JANUARY
Makugihon

FEBRUARY
Mahigugmaon

MARCH
Matinabangon

APRIL
Matinahuron

MAY
Mahapsay og Malinpyo

JUNE
Maabtik og Masunod sa Insaktong Oras

JULY
Maantigo og Maabilidad

AUGUST
Maginhandunaon para sa Uban

SEPTEMBER
Madaginoton

OCTOBER
Matinud-anon

NOVEMBER
Masaligan

DECEMBER
Maalampuon

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

Zest for Progress
Zeal of Partnership

6

MATHEMATICS

4th QUARTER – Module 8:
SIMPLE PREDICTIONS

Name of Learner: ___________________________

Grade & Section: ___________________________

Name of School: ___________________________

Mathematics – Grade 6
Alternative Delivery Mode
Quarter 4 - Module 8: Making Simple Predictions
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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 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 aid in the probability lesson of the fourth quarter of grade 6 mathematics. The module follows a step – by – step approach to predict and calculate probability outcomes supported by examples and exercises. It covers the key concepts of making simple predictions of events based on the results of experiments.

This module was designed to cater to diverse learners' academic needs 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 6 students. The lessons followed developmentally sequenced teaching and learning processes to meet the curriculum requirement.

After going through the module, you are expected to make simple predictions of events based on the results of experiments. (**M6SP-IVi-23**)

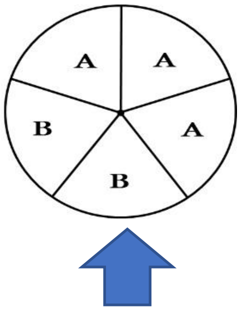
Believe that learning can continue amidst the health crisis. Good luck, stay safe, and God bless.

What I Know

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

1. A coin is to be tossed 100 times. What is the best prediction for the number of times that the coin will land heads up?
   A. Exactly 100 B. more than 100 C. More or less 50 D. 0

For question numbers 2-3, refer to the spinner below:



2. If the spinner is spun 10 times, how many times will A land straight on the arrow?
   A. 6 C. 2
   B. 4 D. 1
3. The spinner is spun 15 times, and A landed straight on the arrow 10 times. If the spinner is to be spun for another 42 times, about how many times B will land straight on the arrow?
   A. 42 C. 14
   B. 21 D. 7
4. Carlo flipped three identical coins five times, and the results are recorded below:

Trial	1	2	3	4	5
Result	HHT	HTT	THT	THH	HTH

   If the coins are to be flipped on the 6^{th} trial, which could be the result?
   A. THT B. THH C. TTH D. TTT
5. There are 20 TVs on display at a certain electronic showroom, and each TV is turned on a random channel from 10 channels: 4 sports channels, 3 news channels, 2 lifestyle channels, and 1 movie channel. Which statement best predicts the number of TVs showing lifestyle channel?
   A. More or less 4 TVs C. About 20 TVs
   B. Exactly 4 TVs D. More or less 20 TVs

LESSON: MAKE SIMPLE PREDICTIONS OF EVENTS

What's In

ACTIVITY GUESS WHAT

Directions: Find the probability of using a tree diagram.

A vendor sells four different flavors of ice cream: vanilla, chocolate, mango, and strawberry. It comes with marshmallows and sprinkles for toppings. How many combinations are possible?

FLAVOR	TOPPING
Vanilla	Marshmallows
Chocolate	Sprinkles
Mango	
Strawberry	

To calculate probability, we need to know all the different things that can happen. A sample space is a list of all the possible outcomes of activity or experiment.

What's New

ACTIVITY WHO IS WHO

Directions: Find the probability. Write your answer on a separate sheet.

Lito and Ben spent their free time playing games together. The two boys thought of playing a coin and agreed on which side for a bet. Lito chose a head while Ben chose a tail. They flipped the coin for 15 trials. The table below shows the results.

TRIAL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RESULTS	T	H	H	T	H	T	T	H	H	T	T	H	H	H	T

QUESTION:
If we will continue tossing the coins until 20 trials, will there be a possibility of a tie? Why?

What is It

A Using Theoretical and Experimental Probability in making Predictions

Making Predictions is not equivalent to fortune-telling. It is about making educated guesses based on the probability or the likelihood of an event to occur or based on the patterns of events that had occurred. Hence, making predictions rely on probability.

Probability is a type of ratio where we compare how many times an outcome can occur than all possible outcomes.

$$Probability = \frac{number\ of\ favorable\ outcomes}{number\ of\ possible\ outcomes}$$

There are methods to tell the number of favorable outcomes of an event: **Theoretical** and **Experimental Probability**.

THEORETICAL PROBABILITY

Theoretical Probability of an event is the number of ways that an event can occur divided by the total number of outcomes.

Finding Theoretical Probability of Simple Events

We use this formula:

$$Theoretical\ Probability\ (event) = \frac{number\ of\ favorable\ outcomes}{number\ of\ possible\ outcomes}$$

SAMPLE 1 A regular 6-sided die (singular of dice) is rolled.

a. What is the probability of rolling a 3? a 5? a 6?
b. How many ways will an odd number occur?
c. What is the probability that an even number will occur?
d. If the die is rolled for 24 times, about how many times will 5 appear heads up?

SOLUTIONS:

a. What is the probability of rolling a 3? a 5? a 6?
   - Each number on a die has an equal chance of landing face-up, so,

$$Probability\ (3) = \frac{number\ of\ favorable\ outcomes}{number\ of\ possible\ outcomes} = \frac{1}{6}$$

$$Probability\ (5) = \frac{number\ of\ favorable\ outcomes}{number\ of\ possible\ outcomes} = \frac{1}{6}$$

$$Probability\ (6) = \frac{number\ of\ favorable\ outcomes}{number\ of\ possible\ outcomes} = \frac{1}{6}$$

b. How many ways will an odd number occur?
   - There are 3 possible ways (1, 3, and 5) of rolling an odd number.

c. What is the probability that an even number will occur?
   - We have 3 even numbers (2, 4, and 6), so,

$$Probability\ (even\ number) = \frac{number\ of\ favorable\ outcomes}{number\ of\ possible\ outcomes} = \frac{3}{6}\ or\ \frac{1}{2}\ or\ 50\%$$

d. Theoretically, 1 out of 6 times that the number 5 appears heads up, or $\frac{1}{6}$. So, if the die is rolled 24 times, then number 5 will likely appear heads up for 4 times $\left(\frac{1}{6} \times 24 = 4\right)$.

SAMPLE 2. A coin is tossed for 10 times.

a. What are the possible outcomes every time the coin is tossed?
b. What is the probability of landing heads up every time the coin is tossed?
c. How many times that the coin lands tails up?

SOLUTIONS:

a. What are the possible outcomes every time the coin is tossed?
   - There are only two possible outcomes (head or tail) every time a coin is tossed.

b. What is the probability of landing heads up every time the coin is tossed?
   - Each face (head or tail) has an equal chance of landing face-up, so,

$$Probability\ (head) = \frac{number\ of\ favorable\ outcomes}{number\ of\ possible\ outcomes} = \frac{1}{2}\ or\ 50\%$$

c. How many times that the coin lands tails up?
   - Theoretically, 1 out of 2 times that the coin lands tails up, or $\frac{1}{2}$. So, if the coin is tossed 10 times, the coin will likely to land tails up 5 times $\left(\frac{1}{2} \times 10 = 5\right)$.

In short, theoretical probability helps us make predictions based on what is expected to happen or the expected outcome. However, the expected outcome may not necessarily be equal to the actual outcome once the experiment is performed. Hence, Experimental Probability also comes into play when making predictions.

EXPERIMENTAL PROBABILITY

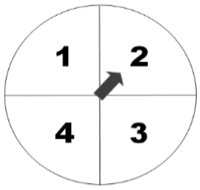
Experimental probability of an event is the ratio of the number of times event occurs to the total trials or times the activity is performed.

Finding Experimental Probability of Simple Events

We use this formula:

$$\textbf{\textit{Experimental Probability (event)}} = \frac{\textbf{\textit{number of times favorable outcomes occur}}}{\textbf{\textit{number of trials in the experiments}}}$$

SAMPLE 1. The spinner shown below is spun for 50 times and every time it stops, the number that lands directly pointing by the arrow is recorded. The table below shows the results.



NUMBER	OCCURRENCES
1	8
2	15
3	17
4	10

a. What is the experimental probability of 2 landings directly on the arrow on the fifty trials?
   - The probability of number 2 landing directly on the arrow is 15 out of 50 trials. So,

$$Experimental\ Probability\ (2) = \frac{number\ of\ favorable\ outcomes}{number\ of\ trials} = \frac{15}{50}\ or\ \frac{3}{10}\ or\ 30\%$$

b. If the spinner is spun for another 20 times, how many times will the number 2 land on the arrow?
   - Since the probability of number 2 landing directly on the arrow is 15 out of 50 trials, or $\frac{15}{50}$ or $\frac{3}{10}$, so if the spinner is spun for another 20 trials, the number 2 will likely land directly on the arrow for 6 times $\left(\frac{3}{10} \times 20 = 6\right)$.

SAMPLE 2. A coin is tossed for 14 times and the results are shown below.

SIDE OF THE COIN	NUMBER OF OCCURRENCES
Head	8
Tail	6

a. What is the experimental probability of the coin landing heads up?
   - The occurrence of the coin landing heads up is 8 out of 14 trials, so,

$$Experimental\ Probability\ (Head) = \frac{number\ of\ favorable\ outcomes}{number\ of\ trials} = \frac{8}{14}\ or\ \frac{4}{7}$$

b. If the coin is to be tossed 70 times, how many times will the coin likely land tails up?
   - Since the probability of the coin to land tails up is 6 out of 14 trials, or $\frac{6}{14}\ or\ \frac{3}{7}$, so if the coin is to be tossed for 70 trials, the coin will likely to land tails up for about 30 times$\left(\frac{3}{7} \times 70 = 30\right)$.

In short, experimental probability helps us make predictions based on the results of the actual experiments.

B Differences between Theoretical and Experimental Probabilities

We can use Theoretical and Experimental Probabilities in making predictions.

SAMPLE: Aida is trying to differentiate between theoretical and experimental probabilities by tossing a coin for 20 times. Her expected results and the actual results are shown below

SIDES OF THE COIN	EXPECTED RESULTS	ACTUAL RESULTS
Head	10	12
Tail	10	8

a. If the coin is tossed 100 times, how many times the coin is expected to land heads up?
   - Theoretically, the probability of the coin to land heads up is 1 out of 2, or $\frac{1}{2}$ so if the coin is to be tossed 100 times, the probability of the coin to land heads up is 50 times $\left(\frac{1}{2} \times 100 = 50\right)$.

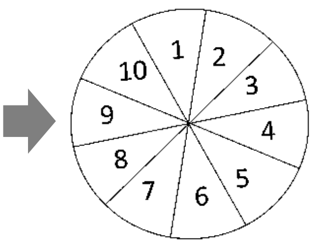
b. If the coin is tossed 100 times, what is most likely the possible number of occurrences that the coin to land heads up?
   - Experimentally, the probability of the coin to land heads up is 12 out of 20 trials, or $\frac{12}{20}$ or $\frac{3}{5}$ so if the coin is tossed 100 times, the probability of the coin to land heads up is likely to be 60 times$\left(\frac{3}{5} \times 100 = 60\right)$.

In short, making predictions based on theoretical probability rely on the expected outcomes or results, while making predictions based on experimental probability rely on the results of the actual experimentation.

What's More

Directions: Read the given situation carefully and answer the question that follows. Solve and write your answer on a separate sheet.

Bensar spun the spinner numbered from 1 to 10, as shown below for 30 times and recorded the results given below.



NUMBER	EXPECTED RESULTS	ACTUAL RESULTS
1	3	0
2	3	3
3	3	4
4	3	1
5	3	3
6	3	1
7	3	5
8	3	4
9	3	5
10	3	4

If the spinner is to be spun 120 times, what is the difference between the expected results and the most likely possible actual results of number 9 landing on the arrow?

What I Have Learned

ACTIVITY GUESS WHAT?

Directions: Complete the paragraph by writing the correct word or phrase on each blank. Choose the correct answers from the words/phrases inside the box. Write your answer on a separate sheet.

educated guesses	actual results or outcomes	theoretical probability
fortune-telling	predictions	experimental probability
	expected results or outcomes	

Making simple ____(1)____ is not the same as ____(2)____ by the fortune teller. It is about making ____(3)____. In making predictions, we can use ____(4)____ and ____(5)____. Theoretical probability relies on the ____(6)____ while the experimental probability relies on the ____(7)____ of the experimentation.

What I Can Do

ACTIVITY FIND OUT!

Directions: Answer the following questions. Write your answers on a separate sheet.

1. Out of 6 free-throw trials, a player was able to score 3 points. How many points will the player make if he has 10 free-throw trials?
2. A coin is tossed 32 times. How many times will it be expected that the coin to land tails up?
3. A regular die is rolled 18 times. How many times will it be expected that number 4 appears on top?
4. Ping Pong balls aimed to shoot inside a glass. For 20 attempts, a man was able to shoot 8 Ping Pong Balls. If the man makes 45 trials, how many times will he shoot the Ping Pong balls?
5. A die is rolled 10 times; 1 appeared two times, 2 appeared one time, 3 appeared three times, 4 appeared two times while 5 and 6 appeared once each. If the die is to be rolled 35 times, how many times will number 4 appear on top?

Assessment

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

1. A 6-sided die is rolled 6 times. What is the best prediction of the number of times 5 appears on top?
   A. 0 B. 1 C. 2 D. 3
2. A medical student conducted a study on the efficacy of the new vaccine on 50 patients. It is found effective among the 42 patients. If an additional 300 patients are to be tested with the vaccine, how many patients will the vaccine be found ineffective?
   A. 300 B. 252 C. 48 D. 42

3. Andrea has a bag of 3 identical red chips and 2 identical blue chips. She randomly draws a chip from the bag 25 times, putting the chip back in the bag after each draw. About how many times does Andrea draw a red chip?
   A. exactly 25 times
   B. B. more or less 15 times
   C. about 10 times
   D. more or less 25 times

Refer to the situation below to answer item numbers 4 – 7.

Daniel rolled a regular 6-sided die for 24 times. The table below shows the comparison of the expected results and actual results.

FACES OF THE DIE	EXPECTED RESULTS	ACTUAL RESULTS
1	4	4
2	4	2
3	4 + 4 + 4 + 2	3
4	4	6 + 6 + 6 + 3
5	4	4
6	4	5

4. If the die is to be rolled 84 times, what is the expected number of times that 4 will appear heads up?
   A. 4 B. 10 C. 14 D. 21
5. If the die is to be rolled for 84 times, what will most likely be the possible number of times that 4 will appear heads up?
   A. 4 B. 10 C. 14 D. 21
6. If Daniel is expected to record the face with the number 6 on it to appear 20 times, how many times will he need to roll the die?
   A. 20 B. 36 C. 80 D. 120

Refer to the situation below to answer item numbers 7 – 9.

Danica tossed two identical coins for 30 times. The table below shows the comparison of the expected results and actual results.

COMBINATIONS	EXPECTED RESULTS	ACTUAL RESULTS
Head & Head	10	15
Tail & Tail	10	7
Head &Tail	10	8

7. If Danica will toss the two coins 72 times, what will be the expected number of times that the combination head & head will appear?
   A. 10 B. 15 C. 20 D. 30
8. If Danica will toss the two coins 60 times, what will most likely be the possible number of times that the combination tail & tail will appear?
   A. 14 B. 16 C. 30 D. 60
9. If Danica is expected to record the combination head & tail to appear 14 times, how many times will she need to toss the two coins?
   A. 10 B. 14 C. 30 D. 42
10. The results of a random survey of parents of 6^{th}-grade pupils of a certain school showed that 36 out of 50 parents are not in favor of the proposal for a face-to-face class amid this pandemic. If there are 500 sixth grade pupils, about how many parents would likely be not in favor of the face-to-face classes?
   A. 500 B. 360 C. 250 D. 140

Answer Key

What I Know:

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

What's New:

Possible answer: Yes, there will be a possibility of a tie if T will appear thrice and H will appear twice.

What I Have Learned:

1. predictions
2. fortune-telling
3. educated guesses
4. theoretical probability
5. experimental probability
6. expected results/outcomes
7. actual results/outcomes

What I Can Do:

1. 5
2. 16
3. 3
4. 18
5. 7

What's In:

There are 8 combinations of ice cream ang toppings.
Vanilla & Marshmallows, Mango & Marshmallows
Vanilla & Sprinkles, Mango & Sprinkles
Chocolate & Marshmallows, Strawberry & Marshmallows, Strawberry & Sprinkles
Chocolate & Sprinkles

What's More:

Expected results: $\frac{1}{10} \times 120 = 12$

Actual results: $\frac{5}{30} \times 120 = 20$

Difference: 20 – 12 = 8

Assessment:

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

References:

Marjoseph H. Perez et al., *21st Century MATHEletes 6* Quezon City: Book Media Press, Inc. 2016, 344-351.

Dolores A. Umbina et al., *Lesson Guide in Elementary Mathematics 6* Pasig City: Alkem Company, 2003, 347-353.

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."