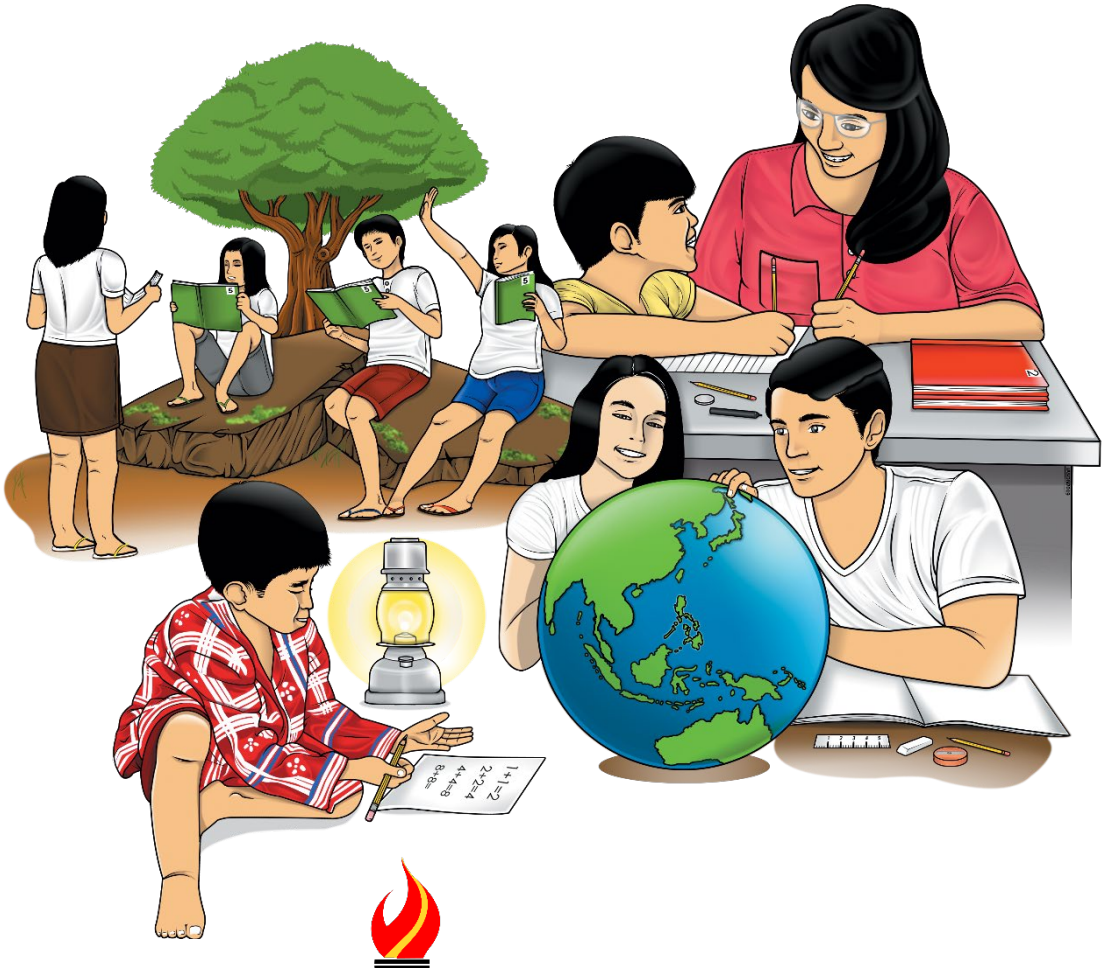
Senior High School

DepED
DEPARTMENT OF EDUCATION

General Mathematics

Quarter 2 – Module 19: Validity of Categorical Syllogisms



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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

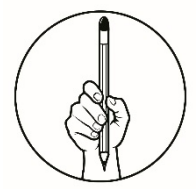
Thinking and communicating clearly and coherently are ways of logic. It is an essential area of study which has various applications in your daily life activities. Your belief can be affected by the way you reason, which ultimately affects the way you behave and live your life. Therefore, reasoning correctly is of utmost importance.

You encounter arguments in your everyday life, you read them in books and magazines, and you hear them on television. Even in most examination problems involving logic are included. Without knowing, you sometimes formulate them when communicating with other people. Logic will help you to discourse and deal with others with correct reasoning. Making logic a habit of your thinking makes you improve your critical thinking skills. As you develop methods and techniques used to distinguish correct reasoning from incorrect one, you become more confident.

As you may already know the main goal in logic is to determine the validity of arguments. This module was designed and written to help you know about determining the validity of categorical syllogisms. It covers varied situations that can be seen in real life. It is hoped that upon exploring this learning kit you will be eager and enthusiastic in completing the task required. Although studying logic is challenging, it is sometimes fun. Good luck!

After going through this module, you are expected to:

1. define categorical syllogism;
2. differentiate Euler's diagram from Venn diagram;
3. enumerate the different set of rules in categorical syllogism; and
4. determine the validity of categorical syllogism.



What I Know

Let's find out how far you might already know about this topic! Please take this challenge! Have Fun!

Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. It is the subject term of the conclusion.
    a. major term
    b. major premise
    c. minor term
    d. minor premise

2. It has two categorical premises and a conclusion.
    a. categorical syllogism
    b. conjunctive syllogism
    c. hypothetical syllogism
    d. logical syllogism

3. It appears in both premises but not in the conclusion.
    a. major term
    b. minor term
    c. middle term
    d. minimum term

4. Determine the quantity of the categorical proposition: Some teachers are Math teachers.
    a. affirmative
    b. negative
    c. particular
    d. universal

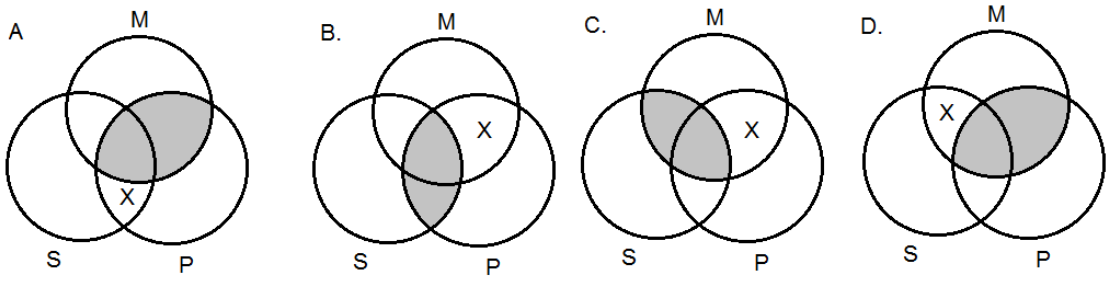
5. What type of categorical proposition is: No successful persons are lazy.
    a. A
    b. E
    c. I
    d. O

For number 6-7, refer to the given categorical syllogism below:

No P are M.
Some M are S.
∴Some S are not P

6. Determine the form of the given standard categorical syllogism.
   a. IIE-3
   b. EIO-4
   c. IOO-1
   d. EII-1

7. Which is the correct diagram of the standard categorical syllogism?



8. How many standard forms of categorical syllogisms are there?
   a. 256
   b. 24
   c. 15
   d. 9

9. Which of the following letter name is used as symbol for particular negative categorical syllogism?
   a. A
   b. E
   c. I
   d. O

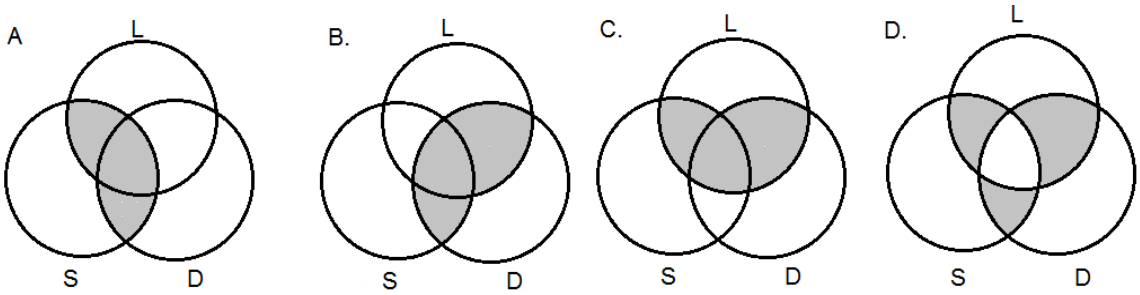
For numbers 10-11, refer to the given categorical syllogism below:

No superb athletes are lazy. No lazy people are disciplined.
Therefore, all superb athletes are disciplined.

10. Which is the major term in the given categorical syllogism?
    a. all people
    b. lazy people
    c. disciplined people
    d. superb athletes

11. Which is the correct diagram of the standard categorical syllogism?

(Let S=superb athletes; D=disciplined people and L=lazy people)



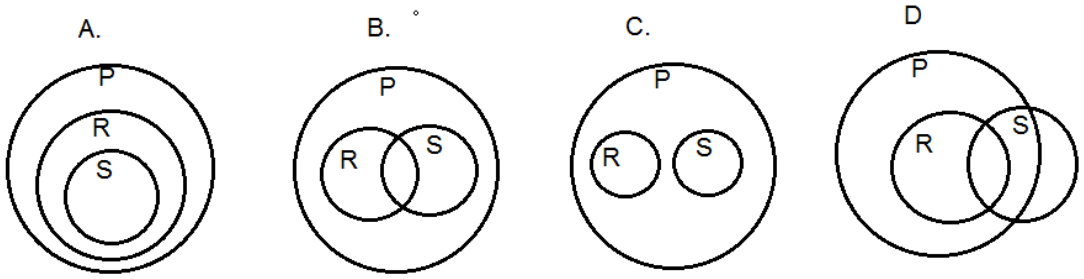
For numbers 12-13, refer to the given categorical syllogism below:

All rectangles are parallelograms. All squares are rectangles.
Therefore, all squares are parallelograms.

12. What is the middle term of the given categorical syllogism?
    a. parallelogram
    b. rectangles
    c. rhombus
    d. squares

13. Which is the correct Euler's diagram of the standard categorical syllogism?

(Let S=Squares; R=rectangles and P=parallelograms)



14. Determine the form of the categorical syllogism: Some great teachers are caring.
    All caring people are encouraging. Therefore, some great teachers are encouraging.
    a. IAI-4
    b. AII-1
    c. AII-3
    d. IAI-3

15. Which of the following categorical syllogisms is INVALID?
    a. No P are M. Some M are S. Therefore, some S are not P.
    b. No superb athletes are lazy. No lazy people are disciplined. Therefore, all superb athletes are disciplined.
    c. All rectangles are parallelogram. All squares are rectangles. Therefore, all squares are parallelogram.
    d. Some great teachers are caring. All caring people are encouraging. Therefore, some great teachers are encouraging.

Lesson 1 Validity of Categorical Syllogisms

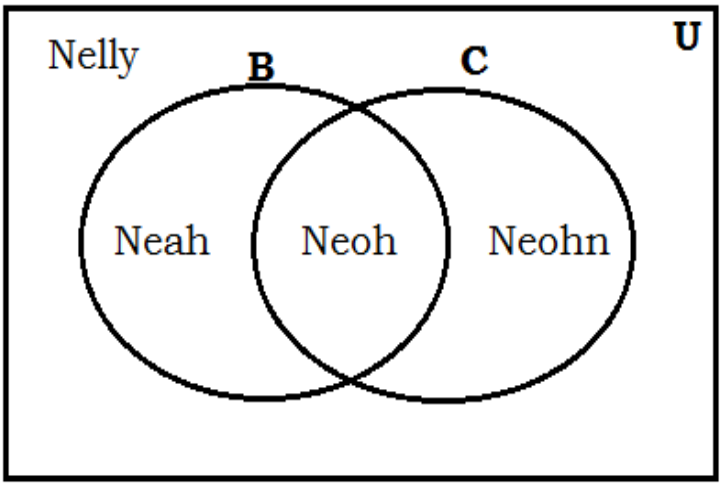
Deductive and inductive arguments are among the best-known types of arguments. A categorical syllogism is a deductive argument consisting of exactly three categorical propositions (two premises and a conclusion). It is said to be valid if and only if the conjunction of the premises implies the conclusion. There are four ways to determine the validity of categorical syllogisms: Check the form against the list of valid arguments; use Venn diagrams; draw a picture of the premises using Euler's diagrams and lastly, use a set of rules. You may use any method in determining the validity of the categorical syllogisms. However, only two methods will be intensively discussed in this module.

What's In

Before you proceed with the lesson, you should be able to recall how to construct a Venn diagram to represent a given statement.

Activity 1: A Visit to Historical Place

Mr. Sandoval wants his children to instill the value of patriotism to his four children. This summer, he is planning to visit with his family one historical place in the Philippines. He has not yet decided if they will go to Corregidor Island in Bataan or will visit the Emilio Aguinaldo Shrine in Kawit, Cavite. To help him decide, he asked his four children which of the two historical places they want to explore. Their answers are summarized in a Venn diagram below:



Let B = set of children who want to visit Corregidor Island, Bataan
C = set of children who want to visit Emilio Aguinaldo Shrine, Kawit,Cavite

Who wants to visit:

1. Bataan?
2. Cavite?
3. Bataan only?
4. Cavite only?
5. Cavite and Bataan?
6. Neither of the two spots?

Notes to the Teacher

The students may use any method in determining the validity of the categorical syllogisms. Emphasize that validity is not determined by the actual truth values of the premises or the conclusion. It is determined solely by the relationship between the premises and the conclusion. It doesn't matter if the premises are true or false. It is the matter of structure of this argument. Meanwhile a categorical syllogism is sound if and only if it is both **valid**, and all of its premises are actually true. Soundness of an argument was not discussed in this module. Also, the distribution of terms was not also covered here which is a necessary concept to apply the set of rules specifically rules 2 and 3.

What's New

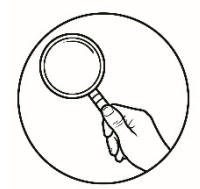
Activity 2: What's that Prove?

Using your reasoning, determine whether the following are **VALID** or **INVALID**. Justify your answers. You may use illustrations to support your claim.

1. God is love; love is blind. Therefore, God is blind.
2. All hardworking students are friendly. No friendly student violates school policies. Therefore, no violator of school policies is a hardworking student.
3. All monkeys eat banana, Nestor eats banana. Therefore, Nestor is a monkey.
4. All frogs can jump, horses can jump. Therefore, a horse is a frog.
5. All SHS students are honest. Some creative thinkers are SHS students. Therefore, some creative thinkers are honest.
6. All birds can fly, airplanes can also fly. Therefore, an airplane is a bird.
7. Laila has a heart; banana also has a heart. Therefore, Laila is a banana.
8. All pigs have 4 legs, tables have 4 legs. Therefore, a table is a pig.
9. Angelica is beautiful, a mountain is also beautiful. Therefore, Angelica is a mountain.
10. All donors for the "Pasko with Ate and Kuya" are successful persons. No successful persons are lazy persons. Therefore, no lazy persons are donors for the "Pasko with Ate and Kuya".

Guide Questions:

1. How did you find the activity?
2. Were you able to determine the validity of each statement?
3. What strategies or methods did you use to justify the validity or invalidity of each statement?
4. Did you consider the truth value of each proposition in the syllogisms to determine each validity? Why?
5. How can we determine if the statements just like presented are valid or not?
6. In your own words, what is validity?



What is It

The theory of categorical propositions was originated by Aristotle. It remains important even today since many of the statements used in ordinary language can be translated into standard categorical propositions. The method used in logic provides an approach and framework for some kinds of linguistic usage. In this lesson, you will learn the methods of how to find valid categorical syllogisms. It includes using Euler's and Venn diagram, use of a set of rules and how to look for a table of valid categorical syllogisms.

Before you begin examining the validity of categorical syllogisms, you must know first the nature of categorical propositions and syllogisms.

Nature of Terms in Categorical Propositions

A **categorical proposition** is a proposition that relates two classes or categories. It is composed of a quantifier, a subject term, a copula and a predicate term. **Quantifiers** like "all," "no," and "some" specify how much of the subject class is included in or excluded from the predicate class. **Copula** like "are" and "are not" link (or "couple") the subject term with the predicate term.

Example 1. Identify the quantifier, subject, copula and predicate in the categorical proposition: All cookery students are TVL students.

Answer. The following is an illustration of the quantifier, subject, copula and predicate of a categorical proposition.

The **quantity** of a categorical proposition is either universal or particular. **Universal** like "All *S* are *P*" and "No *S* are *P*" assert something about every member of the *S* class. **Particular** like "Some *S* are *P*" and "Some *S* are not *P*" assert something about one or more members of the *S* class.

Example 2. The following are the quantities of the given propositions.

Categorical Propositions	*Quantifiers*	*Quantity*
All Cookery students are TVL students.	All	universal
No TVL students are academic students.	No	universal
Some SHS students are TVL students.	Some	Particular
Some TVL students are not academic students.	Some	particular

The **quality** of a categorical proposition is either affirmative or negative. **Affirmative** quality like "All *S* are *P*" and "Some *S* are *P*" affirms class membership. **Negative** quality like "No *S* are *P*" and "Some *S* are not *P*" denies class membership.

Example 3. The following are the qualities of the given propositions.

Categorical Propositions	*Quantifiers/ Qualifiers*	*Quality*
All Cookery students are TVL students.	All, are	affirmative
No TVL students are academic students.	No, are	negative
Some SHS students are TVL students.	Some, are	affirmative
Some TVL students are not academic students.	Some, not	negative

Four Basic Types of Categorical Propositions:

The four kinds of categorical propositions have commonly been designated by letter names corresponding to the first four vowels of the Roman alphabet: **A, E, I, O.** It may be presented as follows:

Quantity/Quality	Affirmative	Negative
Universal	**A** (All S are P.)	**E** (No S are P.)
Particular	**I** (Some S are P.)	**O** (Some S are not P)

A **standard form** categorical proposition occurs in one of the following four forms:
All *S* are *P*. No *S* are *P*. Some *S* are *P*. Some *S* are not *P*.

Example 4. Express the following into standard categorical propositions.

1. Every TVL student is a SHS student.
2. Most Quezonians are God-fearing.
3. The teacher needs an internet connection.
4. None TVL students are academic student.
5. All great leaders are not arrogant.

Answers.

1. All TVL students are SHS students.
2. Some Quezonians are God-fearing people.
3. All teachers are the person who needs internet connection.
4. No TVL students are academic students.
5. No great leaders are arrogant people.

Remember: Subject and predicate terms need to be expressed as classes of things (nouns or noun phrases).

Nature of Terms in Categorical Syllogisms

A **syllogism** is a deductive argument in which a conclusion is inferred from two premises.

A **categorical syllogism** is an argument consisting of exactly three categorical propositions (two premises and a conclusion) in which there appears a total of exactly three categorical terms, each of which is used exactly twice.

Terms of the Categorical Syllogism

1. **Major term** is the predicate of the conclusion.
2. **Minor term** is the subject term of the conclusion.
3. **Middle term** is the term that appears in both premises but not in the conclusion.

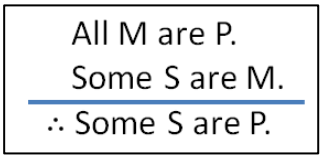
Parts of the Categorical Syllogism

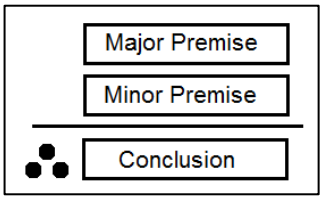
1. **Major premise** contains the major term.
2. **Minor premise** contains the minor term.

A standard form categorical syllogism fulfils all of the following criteria:

1. All three statements are standard-form categorical propositions.
2. The two occurrences of each term are identical.
3. Each term is used in the same sense throughout the argument.
4. The major premise is listed first, the minor premise second, and the conclusion, last.

Arguments in ordinary language may be offered in a different arrangement. But just like categorical propositions, categorical syllogisms need to be written in standard form. Remember that the validity of a categorical syllogism depends solely upon its logical form. Throughout this module, we let S represent the subject of the conclusion (minor term), P the predicate of the conclusion (major term), and M the middle term.





Example 5. Express the categorical syllogism below in the standard form.

All cookery students are HE students and all HE students are TVL students.
So, all cookery students are TVL students.

Solution.

Step 1: Identify the conclusion then label the subject with **S** and the predicate with **P**. Because of the word "so", the conclusion is the last statement.

S P
All Cookery students are TVL students.
Minor Term (subject of the conclusion)
Major Term (predicate of the conclusion)

Focus on the predicate(TVL students), this is also the major term.

Step 2: Identify the major and the minor premise. The **major premise** contains the **major term** while the minor premise contains the minor term.

S M
All Cookery students are HE students . Minor Premise
M Middle Term P
All HE students are TVL students. Major Premise
S P
Therefore, All Cookery students are TVL students.
Minor Term (subject of the conclusion)
Major Term (predicate of the conclusion)

Step 3: Arrange the premises in the correct order. Major premise first followed by minor premise and then conclusion.

M Middle Term P
All HE students are TVL students. Major Premise
S M
All Cookery students are HE students . Minor Premise
S P
Therefore, All Cookery students are TVL students.
Minor Term (subject of the conclusion)
Major Term (predicate of the conclusion)

All HE students are TVL students.
All Cookery students are HE students .
∴ All Cookery students are TVL students.

The **mood** of a categorical syllogism is a series of three letters corresponding to the type of proposition the major premise, the minor premise and the conclusion. It also refers to the arrangement of the premises according to quantity (universal or particular) and quality (affirmative or negative). It consists of the letter names of the propositions that make it up.

Four Basic Types of Categorical Propositions:

Proposition	Letter name	Quantity	Quality
All S are P.	A	universal	affirmative
No S are P.	E	universal	negative
Some S are P.	I	particular	affirmative
Some S are not P.	O	particular	negative

Example 6: Determine the mood of the categorical syllogism: Some creative thinkers are SHS students. All SHS students are honest. Therefore, some creative thinkers are honest.

Solution.

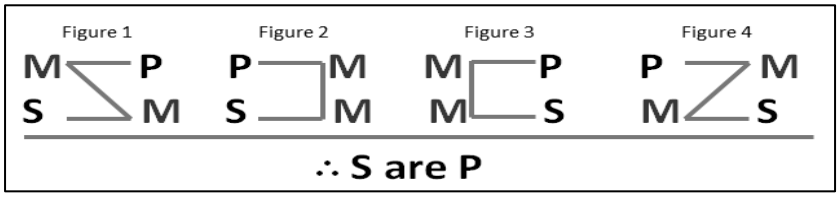
First, write the categorical syllogism in standard form.

M P
All SHS students are honest students.
S M
Some creative thinker students are SHS students.
S P
∴ Some creative thinker students are honest students.

Premises	Type of Categorical Proposition	Mood
All M are P.	universal affirmative	(A)
Some S are M.	particular affirmative	(I)
∴ Some S are P.	particular affirmative	(I)

Therefore, the mood of the given categorical syllogism is **AII.**

The **figure** of a categorical syllogism is determinedby the location of the two occurrences of the **middle term** in the premises. Four different arrangements are possible shown as follows:



Example 7: Determine which figure falls in the categorical syllogism in the previous example.

Premises	Mood	Figure
All M are P.	(A)	M P
Some S are M.	(I)	S M
∴ Some S are P.	(I)	

Therefore, the categorical syllogism is in the **figure 1**. Particularly, it is in the form **AII-1.**

Since there are 4 figures and 64 moods, there are 4 x 64 = 256 forms of categorical syllogisms. Only 15 are unconditionally valid and 9 are conditionally valid forms.

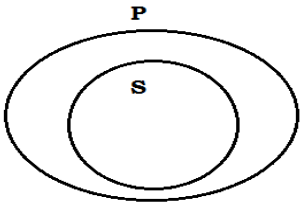
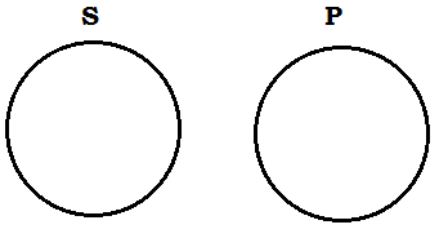
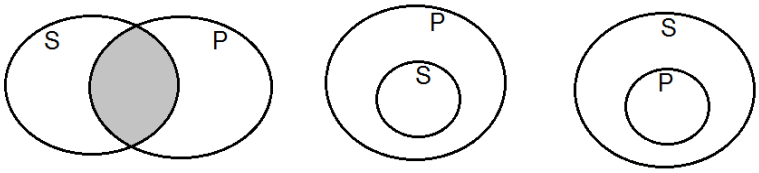
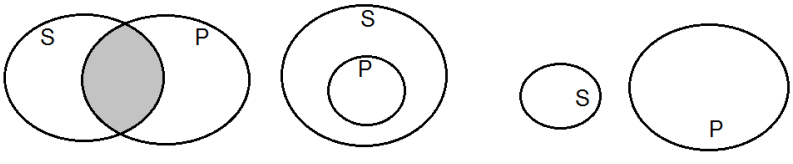
UNCONDITIONALLY VALID FORMS (Valid for both Boolean and Aristotelian standpoints)			
Figure 1	Figure 2	Figure 3	Figure 4
AAA	EAE	IAI	AEE
EAE	AEE	AII	IAI
AII	EIO	OAO	EIO
EIO	AOO	EIO	

CONDITIONALLY VALID FORMS (Valid for Aristotelian standpoint only under certain condition)				Required condition
AAI	AEO		AEO	S exists
EAO	EAO			
		AAI	EAO	M exists
		EAO		
			AAI	P exists

Once the mood and figure of a syllogism are known, the validity of the syllogism can be determined by checking the mood and figure against a list of valid syllogistic forms above. For instance, the categorical syllogism in the form AOO-2 is unconditionally valid while EAO-3 is conditionally valid.

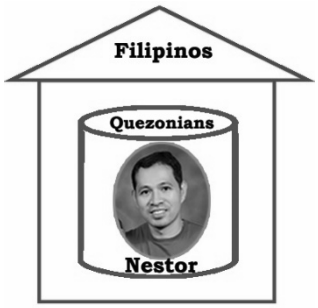
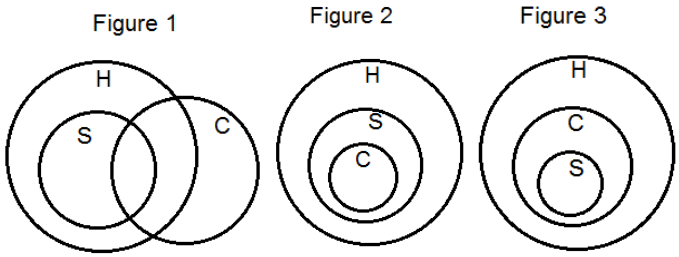
Determining the Validity of Categorical Syllogisms Using Euler's Diagram

Euler's Diagram can also be used to determine the validity of categorical syllogism. Consider the Euler's Circles and representation of the four propositions.

Proposition	Pictorial representation
(A) All S are P	
(E) No S are P	
(I) Some S are P	Some S are not P or All S are P or All P are S 
(O) Some S are not P	Some S are P or All P are S or No S are P 

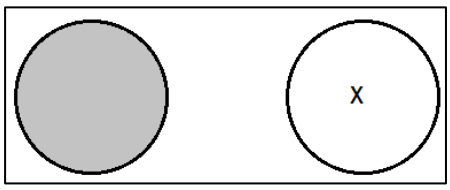
Example 8: Determine the validity of the categorical syllogisms below using the Euler's diagram.

Solution:

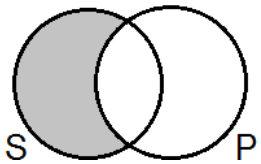
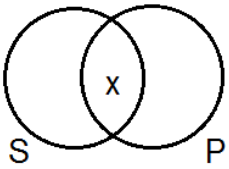
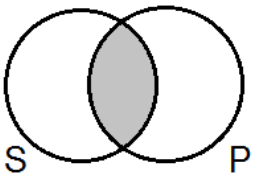
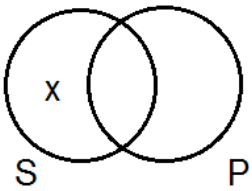
Given: All Quezonians are Filipinos. Nestor is a Quezonian. Therefore, Nestor is a Filipino. *Solution:*  An argument is valid if it is impossible for the conclusion to be false given that the premises are true while it is invalid if it is possible for the conclusion to be false given that the premises are true. Therefore, the given categorical syllogism is **VALID.**	*Given:* All SHS students are honest. Some creative thinkers are SHS students. Therefore some creative thinkers are honest. *Solution:* Let S=SHS students' class, H=honest people's class and C=creative thinker people's class then we will have the following Euler's diagram:  In the three figures, the conclusion "some creative thinkers are honest" is TRUE. Therefore, we have shown that the given categorical syllogism is **VALID.**

Determining the Validity of Categorical Syllogisms Using Venn Diagram

Venn diagram uses different ways of illustrating propositions from Euler's diagram. Both methods require a little practice before it can be done with the facility. John Venn used two overlapping circles to represent the relationship between two classes.

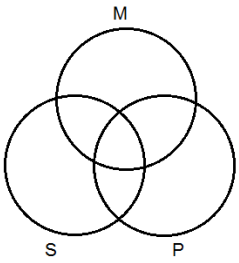


The shaded portion represents a class that has no members. It is empty and cannot hold a value. The circle with an "x" signifies that the class has at least one member.

Use **shading** in diagramming *universal* propositions.	Put an arbitrary x in diagramming particular propositions to denote the possible position of an element.
A All S are P 	**I** Some S are P 
E No S are P 	**O** Some S are Not P 

Here is the three-step procedure to assess the validity of categorical syllogisms using Venn diagram:

1. Draw three interlocking circles and label them with S, P and M to represent the minor, major, and middle terms of the syllogism respectively.



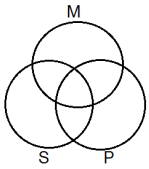
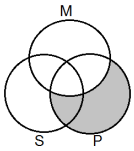
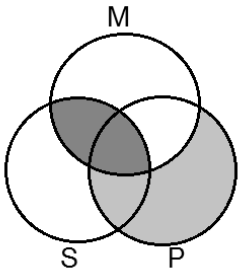
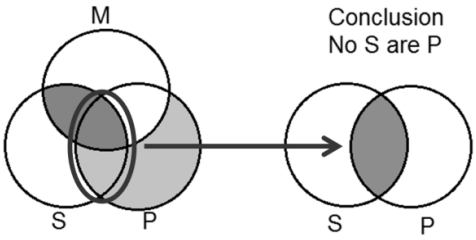
2. Draw the diagram to represent each of the two premises but not the conclusion. *Remember:*

   - Diagram the premises, just as you would when you diagrammed the premises alone.
   - If an argument has universal and particular premises, draw the universal premise first.
   - Use an X to indicate “at least one”, and place it on the line between two areas if it isn’t clear which side of the line it should be.
   - When diagramming two universal premises, make the lines go opposite directions when filling in the circle (makes it easier for your reader to "see" each premise)

3. After diagramming the premises, see if the conclusion is consistent with the drawing. If it is, the syllogism is valid. If not, the syllogism is invalid.

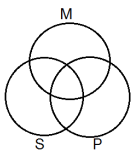
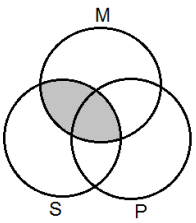
Example 9. Determine the validity of the following using Venn Diagram

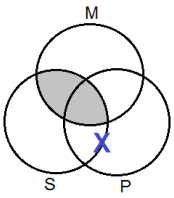
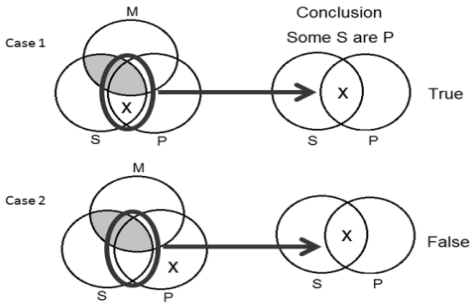
All P are M.
No S are M.
∴No S are P.

Step 1. Draw three interlocking circles and label them with S, P and M to represent the minor, major, and middle terms of the syllogism respectively  	**Step 2.1.** Draw the diagram to represent each of the two premises but not the conclusion. Since both premises are universal, you may draw either of the two first.  In this case, All P are M was drawn.
Step 2.2. Draw the other premise.  No S are M.	**Step 3.** After diagramming the premises, see if the conclusion is consistent with the drawing. If it is, the syllogism is valid. If not, the syllogism is invalid.  As you can see, the intersection between S and P is shaded. It means that the conclusion No S is P is true. Hence, the categorical syllogism is **VALID.**

Example 10. Determine the validity of the following using Venn Diagram

Some P are not M.
No M are S.
∴Some S are P.

Step 1. Draw three interlocking circles and label them with S, P and M to represent the minor, major, and middle terms of the syllogism respectively.  	**Step 2.1.** Draw the diagram to represent each of the two premises but not the conclusion. Draw the universal premise first.  No M are S.

Step 2.2. Draw the other premise.  Some P are not M. Put an X on the curve line between two areas as shown above. This is to denote that an element can be in either areas.	**Step 3.** After diagramming the premises, see if the conclusion is consistent with the drawing.  The above illustrations show that the conclusion could be true or could be false. Therefore, the syllogism is **INVALID.**

Example 11: Determine the validity of the categorical syllogism:

Some creative thinkers are SHS students.
<u>All SHS students are honest.</u>
Therefore, some creative thinkers are honest.

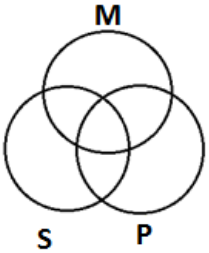
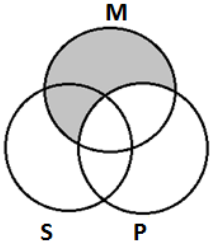
Solution. Write the categorical syllogism in the standard form.

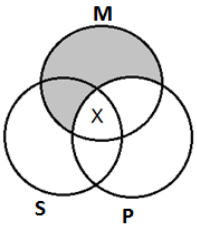
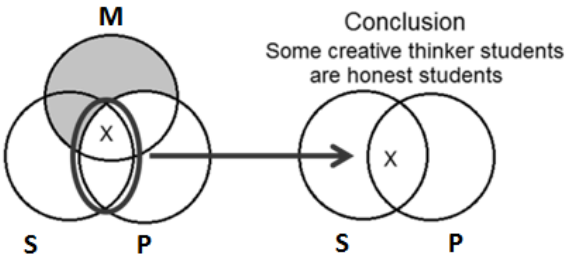
All SHS students are honest students.
<u>Some creative thinker students are SHS students</u>.
∴ Some creative thinker students are honest students.

Assign a letter to each class.

M **P**
All SHS students are honest students.
S **M**
Some creative thinker students are SHS students.
S **P**
∴ Some creative thinker students are honest students.

Draw the Venn diagram of the standard categorical syllogism.

Step 1. Draw three interlocking circles and label them with S, P and M to represent the minor, major, and middle terms of the syllogism, respectively.  	**Step 2.1.** Draw the diagram to represent each of the two premises but not the conclusion. Draw the universal premise first.  All SHS students are honest students

Step 2.2. Draw the other premise.  Some creative thinker students are SHS students. Place an X on the respective unshaded area as shown above.	**Step 3.** After diagramming the premises, see if the conclusion is consistent with the drawing. If it is, the syllogism is valid. If not, the syllogism is invalid.  The illustration above shows that the conclusion is true. Therefore, the categorical syllogism is **VALID.**

Determining the Validity of Categorical Syllogism Using Set of Rules

The method of Venn and Euler's diagram maybe check against the set of rules. The syllogism is invalid if any one of these rules is violated. Accordingly, a specific formal fallacy is committed.

Rule 1: There should be three terms in the syllogism each of which is used in the same sense.
Fallacy: *Fallacy of four terms*
Example: God is love, love is blind therefore God is blind.

Rule 2: The middle term must be distributed in at least one premise. (At least one of the middle terms must be universal.)
Fallacy: *Undistributed middle.*
Example: All teachers are human beings. All gentlemen are human beings.
Therefore, all teachers are gentlemen.

Rule 3: If a term is distributed in the conclusion, then it must be distributed in a premise. (The major and the minor terms should only be universal in the conclusion if they are universal in the premises.)
Fallacy: *Illicit major and Illicit minor.*
Example: All teachers are human beings. Some gentlemen are not teachers.
Therefore, some gentlemen are not human beings.

Rule 4: No conclusion drawn from two negative premises. Likewise, If the premises are affirmative, then the conclusion must be affirmative.
Fallacy: *Exclusive premises*
Example: No teachers are gentlemen. Some Humans are not teachers. Therefore, Some gentlemen are not humans.

Rule 5: If one premise is affirmative and the other is negative, then the conclusion must be negative.

Fallacy: *Drawing an affirmative conclusion from a negative premise, or drawing a negative conclusion from an affirmative premise*

Example: Some students are kind. Some students are not brave. Therefore, some kind students are brave.

Rule 6: If both premises are universal, the conclusion cannot be particular. Also there is no conclusion that can be from two particular premises.
One premise at least must be universal and if one premise is particular, then the conclusion must be particular.

Fallacy: *Existential fallacy*

Example: No teachers are gentlemen. All human beings are gentlemen. Therefore, some human beings are not teachers.

What's More

Activity 1.1

Write the following categorical proposition in standard form

1. Filipinos are Asians.
2. A reptile is cold-blooded.
3. Many SHS students are with honors.
4. Most introverts aren't optimistic.
5. All successful people are not cheaters.

Activity 1.2

Determine the validity of the following categorical syllogisms using the Venn diagram.

1. All M are P.
   Some S are M
   ∴Some S are P.

2. No P are M.
   Some S are M.
   ∴Some S are not P.

3. Some M are not P.
   All M are S.
   ∴Some S are not P.

4. Some P are M.
   All M are S.
   ∴No S are P.

5. All P are M.
   No M are S.
   ∴No S are P.

Activity 1.3

Identify the terms, mood and figure then determine its validity by looking at the table of valid categorical syllogisms. Write your answer in the table and use the format given below:

Kinds of term	Term	Mood	Figure	Validity
Major term				
Minor term				
Middle term				

1. Some of the wastes collected in factories are radioactive. No wastes collected in factories are dumped into the ocean. Therefore, some radioactive wastes are dumped into the ocean.

2. All pliers are tools and all screwdrivers are tools. Therefore, all pliers are screwdrivers.

3. All contagious diseases should be subject to mandatory testing. COVID-19 is contagious. Therefore, testing for COVID-19 should be mandatory.

4. All working students have no laptops and all successful students are persons who have laptops. Thus, all working students are successful students.

5. All sea vessels that sunk are unsafe vessels. All well-maintained vessels are safe vessels. Therefore, no vessels that sunk are well-maintained.

Activity 1.4

Reconstruct the syllogistic forms from the following combinations of mood and figure.

1. **OAE**-3
2. **AII**-3
3. **AOO**-2
4. **AAA**-1
5. **OEI**-3
6. **EIA**-4
7. **IAE**-1
8. **EAO**-4
9. **EAO**-2
10. **OEA**-4

Activity 1.5

Determine the validity of the following categorical syllogisms using any method.

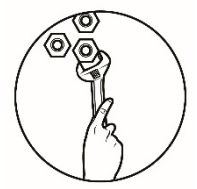
1. All educational games should be encouraged. Not all games are educational games. Therefore, not all games should be encouraged.
2. All leaders are good communicators. All good communicator people are creative. Therefore, all creative people are leaders.
3. All good students show love for country. Some students who show love for country are respectful. Therefore, all respectful students are good students.

4. All prisms are plane figures. All cubes are prisms. Therefore, all cubes are plane figures.
5. No Quezonians are lazy. Most lazy people have low income. Therefore, no Quezonians have low income.

What I Have Learned

A. Please read the sentences carefully and fill in the missing word/s by writing your answer on the line/s provided.

1. A _____ is a proposition that relates two classes or categories.
2. A _____ is a deductive argument in which a conclusion is inferred from two premises.
3. A _____ is an argument consisting of exactly three categorical propositions (two premises and a conclusion) in which there appear a total of exactly three categorical terms, each of which is used exactly twice.
4. The _____of a categorical proposition is either universal or particular
5. The _____of a categorical proposition is either affirmative or negative
6. Terms of the Categorical Syllogism
   a. _____is the predicate of the conclusion.
   b. _____is the subject term of the conclusion.
   c. _____is the term that appears in both premises but not in the conclusion.
7. Parts of the Categorical Syllogism
   a. _____contains the major term.
   b. _____contains the minor term.
8. The _____of a categorical syllogism consists of the letter names of the propositions that make it up. Moods are defined as the arrangement of the premises according to quantity (universal or particular) and quality (affirmative or negative). In other words, we can say that mood is determined by the type of standard form categorical propositions of the syllogism contains.
9. The _____of a categorical syllogism is determined by the location of the two occurrences of the middle term in the premises. Four different arrangements are possible. If we let *S* represent the subject of the conclusion (minor term), *P* the predicate of the conclusion (major term), and *M* the middle term, and leave out the quantifiers and copulas, the four possible arrangements may be illustrated as follows:
10. Since there are 4 figures and 64 moods, there are _____categorical syllogisms. Only _____are unconditionally valid and _____are conditionally valid forms.

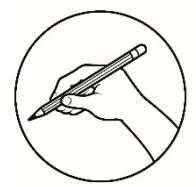


What I Can Do

A. Construct your own syllogisms that satisfy the following conditions:

Major term		Minor term	Middle term	Form
1	TVL students	Good performing students	ACP club members	AAA-3
2	fathers	Married people	Drivers	IAI-3
3	SMAW students	Students who are good in history subject	Students who know the pen name of Jose Rizal	EIO-4
4	Transmissible diseases	Airborne diseases	Contagious diseases	AAA-1
5	Students who achieved career goals	Students who cheat	Students who expelled from college	EII-1

1. An **AII**-3categorical syllogism with these terms: *major:* creative people; *minor:* brave people; *middle:* musicians.
2. An unconditionally valid syllogism in the first figure with a universal negative conclusion and these terms: *major: Academic students*; *minor: ICT students*; *middle: TVL students*.
3. An unconditionally valid syllogism in the fourth figure having two universal premises and these terms: *major:* Filipinos; *minor: selfish*; *middle:* hospitable.
4. A valid syllogism having mood **AOO** and these terms: *major: entrepreneurs*; *minor: risk-taker people*; *middle:* persistent people.
5. A valid syllogism in the first figure having a particular negative conclusion and these terms: *major: SHS subjects*; *minor: fun and challenging* subjects; *middle: research subjects*



Assessment

Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. It is the predicate term of the conclusion.
   a. major term
   b. major premise
   c. minor term
   d. minor premise

2. It is a proposition that relates two classes or categories.
   a. categorical proposition
   b. conjunctive proposition
   c. c. hypothetical proposition
   d. d. logical proposition

3. The copula in the categorical proposition "All STEM students are students with scientific attitude" is
   a. all
   b. are
   c. STEM
   d. scientific

4. Determine the quality of the categorical proposition: Some teachers are not Math teachers.
   a. affirmative
   b. b. particular
   c. c. negative
   d. d. universal

5. If we will change the categorical proposition, "All successful people are not lazy" in standard form, which of the following is the correct proposition?
   a. All *S* are *P*.
   b. b. No *S* are *P*.
   c. c. Some *S* are *P*.
   d. d. Some *S* are not *P*.

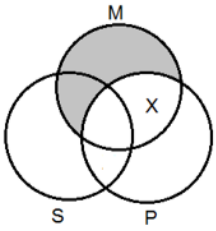
6. How many standard forms of categorical syllogisms are unconditionally valid?
   a. 256
   b. 24
   c. 15
   d. 9

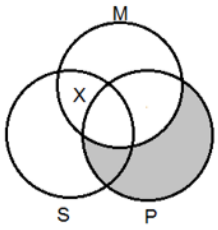
For number 7-8, refer to the given categorical syllogism below:

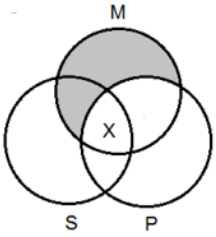
All M are P. Some M are S. Therefore, some S are P.

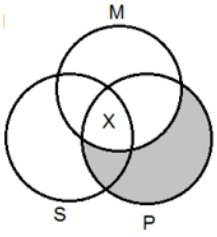
7. Determine the form of the given standard categorical syllogism
   a. IIE-3
   b. AII-3
   c. IOO-1
   d. EII-1

8. Which is the correct diagram of the standard categorical syllogism?

a. 

b. 

c. 

d. 

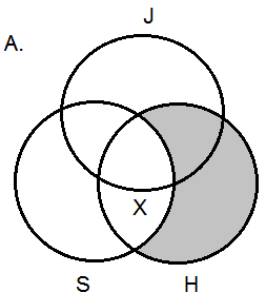
9. Which of the following letter name is used as symbol for universal negative categorical syllogism?
   a. A
   b. E
   c. I
   d. O

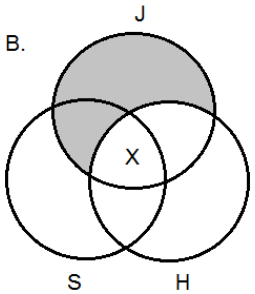
For numbers 10-11, refer to the given categorical syllogism below:

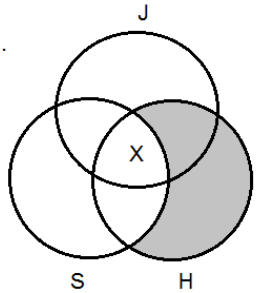
Some jokes are stupid. All jokes are hilarious. Therefore, some stupid things are hilarious.

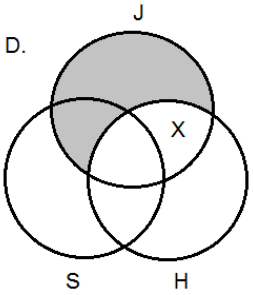
10. Which is the major term in the given categorical syllogism?
    a. jokes
    b. hilarious things
    c. stupid things
    d. stupid jokes

11. Which is the correct diagram of the standard categorical syllogism?

A. 

B. 

C. 

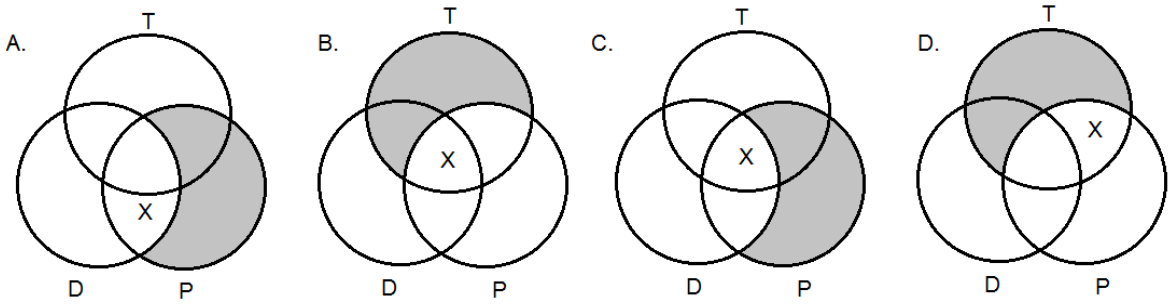
D. 

For number 12-13, refer to the given categorical syllogism below:

Some dedicated people are teachers. All teachers are public servants. Therefore, some dedicated people are public servants.

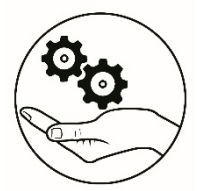
12. What is the minor premise of the given categorical syllogism?
    a. All teachers are public servants.
    b. Some dedicated people are teachers.
    c. All public servants are dedicated people.
    d. Some dedicated people are public servants.

13. Which is the correct diagram of the given categorical syllogism?



14. Determine the form of the categorical syllogism:
    All competent teachers are experienced teachers.
    Some competent teachers are efficient teachers.
    Therefore, some experienced teachers are not efficient teachers.
    a. AII-1
    b. b. AIO-2
    c. c. IAO-3
    d. d. IAI-4

15. Which of the following categorical syllogisms is INVALID?
    a. All M are P. Some M are S. Therefore, some S are P.
    b. Some jokes are stupid. All jokes are hilarious.
       Therefore, some stupid things are hilarious.
    c. Some dedicated people are teachers. All teachers are public servants.
       Therefore, some dedicated people are public servants.
    d. All competent teachers are experienced teachers.
       Some competent teachers are efficient teachers.
       Therefore, some experienced teachers are not efficient teachers.



Additional Activities

I. For each of the following syllogisms, complete the following steps:

A. Put the syllogism into standard form, symbolizing all the statements appropriately (use S to indicate the minor term, P the major term, and M the middle term)
B. Identify the mood and figure of the syllogism.
C. Draw a Venn diagram representing the syllogism, making sure to label the circles.
D. Determine whether the argument is valid or invalid, based on the diagram.

1. Some proposed researches are expensive study, because all experimental researches are expensive study, and some proposed researches are experimental studies.

2. All island municipalities are home of peace-loving people. Some peace-loving people municipalities are 5th class municipalities. Therefore, some 5thclass municipalities are island municipalities

3. All STEM students are honest. All honest students are persons genuinely interested in others. Therefore, some persons genuinely interested in others are STEM students.

II. Write the conclusion to make the following premises valid. If no conclusion can be validly drawn, write "no conclusion."

1. Some *M* are *P*.
   All *M* are *S*.

2. No *M* are *P*.
   Some *S* are *M*.

3. Some *P* are *M*.
   No *S* are *M*.

4. All *P* are *M*.
   No *M* are *S*.

5. No *P* are *M*.
   Some *M* are *S*.

Answer Key

What I have Learned
1. categorical proposition
2. syllogism
3. categorical syllogism
4. Quantity
5. Quality
6. Major term, Minor term, Middle term
7. Major premise, Minor premise
8. Mood
9. Figure
10. 256, 15, 9

Activity 4
1. Some M are not P. All M are S. Therefore, no S are P.
2. All M are P. Some M are S. Therefore, some S are P.
3. All P are M. Some S are not M. Therefore, some S are not P.
4. All M are P. All S are M. Therefore, all S are P.
5. Some M are not P. No M are S. Therefore, some S are P.
6. No P are M. Some M are S. Therefore, all S are P.
7. Some M are P. All S are M. Therefore, no S are P.
8. No P are M. All M are S. Therefore, some S are not P.
9. No P are M. All S are M. Therefore, some S are not P.
10. Some P are M. No M are S. Therefore, all S are P.

What's More
Activity 2

What's New Activity 2:
What's that Prove?
1. Invalid. commits the fallacy of equivocation, because the word "love" is being used in different senses in the first two premises.
2. Valid. AEE-4.
3. Invalid. AAA-2
4. Invalid. AAA-2
5. Valid. All-1
6. Invalid. commits the fallacy of equivocation, because the word "fly" is being used in different senses in the first two premises.
7. Invalid. commits the fallacy of equivocation, because the word "heart" is being used in different senses in the first two premises.
8. Invalid. AAA-2
9. Invalid. AAA-2
10. Valid. AEE-4.

What's More
Activity 5

1. Valid. All-1
2. Invalid. AAA-4
3. Invalid. AIA-4
4. Valid. AAA-1
5. Invalid. IEE-1

What's More:
Activity 1:
1. All Filipinos are Asians.
2. All reptiles are cold-blooded animals.
3. Some SHS students are with honors students.
4. Some introverts are not optimistic people.
5. No successful people are cheaters.

What's In
Activity 1: A visit to historical place
1. Neah and Neoh
2. Neoh and Neohn
3. Neah
4. Neohn
5.Neoh
6. Nelly

What I Know	Assessment
1. c	1. a
2. a	2. a
3. c	3. b
4. c	4. c
5. b	5. b
6. b	6. c
7. d	7. b
8. a	8. c
9. d	9. b
10. c	10. b
11. c	11. b
12. b	12. b
13. a	13. b
14. b	14. c
15. b	15. d

Additional Activities:

1.1. All experimental studies are expensive studies. Some proposed researches are experimental researches. Therefore, some proposed researches are expensive studies. (All M are P. Some S are M. Therefore, some S are P.) All-1. Valid

2. All island municipalities are home of peace loving people. Some peace loving people municipalities are 5th class municipalities. Therefore, some 5th class municipalities are island municipalities. (All P are M. Some M are S. Therefore, Some S are P.). All-4. Invalid.

3. All STEM students are honest. Some honest students are genuinely interested in others. Therefore, some genuinely interested in others are STEM students. (All P are M. Some M are S. Therefore, Some S are P.). All-4. Invalid.

II. 1. Some S are P
2. Some S are not P
3. no conclusion
4. No S are P
5. Some S are not P.

What I can Do

1. All ACP club members are TVL students. All ACP club members are good performing students. Therefore, all good performing students are TVL students.
2. Some drivers are fathers. All drivers are married. Therefore, some married people are fathers.
3. No SMAW students know the pen name of Jose Rizal. Some students who knew the pen name of Jose Rizal are good in history. Therefore, some students who are good in history are not SMAW students.
4. All contagious diseases are transmissible. Airborne diseases are contagious diseases. Therefore airborne diseases are transmissible.
5. No students who expelled from college achieved their career goals. Some students who cheat are expelled from college. Therefore, Some students who cheat achieved their career goals.
6. All musicians are creative. Some musicians are brave. Therefore, some brave people are creative
7. No TVL students are academic students. All ICT students are TVL students. Therefore, No ICT students are academic students.
8. All Filipinos are hospitable. No hospitable people are selfish. Therefore, no selfish people are Filipinos.
9. All entrepreneurs are persistent. Some risk-taker people are not persistent. Therefore, some risk-taker people are not entrepreneurs.
10. All research subjects are SHS subjects. Some fun and challenging subjects are research subjects. Therefore, some fun and challenging subjects are SHS subjects.

What's More Activity 3

	Kinds of Terms	terms	Mood	Figure	Validity
1	Major term	Wastes that are dumped into the ocean	EII	3	Invalid
	Minor term	Radioactive wastes			
	Middle term	Wastes collected in factories			
2	Major term	Screwdrivers	AAA	2	Invalid
	Minor term	Pliers			
	Middle term	tools			
3	Major term	Diseases subject to mandatory testing	AAA	1	Valid
	Minor term	All diseases identical to COVID-19			
	Middle term	Contagious diseases			
4	Major term	Successful students	AEA	2	Invalid
	Minor term	Working students			
	Middle term	Students who have laptops			
5	Major term	Well-maintained vessels	EAE	2	Valid
	Minor term	Vessels that sunk			
	Middle term	Safe vessels			

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