Senior High School

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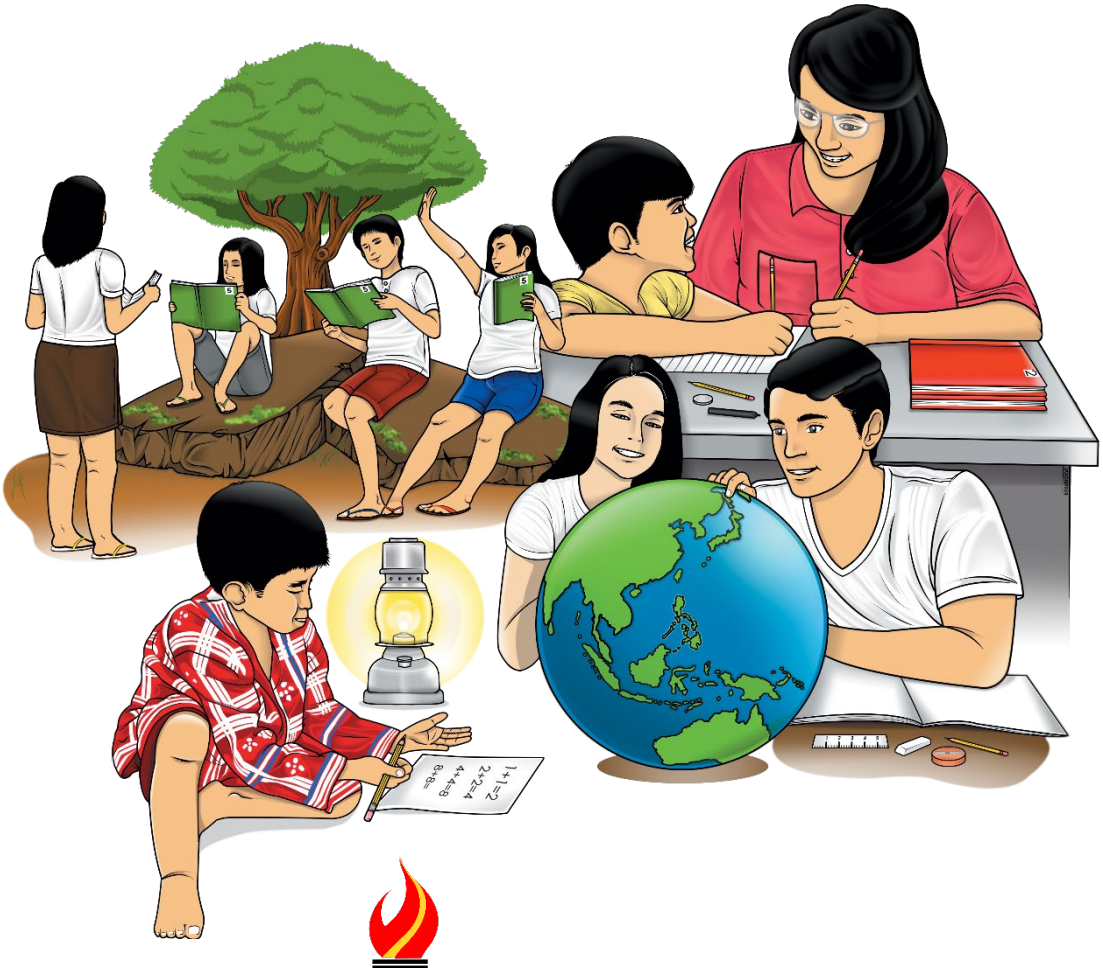
DEPARTMENT OF EDUCATION

General Mathematics

Quarter 2 – Module 13:
Propositions



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Quarter 2 – Module 13: Propositions
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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

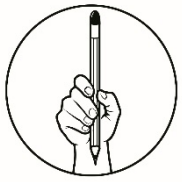
This module will help you understand the concepts of propositions. To be specific, you will learn how to illustrate a proposition as you go through its pages.

The module is composed of one lesson, namely:

- Lesson 1 – Propositions

After going through this module, you are expected to:

1. define proposition;.
2. illustrate a proposition; and
3. identify whether a sentence is a proposition or not.



What I Know

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

1. Which of the types of sentences qualifies a proposition?
    a. declarative
    b. imperative
    c. exclamatory
    d. interrogative

2. Which of the following denotes a proposition?
    a. a bold letter
    b. a small letter
    c. a capital letter
    d. an italicized letter

3. What is the truth value of a false proposition?
    a. True
    b. False
    c. Either true or false
    d. Cannot be determined

4. Which of the following shows a correct proposition?
    a. a: Rest recharges.
    b. b: Do not ever quit.
    c. c: What does failure teach?
    d. d*:* Stepping forward is a good start.

For items 5-10, identify the only proposition among the choices.

5.
    a. Alas!
    b. Come and see it.
    c. Where do you come from?
    d. It is a hot day yet it brings comfort.

6.
    a. Really?
    b. Awesome!
    c. Calm down to avoid commotion.
    d. Obedience is a good trait of a member.

7.
    a. What a bright smile!
    b. Is the laugh too loud?
    c. Brush your teeth after eating.
    d. Enamel covers the outer surface of our teeth.

8.
    a. Don't pick flowers.
    b. Does nature teach us?
    c. Try smelling a sampaguita flower.
    d. Sampaguita is our national flower and is lovely.

9.
    a. Mix them.
    b. Which hue of green do you like?
    c. You can make violet if you mix blue and red.
    d. Can you give a pair of complementary colors?

10.
    a. That is too much!
    b. Take your meds on time.
    c. Do I have to drink my medication?
    d. If one is overdosed with drugs, then the body may be harmed.

11. Which makes “I am excited!” a non-proposition?

    a. It is bias.
    b. It is nonsense.
    c. It is not declarative.
    d. It is a false statement.

12. Which makes “The capital city of the Philippines is Manila.” a proposition?
    a. It is a true statement.
    b. It is a simple sentence.
    c. It involves proper nouns.
    d. It begins with the predicate.

13. Is “Can I add soy sauce in Adobo?” a proposition?
    a. No
    b. Yes
    c. Sometimes
    d. Given is insufficient

14. Which does not make “You will get orange in a mixture of red and blue.” a proposition?

    a. It is false.
    b. It is declarative.
    c. It is a statement.
    d. It gives a command.

15. What kind of proposition is “One half is greater than ¾.”?
    a. True
    b. False
    c. Either true or false
    d. Neither true nor false

Lesson 1

Propositions

Math involves logic. There is the logic in performing mathematical operations, in playing chess, in making decisions, in communicating with peers and in many other activities that we do. Actually, we may be using the principles and concepts of logic in our daily tasks which may be unknowing to us sometimes. That is how the study of logic may be significant to us.

To commence our discussion on logic, this lesson will introduce the key concepts of propositions. In the end, learners are expected to demonstrate understanding of these concepts.

What's In

Determine what type of sentence is each of the following. On a space provided before each number, write "**D**" if it is a declarative sentence, "**E**" if exclamatory sentence, "**Im**" if imperative and, "**In**" if it is interrogative.

____ 1. Your eye is the lamp of your body.
____ 2. When did you last hug your parents?
____ 3. Admit your fault.
____ 4. Since you are what you eat, then your food can describe your health.
____ 5. Life is more than food, and the body is more than clothing.

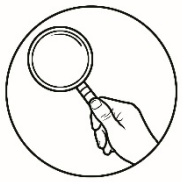
What's New

Fact or Bluff?

Before you go on, pause for a while and play this game with your family member or peer. All you have to do is to read the listed sentences. The other player will decide and tell you whether each sentence is a fact or a bluff. To make it more informative, you may search about each given topic and tell the reasons why it is a fact or a bluff.

Sentences	Answer
You are taller in the morning than in the evening.	Fact
There are more right-handed people than left-handed ones.	Fact
Sourness is a taste in the tip of the tongue.	Bluff
There are more Chinese than American.	Fact
Melatonin gives color to our skin.	Bluff

Did you both enjoy the game? Try it with somebody else.



What is It

Proposition Defined

A **Proposition** is a declarative sentence that is either true or false, but not both.
A true proposition has a truth value of "true", otherwise, its truth value is "false".
Oftentimes, a small letter is used to denote a proposition. That is, the proposition

a: It is getting clearer.

may be read as

a is the proposition "It is getting clearer.".

Moreover, a sequence of propositions may be denoted by $p_1, p_2, p_3, \ldots$

Examples

Determine if each sentence is a proposition or not. If it is, give its truth value.

a: Grounding is beneficial to a person.
b: Forgive and forget.
c: Happy birthday!
d: There is no stronger than the heart of a volunteer.

p: 3! = 6/2
q: Never mind, I am just joking.
p_1: If an individual is great, then there is a teacher behind.
p_2: Either a person saves before spending, or one spends before saving.
p_3: It is not shame to greet the utility worker the same way as with the school principal.
p_4: If a person is disabled, then he/she is entitled to obtain a PWD ID, and if a person is entitled to obtain a PWD ID, then he/she is disabled.

Solution

a: It is a declarative sentence that may either be true or false, so it is a proposition. And, since research says it's true, then its truth value is true.
b: It is an imperative sentence. Hence, it is not a proposition.
c: It is an exclamatory sentence which makes it not a proposition also.
d: It is a declarative sentence that may either be true or false. It is a proposition. Most especially in cases of front liners, this is true. Otherwise proven to be wrong, then it is false in that specific instance.
p: Translated to the verbal statement, this mathematical sentence is "three factorials is equal to six divided by two". It is a declarative sentence, so it is a proposition. Meanwhile, since 3! = 6 and 6/2 = 3, then the proposition is false.
q: It is a declarative sentence, but be cautious. Notice that the statement cannot be true nor false. If the statement is true, it cannot be because the speaker is telling a joke. If it is false, it cannot be either because the person is speaking the truth. Hence, it is not a proposition.
p_1: It is a declarative sentence that may either be correct or not. It is therefore a proposition. Every great person the world has known has a patient teacher or coach, acknowledged or not, hence the proposition is true.
p_2: It is a declarative sentence that may either be true or false which tells us that it is a proposition. It is especially true if one earns money. It may be false if there is none to spend or save.
p_3: It is a declarative sentence that is absolutely true. Thus, it is a proposition.
p_4: It is a declarative sentence which by law is true. It is a proposition.

What's More

Activity 1.1

Consider the following sentences. Write **P** if it is a proposition, and **NP** if not.

1. a: The largest continent is Asia.
2. b: Do I need to wash my hands regularly?
3. c: Occipital is the part of our brain responsible for vision so we have to be sure that it is taken care of.
4. d: Happy Birthday, Inay!
5. e: The longest bone in the body is the femur.

Activity 1.2

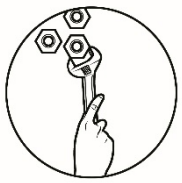
Tell whether each of the propositions below is true or false.

1. f: There are 10 years in a decade and 100 years in a century.
2. g: One of the primary colors is yellow.
3. h: Twenty-five is ¼ of a hundred.
4. i: You will get 15 when you subtract 30 from 50.
5. j: Fish is rich in protein and Vitamin D helps the body effectively absorb calcium.

What I Have Learned

Fill in the blanks.

1. A proposition is a/an _____ sentence.
2. It may either be _____ or _____, but not both.
3. It is denoted by a/an _____ letter.
4. A true proposition has a truth value of _____.
5. A false proposition has a truth value of _____.



What I Can Do

Around the globe, the human race experienced an unforgettable turning event in the year 2020. I, you and all the rest out there have in a way or another experienced the effects of the pandemic COVID-19. Write an essay or propositions about your actual experiences and your realizations in life while in this crisis.

Note the rubrics shown below which will be used in scoring your essay.

CRITERIA	**3**	**2**	**1**
Quality of writing **(score x 3)**	The essay was written in an extraordinary style; very informative and well-organized	The essay was written in an interesting style; somewhat informative and organized	The essay has no style; no novel information and not organized
Grammar, usage and mechanics **(score x 2)**	With no spelling or grammatical errors	With some spelling or grammatical errors	With many spelling or grammatical errors

Assessment

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

1. Which of the following may never describe a proposition?
    a. either true or false
    b. declarative sentence
    c. exclamatory sentence
    d. a period at the end of the proposition

2. What is the truth value of a true proposition?
    a. True
    b. False
    c. both true and false
    d. cannot be determined

3. Which of the following denotes a proposition?
    a. a bold letter
    b. a small letter
    c. a capital letter
    d. an italicized letter

4. How is the proposition "f: Time is an independent variable." correctly read?
    a. "Time is an independent variable."
    b. f means "Time is an independent variable."
    c. Proposition f "Time is an independent variable."
    d. f is the proposition "Time is an independent variable."

For items 5-10, identify the only proposition among the choices.

5.
    a. Are there 60 seconds in a minute?
    b. Has anybody seen the throne of God?
    c. Light travels 186,000 miles per second!
    d. Though God may be physically far from us, He is near when His obedient servant prays

6.
   a. Does it break your heart?
   b. Be thankful for being alive.
   c. Take courage and have a happy heart.
   d. The heart pumps blood throughout the body and it keeps us alive.

7.
   a. Don't pollute the air.
   b. The brain needs oxygen.
   c. Be grateful for the priceless air we take in.
   d. Have you thanked God for the air we breathe?

8.
   a. Good job students!
   b. Be proud of hard work.
   c. Are you a working student?
   d. When a learner studies well, opportunities knock later.

9.
   a. Be truthful.
   b. It's correct!
   c. Are you sure?
   d. It is wonderful.

10.
   a. What is your name?
   b. Good day everybody!
   c. The Philippines is located in East Asia.
   d. Can we kill the virus by just washing our hands regularly?

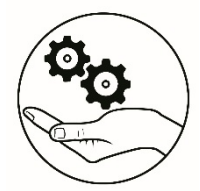
11. Which makes "Can we eat takoyaki?" not an example of a proposition?
   a. It is biased.
   b. It is nonsense.
   c. It is not declarative.
   d. It is a false statement.

12. Which makes "Leap year occurs every five years" a proposition?
   a. It involves time.
   b. It is a true statement.
   c. It is a false statement.
   d. It is a simple sentence.

13. Is “Study well!” a proposition?
    a. No
    b. Yes
    c. Sometimes
    d. Given is insufficient

14. Which does not make “Do your homework.” a proposition?
    a. It is true.
    b. It is declarative.
    c. It is a statement.
    d. It gives a command.

15. What kind of proposition is “There are 15 eggs in a dozen”?
    a. True
    b. False
    c. Either true or false
    d. Neither true nor false



Additional Activities

Create an informative poster on healthy lifestyle. The poster should involve at least three true propositions.

The following rubrics will be used to score your poster:

Criteria	**3**	**2**	**1**
Content **(score x 4)**	Three or more propositions are informative and novel	One or two propositions are informative or novel	Common information
Layout **(score x 3)**	The design has a theme; does not spoil the content; the text is clear and readable	Has design but no clear theme; the text is readable	Has no theme, no design; the text is not readable
Reference **(score x 3)**	References are all cited	Some references are cited	No cited reference

Answer Key

What I Know

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

What's More

Activity 1.1

1. P
2. NP
3. P
4. NP
5. P

Activity 1.2

1. True
2. True
3. True
4. False
5. True

Assessment

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

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