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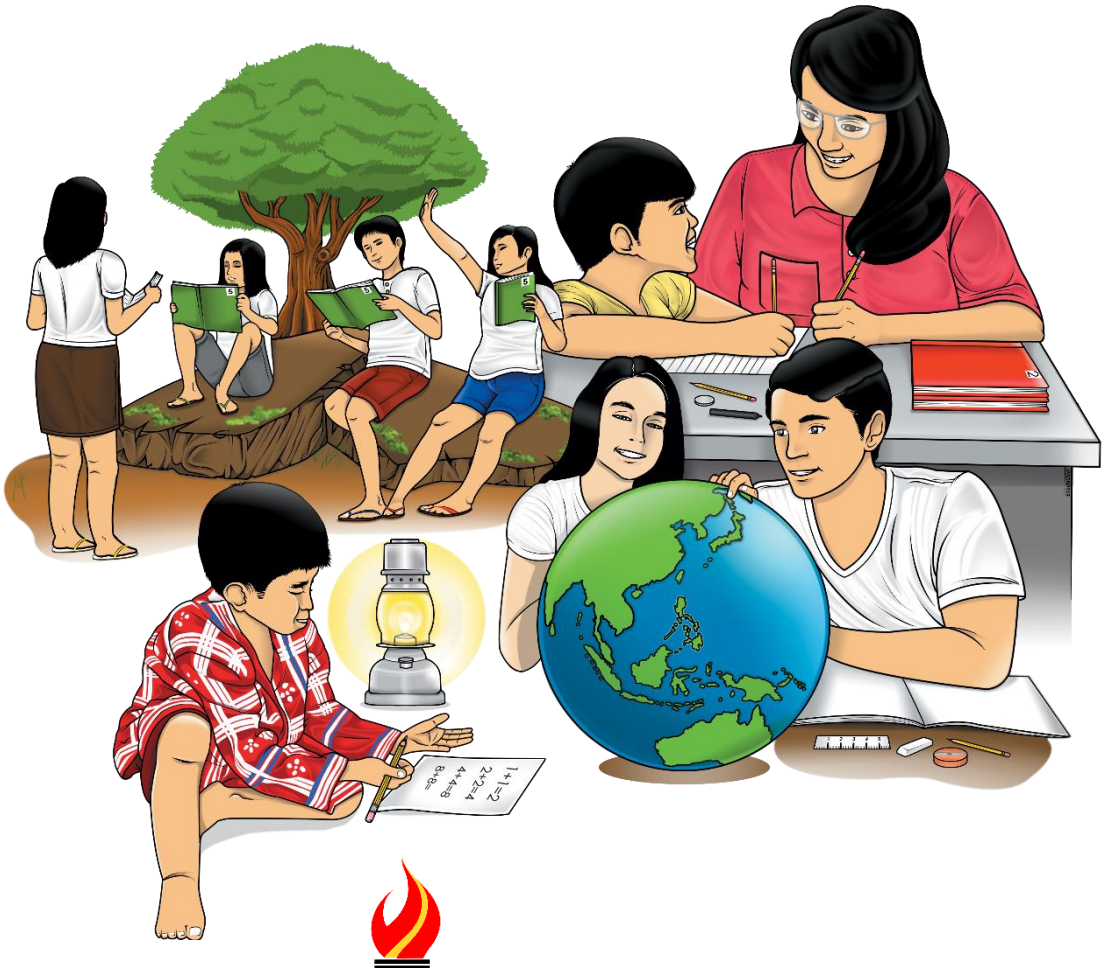
Mathematics

Quarter 4 – Module 8:
Probability



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Mathematics

Quarter 4 – Module 8:
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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 on 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 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 on 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 instructions carefully before performing each task.

If you have any questions in 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 designed in order to assist you in learning about probability.

In this lesson, you will learn how to record, express and explain outcomes. The learning activities allow you to explore and discover how you can properly give the outcomes in simple experiments.

After going through this module, you are expected to be able to:

1. record favorable outcomes in a simple experiment;
2. express the outcome in a simple experiment in words, symbols, tables, or graphs;
3. explain the outcomes in an experiment; and
4. solve routine and non-routine problems involving simple experiments.

What I Know

Read the situations and answer the questions that follow. Look for the correct answers in the box.

I. Sylvia has six marbles. One is colored red, two marbles are yellow, and the three remaining marbles are blue. She puts the marbles inside a box and calls her friend Melinda. She told her to pick one marble without looking at it.

1. What is the chance that Melinda will pick a yellow marble?
2. What is the chance that she will pick a blue marble?
3. What is the probability that she will pick a red marble?
4. What is the probability that she will pick a green marble?
5. How many times will Melinda pick to get all marbles?

a. 0 out of 6	c. 6	e. 1 out of 6
b. 3 out of 6	d. 2 out of 6	

II. Using the illustrations below, color the part showing the chance of picking the desired color of marbles.

green

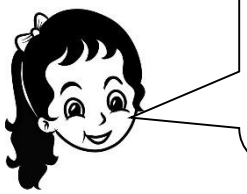
yellow

blue

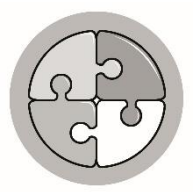
red

all colors

Check your answers with the ***Answer Key.***



If you got all correct answers, GREAT JOB! The activities in this module would be easy tasks for you. If not, you need to study well the lesson and exercises in this module.



What's In

In our daily lives, there are plenty of things that we are not sure to happen. We are not sure of what the weather would be on a particular day - maybe sunny or rainy. But if we see very dark clouds in the sky, we are almost certain that it will rain.

In this module, we will study about the chance or probability of an event to happen.

What's New

In her English class, Mrs. Santos gave an activity. The names of the days of the week were written on flashcards which were then placed in a basket. The students were asked to pick a card from the basket. Arwin was the first to pick a flashcard. What is the probability that he would pick a card showing a day that begins with S?

What Is It

Let us write down the days of the week.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

- *What is the probability that he would pick a day that begins with* ***S****?*

What is probability?

Probability is the chance or likelihood that an event will happen. It is the ratio of the number of ways an event can occur to the number of total possible outcomes.

$$\textbf{\textit{Probability}} = \frac{\textit{Number of outcomes of an event}}{\textit{Total number of possible outcomes}}$$

How many days are there in a week? - 7
What day starts with **S?** - Sunday, Saturday
How many days start with **S**? - 2

Since there are 2 out of the seven days then, the probability of picking a day that begins with S is:

2 out of 7, or $\frac{2}{7}$

- *What is the probability that he would pick a day that begins with* ***M****?*

How many days are there in a week? - 7
What day starts with ***M***? - Monday
How many days start with ***M***? - 1

Since it is only 1 out of the seven days, then the probability of picking the day that begins with M is:

1 out of 7, or $\frac{1}{7}$

- What is the chance that he would pick a day that begins with R? Is there a day that begins with R? **None**.
  Therefore, the chance that he would pick a day that begins with R is:

$$\textbf{0 out of 7 or } \frac{\textbf{0}}{\textbf{7}} \textbf{ or 0.}$$

This is also called **zero probability.** This is an event that is **impossible to happen.**

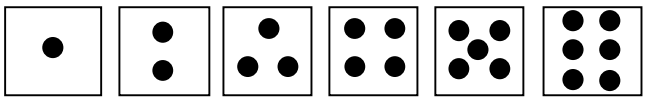
Did you understand how to compute the probability of an event?

Let us have another example.

Lemuel and Ian will play scrabble. In order to know who will play first, they will roll a die with six faces. Whoever rolls the higher number will play first.

What is the probability that Lemuel will roll a six? The illustrations below are the possible outcomes in rolling a die.

upturned face
(side facing upward)

A die has 6 faces. 

How many faces of the die has six dots? **Only 1**
How many faces does a die have? **6**

Let P(6) be the probability of getting 6 dots in one roll of a six-sided die.

$$\textbf{P (6) = 1 out of 6, or } \frac{\textbf{1}}{\textbf{6}}$$

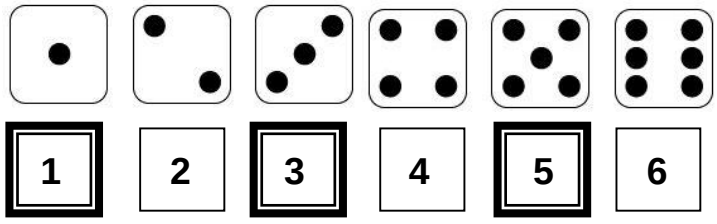
Let us examine the table of the probabilities of the other outcomes.

Probability of getting *n* dots	**Probability**
P (6)	1 out of 6 or $\frac{1}{6}$
P (5)	1 out of 6 or $\frac{1}{6}$
P (4)	1 out of 6 or $\frac{1}{6}$
P (3)	1 out of 6 or $\frac{1}{6}$
P (2)	1 out of 6 or $\frac{1}{6}$
P (1)	1 out of 6 or $\frac{1}{6}$

How about the probability of rolling a 7? Is there a face in a die with 7 dots? **None.** So, it is **impossible to happen.** Therefore, the probability of getting **7 dots is 0 out of 6.**

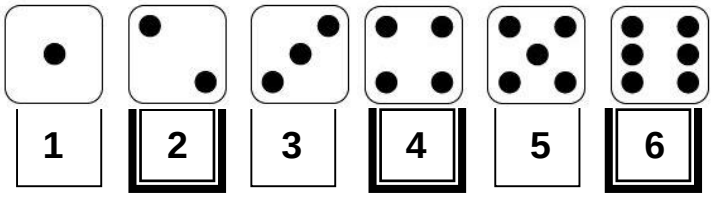
P (7) = $\frac{0}{6}$ or zero probability

What is the probability of getting an odd number when a six- faced die is rolled once? How many faces of a die have odd number of dots?



Three out of the six faces of a die have an odd number of dots. These are 1, 3, and 5. The probability of getting an odd number in one roll of a die is **3 out of 6 or $\frac{3}{6}$ or $\frac{1}{2}$.**

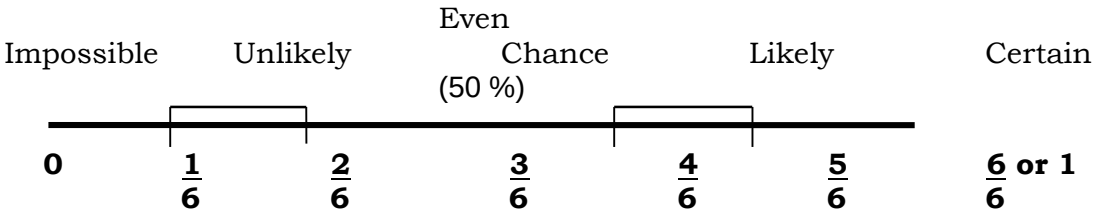
How about even numbers? How many faces of the die have an even number of dots?



Three out of the six faces of a die have an even number of dots. These are 2, 4, and 6. The probability of getting an even number in one roll of a die is **3 out of 6 or** $\frac{3}{6}$ **or** $\frac{1}{2}$ **.**

The probability of getting an even number is equal to the probability of getting an odd number when a six-sided die is rolled once.

Look at the **Probability Line.**



probability

- The probability of getting 6 when a die is rolled once is only $\frac{1}{6}$**.** The event of getting a six when a die is rolled once is **unlikely to happen.** There is a small chance that this event will happen; it is below 50%.

$$P(6) = \frac{1}{6}$$

- The probability of getting an **even number** when a die is rolled once is $\frac{3}{6}$ or $\frac{1}{2}$. The probability of getting an **odd number** when a die is rolled once is also $\frac{3}{6}$ or $\frac{1}{2}$. There are **even** or **equal chances** for these two events to happen. There is a 50/50 chance of getting an even number in one roll of die. There is also a 50/50 chance of getting an odd number in the given situation. These are **equally likely events.**

$$P(\text{odd}) = \frac{3}{6} = \frac{1}{2} \qquad P(\text{even}) = \frac{3}{6} = \frac{1}{2}$$

- The probability of getting **a number of dots less than 6** when a die is rolled once is 5 out of 6 or $\frac{5}{6}$ **.** This is **likely to happen.**

- The probability of getting a number of dots **less than 7** when a die is rolled once **is 6 out of 6** or **1.** There are 6 numbers–less than 7 in a die, and these are 1, 2, 3, 4, 5 and 6. There are 6 possible outcomes when a die is rolled once which are 1, 2, 3, 4, 5, 6. Therefore, the probability of getting a number less than 7 is 1. This event is **certain or sure to happen.**

$$P(\text{less than } 7) = \frac{6}{6} = \mathbf{1}$$

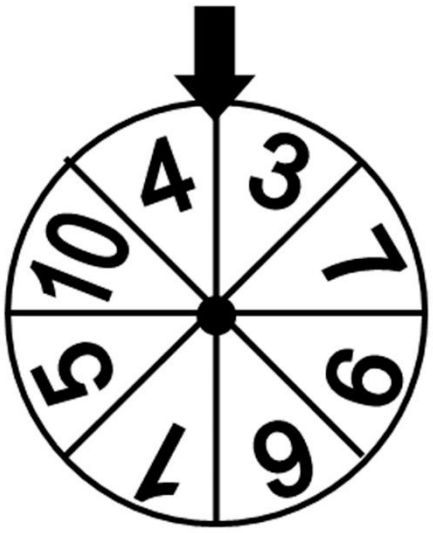
- The probability of getting **7 dots** in rolling a die once is zero. This is an **impossible event** because there is no face with 7 dots. It has a **zero probability,** and so it will never happen.

Hey kids, did you understand the process of computing the probability of an event? Remember to look for the number of outcomes in an event and the total possible number of outcomes.

What's More

Activity 1 – "Spin the Wheel"

A grade five class plays "Spin the Wheel." The wheel is divided into 8 parts. It contains the numerals 3, 7, 9, 6, 1, 5, 10,



1. What is the probability that in one spin of the wheel, the pointer will land on an odd number?

2. If the pointer lands on any numeral less than 5, what are the possible outcomes?

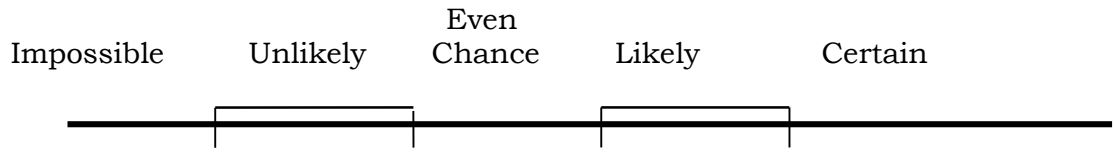
3. What is the probability of landing on a numeral greater than 10

4. If the pointer will land on an even number, list down the possible outcomes.

5. Is it possible that the pointer will land on numeral 2? Why?

Activity 2 – "Plot It"

Using the answers in activity 1, plot them in the probability line below.



Activity 3 – "Pick The Pen"

Ian has four pens of different colors inside the pocket of his bag. One is blue, two are red, and one is black. Without looking at them, Ian will pick one pen from the pocket of his bag.

1. What is the probability that he will get a black pen?
2. Is there a possibility that he will pick an orange pen? Why?
3. What is the probability that he will get a blue pen?
4. What is the probability that he will pick a yellow pen?
5. How many possible outcomes are there in picking a pen? Why?

Check your answers with the ***Answer Key.***

If you got a score of 12-15, CONGRATULATIONS! You did well in this lesson. You will not find difficulty in performing other activities in this module.

If your score is below 12, kindly go back and study carefully the examples given.

What I Have Learned

How do we interpret the data in different bar graphs?

Let us remember:

Probability is the chance or likelihood that an event will happen. It is the ratio of the number of outcomes of an event to the total number of possible outcomes.

- **An event impossible to happen** has a **zero probability**.
- An event is **unlikely** to happen if there is a **very small chance for it to happen.** Its probability is **greater than 0 but below 50 %.**
- An event has **even chance** if it has **50% probability** to happen.
- An event is **likely** to happen if the chance is big or **more than 50%.**
- An event is **certain** if it is **100 % sure to happen**.

What I Can Do

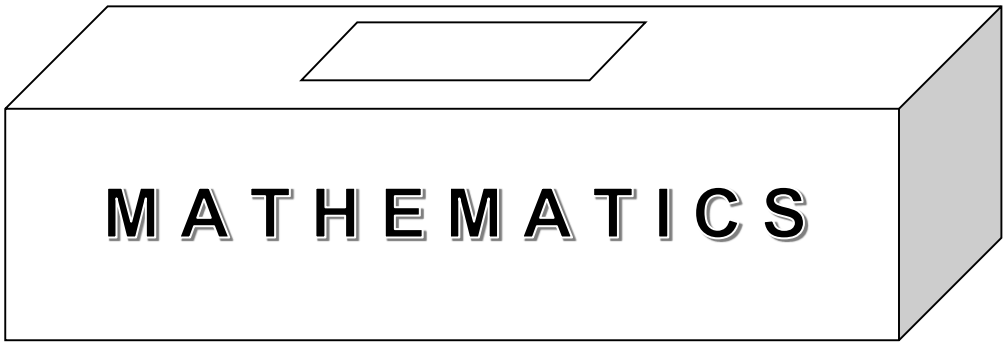
Toss 2 coins at the same time. How many possible outcomes are there? What are those possible outcomes? List them down using head or trail.

Coin 1	Coin 2

Got it? If yes, you may now answer the **Assessment**. If not, kindly go back to the previous discussion in this module and study the explanations and examples.

Assessment

I. The letters of the word MATHEMATICS are placed in a box. Give the probability in fractional form.



1. If you are to pick one, what is the probability of picking letter M?
2. How many possible outcomes are there?
3. What are the possible outcomes of picking vowels? List them down.
4. What is the probability of picking consonants?
5. Is there a chance that you can pick letter N? Why?

II. Study the given situation. Identify the probability of each event. Record the outcomes using the statements listed in the box.

A teacher introduced a game "Pick and Win" for his 20 learners. He prepared 20 balls in a box with numbers 1 to 20. Whoever picks an even number will receive a pencil.

1. What is the probability of getting an even number? _____
2. What is the probability of getting numbers below 5? _____
3. What is the probability of getting numbers below 15? _____
4. What is the probability of getting numbers above 20? _____
5. What is the probability of getting any number from 1 to 20? _____

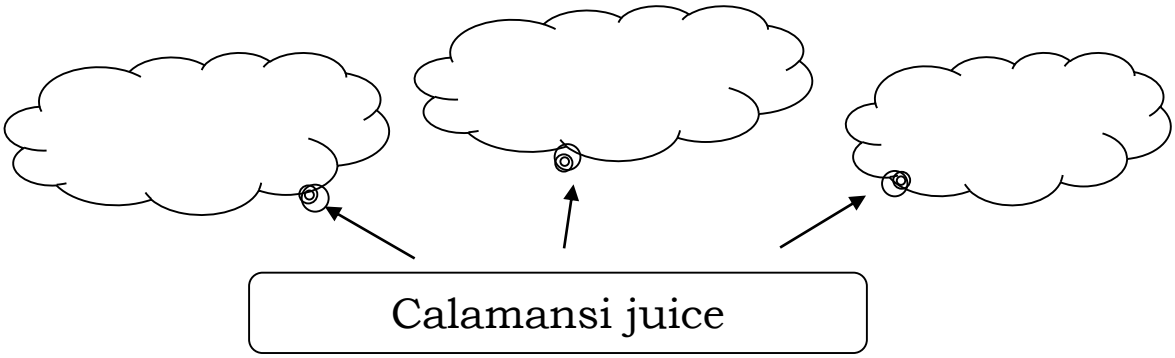
impossible to happen	unlikely to happen	equal chance
likely to happen	certain to happen	

If you got 8 to 10, YOU'VE DONE A GREAT JOB! You are now ready for the next module. Answer the additional activities below.
If not, please study again the examples and explanations in this module.

Additional Activities

Neil went to the canteen to buy food. He bought calamansi juice. There are different snacks to choose from such as pansit, pandesal, banana cue, spaghetti, camote chips and ensaymada.

1. Using a cloud diagram, show all the possible outcomes of pairs of calamansi juice and snacks. Sample diagram is shown below.



2. How many possible outcomes are there if he would only choose one pair of snacks?

3. What is the probability that he would choose bread?

4. What are the possible outcomes if he would not choose bread? List them down.

5. Is choosing *puto* possible to happen? Why?

Answer Key

What I Know

I.

1. d. 2 out of 6
2. b. 3 out of 6
3. e. 1 out of 6
4. a. 0 out of 6
5. c. 6

II.

green
yellow
blue
red
all colors

What's More

Activity 1: "SPIN THE WHEEL"

1. 5 out of 8 5/8
2. 3,1,4
3. Zero or 0/8
4. **6, 10 4**
5. **No, it is impossible because there is no numeral 2 in the same space**

Activity 2: "PLOT IT"

Activity 3: "PICK THE PEN"

1. 1 out of 4 or ¼
2. No, because there is no orange pen in the sample space.
3. 1 out of 4 or ¼
4. Zero probability or 0/4
5. 4 because there are 4 pens

What I Can Do

Coin 1	Coin 2
Head	Tail
Tail	Head
Head	Head
Tail	Tail

Assessment

II.

1. Equal chance
2. Unlikely to happen
3. Likely to happen
4. Impossible to happen
5. Certain to happen

Additional Activities

2. 6
3. 2 out of 6 or 2/6 or 1/3
4. Pansit, banana cue, spaghetti, camote chips
5. No because there is no puto in the options

References

Tabilang, Alma R., Ian Jay B. Arce, Rodrigo V. Pascua, Nelma P. Calayag, Lolita P. Dacuba, Dioleta B. Borais, Rafael B. Buemia, Myrna T Collao, Larry G. Morandante, Amado B. Danao, Laura N. Gonzaga, Isagani A. Briones, John Antonio D. Daganta, 2015, Mathematics 4 Learner's Material, Department of Education

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