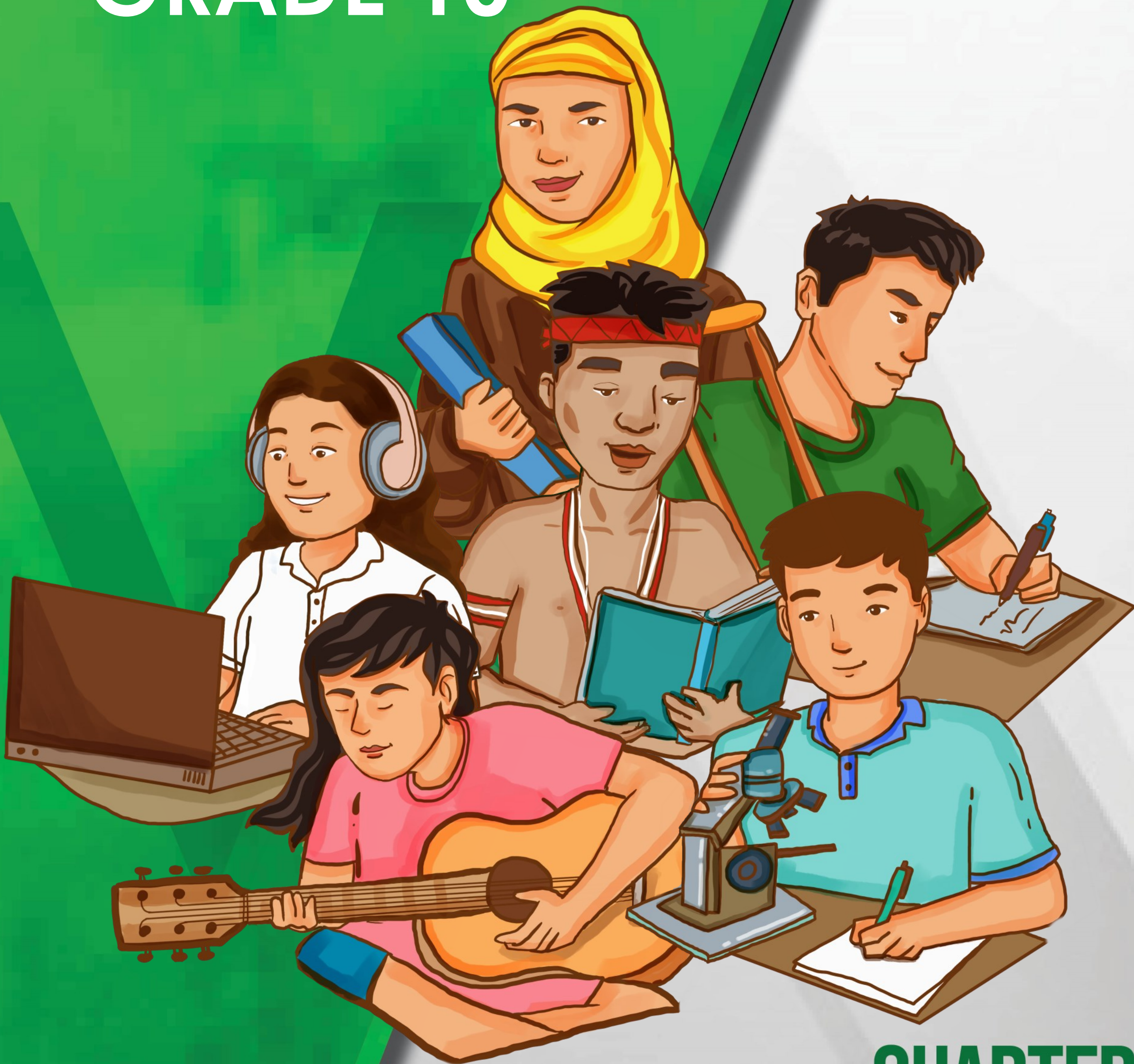
PIVOT 4A
LEARNER'S MATERIAL
MATHEMATICS
GRADE 10



QUARTER 3
Key Stage 3 SLM

MELC-based SLM

DepEd CALABARZON
Curriculum and Learning Management Division

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PIVOT 4A Learner's Material
Quarter 3
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Mathematics
Grade 10

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Guide in Using PIVOT 4A Learner's Material

For the Parents/Guardians

This module aims to assist you, dear parents, guardians, or siblings of the learners, to understand how the materials and activities are used in the new normal. It is designed to provide information, activities, and new learning that learners need to work on.

Activities presented in this module are based on the Most Essential Learning Competencies (MELCs) in **English** as prescribed by the Department of Education.

Further, this learning resource hopes to engage the learners in guided and independent learning activities at their own pace. Furthermore, this also aims to help learners acquire the essential 21st century skills while taking into consideration their needs and circumstances.

You are expected to assist the children in the tasks and ensure the learner's mastery of the subject matter. Be reminded that learners have to answer all the activities in their own notebook.

For the Learners

The module is designed to suit your needs and interests using the IDEA instructional process. This will help you attain the prescribed grade-level knowledge, skills, attitude, and values at your own pace outside the normal classroom setting.

The module is composed of different types of activities that are arranged according to graduated levels of difficulty—from simple to complex. You are expected to :

a. answer all activities in your notebook;
b. accomplish the **PIVOT Assessment Card for Learners on page 38** by providing the appropriate symbols that correspond to your personal assessment of your performance; and
c. submit the outputs to your respective teachers on the time and date agreed upon.

Parts of PIVOT 4A Learner's Material

	K to 12 Learning Delivery Process	Descriptions
Introduction	What I need to know	This part presents the MELC/s and the desired learning outcomes for the day or week, purpose of the lesson, core content and relevant samples. This maximizes awareness of his/her own knowledge as regards content and skills required for the lesson.
	What is new	
Development	What I know	This part presents activities, tasks and contents of value and interest to learner. This exposes him/her on what he/she knew, what he/she does not know and what he/she wants to know and learn. Most of the activities and tasks simply and directly revolve around the concepts of developing mastery of the target skills or MELC/s.
	What is in	
	What is it	
Engagement	What is more	In this part, the learner engages in various tasks and opportunities in building his/her knowledge, skills and attitude/values (KSAVs) to meaningfully connect his/her concepts after doing the tasks in the D part. This also exposes him/her to real life situations/tasks that shall: ignite his/ her interests to meet the expectation; make his/her performance satisfactory; and/or produce a product or performance which will help him/her fully understand the target skills and concepts .
	What I can do	
	What else I can do	
Assimilation	What I have learned	This part brings the learner to a process where he/she shall demonstrate ideas, interpretation, mindset or values and create pieces of information that will form part of his/her knowledge in reflecting, relating or using them effectively in any situation or context. Also, this part encourages him/her in creating conceptual structures giving him/her the avenue to integrate new and old learnings.
	What I can achieve	

This module is a guide and a resource of information in understanding the Most Essential Learning Competencies (MELCs). Understanding the target contents and skills can be further enriched thru the K to 12 Learning Materials and other supplementary materials such as Worktexts and Textbooks provided by schools and/or Schools Division Offices, and through other learning delivery modalities, including radio-based instruction (RBI) and TV-based instruction (TVI).

WEEK
1

Permutations

Lesson

I

In this Lesson you are going to illustrate the different arrangements of objects; in doing so, you can be able to determine the number of ways of possible arrangements.

We can also know the number of permutations by assessing your knowledge of the basic counting technique called the **Fundamental Counting Principle.** Using this principle you will also learn the different permutation formulas and how to apply them in solving problems.

As you go along with this lesson here is the guide question that you need to answer.

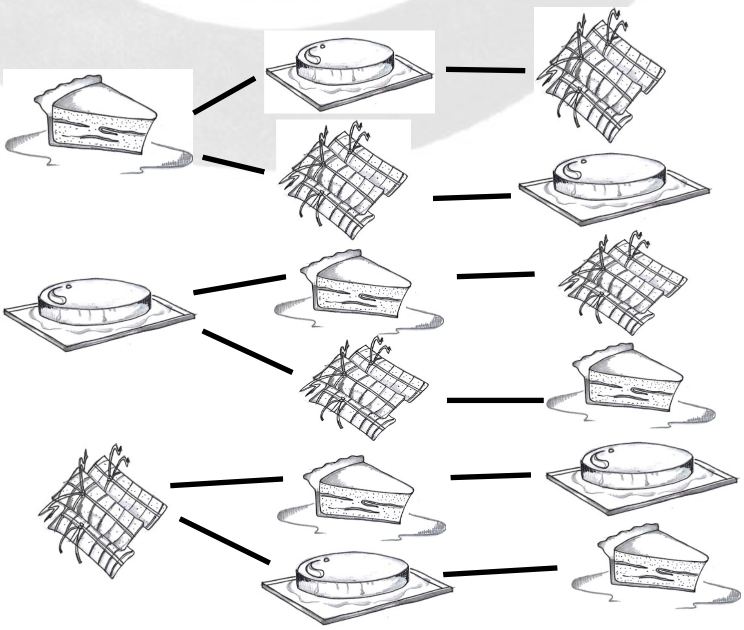
How does the concept of permutation help in forming conclusions and in making wise decisions?

Illustration of Permutations
Example 1.

The family work together in preparing food for the visitors. Mother prepared 3 types of desserts suman, buko pie and leche plan. If you are supposed to help your mother in preparing the dishes to be served to your visitors, then, in how many possible ways can you serve the three sweet desserts?

Solution:

By using Tree Diagram



By Systematic Listing

buko pie, leche flan, suman

buko pie, suman, leche flan

leche flan, buko pie, suman

leche flan, suman, buko pie

suman, buko pie, leche flan

suman, leche flan, buko pie

If there are **m** ways to do one thing, **n** ways to do another, and **o** ways to do another, then, there are ***m*** x ***n x o*** *of doing those things.*

We have : m x n x o = (3)(2)(1) = ***6 possible ways*** *of serving the sweet delicacies*

In this example you notice that the ***factors are decreasing****. Another way of writing (3)(2)(1) is* ***3! (read as 3 factorial)****.*

Therefore, 3! = (3)(2)(1) = 6;   3! = 6

Factorial Notation

If n is a positive integer, n! is a product of all positive integers less than n or equal to n.

We also define **0! = 1**

The only downside of using ***FCP (Fundamental Counting Principle)*** *is that you cannot see the specific lists of the possible outcomes; you can only find the number of the possible ways or the number of permutations. But, as we continue our lesson you will learn the significance of this concept or principle about deriving the formulas of permutations.*

The Permutation Formulas

Example 2.

Mother has taken fresh sitaw, lagkitang mais (white corn), saging matsing (banana), and macapuno from the farm where they lived before in some part of Brgy. Concepcion, San Pablo City.

How many possible ways can we arrange the following products that are freshly taken from the farm?

1. Sitaw
2. Sitaw and Lagkitang Mais
3. Sitaw, Lagkitang Mais and Saging Matsing
4. Sitaw, Lagkitang Mais, Saging Matsing and Macapuno

Another way to illustrate the permutation is by using the **Table.**

Solution :

At this point we will use the **Table** to illustrate the permutations and derive the formula for finding the number of permutations.

At this point we will use the **Table** to illustrate the permutations and derive the formula for finding the number of permutations.

Size of Set	Number of Permutation (Multiplication Rule)	Factorial Notation
Sitaw	1 = 1	1!
Sitaw and Lagkitang Mais	2(1) = 2	2!
Sitaw, Lagkitang Mais and Saging Matsing	(3)(2)(1) = 6	3!
Sitaw, Lagitang Mais, Saging Matsing and Macapuno	(4) (3)(2)(1) = 24	4!
	…	
n	***n*** **(*n*-1)(*n*-2)(*n*-3)(*n*-4)…(3)(2)(1)**	***n!***

Therefore, the number of permutations of n objects taken all at a time is ***n!***

Then, the formula for Permutations of objects taken all at a time is ***P(n,n) = n!***

Example 3

There are 5 sweet delicacies that your mother prepared for fiesta and these were: Ubeng Halaya, Buko Salad, Sweetened Macapuno, Leche Flan, and Buko Pandan. If you are supposed to help your mother in preparing the dishes to be served to your visitors, then, in how many possible ways can you arrange the 5 delicacies if three sweet delicacies are served at a time?

$$\begin{aligned} \text{Permutations} &= 5 \times 4 \times 3 \\ &= \frac{5 \times 4 \times 3 \times 2 \times 1}{2 \times 1} \\ &= \frac{5!}{2!} \\ P(5,3) &= \frac{5!}{(5-3)!} \end{aligned}$$

Let 5 = n, 3 = r Therefore, P(n,r) is the number of permutations of n objects taken r at a time.

Formula: $P(n,r) = \dfrac{n!}{(n-r)!}$

Example 4.

In how many distinguishable permutations are possible with the letters of the word PALAKPAKIN?

Solution:

Since the word "distinguishable" is already mentioned in the problem, obviously the formula that you are going to use is:

$$P = \frac{n!}{p!\ q!\ r! \ \ldots}$$

There are 10 letters in the word. 2 Ps are alike, 3 A's are alike, 2 K's are alike, therefore, we have :

$$P = \frac{10!}{2!\ 3!\ 2!} = \frac{(10)(9)(8)(7)(6)(5)\cancel{(4)}\cancel{(3)}\cancel{(2)}(1)}{\cancel{(2)}(1)\cancel{(3)}\cancel{(2)}\cancel{(2)}(1)} = (10)(9)(8)(7)(6)(5) = 151,200$$

Answer: 151, 200 ways

Example 5.

There is a JHS Math Camp in the Division of San Pablo City held at the oval of Dizon High. Many students are participating from the different secondary schools. The Math Campers are grouped into 10 groups with 8 members each. Each group is asked to form a circle and they will be sitting on the ground. If the seating arrangement is circular, in how many possible ways can the 8 members be seated?

Solution :

Obviously, this problem involves ***Circular Permutation***. Thus, we are going to use the formula :

$$P = (n - 1)!$$

There are 8 members, therefore , let's n = 8. By using the formula :

$P = (8-1)! = 7! = (7)(6)(5)(4)(3)(2)(1) =$ **5,040 ways**

Remember this !

Your goal in this lesson is to apply the key concepts of permutations, particularly in using the formulas, however, before solving a problem you must take note first of the importance of understanding the problem and infer what formula are you going to use. You should know how to differentiates the different kinds of permutations and make a wise decisions based on your knowledge and understanding of these concepts.

D

Learning Task 1: Read the given situations and provide an answer on a separate sheet of paper.

1. A close friend invited Anna to her birthday party. Anna has 4 new blouses (stripes, with ruffles, long-sleeved, and sleeveless) and 3 skirts (red, pink, and black) in her closet reserved for such occasions.
   Assuming that any skirt can be paired with any blouse,

a. How many blouse-and-skirt pairs are possible?

b. Show another way of finding the answer in item a.

2. How many ways are there to order the letters L,A,K,E,S?
3. In how many possible ways can you arrange 5 kilos of rambutan, 2 of kilos lanzones, 4 kilos of Indian mangoes, and 3 kilos of chicos on the table?

E

Learning Task 2: In each problem, please indicate what kind of permutations is involved, then solve.

1. How many permutations can be made to 10 pocalettes (small coconut shells) in designing the edge of a circular card?
2. The view of Sampaloc Lake is a very nice background to take pictures of. How many ways can 6 friends arrange themselves in a row for taking pictures?

A

Do this in your notebook .

1. Give 2 examples of problems or situations in real life that involve permutations, and try to solve them
2. Discuss how you can use these sample situations in your daily life especially in making decisions or formulating conclusions.

WEEK 2

Combinations

Lesson

I

Your knowledge from the previous lessons about the Fundamental Counting Principle and Permutations will help you understand our topic for this week, which is "COMBINATION".

After learning how to illustrate COMBINATION, you are going to use your knowledge in identifying if a given situation involves permutation or combination. To do this you must know how to differentiate permutation from a combination.

Recall how to arrange set of objects by Listing Method.

Example 1.

I need to put the harvested Sitaw, Lagkitang Mais, Saging Matsing, and Macapuno in a basket, however, the basket can only carry 3 kinds of these. How many ways can I select 3 kinds out of these 4 farm products?

Solution :

Sitaw - Lagkitang Mais - Saging Matsing

Sitaw- Lagkitang Mais - Macapuno

Sitaw - Saging Matsing - Macapuno

Lagkitang Mais- Saging Matsing – Macapuno

From the illustration, you notice that the number of ways is 4 and the order of the arrangement is not important. This is what we called **COMBINATIONS.**

Now, that you learned how to illustrate COMBINATION, you are going to use your knowledge in identifying if a given situation involves permutation or combination. To do this, you must know how to differentiate permutation from a combination.

D

Learning Task 1: Identify which involves combinations or permutations.

1. Five friends taking group pictures at Doña Leonila Park in a row

2. Selecting members to form a group

3. Assembling a jigsaw puzzle

4. Determining the top three winners in a Math Quiz Bee

5. Forming lines from six given points with no three of which are collinear

How did you find the activity? Were you able to identify if the given situation involves permutation or combination?

Permutations refer to the different possible arrangements of a set of objects and the order is important.

Now, we learn that **Combinations** also refer to the arrangement of a set of objects, however, the order is not important.

Example 2.

Identify whether each given statement is permutation or combination and explain why.

1. Selecting 5 members to form a group.

2. 5 friends taking a picture in a row at Doña Leonila Park.

3. Arranging 6 pots of Sunflower bought from San Flower Farm in San Ignacio.

4. Making a salad by selecting different ingredient.

5. Assigning rooms for Math Campers.

Answers :

1. Combination because in selecting the 5 members to form a group, the order is not needed.

2. Permutations taken at all times because the keyword for an order is " in a row".

3. Permutations taken at all time because the order is important in arranging the pots.

4. Combination because in making salad order is not needed.

5. Combination because the order is not relevant.

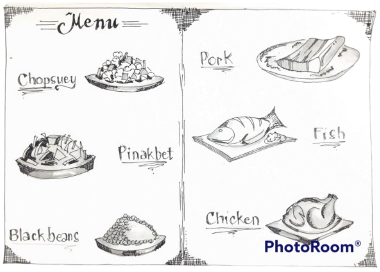
E

Understanding the concepts of COMBINATIONS will further help you in forming conclusions and in making decisions.

To be able to do this perform its learning tasks that follow.

Learning Task 2 : Read each statement and answer the questions provided.

1. If your school cafeteria offers pork, beef, chicken, and fish for the main dish, chop suey, *pinakbet,* and black beans for vegetable dishes, banana and pineapple for dessert, and tea, juice, and soft drinks for beverage, in how many ways can you choose your meal consisting of 1 cup of rice, 1 main dish, 1 vegetable dish, 1 beverage, and 1 dessert?



2. You were tasked to take charge of the auditions for the female parts of a stage play. In how many possible ways can you form your cast of 5 female members if there were 12 hopefuls?

3. If ice cream is served in a cone, in how many ways can Abby choose her three-flavor ice cream scoop if there are 7 available flavors?

4. If each Automated Teller Machine card of a certain bank has to have 6 different digits in its passcode, how many different possible passcodes can there be?

5. How many possible permutations are there in the letters of the word PHILIPPINES?

A

A. Read each statement carefully. Infer and decide if it is about permutation or combination. Explain why.

1. Determining the Mutya ng San Pablo and Miss Cocofest from 13 Candidates.
2. Selecting groupmates in Math Class
3. Arranging Sunflowers from San Ignacio in a base
4. Assigning number for pin number
5. Collecting coins to buy macapuno candies

B. Complete the statement below. Write your personal insights about the lesson using the prompts.

I understand that ___________________.

I realize that _________________________.

I need to learn more about __________.

Combination Formula

Lesson

I

The lesson for this week is about deriving the Combination Formula.

From the previous lesson, you were able to learn the illustration of a combination and differentiate permutation from combination.

Can you still remember the difference between permutation and combination? In permutation, the order is important while in combination, order is not important.

Are you now ready to learn more about combinations? Last week, we recalled not only permutation but also the FCP (Fundamental Counting Principle). These two are essential concepts in understanding combinations.

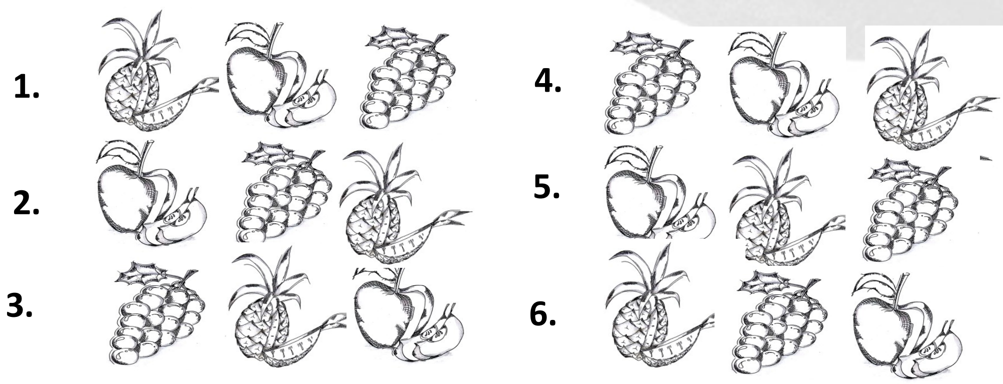
COMBINATION is an arrangement of **n** objects with no repetition and order is not important.

Let us recall the difference between permutation and combination, again by giving examples.

Deriving Combination Formula

Example 1. Suppose in your TLE subject, you are assigned to make a menu, and one of the lists is SALAD. If you decide to make a special chicken salad, you need to add pineapple, apples, and grapes. You buy these fruits from the market of San Pablo City. How many ways are you going to arrange these fruits while you are preparing them as ingredients? How can you derive the formula for finding the number of combinations more systematically?

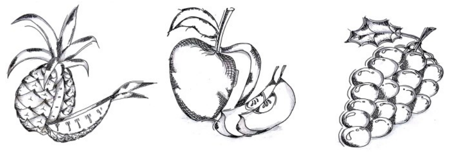
If the order is important then we have:



Based on the illustration, there are six ways if the order is important. This is

PERMUTATION.

But if the order is not important, then have the illustration below:

1 

There is only one way. This is called **COMBINATION.**

Since you learned Permutation formula for the objects taken at all time is P(n, r), where n = r

$$P(n,r) = P(n,n) \text{ or } nPr = nPn = \frac{n!}{(n-n)!} = \frac{3!}{(3-3)!} = 3! = (3)(2)(1) = 6$$

There are six possible ways if the order is important, however, let us have the number of combinations. This does not consider the importance of order.

If by illustration the number of combinations is one, then we can conclude that one is the answer for the number of combinations of objects taken all at a time.

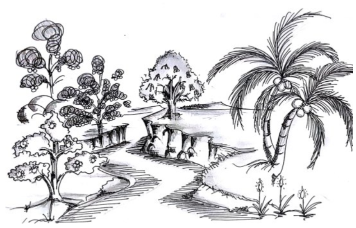
If the **permutation** of objects taken all at a time is **nPn,** then the **combination** of objects taken at a time is **nCn.**

Therefore, for COMBINATION we have :

$$C(n, r) = C(n,n) \text{ or } nCn = nCn = \frac{nPn}{n!} = 1$$

Therefore: $3C3=1$

Example 2. One day, your friend visited you while you are planning to go to your farm. Then, you think of giving him a set of fruits, and this is the combination of fruits that you can find in your orchard: buko, tamarind, rambutan, and caimito. How many combinations can be formed if you select only three fruits out of four choices?



By illustration:

buko - tamarind – rambutan **caimito – buko - rambutan**

tamarind – rambutan – caimito **caimito – buko – tamarind**

There are 4 combinations that you can make by illustrating.

Let us derive the formula:

The number of different orders of four fruits taken three at a time is given by:

$$P(4, 3) = \frac{4!}{(4-3)!} = 24.$$

There are 24 possibilities if order is significant, but we are looking for the formula for finding the number of COMBINATION.

If P(4,3) is for permutation, then C(n,r) is for combination.

$$\text{Since } C(n, r) = C(4,3) = 4 = \frac{24}{6}$$

$$C(4, 3) = \frac{P(4, 3)}{6}$$

$$C(4, 3) = \frac{\frac{4!}{(4-3)!}}{6}$$

You know that 6 = (3)(2)(1) = 3!

Therefore, we have:

$$C(4, 3) = \frac{\frac{4!}{(4-3)!}}{3!} = \frac{4!}{3!\,(4-3)!}$$

If we let n=4; r = 3, then, the formula for finding the number of combinations of n objects taken r at a time is:

$$C(n, r) = \frac{n!}{r!(n-r)!} \quad \text{Where: } n \geq r \geq 0$$

D

Learning Task 1: Flex that Brain! Find the missing value in each item.

1. C(8, 3) = ___
2. C(n, 4) = 15
3. C(9, 9) = ____

E

Learning Task 2: Choose Wisely, Choose Me! Solve the following problems. Write your answer on a separate sheet of paper.

1. If there are 12 teams in a basketball tournament and each team must play every other team in the eliminations, how many elimination games will there be?
2. If there are seven distinct points on a plane with no three are collinear, how many different polygons can form?
3. How many different sets of five cards each can arrange from a standard deck of 52 cards?
4. In how many ways can a MathSci Committee of five be formed from seven Math lovers and five Science lovers if the committee must have three Math lovers?

A

Level Up! Do this on your notebook.

A. Answer the items below.

1. Give two examples of situations in real life that involves permutations in each situation:

   a. Formulate a problem.

   b. Solve the problem.

2. Explain how each particular may help you in formulating conclusions and/or making decisions.

B. Write your personal insights about the lesson using the prompts below. Do this on your notebook.

I understand that ___________________.

I realize that ________________________.

I need to learn more about __________.

WEEK 4

Permutation or Combination Problems

Lesson

I

From the previous lessons, we learned the concepts about permutations and combinations. There are different Permutation Formulas that you learned, such as permutation taken at all times, permutation taken at r time, distinguishable permutation, circular permutation. You also learned the Combination Formulas.

Moreover, you learned, too, how to differentiate permutation and combination. In **permutation**, the **order is important**, while in **combination**, **order is not important.**

Let's Recall !

San Pablo City is not only known as "The City of the Seven Lakes" but is also known as the "Jeepney Capital of the Philippines." All the jeepneys need to have license plate numbers. Each plate number consists of 3 letters and 4 digits. What do you think is involved in deciding the arrangement of the letters and numbers in each license plate number? Is it permutation or combination? Why?

Now that you have a deeper understanding of these concepts, you will apply the concepts you learned in solving problems involving permutation or combination.

Example 1.

San Pablo City is not only known as "The City of the Seven Lakes" but is also known as the "Jeepney Capital of the Philippines." All the jeepneys need to have license plate numbers. Each plate number consists of 3 letters and 4 digits. How many different license plates are possible if:

- repetition of letters and numbers are allowed?
- only repetition of letters is allowed?
- no repetition of letters is allowed?
- no repetition of letters and numbers is allowed?

Take note that in the given situation, the order is important.

Solutions:

- repetition of letters and numbers are allowed

Take note that there are 26 letters and 10 digit numbers.

$P = (26)(26)(26)(10)(10)(10)\ (10) = 175{,}760{,}000$ ways

- only repetition of letters is allowed:

P = (26)(26)(26)(10)(9)(8)(7)= 88, 583,040 ways

- no repetition of letters is allowed:

P = (26)(25)(24)(10)(10)(10)(10) = 156,000,000 ways

- no repetition of letters and numbers are allowed:

P= (26)(25)(24)(10)(9)(8)(7) = 78, 624, 000 ways

Example 2

Usually, Armak Motors designed 22 seaters jeepney; however, during this time of the pandemic, only 14 passengers are allowed, following the guidelines given by IATF (Inter-Agency Task Force). Therefore, in how many ways can the 14 passengers be seated?

Solution :

Take note that in this situation order is not important.

Therefore, combination formula will be used .

$$C(n, r) = \frac{n!}{r!(n-r)!} \qquad \text{Where: } n \geq r \geq 0$$

$$C(22, 14) = \frac{22!}{(22-14)!\,14!} = \frac{22!}{8!\,14!}$$

$$= \frac{(22)\cancel{(21)}^{3}\cancel{(20)}^{5}(19)\cancel{(18)}^{3}(17)\cancel{(16)}\cancel{(15)}\cancel{(14!)}}{\cancel{(8)}\cancel{(7)}\cancel{(6)}\cancel{(5)}\cancel{(4)}\cancel{(3)}\cancel{(2)}(1)\cancel{(14!)}}$$

$$= (22)(19)(17)(3)(5)(3)$$

$$= 319{,}770 \text{ ways}$$

Remember!

In solving a problem, take note first if a given situation involves permutation or combination.

Permutations refer to the different possible arrangements of a set of objects.

- The number of permutations taken at a time is given $P(n,r) = \frac{n!}{(n-r)!}$ by , n≥r.
- The number of permutations at all times is P(n,n) = n !

***n- factorial** is the product of the positive integer n and all the positive integers less than n. **n!** = n(n-1)(n-2)(n-3)…(3)(2)(1).

The number of distinguishable permutations of **n** objects when **p** are alike, **q** are alike, and so on, is given by $P = \frac{n!}{p!\ q!\ r!\ \ldots}$

- The number of permutations of **n** objects around a circle is given by P = (n-1)!

Combinations refer to the number of selecting from a set when the order is not important.

- The number of combinations taken at a time is given by $C(n, r) = \dfrac{n!}{r!(n-r)!}$

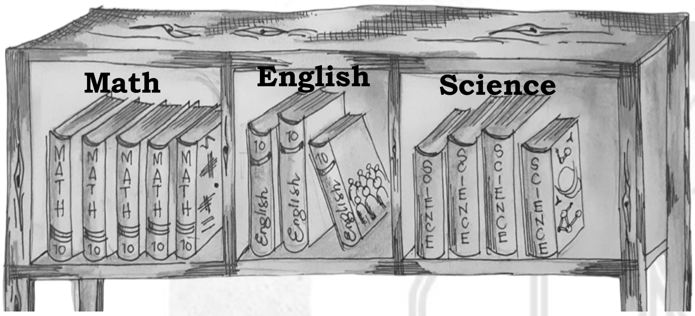
  Where: $n \geq r \geq 0$

The number of permutations at all time is C (n, n) = 1.

D

Learning Task 1: Solve the following permutation and combination problems.

1. In how many ways can you arrange 5 Mathematics books, 4 Science books, and 3 English books on a shelf such that books of the same subject are kept together?



2. In how many ways can 6 students be seated in a row of 6 seats if 2 of the students insist on sitting beside each other?
3. In a gathering, the host makes sure that each guest shakes hands with everyone else. If there are 25 guests, how many handshakes will be done?

E

Learning Task 2: Answer the following questions.

1. How do you determine if a situation involves combinations?
2. To find the total number of polygons that can be formed from 7 points on a plane with no three of which are collinear.

Joy answered:

$$C(7, 3) = \frac{7!}{4!\,3!} = \frac{7 \cdot 6 \cdot 5 \cdot \cancel{4!}}{\cancel{4!}\,3!} = \frac{7 \cdot \cancel{6} \cdot 5}{\cancel{3} \cdot \cancel{2} \cdot 1}$$

= 35 different polygons

Is Joy correct? Justify your answer?

3. a. In how many ways can the 12 members of the Board of Directors (BOD) be chosen from 12 parent- nominees and 7 teacher-nominees if there must be 8 parents in the BOD?

   b. After the 12 members are chosen, in how many ways can they elect among themselves the 7 top positions (president, vice president, and others)?

A

A. Solve the problem below applying the concepts learned. Write your answer on a separate sheet of paper.

In going home, two sisters decide to take a ride; as San Pablo City is also known as “Jeepney Capital of the Philippines”, jeepneys are more available. Due to COVID 19-Pandemic, only 14 passengers are allowed, 7 on each side. Following the health protocol such as social distancing, they can choose the seats available that are available. Therefore, in how many ways can the two sisters be seated on one side of the jeepney?

B. Write your personal insights about the lesson using the prompts below. Do this on your notebook.

I understand that ___________________.

I realize that ________________________.

I need to learn more about __________.

Union and Intersection of Events

Lesson

I

When you were in Grade 7, you studied how to represent sets, subsets, and set operations using geometric figures, particularly rectangles and circles. This representation is called **Venn diagram**, named after the English logician **John Venn**.

Example 1.
The extracurricular activities participated by the Grade 10 students during the School Year 2019-2020 were shown in the Venn diagram below (Figure 1):

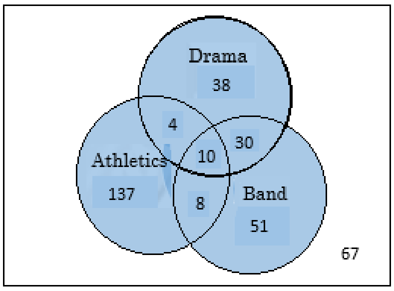


Figure 1

These are the answers in the questions above. Kindly check if your answers are correct.

1. The number of Grade 10 students during School Year 2019-2020 was 38+4+10+30+137+8+51+67=345.

This shows the concept of the union of sets in which we added the number of students in the following sets: set of participants in drama only, set of participants in a band only, set of participants in Athletics only, set of participants who joined both Drama and Band only, set of participants who joined both Band and Athletics only, set of participants who joined Drama and Athletics only, set of participants who joined all the extracurricular activities, and set of non-participants.

2. There were 137+4+8+10=159 students who participated in athletics. This includes the students who participated in athletics and in other extracurricular activity. Thus, this indicates a union of sets.

3. There were 38+30+10+4+8+137=227 students who participated in athletics or in drama. This also shows union of sets.

4. There were 30 students who participated only in drama and in band. It shows intersection of sets since there is a requirement that a student must join both drama and band and no activity other than those.

Based on the answers above, it can be concluded that the word "***or***" *is related to union of sets and "**and**" is connected to intersection of sets.*

Union Set can be defined as the set of elements that belong to A or B (or to both).

It can be written as A∪B and read as **"A union B"**. For example, if A={b,n,o,t} and B={p,o,n,y,} then A∪B={b,n,o,t,p,y.} The shaded region in the figure below represents A∪B. (Figure 2)

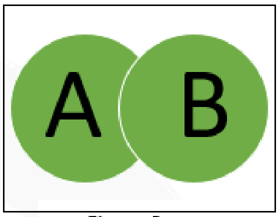


Figure 2

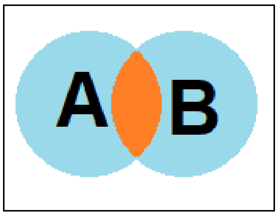


Figure 3

On the other hand, the **intersection of sets** A and B, written as A∩B and read as **"A intersection B"**, is formed by getting the elements that are common to both A and B. For example, if A={3,6,9,12,} and B={3,9,27,} then A∩B={3,9.} The shaded region in the figure above represents A∩B (Figure 3).
Now that you have recalled yourself with the union and intersection of sets, you are ready to learn the union and intersection of events.

When you were in Grade 8, you learned different terms in finding probability of a simple event. Some of them are as follows:

a. **Experiment** – an activity which could be repeated over and over again and which has well- defined results.
b. **Outcome** – a result of an experiment
c. **Sample Space** – a set of all outcomes in an experiment
d. **Event** – a subset of the sample space

Example2:

a. **Experiment:** A die is rolled once.
b. **Outcomes**: If you roll a die once, then, you have 1, 2, 3, 4, 5, or 6.
c. **Sample Space**: Write all the outcomes as a set, so it is {1, 2, 3, 4, 5, 6}
d. **Event**: "Getting a 3" and "Getting a 2" are some of the simple events.

Consider the experiment above and let us say that you want to find the probability of "getting a 3". Since the outcomes of rolling a die are 1, 2, 3, 4, 5, 6, there is an equal chance to land on once face as on any other. Therefore, we can say that the probability of "getting a 3" is one (1) out of six (6).

In symbol, we use

$$P(\text{getting a } 3) = \frac{1}{6}$$

The same probability is also incurred when the event is "getting a 2".

$$\text{So, } P\ (\text{getting a } 2) = \frac{1}{6}$$

It is worthy to note that 16 is the probability that any of the faces shows up.

Probability of Simple Events: If each of the outcomes in a sample space is equally likely to occur, then the probability of an event E, denoted as $P(E)$ is given by

$$P(E) = \frac{number\ of\ ways\ the\ event\ can\ occur}{number\ of\ possible\ outcomes}$$

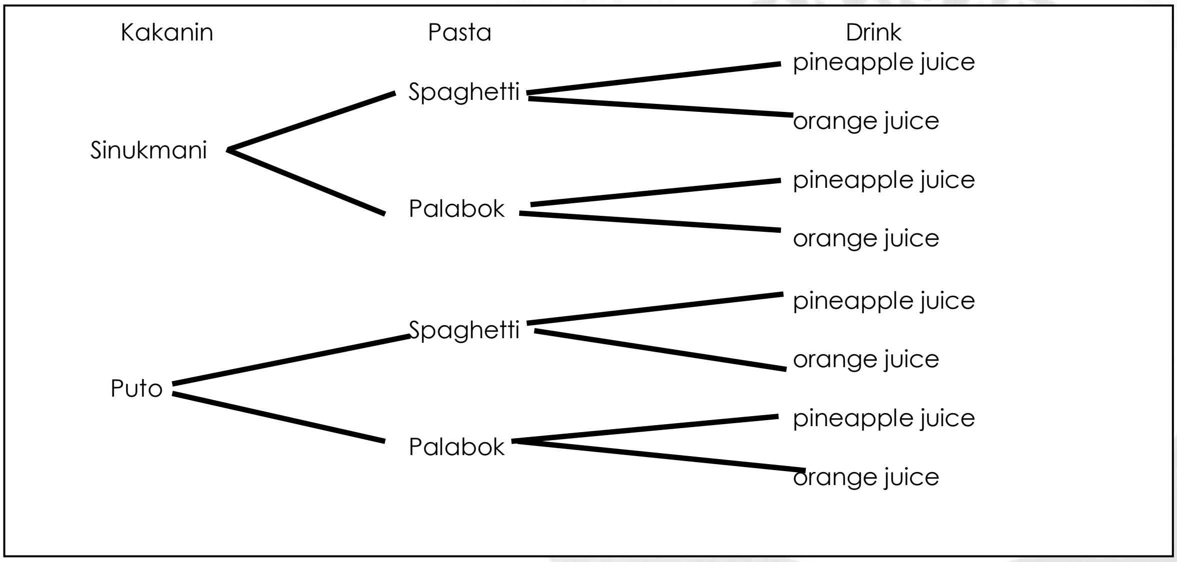
or

$$P(E) = \frac{number\ of\ outcomes\ in\ the\ event}{number\ of\ outcomes\ in\ the\ sample\ space}$$

UNDERSTANDING COMPOUND EVENTS

Example 3.

Aling Nena sells merienda in your barangay. A set of order consists of one type of kakanin, one type of pasta, and one type of drink. The tree diagram below shows the possible order combinations.



If you were asked to select a set of order, then, you have to choose between the two kakanin, between the two kind pastas, and between the two drinks.

Then, sample space : {(sinukmani, spaghetti, pineapple juice), (sinukmani, spaghetti, orange juice), (sinukmani, palabok, pineapple juice), (sinukmani, palabok, orange juice), (puto, spaghetti, pineapple juice), (puto, spaghetti, orange juice), (puto, palabok, pineapple juice), (puto, palabok, orange juice)}.

What if you were asked of the number of outcomes in selecting an order of merienda with sinukmani and with pineapple juice? Based from the illustration, there are two outcomes for the given event which are (sinukmani, spaghetti, pineapple juice) and (sinukmani, palabok, pineapple juice).

You can recognize that the events in the given situation are not simple events. In finding the sample, you need to find first the sample space using the fundamental counting principle. The said events are called **compound events.** It is defined as events which consist of more than one outcome.

UNION AND INTERSECTION OF EVENTS

Union of Events: Given that A and B are events in an experiment, the union of A and B which can be written as $A \cup B$ includes all outcomes that are in A or in B or in both A and B.

Intersection of Events: Given that A and B are events in an experiment, the intersection of A and B which can be written as A∩B includes all outcomes that are in both A and B.

It is important to note that the word **"or"** indicates **union of events** while "**and"** shows **intersection of events**.

Example 3.

Consider the given situation

A die is tossed twice. A is the event of getting equal dots and B is the event of getting a sum of 8.

A. Experiment: tossing a dice twice

B. Event A: the event of getting equal dots.: (2,2), (3,3), (4,4), (5,5), (6,6)

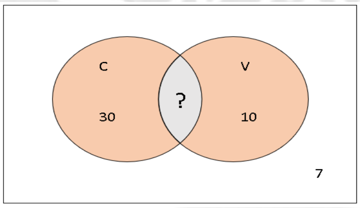
C. Event B: the event of getting the sum of 8: (2,6), (3,5), (4,4), (5,3), (6,2)

D. Union of A and B (AUB):(2,2),(2,6),(3,3),(3,5), (4,4),(5,3), (5,5),(6,2), (6,6)

E. Intersection of A and B (A∩B) : (4,4)

D

Learning Task 1: Look at the Venn diagram below and answer the questions that follow.
The Venn diagram below shows the favorite ice cream flavors between chocolate and vanilla of 50 kids in the Barangay. (C– chocolate, V– vanilla)



1.How many kids like chocolate ice cream?
2. How many kids like vanilla ice cream?
3. How many kids like chocolate and vanilla ice cream?
4. How many kids do not like chocolate or vanilla ice cream?

E

Learning Task 2: Given the experiment below, supply the appropriate ***outcomes, sample space,*** and ***events.***

Experiment: A1-peso coin is tossed.

A

Reflect and answer the following questions: Write your answer on a separate sheet of paper.
1.How will you determine the union and intersections of events?
2. How does the concepts learned help in making decisions in real-life?

WEEK 6

Probability of a Union of Two Events

Lesson

I

In the previous lesson, you were able to illustrate union and intersection of events. For example, among the Seven Lakes of San Pablo City namely Sampaloc, Bunot, Yambo, Pandin, Mohicap, Calibato, and Palakpakin, the union and intersection of event A which is choosing a lake that starts with “P” and event B which is choosing a lake with 6 letters are as follow:

Union of A and B: $(A \cup B) = \{Palakpakin,\ Pandin,\}$

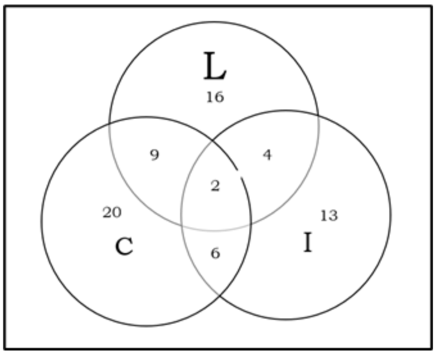
Intersection of A and B: $(A \cap B) = \{Pandin\}$

In this lesson you are going to explore on the lesson on Probability of a union of two events.

Now, try to illustrate the probability of a union of two events by reading the following text.

Example 1.

Read the situation below and answer the questions that follow.



As part of the celebration of Coco Festival 2021 New Normal Edition, the Local Government of San Pablo conducted the Lakan at Mutya ng San Pablo (L), the Search for Mr. and Ms. Coco Star (C), and the San Pablo Idol (I) via online.

The Venn diagram shows the number of students in two sections of San Vicente Integrated High School who watched festival.

1. How many students were asked in the survey?

   Solution:

   Add the number of students in each region of the Venn diagram at the left.

   So, you have : $16 + 4 + 9 + 2 + 20 + 6 + 13 + 10 = 80$

2. How many students watched Lakan at Mutya?
   Solution:

   Consider the number of students who watched only Lakan at Mutya (16), watched only Lakan at Mutya and San Pablo Idol (4), watched only Lakan at Mutya and CocoStar (9), and watched all activities (2), then add them all.

Thus, $16 + 4 + 9 + 2 = 31$

3. If a student is randomly chosen, what is the probability that the student watched Lakan at Mutya or San Pablo Idol?

Solution:

The word “or” in the question indicates the union of the two events. So, we have to get first the sum of the number of students who watched only Lakan at Mutya (16), only Lakan at Mutya and San Pablo Idol (4), only Lakan at Mutya and CocoStar (9), only San Pablo Idol and CocoStar (6), only San Pablo Idol (13), and all activities (2).

So, $16 + 4 + 9 + 6 + 13 + 2 = 50$.

Then, divide 50 by the total number of students asked in the survey.

Thus, $P(Lakan\ at\ Mutya\ or\ Idol) = \frac{50}{80} = \frac{5}{8}$

4. If a student is randomly chosen, what is the probability that the student watched only San Pablo Idol and CocoStar?

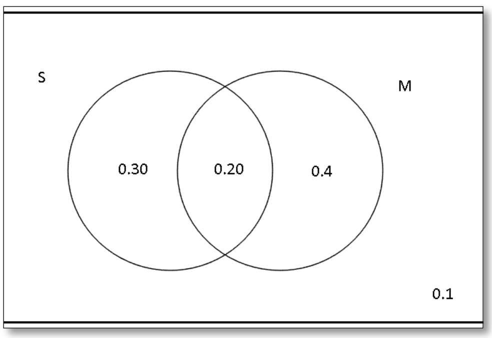
Solution:

The word “and” in the question suggests the intersection of the two events. There are 6 students in the Venn diagram who watched only San Pablo Idol and CocoStar and no other activity. Then, divide 6 by the total number of students asked in the survey.

Hence, $P(Idol\ and\ CocoStar) = \frac{6}{50} = \frac{3}{25}$

Example 2.

What if the given values are already the probabilities? Consider the situation below.
As part of this year’s Festival of Talents of San Jose National High School, the organizing committee has opened Mobile Legends Tournament and Online Singing Contest. The Venn diagram below shows the probabilities of Grade 10 students joining either Mobile Legends Tournament (M) or Online Singing Contest (S).



If a student is randomly chosen, the probability that he or she joined Mobile Legends Tournament is the sum of the probability that only M occurs which is 0.4 and the probability that M and S occur which is 0.2.

In symbol, $P(M) = 0.4 + 0.2 = 0.6$

The probability that a student randomly chosen joined Online Singing Contest is the sum of the probability that S occurs which is 0.3 and the probability that M and S occur which is 0.2.

In symbol, $P(S) = 0.3 + 0.2 = 0.5.$

Let's look for the probability of randomly choosing a student who joined both the Mobile Legends Tournament and Online Singing Contest. We have to look at the overlapping region of M and S, which is the intersection of M and S. It can be seen that the probability is 0.2.

In symbol, $P(M \cap S) = 0.2$

Suppose we are looking for the probability of randomly choosing a student who joined Mobile Legends or Online Singing Contest. In that case, we have to get the sum of the probability that only M occurs, the probability that only S occurs, and the probability of both M and S occurs. It indicates the union of events.

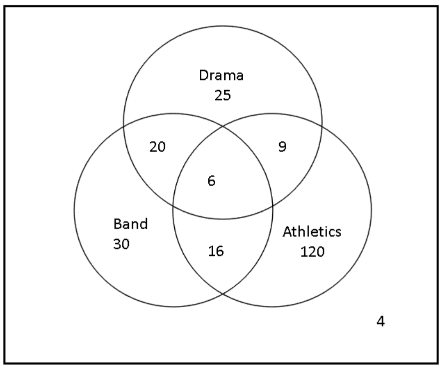
So, in symbol, $P(M \cup S) = 0.4 + 0.2 + 0.3 = 0.9$

Complement of an Event – the set of all outcomes that are NOT in the event. It is denoted by and read as the probability of the complement of event A. It can be found by using the formula . For example, in the situation above, If we are looking for the probability that a randomly chosen student did not join Mobile Legends Tournament then we have to subtract P(M) from 1.

In symbol, $P(M') = 1 - P(M) = 1 - 0.6 = 0.4$

D

Learning Task 1: The extracurricular activities in which the Junior class at Tanauan School of Fisheries participate are shown in the Venn diagram.



1. How many students are in the Junior class?

2. How many students participate in athletics?

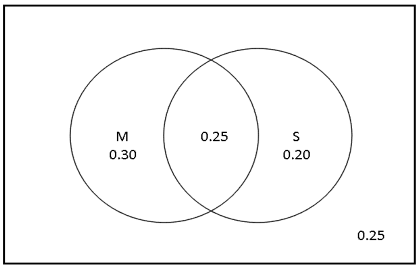
3. If a student is randomly chosen, what is the probability that the student participates in athletics or drama?

4. If a student is randomly chosen, what is the probability that the student participates only in drama and band?

E

Learning Task 2: Answer the following questions based on the concept presented in the discussions.

Grade 10 students of Tanauan School of Fisheries, Tanauan City have chosen their favorite subjects. The Venn diagram below shows the students' probabilities of choosing either Science or Mathematics as their favorite subject.



Find the following:

1) $P(M)$
2) $P(S)$
3) $P(M \cup S)$
4) $P(M')$
5) $P(M \cap S)'$

A

A. Answer the following questions based on the concept presented in the discussions.

1. How will you determine the probability of the union of two events?
2. Cite a real life situations where you can apply the learned concepts presented in the discussions.

B. Complete the following phrases.

I understand that ____

I realize that ____

I need to learn more about _____________________________________

WEEK 7

Probability of $(A \cup B)$

Lesson

I

In your previous lessons, you have learned to find the probability of simple events like getting an odd number in a roll of a die and getting a head in a toss of a coin.

However, what if two events are being considered in finding a probability? An example is finding the probability of choosing Yambo lake or a lake that starts with "C" from the Seven Lakes of San Pablo City, Laguna namely Sampaloc, Bunot, Yambo, Pandin, Mohicap, Calibato, and Palakpakin. It means that you will be looking for the probability of the union of the given two events. In addition, the word "or" indicates the union of such.

In this lesson, you will learn to determine the probability of union of two events ($A \cup B$).

Probability of Union of Two Events

If A and B are events in the sample space, then the probability of A or B occurring is:

However, if there is no intersection between events A and B, then the probability of A or B occurring is

Study the following illustrative examples.

Example 1: $P(A\ or\ B) = P(A \cup B) = P(A) + P(B) - P(A \cap B)$

A die is rolled once. Find the probability that the number is an even number or a multiple of 4.

Let us denote A as the event of getting an even number and B as the event of getting a multiple of 4. Since there are 3 even numbers in a die {2,4,6}, we can say that the probability of getting an even number is 3 out of 6.

In symbol,

When it comes to the event of $P(A) = \frac{3}{6} = \frac{1}{2}$ getting a multiple of 4, there is only one multiple of 4 in a die {4}, thus the probability of getting a multiple of 4 is 1 out of 6.

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

In symbol, $P(A) = \frac{3}{6} = \frac{1}{2}$.

However, there is a number which is both an even number and a multiple of 4 in a die {4} and its probability is 1 out of 6.

In symbol, $P(A \cap B) = \frac{1}{6}$

Hence, we can say that the probability of getting an even number or a multiple of 4 in a roll of a die is

$$P(A\ or\ B) = P(A \cup B) = P(A) + P(B) - P(A \cap B) = \frac{1}{2} + \frac{1}{6} - \frac{1}{6} = \frac{1}{2}.$$

Example 2:

A die is rolled once. Find the probability that the number is an even number or a multiple of 5.

Let us denote A as the event of getting an even number and B as the event of getting a multiple of 5. The probability of getting an even number in a roll of a die is : $P(A) = \frac{3}{6} = \frac{1}{2}$ while the probability of getting a multiple of 5 is: $P(B) = \frac{1}{6}$

Since, there is only one number in a die which is a multiple of 5 {5}.There is no number in a die which is both an even number and a multiple of 5, so there is no intersection between the two events. Hence, the probability of getting an even number or a multiple of 5 in a roll of a die is $P(A\ or\ B) = P(A \cup B) = P(A) + P(B).$.

D

Learning Task 1: Find the probability of the following problems.

1. A bowl contains 15 chips numbered 1 to 15. If a chip is drawn randomly from the bowl, what is the probability that it is
   a) 7 or 15?
   b) 5 or a number divisible by 3?
   c) even or divisible by 3?
   d) a number divisible by 3 or divisible by 4?

2. Dario puts 44 marbles in a box in which 14 are red, 12 are blue, and 18 are yellow. If Dario picks one marble at random, what is the probability that he selects a red marble or a yellow marble?

E

Learning Task 2: Find the probability of the following problems.

Maricar labeled each of 26 small pieces of paper a distinct letter in the English alphabet. She puts them in a box. If she will ask her brother, Paulo, to randomly pick a piece of paper from the box, what is the probability that it is:

1) a vowel or a consonant?

2) a consonant or w?

3) a vowel or e?

A

A. Solve the following problems.

1. A die is rolled once. Find the probability that

   a) the number is even or a multiple of 3;

   b) the number is a multiple of 2 or multiple of 3;

   c) the number is an odd number or a multiple of 2.

B. Answer the following questions based on the concepts presented in the discussion.

1. How can you solve problems involving probability of the union of events?
2. Cite a real life situation where you can apply the learned concepts presented in the discussion.

WEEK 8

Mutually Exclusive Events and Word Problems Involving Probability

Lesson

I

In the past lessons, you have learned to find the probability of the union of two events. It involves determining whether any two events can or cannot happen at the same time.

Consider the table below, which pair of events can happen at the same time?

In choosing a lake to visit among Seven Lakes of San Pablo City, namely: Sampaloc, Bunot, Yambo, Pandin, Mohicap, Calibato at Palakpakin,	
A	B
Event 1: choosing Bunot lake Event 2: choosing a lake that starts with "B"	Event 1: choosing Sampaloc lake Event 2: choosing a lake that starts with "M"

Study the concepts below and check if your answer is correct.

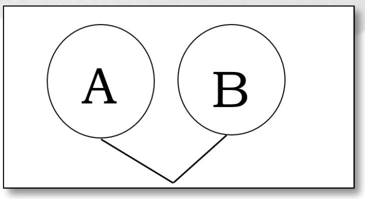
Mutually Exclusive Events: These are events that cannot occur at the same time. This means that two events A and B are mutually exclusive. In other words, there is no intersection between events A and B.

Consider the following illustrative examples:

Example 1:

In an experiment of randomly choosing a lake in Laguna, event A of choosing a lake in Seven Lakes of San Pablo City and the event of B of choosing a lake that starts with the letter "D" are mutually exclusive events because there is no lake in Seven Lakes of San Pablo City that starts with the letter "D" {Sampaloc, Bunot, Yambo, Pandin, Mohikap, Calibato, Palakpakin}.

This can be illustrated using a Venn diagram which is shown below:



$P(A\ or\ B)$

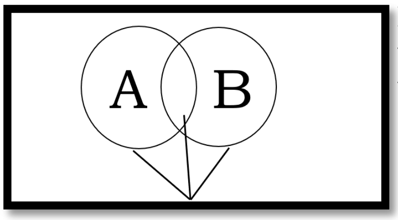
It can be seen in the Venn diagram at the left that there is no intersection between the events A and B.
Hence, there is no chance that the two events happen at the same time.

Remembering how to find the probability of union of events, you will learn that the same way is used in finding the probability of mutually exclusive events. That is, $P(A\ or\ B) = P(A \cup B) = P(A) + P(B)$

Using Example 1, the probability of event A is since there are 5 vowels {a, e, i, o, u} out of 26 letters in the English alphabet . The probability of event is $P(B) = \frac{21}{26}$ since there are 21 consonants {b, c, d, f, g, h, j, k , l, m, n, p, q, r, s, t , v, w, x, y, z} out of 26 letters in the English alphabet. There is no letter in the English alphabet that is both vowel and consonant. Hence, $P(A\,or\,B)=\frac{5}{26}+\frac{21}{26}=\frac{26}{26}=1$. However, if there is a chance for the events A and B happen at the same time, then they are not mutually exclusive events.

Example 2.

In an experiment of rolling a die once, the event A of getting an even number and the event of getting a multiple of 3 are not mutually exclusive events. There is a number in a die that is both an even number and a multiple of 3 which is 6. In other words, the intersection between events A and B is 6.



It can be seen in the Venn diagram at the left that there is intersection between events A and B. Hence, there is a chance that the two events happen at the

If two events, A and B, are not mutually exclusive, then the probability that either A or B occurs is the sum of their probabilities decreased by the probability of both occurring. In symbol, $P(A\,or\,B)=P(A\cup B)=P(A)+P(B)-P(A\cap B)$

In example 2, the probability of event A is $P(A)=\frac{3}{6}=\frac{1}{2}$ and the probability of event B is $P(B)=\frac{2}{6}=\frac{1}{3}$

Since there is a number in a die which is both an even number and a multiple of 3 {6}, its probability is $P(A\cap B)=\frac{1}{6}$

Hence, $P(A\,or\,B)=P(A\cup B)=\frac{1}{2}+\frac{1}{3}-\frac{1}{6}=\frac{3}{6}+$

Looking back at the question in the introduction, Pair A can happen at the same time therefore they are mutually exclusive events.

INDEPENDENT AND DEPENDENT EVENTS

Independent Events: Events are independent if the occurrence of one of the events does not affect the other event. In other words, an event's occurrence does not give any clue whether or not the other event will occur. Given that A and B are independent events, the probability of both events occurring is the product of A's probability and the probability B. In symbols,

$P(A\,and\,B)=P(A\cap B)=P(A)\cdot P(B)$.

Example 3:

Suppose that a coin is tossed once and a die is rolled once, the event that a coin shows up tail and the event that a die shows up a 2 are independent events. The first event does not influence the second event. If we will find for the probability of the two events, then we will multiply the probability of the first event by the probability of the second event . Thus, $P(A\ and\ B) = P(A \cap B) = P(A) \cdot P(B) = \frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$.

Dependent Events: Events are dependent if the occurrence of one of the events influences the other event. Given that A and B are dependent events, the probability of both events occurring is the product of the probability of A and the probability of B after A occurs. In symbols, $P(A\ and\ B) = P(A \cap B) = P(A) \cdot P(B\ following\ A)$.

Example 5:

If there is a box containing 5 white marbles and 4 black marbles, the probability of drawing 1 white marble and 2 black marbles in succession without replacement is:

On the first draw, the probability of getting a white marble is since there are 5 white marbles out of a total of 9 marbles. On the second draw, $\frac{5}{9}$ the probability of getting a black marble is since there are 4 black marbles out of 8 total marbles (subtracted a white ball that was drawn on the first draw). Then on the third draw, the probability $\frac{4}{8} = \frac{1}{2}$ of getting black marble is since there are 3 remaining black marbles out of 7 total remaining marbles. Hence,

$\frac{3}{7}$

CONDITIONAL PROBABILITY: Conditional Probability: It is the probability that an event will occur given that another event has already occurred. It is denoted as " " and read as "A given B". For any two events A and B with the conditional probability of A given that B has occurred is defined by $P(1\ white, 1\ black, 1\ black) = \frac{5}{9} \cdot \frac{1}{2} \cdot \frac{3}{7} = \frac{5}{42}$.

Example 6:

The guidance counselor of San Jose National High School conducted a survey to Grade 10 students on what Senior High School Strand they will enroll next year. The breakdown of the survey that involves only ABM and STEM strands is shown in the table below.

Consider the following problems involving the situation above.

1. Find the probability that the student chose STEM, given that he was a male.
2. Find the probability that the student was a male, given that he chose STEM.
3. Find the probability that the student was a female, given that she chose ABM.

Solution No. 1

In the first problem, the first event is choosing a student who chose STEM and the second event is choosing a male student. So, getting the probability of the intersection of S and M, we will get . Then, the probability of the second event is . Hence, the probability that the student chose STEM, given that he is a male is

$P(A\ and\ B) = P(A \cap B) = P(A) \cdot P(B\ following\ A)$.

	Male (M)	Female (F)	Total
STEM (S)	26	34	60
ABM (A)	14	26	40
	40	60	100

2. The first event in the second problem is choosing a male student while the second event is choosing a student who chose STEM. First, the probability of the intersection of M and S (in other words, the student is both male and chose STEM) is $P(M|S) = \frac{\frac{26}{100}}{\frac{60}{100}} = \frac{26}{60} = \frac{13}{30}$.

Then, the probability of choosing a student who chose STEM is $P(S \cap M) = \frac{26}{100}$

Therefore, the probability that the student was a male, given that he chose STEM is $P(M) = \frac{40}{100}$.

3. Find the probability that the student is a female, given that she chose ABM.

In the first problem, the first event is choosing a student who chose STEM and the second event is choosing a male student. So, getting the probability of the intersection of S and M, we will get . Then, the probability of the second event is . Hence, the probability that the student chose STEM, given that he was a male is $P(F|A) = \frac{\frac{26}{100}}{\frac{40}{100}} = \frac{26}{40} = \frac{13}{20}$.

The first event in the second problem is choosing a male student while the second event is choosing a student who chose STEM. First, the probability of the intersection of M and S (in other words, the student is both male and chose STEM) is . Then, the probability of choosing a student who chose STEM is . Therefore, the probability that the student was a male, given that he chose STEM is $P(M|S) = \frac{\frac{26}{100}}{\frac{60}{100}} = \frac{26}{60} = \frac{13}{30}$.

In the last problem, the first event is choosing a female student and the second event is choosing a student who chose ABM. First, the probability of choosing a student who is both female and chose ABM is $P(F \cap A) = \frac{26}{100}$

Then, the probability of choosing a student who chose ABM is . $P(F|A) = \frac{\frac{26}{100}}{\frac{40}{100}} = \frac{26}{40} = \frac{13}{20}$

Thus, the probability that the student was a female, given that she chose ABM is $P(F|A) = \frac{\frac{26}{100}}{\frac{40}{100}} = \frac{26}{40} = \frac{13}{20}$.

D

Learning Task 1: Consider the situation below and answer the questions that follow.

A restaurant serves a bowl of candies to their customers. The bowl of candies Gabriel receives has 10 chocolate candies, 8 coffee candies, and 12 caramel candies. After Gabriel chooses a candy, he eats it. Find the probability of getting candies with the indicated flavors.

a. P (chocolate or coffee)

b. P (caramel or not coffee)

c. P (coffee or caramel)

d. P (chocolate or not caramel)

e. P (coffee or not chocolate)

E

Learning Task 2: Answer the following question based on the concept presented in the discussion. Differentiate the following:

1. mutually exclusive event from not mutually exclusive event
2. independent event from dependent events

A

Cite a real life situation involving conditional probability. Do this on your notebook.

____.

Answer Key

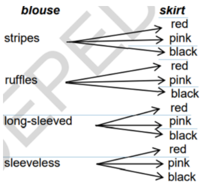
WEEK 1

Learning Task 1

12 blouse-and-skirt pairs are possible

Another way of answering item 1 is through a tree diagram.

3. 120



4. 120

Learning Task 2

1. 40, 320

2.720

WEEK 2

Learning Task 2

1.72
2.95,040
3.210
4.151,200
5. 1,108,800

Assimilation

1. Permutation
2. Combination
3. Permutation
4. Permutation
5. Combination

WEEK 3

Learning Task 1

56
6
1

Learning Task 2

1. 66
2. 99
3. 2, 598,960
4. 252

WEEK 4

Learning Task 1

103, 680
240
325

Learning task 2

1. A situation involves combinations if it consists of task/tasks of selecting from a set and the order or arrangement is not important.
2. Joy is not correct because she only calculated the number of triangles that can be formed {C (7,3) }. She did not include the number of other polygons, namely, quadrilateral, pentagon, hexagon, or heptagon

3. a. 17, 325

b. 3,991,680

WEEK 5

Learning Task 1

1. 30
2. 10
3. 3
4. 7

Learning Task 2

1. H,T
2. H,T
3. Tossing 1-peso coin

WEEK 6

Learning Task 1

1. 230
2. 137
3. 9
4. 20

Learning Task 2

1. 0.55
2. 0.45
3. 0.75
4. 0.45
5. 0.75

WEEK 7

Learning Task 1

1.a. 2/15
b. 2/3
c. 2/3
D. 7/15

2. 8/11

Learning Task 2

1. 1
2. 21/26
3. 5/26

Assimilation

1. ½
2. 2/3
3. 1/2

WEEK 8

Learning Task 1

1. A. 3/5

B. 11/15

C. 2/3

D. 3/5

E. 2/5

PIVOT Assessment Card for Learners

Personal Assessment on Learner's Level of Performance

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below.

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/lesson.

✓ - I was able to do/perform the task. It was quite challenging but it still helped me in understanding the target content/lesson.

? - I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

Distribution of Learning Tasks Per Week for Quarter 2

Week 1	**LP**	**Week 2**	**LP**	**Week 3**	**LP**	**Week 4**	**LP**
Learning Task 1		Learning Task 1		Learning Task 1		Learning Task 1	
Learning Task 2		Learning Task 2		Learning Task 2		Learning Task 2	
Learning Task 3		Learning Task 3		Learning Task 3		Learning Task 3	
Learning Task 4		Learning Task 4		Learning Task 4		Learning Task 4	
Learning Task 5		Learning Task 5		Learning Task 5		Learning Task 5	
Learning Task 6		Learning Task 6		Learning Task 6		Learning Task 6	
Learning Task 7		Learning Task 7		Learning Task 7		Learning Task 7	
Learning Task 8		Learning Task 8		Learning Task 8		Learning Task 8	

Week 5	**LP**	**Week 6**	**LP**	**Week 7**	**LP**	**Week 8**	**LP**
Learning Task 1		Learning Task 1		Learning Task 1		Learning Task 1	
Learning Task 2		Learning Task 2		Learning Task 2		Learning Task 2	
Learning Task 3		Learning Task 3		Learning Task 3		Learning Task 3	
Learning Task 4		Learning Task 4		Learning Task 4		Learning Task 4	
Learning Task 5		Learning Task 5		Learning Task 5		Learning Task 5	
Learning Task 6		Learning Task 6		Learning Task 6		Learning Task 6	
Learning Task 7		Learning Task 7		Learning Task 7		Learning Task 7	
Learning Task 8		Learning Task 8		Learning Task 8		Learning Task 8	

Note: If the lesson is designed for two or more weeks as shown in the eartag, just copy your personal evaluation indicated in the first Level of Performance found in the second column up to the succeeding columns, ie. if the lesson is designed for weeks 4-6, just copy your personal evaluation indicated in the LP column for week 4, week 5 and week 6. Thank you.

References

Department of Education. (2020). *K to 12 Most Essential Learning Competencies with Corresponding CG Codes*. Pasig City: Department of Education Curriculum and Instruction Strand.

Department of Education Region 4A CALABARZON. (2020). *PIVOT 4A Budget of Work in all Learning Areas in Key Stages 1-4: Version 2.0.* Cainta, Rizal: Department of Education Region 4A CALABARZON.

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https://tinyurl.com/Concerns-on-PIVOT4A-SLMs