Senior High School

DepED
DEPARTMENT OF EDUCATION

General Mathematics

Quarter 2 – Module 15:
Logical Operators

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ADM

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General Mathematics – Senior High School
Alternative Delivery Mode
Quarter 2 – Module 15: Logical Operators
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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

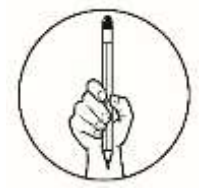
In this module, you will know the different operations involved in propositions, especially in compound propositions. You will learn how to perform each of these operations. Moreover, this will provide you guidance on the symbols of these operations, their verbal equivalents, and how they are applied in the real world.

The module is composed of one lesson, namely:

- Lesson 1 – Logical Operators

After going through this module, you are expected to:

1. define the logical operators: negation, conjunction, disjunction, condition, and biconditional;
2. distinguish the logical operator used in a proposition; and
3. perform different types of operations on propositions.



What I Know

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

1. Which is not a logical operator?
    a. conditional
    b. biconditional
    c. negation
    d. binegation

2. Which of the following is not a logical connector?
    a. or
    b. can
    c. if-then
    d. and

3. It is a proposition that can be broken down into more than one proposition.
    a. simple proposition
    b. compound proposition
    c. connective proposition
    d. logical proposition

4. Which logical operator uses the connector “or”?
    a. negation
    b. conjunction
    c. disjunction
    d. conditional

5. Which denotes disjunction?
    a. $p \vee q$
    b. $p \wedge q$
    c. $\sim p$
    d. $p \leftrightarrow q$

For numbers 6 to 10, choose the logical operator used in each given proposition.

6. If a finite won’t fathom the Infinite, then faith must prevail.
    a. biconditional
    b. conditional
    c. conjunction
    d. negation

7. Outer beauty does not suggest inner beauty.
    a. biconditional
    b. conditional
    c. disjunction
    d. negation

8. Healthy Zade is either a vegan or an organic consumer.
    a. biconditional
    b. conditional
    c. conjunction
    d. disjunction

9. Not everyone will love you the way I did.
    a. conditional
    b. conjunction
    c. disjunction
    d. negation

10. One has peace of mind if and only if there is contentment.
    a. biconditional
    b. conditional
    c. disjunction
    d. negation

For numbers 11 to 15, consider the following propositions:

x: A silent prayer can be heard through a storm.
y: It is a clean heart that counts in prayer.
z: God who is far more than lightyears away listens.

11. Which is the symbol for the proposition "A silent prayer cannot be heard through a storm"?
    a. $\wedge x$
    b. $\sim x \rightarrow x$
    c. $\sim x$
    d. $\vee x$

12. Which is the symbol for the proposition "If it is a clean heart that counts in prayer, then God who is far more than lightyears away listens"?
    a. $\sim z \vee y$
    b. $y \wedge z$
    c. $y \rightarrow z$
    d. $z \leftrightarrow \sim y$

13. Which is the symbol for "Either a silent prayer can be heard through a storm or God who is far more than lightyears away listens"?
    a. $(x \wedge \sim) \leftrightarrow z$
    b. $x \rightarrow \sim z$
    c. $x \wedge \sim z$
    d. $x \vee \sim z$

14. Which is the verbal form of $\sim y \wedge \sim z$?
    a. It is a clean heart that counts in prayer and God who is far more than lightyears away listens.
    b. It is a clean heart that counts in prayer or God who is far more than lightyears away listens.
    c. It is not a clean heart that counts in prayer and God who is far more than lightyears away does not listen.
    d. It is not a clean heart that counts in prayer or God who is far more than lightyears away does not listen.

15. Which is the verbal form of $(z \wedge x) \leftrightarrow y$?
    a. God who is far more than lightyears away listens or a silent prayer can be heard through a storm if and only if it is a clean heart that counts in prayer.
    b. God who is far more than lightyears away listens and silent prayer can be heard through a storm if and only if it is a clean heart that counts in prayer.
    c. If God who is far more than lightyears away listens and silent prayer can be heard through a storm, then it is a clean heart that counts in prayer.
    d. If God who is far more than lightyears away listens or a silent prayer can be heard through a storm, then it is a clean heart that counts in prayer.

Lesson 1 Logical Operators

Just like operations with integers, fractions, rational expressions, polynomials, exponential functions, and the many other types of functions, there are operations involved in propositions. That is what this module is all about. With knowledge on propositions, you are now ready to understand the logical operators, their symbols, and corresponding verbal equivalents. Ultimately, you will learn how to perform the operations on propositions. Enjoy performing operations on nonnumerical symbols!

What's In

For each sentence below, identify the conjunction/s used.

_____1. It is not true that a good deed will give a bad result.
_____2. A happy heart is a medicine and a sorrowful spirit weakens the bones.
_____3. Apartheid is only a thing of the past if and only if dark colored people are treated the same way as with fair colored race.
_____4. Every person sides with God or one willingly chooses evil.
_____5. If bullying introduces a not so good background of the bully, then a psychosocial intervention should be designed for these bullies.
_____6. One can serve a master at a time, yet, nobody can serve two masters simultaneously.
_____7. Working hard pays off and the satisfaction it gives is priceless.
_____8. It is a good deed to love friends but, it is divine to love enemies.
_____9. A wise person cherishes advices and a fool despises corrections.
_____10. If sharing inspirational stories relaxes a tired spirit, then keep telling such.

What's New

Complete the paragraph by changing the underlined letter with the appropriate logical connector, then write the letter that corresponds to the correct logical connector on the blanks next page.

Hey, dear student! I know you. Either you are enrolled in a private school A you are studying in a public school. I bet, it does U matter. If you are in a private school, E you should make the most of the available resources you have. In like manner, T you are in a public school, then you should value the big benefit of enjoying access to quality education for free. Victory knows no place, Y any individual can be successful. A person has to look at the brighter side B one can grow wherever he/she is planted. Truly, God is fair.

____ ____ ____ ____ ____ ____

and then or not if if and only if

Did the message sink in? I hope so. Mind you, that will do you good dear learner. Now, you are very ready to learn a new lesson.

What is It

Logical Operators Enumerated

Let us consider logical connectors we join with propositions. In this part, we shall deal with logical operators.
Logical operators include negation, conjunction, disjunction, conditional, and biconditional. The definition of each of the logical operators with the aid of a truth table and truth values are shown below

Negation Defined

The **Negation** of a proposition p is denoted by $\sim p$ which is read as "not p", and is defined through its truth table

p	$\sim p$
T	F
F	T

Example 1
State the negation of each of the following propositions.
n_1: Quality determines the price.
n_2: A learned is one who is educated.
n_3: $f(x) = x^2$ is a cubic function.
n_4: An obtuse angle measures 180^o.
n_5: A curve is the shortest distance between two points.

Solution:

$\sim n_1$: It is not true that quality determines the price or $\sim n_1$: Quality does not determine the price.
$\sim n_2$: A learned is not one who is educated.
$\sim n_3$: $f(x) = x^2$ is not a cubic function or $\sim n_3$: It is not true that f(x) = x^2 is a cubic function.
$\sim n_4$: An obtuse angle does not measure or $\sim n_4$: It is not true that an obtuse angle measures 180^o.
$\sim n_5$: A curve is not the shortest distance between two points.

Conjunction Defined

Another logical operator is the **Conjunction** of the propositions p and q which is denoted by $p \wedge q$ and is read as "p and q". It is defined through its truth table

p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

Proposition p and proposition q are called **Conjuncts**. The conjunction $p \wedge q$ is true only when both conjuncts p and q are true.

Example 2

Let d and e be propositions.

d: Leniency is long-suffering.
e: Those who misunderstand it abuse it.

Express the conjunctions below in verbal sentences or in symbols.

1. $d \wedge e$
2. $\sim d \wedge e$
3. "Leniency is long-suffering and it is not true that those who misunderstand it abuse it."
4. "Leniency is not long-suffering and those who misunderstand it do not abuse it."

Solution:

1. Leniency is long-suffering and those who misunderstand it abuse it.
2. Leniency is not long-suffering and those who misunderstand it abuse it.
3. $d \wedge (\sim e)$
4. $\sim d \wedge (\sim e)$

Example 3

Let r, s and t be propositions.

r: There is a profit in physical exercise.
s: It is best to exercise holiness.
t: A person must be holistically fit.

Express the conjunctions below in verbal sentences or in symbols.

1. There is a profit in physical exercise and it is best to exercise holiness.
2. There is no profit in physical exercise and a person must be holistically fit.
3. $r \wedge \sim t$
4. $\sim r \wedge s$

Solution:

1. $r \wedge s$
2. $\sim r \wedge t$
3. There is a profit in physical exercise and it is not true that a person must be holistically fit.
4. There is no profit in physical exercise and it is best to exercise holiness.

Disjunction Defined

Negation and conjunction do not suffice logic. There are logical statements that connote the disjunction of propositions. The **Disjunction** of propositions p and q is denoted by $p \vee q$ which read as "*p or q*", and defined through its truth table

p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

Propositions p and q are each called **Disjunct**. The disjunction $p \vee q$ is false only when both disjuncts p and q are false.

Example 4

Let t, u and y be propositions.

t: He is an old soul.
u: Old songs soothe his ears.
y: Old fashion is inviting to his eyes.

Express the disjunctions below in verbal sentences or in symbols.

1. $u \vee y$
2. $(\sim t \wedge (\sim u)) \vee y$
3. "Either he is an old soul or old songs soothe his ears and old fashion is inviting to his eyes."
4. "He is not an old soul and either old fashion is not inviting to his eyes or old songs soothe his ears."

Solution:

1. Old songs soothe his ears or old fashion is inviting to his eyes.
2. Either he is not an old soul and old songs do not soothe his ears or old fashion is inviting to his eyes.
3. $t \vee (u \wedge y)$
4. $\sim t \wedge (\sim y \vee u)$

Example 5

Let j, k, l and m be propositions.

j: Laughter is the best medicine.
k: Grief causes illness.
l: Prayer relieves pain.
m: God takes charge of worries.

Express the disjunctions below in verbal sentences or in symbols.

1. It is either God takes charge of worries and laughter is the best medicine or prayer relieves pain.
2. Laughter is not the best medicine and God takes charge of worries or prayer relieves pain.
3. $j \vee l$
4. $(j \wedge k) \vee (l \wedge m)$
5. $(\sim k \wedge \sim j) \vee (l \wedge m)$

Solution:

1. $(m \wedge j) \vee l$
2. $\sim j \wedge m \vee l$
3. Laughter is the best medicine or prayer relieves pain.
4. It is either laughter is the best medicine and grief causes illness or prayer relieves pain and God takes charge of worries.
5. Either grief does not cause illness and laughter is not the best medicine or prayer relieves pain and God takes charge of worries.

Conditional Defined

Example 6

Let x, y and z be propositions.

x: Dioxins are found almost everywhere.
y: Plastics, bleached paper, and most commodities contain the chemical dioxin.
z: Dioxins are a culprit to many diseases.

Express the conditionals below in verbal sentences or in symbols, as the case may be.

1. $x \rightarrow z$
2. $(\sim y) \rightarrow (\sim x \wedge \sim z)$
3. "If dioxins are a culprit to many diseases, then they are found almost everywhere and plastics, bleached paper, and most commodities contain this chemical."
4. "If dioxins are not found almost everywhere, then it is not true that either plastics, bleached paper, and most commodities contain the chemical dioxin, or dioxins are a culprit to many diseases."

Solution:

1. If dioxins are found almost everywhere, then they are a culprit to many diseases.
2. If plastics, bleached paper, and most commodities do not contain the chemical dioxin, then it is not true that dioxins are found almost everywhere and it is not true that dioxins are a culprit to many diseases.
3. $z \rightarrow (x \wedge y)$
4. $(\sim x) \rightarrow \sim(y \vee z)$

Example 7

Let f, g, and h be propositions.

f: Parabens are harmful to the body.
g: Parabens are found in many products we use.
h: Parabens can affect health.

Express the conditionals below in verbal sentences or in symbols, as the case may be.

1. $f \rightarrow h$
2. $(\sim g \wedge \sim f) \rightarrow (\sim h)$
3. If parabens are harmful to the body and are found in many products we use, then they can affect health.
4. If parabens cannot affect health or they are not found in many products we use, then they are not harmful to the body.

Solution:

1. If parabens are harmful to the body, then they can affect health.
2. If parabens are not found in many products we use and if they are not harmful to the body, then parabens cannot affect health.
3. $(f \wedge g) \rightarrow h$
4. $(\sim h \vee \sim g) \rightarrow \sim f$

Biconditional Defined

The last logical proposition that we shall consider is **Biconditional**. This is denoted by "$p \leftrightarrow q$" or "p iff q" given propositions or **Components** p and q and it is read as "p if and only f q", and defined through its truth table

p	q	$p \leftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

Example 8

Let g, h and i be propositions.

g: Only physically handicapped individuals can be called persons with disabilities.

h: Psychosocially disabled persons like those with chronic illnesses can also avail PWD ID.

i: There are numerous benefits that come along with owning a PWD ID.

j: Knowledge of the wide extent of the qualifications for PWD has yet to be spread.

Express the biconditionals below in verbal sentences or in symbols.

1. $(\sim g \leftrightarrow h) \wedge (j \rightarrow i)$
2. $(g \wedge (\sim h)) \leftrightarrow (\sim j)$
3. "Knowledge of the wide extent of the qualifications for PWD has yet to be spread if and only if not only physically handicapped individuals can be called persons with disabilities."

Solution:

1. Not only physically handicapped individuals can be called persons with disabilities if and only if psychosocially disabled persons like those with chronic illnesses can also avail PWD ID, and if knowledge on the wide extent of the qualifications for PWD has yet to be spread, then there are numerous benefits that come along with owning a PWD ID.
2. Only physically handicapped individuals can be called persons with disabilities and psychosocially disabled persons like those with chronic illnesses cannot avail PWD ID if and only if it is not true that knowledge on the wide extent of the qualifications for PWD has yet to be spread.
3. $j \leftrightarrow (\sim g)$

What's More

Activity 1.1

Let a, b, c, and d be propositions.

a: You are what you eat.
b: Your food can describe your health.
c: By nature, human is designed to eat meat.
d: A person should eat healthy food.

Express the following propositions in verbal sentences.

1. $(\sim c) \wedge (b \leftrightarrow a)$
2. $(a \vee b) \rightarrow d$
3. $\sim d \leftrightarrow (\sim a \wedge \sim b)$

Activity 1.2

Let d, e, f, and g be propositions.

d: There is wisdom in spending on needs.
e: It makes sense to think at least twice before giving in for wants.
f: A good planner saves first before spending.
g: A shopaholic should learn self-control.

Express the following propositions in symbols.

1. If a good planner saves first before spending, then there is wisdom in spending on needs and it makes sense to think at least twice before giving in for wants.

2. A shopaholic should not learn self-control if and only if a good planner does not save first before spending and it does not make sense to think at least twice before giving in for wants.

3. There is wisdom in spending on needs or a shopaholic should not learn self-control

What I Have Learned

Fill in the blanks.

1. _____ of a proposition p is a logical operator denoted by $\sim p$ which is read as "_____".

2. Biconditional is a logical operator which is denoted by "_____" or "p iff q" given propositions or components p and q and it is read as "_____".

3. The _____ of propositions p and q is denoted by $p \vee q$ which is read as "p or q". Propositions p and q are each called _____.

4. Another logical operator is conjunction of the propositions p and q which is denoted by _____. It is read as "p and q". Proposition p and proposition q are called _____.

5. The _____ of propositions p and q is denoted by _____which is read as "if p, then q" or "p implies q". Proposition p is called _____, while proposition q is called _____.

What I Can Do

Make spoken word poetry on any topic relevant to you. To be sure that it is meaty, include as many propositions with logical operators as you can. Use a separate sheet of paper for your poem.

You may improve your output by checking against the following rubric:

Criteria	**3**	**2**	**1**
Content **(score x 4)**	*The poem reflects a specific topic; all ideas are consistent and seamless*	*The poem reflects little of a specific topic; some ideas are consistent and seamless*	*The poem reflects no specific topic; very few ideas are consistent and seamless*
Structure **(score x 3)**	*All lines highlight rhythm and reflect spoken poetry; most lines include propositions with logical operators*	*Some lines highlight rhythm and reflect spoken poetry; some lines include propositions with logical operators*	*Very few lines highlight rhythm and reflect spoken poetry; very few lines include propositions with logical operators*
Language **(score x 3)**	*Uses clear, rich and detailed imaginative language*	*Uses imaginative language*	*Uses pure everyday language*

Assessment

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

1. It is a logical operator which uses the symbol "v".
   a. negation
   b. conjunction
   c. disjunction
   d. conditional

2. Which logical operator uses the connector "and"?
   a. negation
   b. conjunction
   c. disjunction
   d. conditional

3. Which denotes negation?
   a. $p \vee q$
   b. $p \wedge q$
   c. $\sim p$
   d. $p \leftrightarrow q$

4. Which denotes biconditional?
   a. $p \vee q$
   b. $p \wedge q$
   c. $\sim p$
   d. $p \leftrightarrow q$

5. Which denotes disjunction?
   a. $p \vee q$
   b. $p \wedge q$
   c. $\sim p$
   d. $p \leftrightarrow q$

For numbers 6 to 10, identify the logical operator used in each compound proposition.

6. Competence is not confidence.
   a. conditional
   b. biconditional
   c. negation
   d. conjunction

7. You should be wise as a serpent and modest as a dove.
    a. conditional
    b. disjunction
    c. negation
    d. conjunction

8. A great man either wins a game with humility or loses a game as a real man should.
    a. biconditional
    b. disjunction
    c. negation
    d. conjunction

9. If a picture paints a thousand words, then I should paint you.
    a. biconditional
    b. disjunction
    c. conditional
    d. conjunction

10. Tatay Igo will eat dairy products if and only if they are organic.
    a. biconditional
    b. disjunction
    c. conditional
    d. negation

For numbers 11 to 15, consider the following propositions:
j: A soft answer turns away wrath.
k: A harsh word stirs up anger.
l: A wise man listens before speaking.

11. Which is the symbol for the proposition "A soft answer turns away wrath and a harsh word stirs up anger"?
    a. $\sim j \vee k$
    b. $j \wedge k$
    c. $j \rightarrow k$
    d. $j \leftrightarrow \sim k$

12. Which is the symbol for the proposition "A wise man does not listen before speaking?
    a. $\wedge l$
    b. $\sim l \rightarrow l$
    c. $\sim l$
    d. $\vee l$

13. Which is the symbol for "If a soft answer turns away wrath and a harsh word stirs up anger, then a wise man listens before speaking"?
    a. $(j \wedge k) \rightarrow l$
    b. $(j \wedge k) \leftrightarrow l$
    c. $(j \vee k) \rightarrow l$
    d. $(j \vee k) \leftrightarrow l$

14. Which is the verbal statement for $\sim j \wedge \sim k$?
    a. A soft answer does not turn away wrath or a harsh word does not stir up anger.
    b. A soft answer does not turn away wrath and a harsh word does not stir up anger.
    c. A soft answer turns away wrath and a harsh word stirs up anger.
    d. If a soft answer does not turn away wrath, then a harsh word does not stir up anger.

15. Which is the verbal statement for $j \rightarrow k$?
    a. A soft answer turns away wrath or a harsh word stirs up anger.
    b. A soft answer turns away wrath and a harsh word does not stir up anger.
    c. If a soft answer turns away wrath, then a harsh word stirs up anger.
    d. A soft answer turns away wrath and a harsh word stirs up anger.

Additional Activities

Among the topics listed below, choose one and write a discussion about it. Use propositions with logical operators to surely add emphasis to important details. Use the space given to you to write your answer.

a. Combining Fractions (Addition and Subtraction of Fractions)
b. Multiplication of Fractions
c. Division of Fractions
d. Combining Integers
e. Multiplication and Division of Integers
f. Factoring
g. Simplifying Rational Expressions
h. Combining Rational Expressions
i. Multiplication of Rational Expressions
j. Division of Rational Expressions
k. Solving an Equation
l. Solving an Inequality

The following rubric will be used to rate your work:

Criteria	4	3	2	1
Content **(score x 3)**	The process is discussed completely; with at least one example; manifests an understanding of all prerequisite skills	The process is discussed completely; without example; manifests an understanding of some prerequisite skills	Major points of the process are discussed, but misconception may arise among readers; with or without example; manifests an understanding of few prerequisite skills	Major points are not discussed; with or without example; manifests an understanding of no prerequisite skill
Structure **(score x 3)**	Consistently logical; aids clear and easy understanding of the topic	Somewhat logical; somewhat aids clear or easy understanding of the topic	Inconsistent; tends to complicate an understanding of the topic	Very inconsistent; shows no understanding of the topic
Topic **(score x 2)**	Topic f, g, h, i or j	Topic k or l	Topic b, c or e	Topic a or d
Language **(score x 2)**	uses emphatic statements and appropriate logical operators for propositions	uses emphatic statements or appropriate logical operators for propositions	uses propositions with logical operators but inappropriate sometimes	Uses no logical operators

Answer Key

What I Know

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

What's More

Activity 1.1

1. By nature, human is not designed to eat meat and your food can describe your health if and only if you are what you eat.
2. If you are what you eat or your food can describe your health, then a person should eat healthy food.
3. A person should not eat healthy food if and only if you are not what you eat and your food cannot describe your health.

Activity 1.2

1. $f \rightarrow (d \wedge e)$
2. $\sim g \leftrightarrow (\sim f \wedge \sim e)$
3. $d \vee \sim g$

Assessment

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

What's In

1. Not only, but also
2. and
3. if and only if
4. or
5. if then
6. yet
7. and
8. but
9. and
10. If then

What I Have Learned

1. Negation
2. not p
3. $p \leftrightarrow q$
4. p if and only if q
5. disjunction
6. disjuncts
7. $p \wedge q$
8. conjuncts
9. conditional
10. $p \rightarrow q$
11. hypothesis
12. conclusion

References

Dimasuay, Lynie, Jeric Alcala, and Jane Palacio. *General Mathematics.* Quezon City, Philippines: C & E Publishing, Inc., 2016 .

General Mathematics Learner's Material. First Edition. 2016. p. 246-256

*DepEd Material: General Mathematics Learner's Material

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