes.

$$\textbf{Theoretical Probability (E)} = \frac{\text{number of favorable outcomes}}{\text{number of possible outcome}}$$

Story Problem 1. Kate and Nanay Teresa visited an orphanage to share some gifts with the children. They also prepared a gift box that contains 5 red stars, 9 blue stars, 2 yellow stars, and 5 green stars. Each child will take a turn in picking one star. Those who will pick a blue star will have a chance to win a school supplies package. Since each star is equally likely to be drawn as any other, what is the theoretical probability that the children will pick a blue star?

Let us solve the problem using the 4 – step plan.

FOUR – STEP PLAN	ILLUSTRATIVE EXAMPLE
UNDERSTAND	
• Know what is asked	The **theoretical probability** of getting a blue star when children take a turn in picking a star.
• Know what are the given facts	5 red stars, 9 blue stars, 2 yellow stars, and 5 green stars.
PLAN	
• Determine the operation or formula to use.	There are 21 stars inside the box. 9 out of 21 stars are color blue. Use the formula below to find the theoretical probability of getting a blue star. $$P(E) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcome}}$$ where E refers to the event.
SOLVE	
• Show how the solution is done	If E is the event of getting a blue star, then the formula becomes $$\boldsymbol{P(blue\ star) = \frac{9}{21} = \frac{3}{7}}$$
• Answer	Therefore, the theoretical probability of getting a blue star is $\frac{9}{21}$ or $\frac{3}{7}$.
CHECK AND LOOK BACK	
• Verify using check and balance	Since 9 stars are blue, the probability of picking a blue star is $\frac{9}{21}$ or $\frac{3}{7}$

Experimental probability refers to the chances of an event to occur when an experiment is conducted. It is usually determined by experimenting. Mathematically, experimental probability can be determined by dividing the number of times the favorable outcomes occurred by the number of trials the experiment has conducted.

$$\textbf{Experimental Probability (E)} = \frac{\text{number of favorable outcomes occur}}{\text{number of trials in the experiment}}$$

Story Problem 2. Camille, Carla, and Cassy each owned a dice. They rolled each of their dice at the same time, 6 times. Then, they recorded the outcomes. They agreed that Camille gets the point if all the three dice were showing the same number; that Carla gets the point if two dice showing the same number; and that Cassy gets a point if all the dice showed different numbers. The table shows the result of the game.

Game Number	1	2	3	4	5	6
Camille	2	2	3	4	4	5
Carla	2	3	3	4	5	6
Cassy	2	4	2	4	5	2

A. What is the experimental probability of each player winning the game?

B. Is the point system fair? Explain your answer by citing 1 evidence from the experiment.

Let us solve the problem using the 4 – step plan.

FOUR – STEP PLAN	**ILLUSTRATIVE EXAMPLE**
UNDERSTAND	
• Know what is asked	The **experimental probability** of each player winning the game. The fairness of the pointing system is based on the result of the experiment.
• Know what are the given facts	There are a total of 3 players and 6 games.
PLAN	
• Determine the operation or formula to use**.**	The three players played the game 6 times; based on the outcomes, results vary from one game to another. Use the formula below to find the experimental probability of each player winning the game. $$P(E) = \frac{\text{number of favorable outcomes occur}}{\text{number of trials in the experiment}}$$ where E refers to the event.
SOLVE	
• Show how the solution is done	**QUESTION A: 1. Camille's experimental probability of winning.** If E is the event of Camille's experimental probability of winning, then the formula becomes, $$P(Camille\ Wins) = \frac{2}{6} = \frac{1}{3}$$ Therefore, the experimental probability of Camille to win the game is $\frac{2}{6}$ or $\frac{1}{3}$. **QUESTION A: 2. Carla's experimental probability of winning.** If E is the event of Carla's experimental probability of winning, then the formula becomes, $$P(Carla\ Wins) = \frac{2}{6} = \frac{1}{3}$$ Therefore, the experimental probability of Carla to win the game is $\frac{2}{6}$ or $\frac{1}{3}$. **QUESTION A: 3. Cassy's experimental probability of winning.** If E is the event of Cassy's experimental probability of winning, then the formula becomes, $$P(Cassy\ Wins) = \frac{2}{6} = \frac{1}{3}$$ Therefore, the experimental probability of Cassy to win the game is $\frac{2}{6}$ or $\frac{1}{3}$.

• Answer	A. The probability of each player to win the games is $\frac{2}{6}$ or $\frac{1}{3}$. B. Yes, based on the experiment, they had the same probability of winning.
CHECK AND LOOK BACK	
• Verify using check and balance	Since 9 stars are blue, the probability of picking a blue star is $\frac{9}{21}$ or $\frac{3}{7}$

What's More

Directions: Read the word problem and answer the questions that follow.

PROBLEM 1. Jessica and Kathryn donated different types of face mask to the 3 barangays with the greatest number of active cases. Their donations include 50 pieces N95 mask, 120 pieces surgical mask and 430 pieces cloth mask. They also donated different cleaning and sanitizing materials which comprise 25 bottles of bleach, 10 gallons of alcohol, and 50 boxes of hand soap.

Find the theoretical probability of the following:

1. Number of recoveries.
2. A barangay receiving surgical mask.
3. A barangay receiving alcohol.
4. A barangay receiving bleach.
5. A barangay receiving N95 mask.
6. A barangay receiving cloth mask.
7. A barangay receiving hand soap.

PROBLEM 2. Randy owns different colors of butterflies. There are blue, pink, red, white and yellow butterflies. One day, he performed an experiment. He wrote each color of the butterflies on a strip of paper, rolled and dropped it in the box. He randomly picked a strip of paper, recorded the result and put back the paper each time he picked a paper. He repeated the same process for 10 times. The table below shows the result of Randy's experiment.

1st pick	2nd pick	3rd pick	4th pick	5th pick	6th pick	7th pick	8th pick	9th pick	10th pick
blue	**pink**	**white**	**pink**	**red**	**white**	**blue**	**white**	**white**	**blue**

QUESTIONS:

A. What is the experimental probability that a red butterfly is picked?
B. What is the experimental probability that a white butterfly is picked?
C. What is the experimental probability that the same butterfly colors are repeatedly picked?
D. What is the experimental probability of the most picked butterfly color?
E. What is the experimental probability of the yellow butterfly?

What I Have Learned

ACTIVITY **SOLVE ME**

1. How do you solve Theoretical and Experimental Probability?

_____

_____

_____

What I Can Do

ACTIVITY **ANSWER ME**

Directions: Read and understand the questions below. Use the formula to find the theoretical and experimental probability to answer the questions.

A. A regular die is tossed. What is the probability of getting the following?

1. an odd number
2. a prime number

B. The table below shows the result of a chip experiment. Each time a chip was picked, it was returned to the box.

CHIP EXPERIMENT

OUTCOME	NUMBER
Red chip	21
Blue chip	15

1. How many trials of picking a chip were made?
2. What is the experimental probability of **NOT** picking a blue chip?

Assessment

Directions: Write the letter of the correct answer on separate sheet.

1. Martha rolled a twenty-sided dice (with number one to twenty). What is the theoretical probability that the dice will show a prime number?

A. $\frac{2}{10}$ B. $\frac{4}{20}$ C. $\frac{2}{5}$ D. $\frac{1}{5}$

2. In the figure below, identify the Theoretical Probability of **NOT** landing on B?

A. $\frac{1}{7}$ C. $\frac{7}{7}$

B. $\frac{6}{7}$ D. $\frac{7}{8}$

3. Three one-peso coins, four five-peso coins, and six ten-peso coins were placed in a coin purse. Jessie got one coin at a time. What is the probability that Jessie will be able to get a five peso-coin on his first pick?

A. $\frac{3}{13}$ B. $\frac{4}{13}$ C. $\frac{6}{13}$ D. $\frac{7}{13}$

4. You ask a friend to pick one letter from the word ZAMBOANGA. What is the theoretical probability that he will **NOT** be able to pick the letter "A"?

A. $\frac{1}{3}$ B. $\frac{2}{3}$ C. $\frac{3}{9}$ D. $\frac{1}{9}$

5. A coin is tossed 100 times. The coin landed on the head 58 times. Find the probability of landing on tails.

A. $\frac{21}{50}$ B. $\frac{21}{100}$ C. $\frac{58}{100}$ D. $\frac{42}{50}$

6. A wheel has 7 equal sections: guava, mango, papaya, durian, atis, santol, and lanzones. What is the experimental probability that the wheel will stop on the lanzones section?

A. $\frac{1}{7}$ B. $\frac{6}{7}$ C. $\frac{7}{7}$ D. 1

7. Below is the table of the outcome when Alvin tossed a coin 8 times. Find the experimental probability of getting a head.

TRIAL	1	2	3	4	5	6	7	8
OUTCOME	head	tale	head	head	head	tale	tale	head

A. $\frac{2}{8}$ B. $\frac{3}{8}$ C. $\frac{4}{8}$ D. $\frac{5}{8}$

8. Rodel has a bag of crayons. He removed one crayon, recorded the color, and then placed it back in the bag. He repeated this process 20 times and recorded his results on the table. What is the probability of drawing a purple color?

Color	Pink	Red	Purple	Brown
Frequency	7	5	6	2

A. $\frac{6}{10}$ B. $\frac{3}{20}$ C. $\frac{3}{10}$ D. $\frac{4}{20}$

9. Ryan lost 12 times out of his 28 chess games. What is the experimental the probability that Ryan will win his next game?

A. $\frac{5}{7}$ B. $\frac{4}{7}$ C. $\frac{3}{7}$ D. $\frac{2}{7}$

10. The 2 dice were rolled 27 times, and an odd number sum appeared 9 times. What is the probability that an even number sum to occur?

A. $\frac{2}{27}$ B. $\frac{9}{27}$ C. $\frac{1}{3}$ D. $\frac{2}{3}$

Assessment:

1. C
2. D
3. B
4. B
5. A
6. A
7. D
8. C
9. B
10. D

What I Can Do:

A.

1. $\frac{1}{2}$
2. $\frac{1}{2}$

B.

1. 36 trial
2. $\frac{7}{12}$

What I have learned:

1. Answer will vary

What's More:

Activity 1:

1. $\frac{27}{61}$ 2. $\frac{1}{40}$ 3. $\frac{3}{10}$ 4. $\frac{3}{25}$ 5. $\frac{3}{50}$ 6. $\frac{3}{430}$ 7. $\frac{3}{50}$

Activity 2:

1. $\frac{1}{10}$ 2. $\frac{2}{5}$ 3. $\frac{3}{10}$ 4. $\frac{2}{5}$ 5. $\frac{0}{10}$ or 0

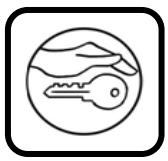
What's New:

Answer will vary

What I Know:

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

Answer Key



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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."