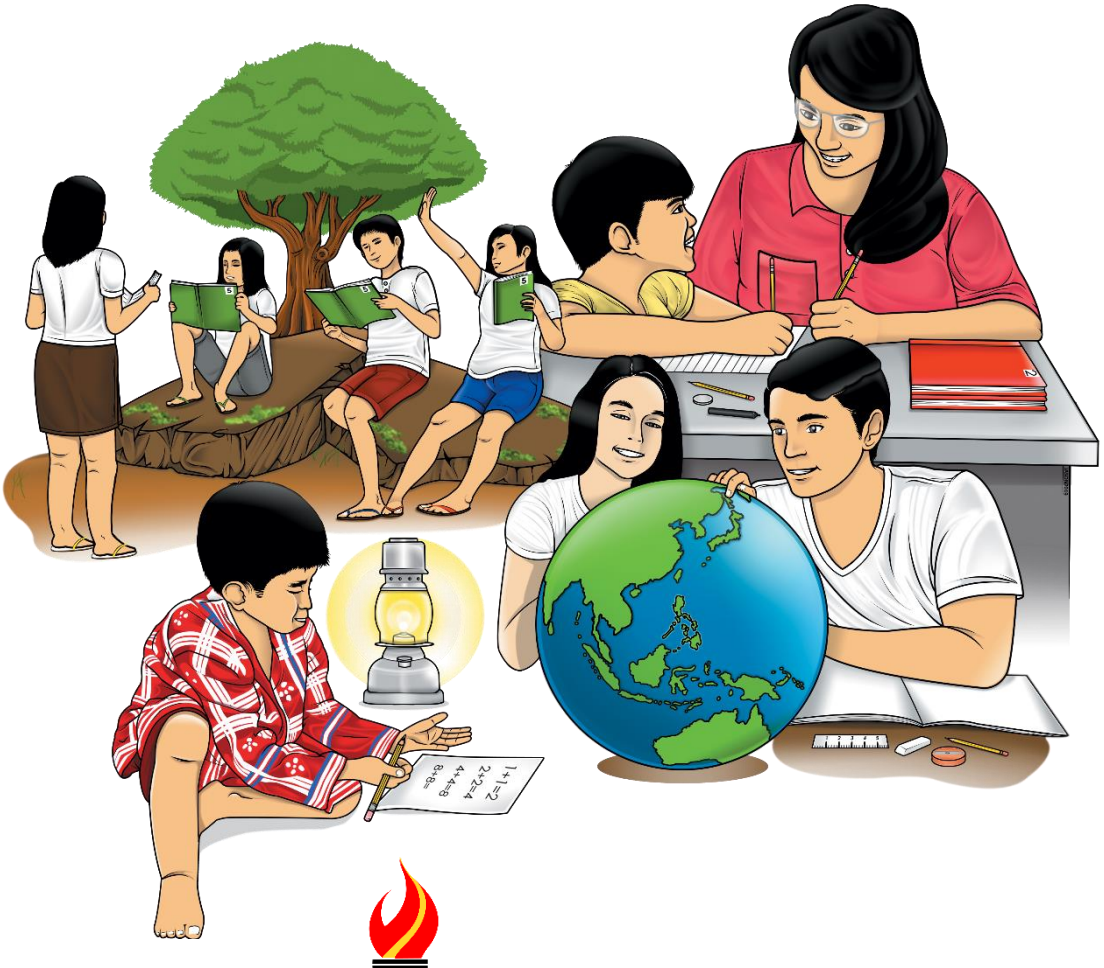
Senior High School

DepED
DEPARTMENT OF EDUCATION

General Mathematics

Quarter 2 – Module 20:
Valid Arguments and Fallacies



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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

This module was designed and written with you in mind. It is here to help you master logical equivalence and conditional propositions. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

After going through this module, you are expected to:

1. establish the validity and falsity of real-life arguments using logical propositions, syllogisms, and fallacies;
2. determine the rules of inferences and fallacies that apply to the given arguments; and
3. manifest cautiousness in accepting issues and principles in life.

What I Know

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

1. What refers to the set of propositions formed by premises supporting the conculsion?
    a. argument
    b. tautology
    c. fallacy
    d. inference

2. How do you call p_1 and p_2 in the propositional form $(p_1 \wedge p_2) \rightarrow q$?
    a. tautology
    b. fallacy
    c. premise
    d. conclusion

3. How do you call q in the propositional form $(p_1 \wedge p_2) \rightarrow q$?
    a. conclusion
    b. premise
    c. fallacy
    d. tautology

4. What is true about a valid argument?
    a. It is a premise.
    b. It is a conclusion.
    c. It is a fallacy.
    d. It is a tautology.

5. Which of the following is a rule of inference?
    a. Affirming the Disjunct
    b. Modus Tollens
    c. Improper Transposition
    d. Denying a Conjunct

6. Which of the following is true with the argument, "If you are a STEM student, then you have Basic Calculus subject. You are a STEM student. Hence, you have Basic Calculus subject."?
    a. It is a fallacy by Fallacy of the Converse.
    b. Is is a fallacy by Denying a Conjunct.
    c. It is valid by Rule of Disjunctive Syllogism.
    d. It is valid by Modus Ponens.

7. Which of the following propositional forms supports the argument in item number 6?
    a. $[(p \vee q) \wedge (\sim p)] \rightarrow q$
    b. $[(p \rightarrow q) \wedge p] \rightarrow q$
    c. $[(p \rightarrow q) \wedge q] \rightarrow p$
    d. $[\sim(p \wedge q) \wedge (\sim p)] \rightarrow q$

8. Which of the following is true with the argument, "If I have higher allowance, then I can buy my needs and wants. Therefore, if I can buy my needs and wants, then I have higher allowance."?
    a. It is a fallacy by Improper Transposition.
    b. Is is a fallacy by Fallacy of the Consequent.
    c. It is valid by Rule of Proof by Cases.
    d. It is valid by Rule of Addition.

9. Which of the following propositional forms supports the argument in item number 8?
    a. $(p \rightarrow q) \rightarrow (q \rightarrow p)$
    b. $(p \rightarrow q) \rightarrow [(\sim p) \rightarrow (\sim q)]$
    c. $p \rightarrow (p \vee q)$
    d. $[(p \rightarrow r) \wedge (q \rightarrow r)] \rightarrow [(p \vee q) \rightarrow r]$

10. Which of the following is true with the argument, "If it rains, then Rhea is not going to the party. Rhea is not going to the party. Therefore, it rains."?
    a. It is valid by Modus Tollens.
    b. It is valid by Rule of Simplification.
    c. It is a fallacy by Fallacy of the Consequent.
    d. It is a fallacy by Fallacy of the Converse.

11. Which of the following propositional forms supports the argument in item number 10?
    a. $(p \wedge q) \rightarrow p$
    b. $[(p \rightarrow q) \wedge (\sim q) \rightarrow (\sim p)$
    c. $[(p \rightarrow q) \wedge q] \rightarrow p$
    d. $(p \rightarrow q) \rightarrow (q \rightarrow p)$

12. Which of the following is true with the argument, "Azel does not eat deep fried and junk foods. Azel does not eat deep fried foods. Thus, she eats junk foods."?
    a. It is valid by Law of Syllogism.
    b. It is valid by Rule of Disjunctive Syllogism.
    c. It is a fallacy by Denying a Conjunct.
    d. It is a fallacy by Affirming the Disjunct.

13. Which of the following propositional forms supports the argument in item number 12?
    a. $[(p \vee q) \wedge (\sim p)] \rightarrow q$
    b. $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$
    c. $[(p \vee q) \wedge p] \rightarrow (\sim q)$
    d. $[\sim(p \wedge q) \wedge (\sim p)] \rightarrow q$

14. Which of the following is true with the argument, "Featured delicacy at Rod and Baby's Online Pasalubong Store is either the best seller or the most affordable. This month's featured delicacy is the best seller. It follows that this delicacy is not the most affordable."?
    a. It is a fallacy by Affirming the Disjunct.
    b. It is a fallacy by Fallacy of the Inverse.
    c. It is valid by Rule of Simplification.
    d. It is valid by Rule of Contradiction.

15. Which of the following propositional forms supports the argument in item number 14?
    a. $[(p \vee q) \wedge p] \rightarrow (\sim q)$
    b. $[(p \rightarrow q) \wedge (\sim p)] \rightarrow (\sim q)$
    c. $(p \wedge q) \rightarrow p$
    d. $[(\sim p) \rightarrow \phi] \rightarrow p$

Lesson 1

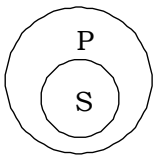
Valid Arguments and Fallacies

"All butterflies love flowers. Concon loves flowers. Concon is a butterfly." Do they make sense? Are they interconnected? Given three ideas, you infer the agreement or disagreement between the first two ideas based on their agreement or disagreement with the third idea. So, do you agree that Concon is a butterfly? Well, take a look again at your previous lesson.

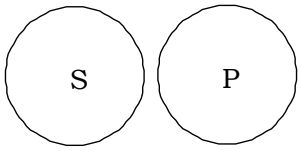
What's In

Activity 1

Indicate the correct categorical proposition for each of the following.



(1)



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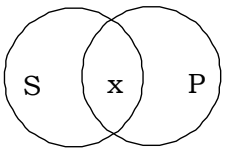

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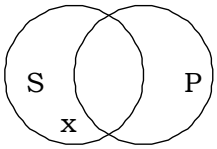


(4)

A categorical proposition expresses the relationship between two categories or sets. In better understanding the relationship between and among the sets in the propositions, we make use of Venn diagrams as in the figures above. In naming the said figures, let us recall the four standard categorical propositions. For (1) we have, All S are P. Then for (2), No S are P. Some S are P is represented by x in (3), whereas x in (4) represents Some S are not P.

All and no are universal quantifiers referring to every element of a set. Some, on the other hand, is an existential qualifier pertaining to at least one element of the set.

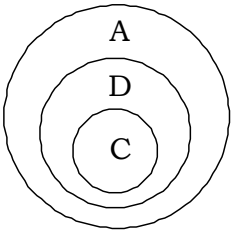
You have learned in your previous lesson that a syllogism is a deductive argument consisting of two premises and one conclusion. And a syllogism formed by categorical propositions only, is called as a categorical syllogism. To determine its validity, the Venn diagram is used.

Consider the following:

"All above 18 years of age can have a driver's license. Christian has a driver's license. Thus, Christian is above 18 years of age."

Is this valid?

Let A = set of people who are above 18 years of age



D = set of those who can have a driver's license

C = set containing a single element which is Christian

Premise 1 becomes all D are A. Premise 2 becomes all C are D. Therefore, all C are A. It can be verified that this argument is valid through the Venn diagram on the left.

Notes to the Teacher

Lead students in understanding the concept of Venn Diagram. This will make them better understand categorical syllogism.

What's New

Activity 2

Consider the compound propositions (1) and (2) below, given that:

hypothesis *p*: I was able to buy *suman* at Infanta's agri-booth.

conclusion *q*: I was in Lucena City during the Niyogyugan Festival.

(1) If I was able to buy *suman* at Infanta's agri-booth, then I was in Lucena City during the Niyogyugan Festival. I was able to buy *suman* at Infanta's agri-booth. Therefore, I was in Lucena City during the Niyogyugan Festival.

(2) If I was able to buy *suman* at Infanta's agri-booth, then I was in Lucena City during the Niyogyugan Festival. I was in Lucena City during the Niyogyugan Festival. Therefore, I was able to buy *suman* at Infanta's agri-booth.

Questions:

1. How would you write the first compound proposition in propositional form?
2. How would you write the second compound proposition in propositional form?
3. What similarities and differences have you observed between the two forms?
4. Which do you think is acceptable between the two? Why do you say so?

Niyogyugan Festival is held annually during August in Lucena City, the capital of Quezon Province. All municipalities in the province gather around the Quezon Provincial Capitol located in Lucena City, and put up their respective agri-booth featuring and selling their own local products. It is also held online especially during the pandemic. Nevertheless, it continues to display the creativity and resourcefulness of Quezonians. It includes virtual trade fairs and shopping featuring various local products in the province.

In the given above, the first compound proposition is expressed as $[(p \to q) \wedge p] \to q$, while the second one's propositional form is $[(p \to q) \wedge q] \to p$.

The two both involve conditionals and conjunction. Their hypotheses are almost the same, both with $p \to q$ as part of conjunctions. However, some parts of the conjunctions vary. That is, (1) contains p; while (2) has q. Also, the conclusions are different. (1) includes q, whereas (2) involves p.

Going back to the two compound propositions stated above, considering that both state that $p \to q$, then it is an acceptable idea that being able to buy *suman* at Infanta's agri-booth, basically means that you are in Lucena City during the Niyogyugan Festival. Now, compound proposition (1) states that I was able to buy *suman* at Infanta's agri-booth, then it is only right to say that I was in Lucena City witnessing the festival at that time.

However, (2) states that I was in Lucena City when the festival happened. Does it follow that I was able to witness it? Or does it mean that I got to see all the agri-booth? How if even I saw Infanta's booth, I was not able to buy *suman* because the booth run out of it due to its high demand among festival-goers? Following the established idea involving $p \to q$, being in Lucena City during the festival does not necessarily mean that I was able to buy *suman*. Hence, the compound proposition (1) is more acceptable.

What is It

An **argument** is a set of propositions formed by premises supporting the conclusion. It can be written in the propositional form $(p_1 \wedge p_2 \wedge \ldots \wedge p_n) \to q$ or in standard form:

$$\begin{array}{l} p_1 \\ p_2 \\ \vdots \\ p_n \\ \hline \therefore q \end{array}$$

$p_1, p_2, \ldots, p_n$ are the premises of the **argument**, while q is the **conclusion**.

Example 1: Let us consider arguments *G* and *G'* represented by the compound propositions in the previous activity where:

p: I was able to buy *suman* at Infanta's agri-booth.

q: I was in Lucena City during the Niyogyugan Festival.

G	$p \to q$	If I was able to buy *suman* at Infanta's agri-booth, then I was in Lucena City during the Niyogyugan Festival.	G'	$p \to q$	If I was able to buy *suman* at Infanta's agri-booth, then I was in Lucena City during the Niyogyugan Festival.
	p	I was able to buy *suman* at Infanta's agri-booth.		q	I was in Lucena City during the Niyogyugan Festival.
	$\therefore q$	Therefore, I was in Lucena City during the Niyogyugan Festival.		$\therefore p$	Therefore, I was able to buy *suman* at Infanta's agri-booth.

Which is valid between the two given arguments?

Solution:

For an argument to be **valid** when the premises are true, the conclusion must be true as well. In argument *G*, the premises are $p \to q$ and p, and the conclusion is q. It can be seen in the truth table that it is possible that when the premises $p \to q$ and p are both true, the conclusion q is true. Hence argument G is a valid argument. On the other hand, for argument *G'*, when the premises $p \to q$ and q are both true, it is possible to get a false conclusion. Hence *G'* is not a valid argument.

Moreover, an argument is valid if conditional $(p_1 \wedge p_2 \wedge \ldots \wedge p_n) \to q$ is a tautology.

$\boldsymbol{p}$	$\boldsymbol{q}$	$\boldsymbol{p \to q}$	$\boldsymbol{(p \to q) \wedge p}$	$\boldsymbol{[(p \to q) \wedge p] \to q}$	$\boldsymbol{(p \to q) \wedge q}$	$\boldsymbol{[(p \to q) \wedge q] \to p}$
T	T	T	T	T	T	T
T	F	F	F	T	F	T
F	T	T	F	T	T	F
F	F	T	F	T	F	T

Since $[(p \to q) \wedge q] \to p$ is not a tautology, then it is not a valid argument. And since $[(p \to q) \wedge p] \to q$ is a tautology, then the argument is valid. This is known as Modus Ponens (or Rule of Detachment). Yet being valid does not guarantee that the conclusions are true. Instead, the validity of an argument implies that the conclusion logically follows the premises.

Rules of Inference

Let $p, q,$ and r be propositions.

Rules of Inference	Propositional Form	Standard Form
Rule of Simplification	$(p \wedge q) \rightarrow p$	$\begin{array}{l} p \wedge q \\ \hline \therefore \quad p \end{array}$
Rule of Addition	$p \rightarrow (p \vee q)$	$\begin{array}{l} p \\ \hline \therefore p \vee q \end{array}$
Rule of Conjunction	$(p \wedge q) \rightarrow (p \wedge q)$	$\begin{array}{l} p \\ q \\ \hline \therefore p \wedge q \end{array}$
Modus Ponens	$[(p \rightarrow q) \wedge p] \rightarrow q$	$\begin{array}{l} p \rightarrow q \\ p \\ \hline q \end{array}$
Modus Tollens	$[(p \rightarrow q) \wedge (\sim q)] \rightarrow (\sim p)$	$\begin{array}{l} p \rightarrow q \\ \sim q \\ \hline \therefore \quad \sim p \end{array}$
Law of Syllogism	$[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$	$\begin{array}{l} p \rightarrow q \\ q \rightarrow r \\ \hline \therefore p \rightarrow r \end{array}$
Rule of Disjunctive Syllogism	$[(p \vee q) \wedge (\sim p)] \rightarrow q$	$\begin{array}{l} p \vee q \\ \sim p \\ \hline \therefore \quad q \end{array}$
Rule of Contradiction	$[(\sim p) \rightarrow \phi] \rightarrow p$	$\begin{array}{l} (\sim p) \rightarrow \phi \\ \hline \therefore \quad p \end{array}$
Rule of Proof by Cases	$[(p \rightarrow r) \wedge (q \rightarrow r)] \rightarrow [(p \vee q) \rightarrow r]$	$\begin{array}{l} p \rightarrow r \\ q \rightarrow r \\ \hline \therefore (p \vee q) \rightarrow r \end{array}$

Example 2: Determine which rule is manifested in this argument.

Buko pie and *yema* cake are well-known delicacies in Quezon Province.
Therefore, *buko* pie is a well-known delicacy in Quezon Province.

Solution:

Let p: "*Buko* pie is a well-known delicacy in Quezon Province."
q: "*Yema* cake is a well-known delicacy in Quezon Province."

Then the argument is in the form $(p \wedge q) \rightarrow p$ or $\begin{array}{l} p \wedge q \\ \hline \therefore \quad p \end{array}$. This is a valid argument by the Rule of Simplification.

On the other hand, an argument that is not valid is called a **fallacy**. Hence in a fallacy, the premises may be true, while the conclusion is false. In a truth table, we call such set as a counterexample. Consequently, the conditional $(p_1 \wedge p_2 \wedge \ldots \wedge p_n) \rightarrow q$ is not a tautology. For instance, argument G' is a fallacy as can be seen in the first truth table presented in this lesson. In standard form it is

$$\begin{array}{l} p \rightarrow q \\ q \\ \hline \therefore \quad p \end{array}$$

This argument is a fallacy of the converse.

Common Fallacies in Logic

Let $p, q,$ and r be propositions.

Common Fallacies in Logic	Propositional Form	Standard Form
Fallacy of the Converse	$[(p \to q) \wedge q] \to p$	$\begin{array}{l} p \to q \\ q \\ \therefore \overline{\quad p \quad} \end{array}$
Fallacy of the Inverse	$[(p \to q) \wedge (\sim p)] \to (\sim q)$	$\begin{array}{l} p \to q \\ \sim p \\ \therefore \overline{\quad \sim q \quad} \end{array}$
Affirming the Disjunct	$[(p \vee q) \wedge p] \to (\sim q)$	$\begin{array}{l} p \vee q \\ p \\ \therefore \overline{\quad \sim q \quad} \end{array}$
Fallacy of the Consequent	$(p \to q) \to (q \to p)$	$\begin{array}{l} p \to q \\ \therefore \overline{q \to p} \end{array}$
Denying a Conjunct	$[\sim(p \wedge q) \wedge (\sim p)] \to q$	$\begin{array}{l} \sim(p \wedge q) \\ \sim p \\ \therefore \overline{\quad q \quad} \end{array}$
Improper Transposition	$(p \to q) \to [(\sim p) \to (\sim q)]$	$\begin{array}{l} p \to q \\ \therefore \overline{(\sim p) \to (\sim q)} \end{array}$

Example 3: Determine which fallacy is manifested in this argument.

If Neth cooks, then she has something to eat.
Therefore, if Neth has something to eat, then she cooked.

Solution:

Let p: "Neth cooks."
q: "Neth has something to eat."

In propositional and standard forms, the argument is expressed as $(p \to q) \to (q \to p)$ and $\begin{array}{l} p \to q \\ \therefore \overline{q \to p} \end{array}$, respectively. This is a Fallacy of the Consequent.

Example 4: Determine whether the given is a valid argument or a fallacy, by identifying the rule manifested in this argument.

If you study hard, then you will get high scores in summative assessments. If you get scores in summative assessments, then you will receive high grades. Therefore, if you study hard, then you will receive high grades.

Solution:

Let p: "You study hard."
q: "You get high scores in summative assessments."
r: "You receive high grades."

In propositional and standard forms, the argument is expressed as $[(p \to q) \wedge (q \to r)] \to (p \to r)$ and $\begin{array}{l} p \to q \\ q \to r \\ \therefore \overline{p \to r} \end{array}$, respectively.

Therefore, by the Law of Syllogism, the argument is valid.

What's More

Activity 1.1

Write the propositional form for each item. Decide whether each of the following arguments is valid or not. If it is valid, identify the rule of inference justifying the validity. If not, write the type of fallacy used.

Propositional Form	Rule of Inference/ Type of Fallacy	Argument
_____	_____	1. Fruits are sources of vitamins. Therefore, fruits or vegetables are sources of vitamins.
_____	_____	2. If the motorcycle does not have gasoline, then it will not run. The motorcycle did not run. Therefore, it had no gasoline.
_____	_____	3. Regan does not speak French and German. Regan does not speak French. Therefore, he speaks German.
_____	_____	4. On my birthday, I plan to have a party or to plant a tree. I did not have a party on my birthday. Therefore, I planted a tree, instead.
_____	_____	5. If I patronize my country's own products, then I will prefer eating Filipino delicacies. I do not prefer eating Filipino delicacies. Therefore, I do not patronize my country's own products.

Activity 1.2

1. Given the following propositions, construct the required argument using Rule of Proof by Cases as a rule of inference.
   p: There is a city ordinance not allowing the use of items made from plastic.
   q: Plastic-free items are beneficial to health.
   r: I will encourage others to use eco-friendly products.
2. Given the propositions below, construct the required argument using Fallacy of Inverse as a fallacy in logic.
   p: It rains.
   q: Rhea will use her umbrella.

What I Have Learned

Fill in the blanks with the correct words or phrases to complete the following statements.

1. An argument is
   _____
   _____

2. A valid argument is
   _____
   _____

3. An argument is not valid when
   _____
   _____

4. Rules of Inferences are used to
   _____
   _____

5. Common Fallacies in Logic are used to
   _____
   _____

6. Five of the nine rules of inferences are
   _____
   _____

7. Three of the five common fallacies are
   _____
   _____

What I Can Do

You have learned when an argument can be considered as valid or just a fallacy. But it must also be noted that though valid, an argument can either be sound or bad. Hence, we must be very careful in believing and in accepting issues or principles in life. Now, suppose you are from a poor family and one day you happen to pass by a note saying, "If you were born poor, then you have no better future ahead of you." You know you are poor. So does it mean you have no chance to have a bright future? The next question you asked yourself was, "Is this valid?" If so, "Is it a sound or a bad argument?" Share your sentiments about this.

Try scoring your essay using the rubric below.

Criteria	**4**	**3**	**2**	**1**
Idea (score x 3)	Very relative to the topic and well-organized	Somewhat relative to the topic and organized	Less relative to the topic and poorly organized	Not relative to the topic and very poorly organized
Spelling, Grammar, and Punctuations (score x 2)	No spelling, punctuation or grammatical errors	Very few spelling, punctuation, and grammatical errors	Several spelling, punctuation, and grammatical errors	Many spelling, punctuation, and grammatical errors

Assessment

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

1. What is true about an argument?
    a. It is always valid.
    b. It can never be a fallacy.
    c. It is formed by a conclusion supporting the premises.
    d. It is formed by premises supporting the conclusion.

For item numbers 2 to 5, refer to the argument, "If you exercise daily, then you have higher chance to become healthy. You exercise daily. Therefore, you have higher chance to become healthy."

2. How would you represent the first premise?
    a. $q \rightarrow p$
    b. $p \rightarrow q$
    c. p
    d. q

3. How would you represent the second premise?
    a. q
    b. p
    c. $p \wedge q$
    d. $p \vee q$

4. How would you represent the conclusion?
    a. $p \wedge q$
    b. $p \vee q$
    c. q
    d. p

5. Which of the following is true with the given argument?
    a. It is valid by Modus Ponens.
    b. It is valid by Modus Tollens.
    c. It is a fallacy by Improper Transposition.
    d. It is a fallacy by Denying a Conjunct.

6. Which of the following is true with the argument, “If the weather is fair, then there are visible stars at night. There are no visible stars at night. Therefore, the weather is not fair.”?
    a. It is a fallacy by Fallacy of the Consequent.
    b. It is a fallacy by Affirming the Disjunct.
    c. It is valid by Modus Tollens.
    d. It is valid by Modus Ponens.

7. Which of the following propositional forms supports the argument in item number 6?
    a. $[(p \vee q) \wedge p] \rightarrow (\sim q)$
    b. $(p \rightarrow q) \rightarrow (q \rightarrow p)$
    c. $[(p \rightarrow q) \wedge p] \rightarrow q$
    d. $[(p \rightarrow q) \wedge (\sim q) \rightarrow (\sim p)$

8. Which of the following is true with the argument, “If the weather is fair, then there are visible stars at night. There are visible stars at night. Therefore, the weather is fair.”?
    a. It is valid by Modus Tollens.
    b. It is valid by Modus Ponens.
    c. It is a fallacy by Fallacy of the Converse.
    d. It is a fallacy by Improper Transposition.

9. Which of the following propositional forms supports the argument in item number 8?
    a. $(p \rightarrow q) \rightarrow [(\sim p) \rightarrow (\sim q)]$
    b. $[(p \rightarrow q) \wedge q] \rightarrow p$
    c. $[(p \rightarrow q) \wedge p] \rightarrow q$
    d. $[(p \rightarrow q) \wedge (\sim q) \rightarrow (\sim p)$

10. Which of the following is true with the argument, “If you make it a habit to do good, then you eventually possess a happy heart. If you possess a happy heart, then your body and soul become healthier. Hence, if you make it a habit to do good, then your body and soul become healthier.”?
    a. It is a fallacy by Affirming a Disjunct.
    b. It is a fallacy by Denying a Conjunct.
    c. It is valid by Rule of Contradiction.
    d. It is valid by Law of Syllogism.

11. Which of the following propositional forms supports the argument in item number 10?
    a. $[\sim(p \wedge q) \wedge (\sim p)] \rightarrow q$
    b. $[(p \vee q) \wedge p] \rightarrow (\sim q)$
    c. $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$
    d. $[(\sim p) \rightarrow \phi] \rightarrow p$

12. Which of the following is true with the argument, "If you exercise regularly, then your blood pressure becomes manageable. Your blood pressure becomes manageable. Therefore, you exercise regularly."?
    a. It is a fallacy by Fallacy of the Converse.
    b. It is a fallacy by Fallacy of the Inverse.
    c. It is valid by Rule of Addition.
    d. It is valid by Rule of Simplification.

13. Which of the following propositional forms supports the argument in item number 12?
    a. $(p \wedge q) \rightarrow p$
    b. $p \rightarrow (p \vee q)$
    c. $[(p \rightarrow q) \wedge (\sim p)] \rightarrow (\sim q)$
    d. $[(p \rightarrow q) \wedge q] \rightarrow p$

14. Which of the following is true with the argument, "If you are a licensed teacher, then you are a professional. You are not a licensed teacher. Therefore, you are not a professional."?
    a. It is a fallacy by Fallacy of the Inverse.
    b. It is a fallacy by Fallacy of the Converse.
    c. It is valid by Modus Tollens.
    d. It is valid by Modus Ponens.

15. Which of the following propositional forms supports the argument in item number 14?
    a. $[(p \rightarrow q) \wedge (\sim p)] \rightarrow (\sim q)$
    b. $[(p \rightarrow q) \wedge q] \rightarrow p$
    c. $[(p \rightarrow q) \wedge (\sim q) \rightarrow (\sim p)$
    d. $[(p \rightarrow q) \wedge p] \rightarrow q$

Additional Activities

A. Construct a valid argument justified by Rule of Proof by Cases.

B. Construct an invalid argument using Improper Transposition.

Answer Key

What I Know

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

What's More

Activity 1.1

1. $p \rightarrow (p \vee p)$ — Rule of Addition
2. $[(p \rightarrow p) \wedge p] \rightarrow p$ — Fallacy of the Converse
3. $[\sim(p \wedge p) \wedge (\sim p)] \rightarrow p$ — Denying a Conjunct
4. $[(p \vee p) \wedge (\sim p)] \rightarrow p$ — Rule of Disjunctive Syllogism
5. $[(p \rightarrow p) \wedge (\sim p) \rightarrow (\sim p)$ — Modus Tollens

Activity 1.2

1. If there is a City Ordinance not allowing the use of items made from plastic, then I will encourage others to use eco-friendly products. If plastic-free items are beneficial to health, then I will encourage others to use eco-friendly products. Therefore, if there is a City Ordinance not allowing the use of items made from plastic or if plastic-free items are beneficial to health, then I will encourage others to use eco-friendly products.
2. If it rains, then Rhea will use her umbrella. It does not rain. Therefore, Rhea will not use her umbrella.

Assessment

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

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