10

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 1 - Module 5: Geometric Sequences vs. Arithmetic Sequences

ALTERNATIVE DELIVERY MODE
ADM

Mathematics – Grade 10
Alternative Delivery Mode
Quarter 1 – Module 5: Geometric Sequences vs. Arithmetic Sequences
First Edition, 2020

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writer's Name: Jess Mitts M. Belingon

Editor's Name: Aiza R. Bitanga and Heather G. Banagui

Reviewer's Name: Bryan A. Hidalgo; Laila B. Kiw-isen; Jim D. Alberto; Selalyn B Maguilao

Management Team: May B. Eclar
Benedicta B. Gamatero
Carmel F. Meris
Marciana M. Aydinan
Ethielyn E. Taqued
Edgar H. Madlaing
Lydia I. Belingon

Printed in the Philippines by:

Department of Education – Cordillera Administrative Region

Office Address: Wangal, La Trinidad, Benguet
Telefax: (074) 422-4074
E-mail Address: car@deped.gov.ph

10

Mathematics

Quarter 1 - Module 5: Geometric Sequences vs. Arithmetic Sequences

DepED
DEPARTMENT OF EDUCATION

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.

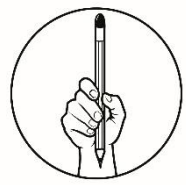
Thank you.

What I Need to Know

This module was designed and written with you in mind. It is here to help you identify the common ratio and the n^{th} term of a geometric sequence and to distinguish a geometric sequence from an arithmetic sequence. The scope of this module permits it to be used in many different learning situations. The lessons are arranged to follow the standard sequence of the course but the pacing in which you read and answer this module will depend on your ability.

After going through this module, the learner should be able to:

a. determine a geometric sequence;
b. identify the common ratio of a geometric sequence;
c. find the missing term of a geometric sequence;
d. determine whether a sequence is geometric or arithmetic; and
e. explain inductively the difference between arithmetic sequence and geometric sequence using real life-situations.



What I know

Multiple Choice. Read and analyze the following items and determine the letter of the correct answer from the given choices. Write the CAPITAL letter of the correct answer on a separate sheet of paper.

1. What operation is used in obtaining the next terms in a geometric sequence?
   A. Addition
   B. Multiplication
   C. Division
   D. Subtraction

2. What operation is used in obtaining the succeeding terms in an arithmetic sequence?
   A. Addition
   B. Multiplication
   C. Division
   D. Subtraction

3. Which of the following terms is closely related to a geometric sequence?
   A. Common Ratio
   B. Common Difference
   C. Both A & B
   D. None of these.

4. Which of the following terms is closely associated to an arithmetic sequence?
   A. Common Ratio
   B. Common Difference
   C. Both A & B
   D. None of these.

5. Which of the following sequences is arithmetic?
   A. $12, -12, -12, -12, \ldots$
   B. $32, 8, 2, \frac{1}{2}, \ldots$
   C. $12, \frac{25}{2}, 13, \frac{27}{2}, \ldots$
   D. $1, 2, 3, 5, 8, \ldots$

6. Which of the following presents a geometric sequence?
   A. $12, -12, -12, -12, \ldots$
   B. $32, 8, 2, \frac{1}{2}, \ldots$
   C. $12, \frac{25}{2}, 13, \frac{27}{2}, \ldots$
   D. $1, 2, 3, 5, 8, \ldots$

7. What is the common difference in the sequence $-1, -\frac{1}{2}, 0, \frac{1}{2}, 1, \ldots$?
   A. -1
   B. $-\frac{1}{2}$
   C. 0
   D. $\frac{1}{2}$

8. What is the common ratio in the sequence $-1, \frac{1}{2}, -\frac{1}{4}, \frac{1}{8}, \ldots$?
   A. -1
   B. $-\frac{1}{2}$
   C. 0
   D. $\frac{1}{2}$

For items 9 to 15, determine whether the given situation presents an arithmetic sequence, a geometric sequence, or neither. Write **A** for arithmetic, **G** for geometric, and **N** for neither.

9. An amount of money invested in a bank that offers an interest rate of 6% compounded annually
10. Saving ₱5 in your piggy bank daily
11. Pushing a swing with a constant force
12. $1, 2, -1, 3, -2, \ldots$
13. Half-life of Carbon
14. Graph of a linear function
15. A car running with a constant speed

What's In

It was discussed earlier that sequences are arrangements of objects or terms which follow a certain pattern. Look around you, can you cite situations, figures, or even routines which follow a certain pattern?

Before going to school, are their sequenced routines that you follow? When performing something, do you follow sequential actions? These are just a few of many situations where we can see the applications of sequences. The patterns or sequences we follow are results of the choices we pick and the decisions that we make. Just like us, humans, different sets of numbers follow different sequences or patterns, too.

Let us review what you have already learned on arithmetic sequences from the preceding modules. Accomplish the activity that follows.

AM I ARITHMETIC OR NOT?

Identify whether the given sequence is arithmetic or not. Write **AS** if it is an arithmetic sequence, otherwise, write **NA**.

> *Hint: For item number 1, the succeeding terms are obtained by adding the common difference, 6, to the preceding terms. Therefore, it is an arithmetic seauence.*

_____ 1. 5, 11, 17, 23, …

_____ 2. 3, 9, 27, 81, …

_____ 3. 12, 9, 6, 3, …

_____ 4. 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, …

_____ 5. 8, $\frac{17}{2}$, 9, $\frac{19}{2}$, …

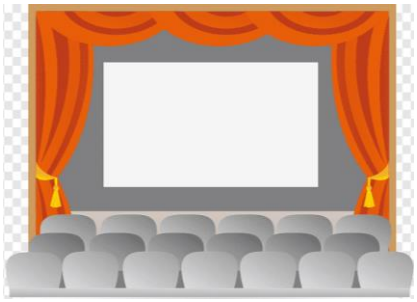
How were you able to identify if the sequence is arithmetic or not? If some of the examples above are not arithmetic, what kind of sequence are they?

Let's discover another type of sequence through this module.

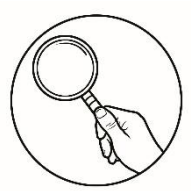
Lesson 1 Geometric Sequences

What's New

Arithmetic sequences were presented to you in the previous modules using situations that involve entrepreneurship, salary, savings, seats in a hall, health using a doctor's advice, construction, and even through the song *Twelve Days of* Christmas. This goes to show that mathematical concepts are not just applied in mathematical scenarios but are also being used in other fields. In this lesson, you will again be exposed to some more circumstances where mathematics is used.



Look at the pictures shown below. Have you ever wondered how plants grow? In your Facebook account, how would you know how many likers/reactors will you have in a couple of minutes if a certain pattern is observed? When saving your money in the bank, have you realized how much will it increase monthly, quarterly or yearly? These are just but situations that will help you arrange or organize things accurately and make wise decisions.



What is It

Consider yourself depositing an amount of money in a local bank which offers 8% interest rate compounded annually. If you deposited ₱10,000 in that bank, how much will you earn after a year? 2 years? 3 years?

Let us compute for the simple interest which is only paid on the initial principal amount.

(*principal amount*) + (*interest earned*) = (*end of the year balance*)

$₱10,000 + [(₱\,10,000)(0.08)] = ₱10,800.00$

interest rate

How much will you earn in two years?

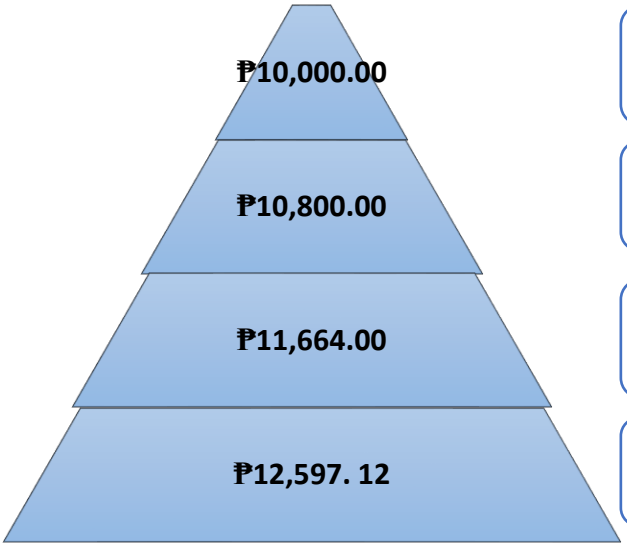
$₱10,000(1.08)(1.08) = ₱11,664.00$

How much will you earn in three years?

$₱10,000(1.08)(1.08)(1.08) = ₱12,597.12$

From the given situation, the principal amount you have is ₱10,000 Then, after a year of investing, you had a remaining balance of ₱10, 800. After the second year, you obtained a remaining balance of ₱11, 664, and ₱12,597.12 after the third year.

The figure shows the remaining balance you obtained for three years.



The first term (a_1) is the principal amount.

Second Term (a_2): obtained by multiplying ₱10,000 x 1. 08

Third Term (a_3): obtained by multiplying ₱10,800 x 1.08

Fourth Term (a_4): obtained by multiplying ₱11,664 x 1. 08

From the figure, can you predict the next?

Consider the principal amount as the first term, then the second term will be the remaining balance after a year, then the third term will be the remaining balance after two years, and so on. The terms were obtained by multiplying a constant value (1.08) from the preceding term. The constant value is referred to as the ***common ratio (r)*** and the terms can be denoted by a_n where, n refers to the placement of the term. This sequence is an example of **geometric sequence.**

Therefore, the **fifth term** of the sequence can be obtained by:

fourth term × common ratio = fifth term

$a_4(r) = a_5$

$₱12,597.12(1.08) = a_5$

$\boldsymbol{a_5 = ₱13,604.76}$

How will you obtain the common ratio?

The **common ratio** is obtained by :

$\frac{a_2}{a_1}$ or $\frac{a_3}{a_2}$ or $\frac{a_4}{a_3}\ldots$

$$\frac{succeeding\ term}{preceding\ term}$$

where $\frac{a_2}{a_1} = \frac{a_3}{a_2} = \frac{a_4}{a_3}\ldots$

What's More

ACTIVITY 1: GENERATE THAT PATTERN!

1. Find the next three terms of the geometric sequence 3, 21, 147, ...

Solution: **To find the next three terms of the sequence:**

a. First, identify the common ratio (***r***).

$$r = \frac{a_2}{a_1} = \frac{21}{3} = 7$$

b. Afterwards, multiply the obtained common ratio (r) to the preceding term to get the next term.

$a_1 = 3$

$a_2 = 3 \times 7 = 21$

$a_3 = 21 \times 7 = 147$

$a_4 = 147 \times 7 = 1\,029$

$a_5 = 1\,029 \times 7 = 7\,203$

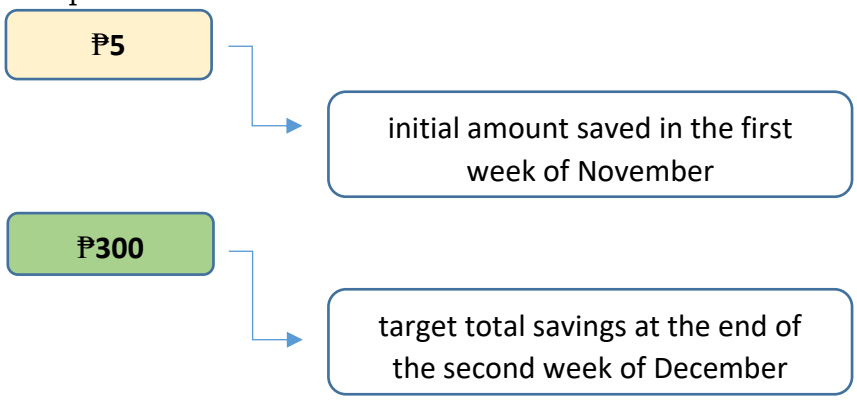
$a_6 = 7\,203 \times 7 = 50\,421$

Therefore, the next three terms of the geometric sequence are 1 029, 7 203, and 50 421.

2. You are planning to buy a new blouse which costs ₱300 as a present to your mother this Christmas season. You started saving money on the first week of November and doubled the amount to be saved every week. If you started saving ₱5 on the first week, will you be able to buy the blouse at the end of the second week of December? What is the sequence obtained?

To solve the problem, you must have to analyze accurately the given situation. The amount to be saved is doubled every week. Therefore, you must multiply the preceding terms by two (2) in order to obtain the succeeding terms. The initial amount saved is ₱5 while your target amount at the end of the second week of December is ₱300.

To represent the situation:



There are six weeks from the first week of November up to the second week of December.

Week Number	1	2	3	4	5	6	Total Savings
Weekly Savings	₱5	₱5 × 2	₱10 × 2	₱20 × 2	₱40 × 2	₱80 × 2	**₱315**
	₱5	**₱10**	**₱20**	**₱40**	**₱80**	**₱160**	

Adding all your savings from the 1st week up to 6th week will enable you to identify if it's possible for you to buy the blouse for your mother. From the table, the amount obtained is ₱315, therefore, you will be able to buy the blouse at the end of second week of December.

The geometric sequence obtained is 5, 10, 20, 40, 80, 160, …

If you do this scheme of saving from the first week of the year until the very last week with ₱1 as the initial amount to be saved, how much will you be able to save for a year? What will you do with such earning?

ASSESSMENT 1. IT'S YOUR TURN!

A frog jumped 20 centimeters away from a door and then jumps again 15 centimeters away from the 20-centimeter point. The frog reaches three-fourths of its preceding distance each time it jumps.

Complete the table of values showing the relationship between the number of jumps and distance covered by the frog per jump. Then, write the geometric sequence formed and answer the question that follows.

Number of Jumps	1	2	3	4	5	6	7
Distance Covered							

Geometric Sequence: _____

If the frog jumped following a straight path, what is the linear distance of the frog from the door after jumping seven times? _____

ACTIVITY 2: WHO'S ON DECK?

Sets of geometric sequences are provided below. Identify the value of the missing term that will satisfy the given geometric sequences.

1. 3, 12, 48, ___

The missing term is a succeeding term and comes after 48.
The common ratio is 4.

To obtain the missing term, multiply 48 to 4.

Therefore, the missing term in the geometric sequence is **192**.

2. ___ , 32, 64, 128

The missing term is a preceding term and comes before 32.
The common ratio is 2.

To obtain the missing term, divide 32 by 2.

Therefore, the missing term in the geometric sequence is **16**.

Remember

To identify the missing term:

First, you must have to find the common ratio.

If the unknown value is a **succeeding term**, then m**ultiply** the preceding term to the common ratio.

If the unknown value is a **preceding term**, then **divide** the succeeding term by the common ratio.

ASSESSMENT 2. MISSING IN ACTION

Identify the value of the missing term in each geometric sequence.

1. _____ , −32, 16, −8
2. 100, 50, 25, _____
3. −2, 12, _____ , 432
4. −4, _____ , −64, −256
5. 32, 2, $\frac{1}{8}$, _____

What I Have Learned

ACTIVITY 1: SHADE THAT GEOMETRIC

Identify whether the given sequence is geometric or not.

SHADING THE BOXES

1. Prepare a crayon of any shade you want.
2. Color the boxes that contain geometric sequences.

−2, 6, −18, 54	3, −2, 4, −5	2, 1, $\frac{1}{2}$, $\frac{1}{4}$	$\frac{1}{2}$, $\frac{1}{4}$, 1, 2	100, 50, 0, −50
0, 12, 24, 36	5, 15, 45, 135	2, −4, 8, −16	3, 6, 12, 24	15, 5, $\frac{5}{3}$, $\frac{5}{4}$
5, $\frac{5}{2}$, $\frac{5}{4}$, $\frac{5}{8}$	7, −3, 4, 1	3, −2, 4, 7	15, 20, 25, 30	108, 36, 12, 4
1, 2, 3, 4	65, 13, $\frac{13}{5}$	90, 30, 10	15, 5, $\frac{5}{3}$	1, $\frac{3}{2}$, 2, $\frac{5}{2}$
−2, −6, −18, −54	10, 20, 30, 40	10, 20, 40, 80	5, 50, 500	20, 10, 5, $\frac{5}{2}$

You did great!

ACTIVITY 2: A THOUGHT TO PONDER

A message is hidden in the boxes. Follow these steps to decode the message.

Step 1. Identify the common ratio of each of the geometric sequences found in the Question Box.

Step 2. Match the answers that you got with those found in the Answer Box by writing the word/punctuation that corresponds with the correct common ratio in the Answer Box.

QUESTION BOX

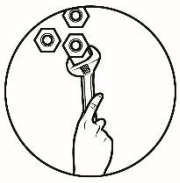
TO	NOT	PERSON	PRAY	FOR
1, 4, 16	12, 6, 3	2, −8, 32	7, 14, 28	$\frac{1}{2}, \frac{1}{6}, \frac{1}{18}$
;	AN	A	BE	STRONG
$\frac{1}{6}, \frac{1}{2}, \frac{3}{2}$	100, 20, 4	2,−2, 2,−2	$\frac{1}{25}, \frac{1}{5}$,1	2, 40, 800
PRAY	EASY	INSTEAD	•	LIFE
2, $\frac{4}{3}, \frac{8}{9}$	$\frac{1}{2}$, −1 , 2	$\frac{1}{3}$, −1, 3	32, 8, 2	10, 10, 10

ANSWER BOX

2	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{5}$	−2
1	3	− 3	$\frac{2}{3}$	4
5	− 1	20	− 4	$\frac{1}{4}$

MESSAGE : _____

Amazing. You're almost there!



What I Can Do

PUSH IT!

A child on a swing is pushed by his father until the swing reached a maximum height of 4 feet. Then, the father released the swing and observed that the maximum height reached by the swing decreases by 15% on each successive swing.

1. If the swing is pushed once by the father, what will be the height reached on the third swing? on the fourth swing? on the sixth swing?
2. Complete the table of values to present the answers to the questions in item 1.

Number of Swings	1	2	3	4	5	6
Height Reached						

Lesson 2 Arithmetic Sequences vs. Geometric Sequences

What's New

HOW TO GENERATE SEQUENCES

Determine the pattern being followed by the consecutive terms or numbers in each of the following sequences.

1. 1, 2, 3, 4, ...
2. 7, 14, 28, 56, ...
3. 12, 6, 3, $\frac{3}{2}$, ...
4. 7, 12, 17, 22, ...
5. 13, 7, 1, −5, ...

What is It

If you are going to observe the given sequences in *What's New*, there is always a constant value that is being added or multiplied to obtain the terms in the sequence. Let us re-discover these concepts through this lesson.

Look at the two sequences below, what can you say about the pattern that is being followed by the consecutive terms or numbers in each sequence? What pattern do you observe in sequence 1? How about in sequence 2?

1. 5, 12, 19, 26, 33, …

2. 3, 12, 48, 192, …

In the first example, the first term, denoted as a_1, is 5. It is followed by the second term (a_2) 12, then the third term (a_3) 19, the fourth term (a_4) 26, and so on. In order to obtain the second term, you add 7 to the first term, and to obtain the third term, you add 7 to the second term. So, the pattern is ***7 is being added to a preceding term to obtain a next term.*** The number that is being added to the preceding term to get the next term is referred to as the ***common difference*** (d) of an arithmetic sequence.

$5 \overset{+7}{,}\ 12 \overset{+7}{,}\ 19 \overset{+7}{,}\ 26 \overset{+7}{,}\ 33, \ldots$

Common Difference (d)

The common difference is obtained by:

$\boldsymbol{a_2 - a_1}$ *or* $\boldsymbol{a_3 - a_2}$ *or* $\boldsymbol{a_4 - a_3}$ …

succeeding term – preceding term

where

$$\boldsymbol{a_2 - a_1 = a_3 - a_2 = a_4 - a_3 = \cdots}$$

Remember

An **arithmetic sequence** is a sequence obtained by adding a common difference (***d***) to a preceding term in order to obtain the next term.

In the second example, 3 is the first term, 12 is the second term, 48 is the third term, and so on. The first term (a_1) is multiplied to 4 to get the second term (a_2). The third

term (a_3) is obtained by multiplying 4 to a_2 and a_3 is multiplied to 4 to get a_4. So, the pattern is ***4 is being multiplied to a preceding term to obtain the next term***. The number that is being multiplied to the preceding term to get the succeeding number is called the ***common ratio*** (r) of a geometric sequence.

3^{x4}, 12^{x4}, 48^{x4}, 192,…

Common Ratio (r)

*The **common ratio** is obtained by :*

$$\frac{a_2}{a_1} \text{ or } \frac{a_3}{a_2} \text{ or } \frac{a_4}{a_3} \ldots$$

$$\frac{\textbf{succeeding term}}{\textbf{preceding term}}$$

where

$$\frac{a_2}{a_1} = \frac{a_3}{a_2} = \frac{a_4}{a_3} \ldots$$

Remember

A **geometric sequence** is a sequence obtained by multiplying a common ratio to the preceding terms in order to obtain the succeeding terms.

What's More

ACTIVITY: ARITHMETIC OR GEOMETRIC!

Determine whether the sequence is geometric or arithmetic.

1.	12,	15,	18,	21,	…
2.	10,	5,	0,	−5,	…
3.	5,	15,	45,	135,	…
4.	−24,	12,	−6,	3,	…

Example 1.) 12, 15, 18, 21, …

First, let's investigate if a common ratio or a common difference exists. Using the first three terms 12, 15, and 18:

$\frac{a_2}{a_1} = \frac{15}{12} = \frac{5}{4}$ and $\frac{a_3}{a_2} = \frac{18}{15} = \frac{6}{5}$ but $\frac{5}{4} \neq \frac{6}{5}$

We got the ratios of two pairs of consecutive terms but, we failed to obtain a common ratio. So, the sequence is not a geometric sequence.

Now, let's try to obtain a common difference by using the first three terms 12, 15, 18.

$a_2 - a_1 = 15 - 12 = \mathbf{3}$ and $a_3 - a_2 = 18 - 15 = \mathbf{3}$ and $\mathbf{3} = \mathbf{3}$

We performed subtraction in two pairs of consecutive terms and, we were able to obtain the common difference, 3. Therefore, we can conclude that the sequence is an arithmetic sequence.
Let us do the same for examples 2 to 4 to find out if the sequence is arithmetic or geometric.

Example 2.) 10, 5, 0, -5, …

$\frac{a_2}{a_1} = \frac{5}{10} = \mathbf{\frac{1}{2}}$ and $\frac{a_3}{a_2} = \frac{0}{5} = \mathbf{0}$

$\frac{1}{2}$ is not equal to 0. Thus, the sequence is not geometric.

$a_2 - a_1 = 5 - 10 = \mathbf{-5}$ and

$a_3 - a_2 = 0 - 5 = \mathbf{-5}$

There is a common difference of **– 5.** Therefore, the sequence is **arithmetic.**

Example 3.) 5, 15, 45, …

$\frac{a_2}{a_1} = \frac{15}{5} = \mathbf{3}$ and

$\frac{a_3}{a_2} = \frac{45}{15} = \mathbf{3}$

There is a common ratio of **3**. Therefore, the sequence is **geometric.**

Example 4.) –24, 12, –6, 3, …

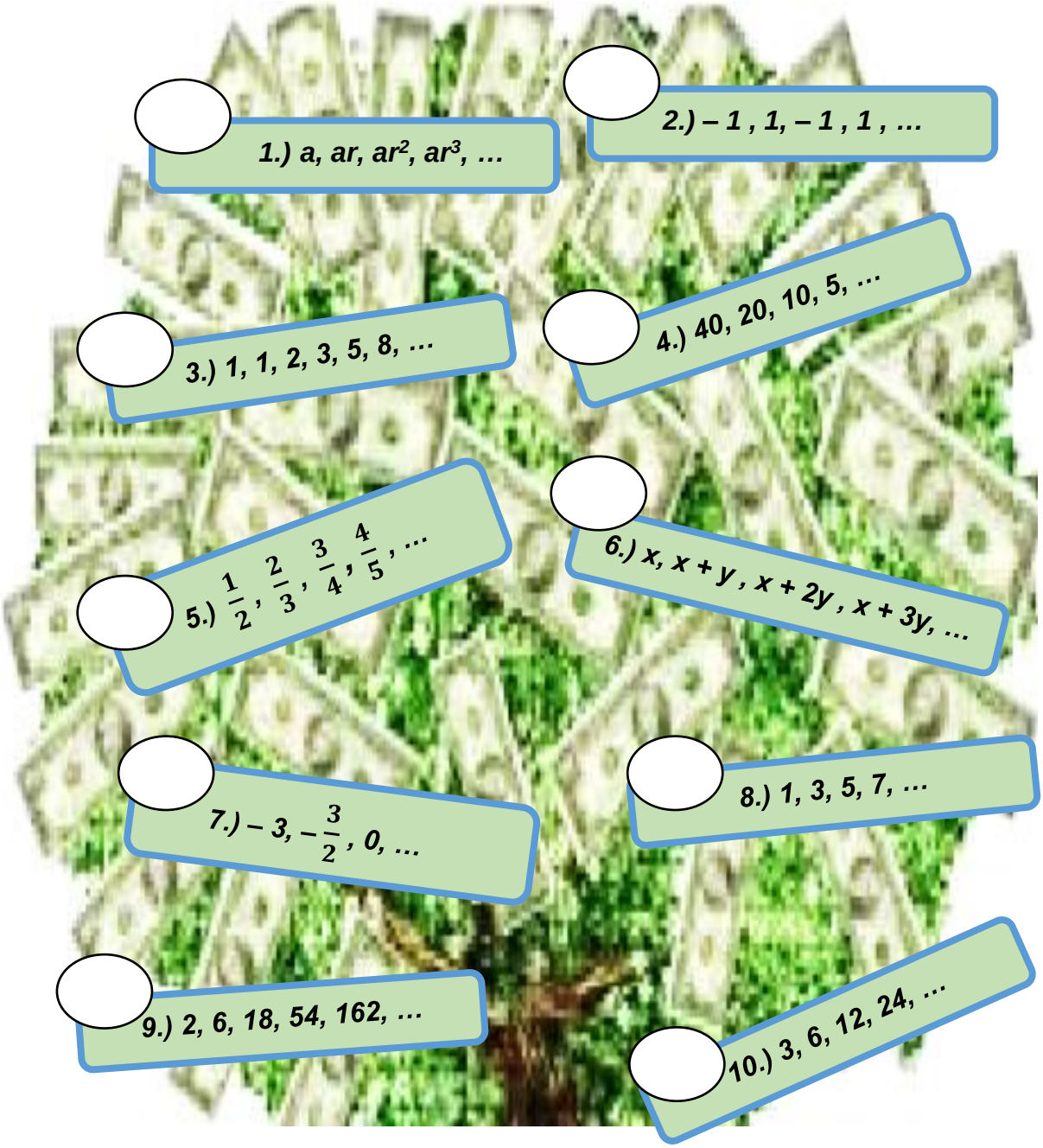
$\frac{a_2}{a_1} = \frac{12}{-24} = \mathbf{-\frac{1}{2}}$ and

$\frac{a_3}{a_2} = \frac{-6}{12} = \mathbf{-\frac{1}{2}}$

There is a common ratio of $-\frac{1}{2}$. Therefore, the sequence is **geometric.**

ASSESSMENT 1. WHICH IS WHICH?

Determine if the following sequence is arithmetic, geometric, or neither. Write **JUST** for arithmetic, **DO** for geometric, and **IT** for neither.



ASSESSMENT 2. THEY NEED HELP

Read and analyze the situation carefully. Then, provide what is being asked for.

SITUATION:
Your classmates Ruben and Nathaniel are arguing during your Math subject. You found out that they are arguing about the examples of sequences presented by your teacher.

A. Saving 5 pesos in your piggy bank daily

B. An amount of money deposited in a bank that is compounded yearly at an interest rate of 6%

Ruben is telling that example A is an arithmetic sequence while example B is a geometric sequence. On the other hand, Nathaniel is defending that example A is a geometric sequence while example B is an arithmetic sequence.

Since you are knowledgeable about the issue, who among your classmates will you agree with?

Answer: _____

What explanation(s) will you provide to your classmates for them to understand clearly the difference between an arithmetic sequence and a geometric sequence?

_____

_____

Your explanation(s) will be scored using this rubric.

8 points	6 points	4 points	2 points
Argument is very informative, accurate, and well organized.	Argument is somewhat informative and organized.	Argument gives some new information but is poorly organized.	Argument gives no new information and is poorly organized.

Congratulations! You did it right!

What I Have Learned

SEE THE DIFFERENCE!

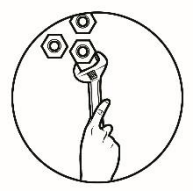
What is the main difference that you observed between the two sequences below? Justify your answer.

A. $12, 4, \frac{4}{3}, \frac{4}{9}, \frac{4}{27}, \ldots$

B. $13, \frac{27}{2}, 14, \frac{29}{2}, 15, \ldots$

Your justification(s) will be rated using this rubric.

8 points	6 points	4 points	2 points
Correct answer with informative and well organized justification	Correct answer with informative but not well organized justification	Correct answer with well organized but not informative justification	An answer is provided but without justification



What I Can Do

INVESTIGATE AND CONCLUDE

Read and analyze the situation below.

Consider yourself depositing an amount of money in a local bank which offers 5% interest rate compounded annually. If you deposited ₱10,000 in that bank, how much will you earn after 3 years?

1. What kind of sequence is illustrated in the above situation?
2. If it shows an arithmetic sequence, then what is the common difference? On the other hand, if it shows a geometric sequence, then what is the common ratio? Provide a justification for your answer using any method.

Assessment

Multiple Choice. Read and analyze the following items and determine the letter of the correct answer from the given choices. Write the CAPITAL letter of the correct answer on your answer sheet.

1. This refers to the number that is being multiplied to obtain a geometric sequence.
   A. Number of Terms
   B. Common Denominator
   C. Common Difference
   D. Common Ratio

2. Which of the following statements is true to all geometric sequences?
   A. If the common ratio is negative, then the sequence is increasing.
   B. If the common ratio is negative, then all the terms of the sequence is also negative.
   C. If the common ratio is less than one, then the sequence is decreasing.
   D. If the common ratio is less than one, then the sequence is increasing.

3. If the common ratio of a sequence is –3 and the first term is 3, then the fourth term is ___.
   A. 27 B. –27 C. – 81 D. 81

4. Which of the following is an example of a geometric sequence?
   A. 2, 4, 6, 8, …
   B. 12, 8, 4, 0, …
   C. $\frac{1}{4}, \frac{1}{2}$, 1, 2, …
   D. $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}$, ….

5. Supply the missing term in the sequence 1, ____, $\frac{1}{4}$, $\frac{1}{8}$, … to make it a geometric sequence.

A. 2 B. $\frac{1}{2}$ C. 3 D. $\frac{1}{3}$

6. Which of the following statements will let you obtain the common difference of an arithmetic sequence?
   A. Divide the first term by the second term of the sequence.
   B. Subtract the first term from the second term of the sequence.
   C. Subtract the second term from the first term of the sequence.
   D. Divide the second term by the first term of the sequence.

7. What is the common difference in the sequence 1, $\frac{1}{2}$, 0, $-\frac{1}{2}$, −1, …?

A. −1 B. $-\frac{1}{2}$ C. 0 D. $\frac{1}{2}$

8. Which of the following is NOT an arithmetic sequence?

A. −1, 0, 1, 2, 3, 4, 5, … C. 0, −2, −5, −9, −14, …

B. $-\frac{1}{2}$, $\frac{1}{2}$, $\frac{3}{2}$, … D. $\frac{1}{2}$, $-\frac{1}{2}$, $-\frac{3}{2}$, $-\frac{5}{2}$, …

9. What term fits on the blank in the sequence ____ , 0, 3, 6, …?

A. −3 B. 0 C. 3 D. 6

For items 10 to 15, determine whether the given situation is an arithmetic sequence, a geometric sequence, or neither. Write **A** for arithmetic, **G** for geometric, and **N** for neither.

10. Growth of bacteria on a petri dish

11. 15, 10, 5, 0, −5, −10, …

12. Doubling your weekly savings

13. The number of people watching a viral video within an hour

14. Playing the stacking cups game

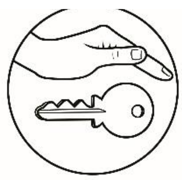
15. The taxi fare a passenger pays per kilometer traveled

Additional Activity

Ben is planning to visit his friend Albert who is suffering from colds and headache. Ben uses his car to travel to Albert's house. The initial speed of Ben's car is 20 mph, then constantly increasing one-fourth of its preceding speed.

1. If the constant increase of its speed is done every 10 minutes, what will be the speed of his car for the first 30 minutes?
2. Construct a table of values which shows the relationship between the speed of the car for the first hour if the constant increase is $\frac{1}{3}$ of the preceding speed for every 20 minutes.
3. What is the common ratio obtained by the sequence based from the table of values?

Congratulations! MISSION ACCOMPLISHED.



Answer Key

What I Know

1. B	6. B	11. G
2. A	7. D	12. N
3. A	8. B	13. G
4. B	9. G	14. A
5. C	10. A	15. G

What's In

1. AS 2. NA 3. AS 4. NA 5. AS

LESSON 1

What's More

Assessment 1: (*in centimeters*)

Number of Jumps	1	2	3	4	5	6	7
Distance Covered	**20**	**15**	$\frac{45}{4}$	$\frac{135}{16}$	$\frac{405}{64}$	$\frac{1215}{256}$	$\frac{3645}{1024}$

The sequence is 20, 15, $\frac{45}{4}$, $\frac{135}{16}$, $\frac{405}{64}$, $\frac{1215}{256}$, $\frac{3645}{1024}$

The frog is 69.32 centimeters away from the door.

Assessment 2:

1. 64 2. $\frac{25}{2}$ 3. -72 4. -16 5. $\frac{1}{128}$

What I have Learned

Activity 1:

-2, 6, -18, 54	3, - 2, 4, - 5	2, 1, ½ , ¼	½ , ¼ , 1, 2	100, 50, 0, -50
0, 12, 24, 36	5, 15, 45, 135	2, - 4, 8, - 16	3, 6, 12, 24	15, 5, 5/3, 5/4
5, 5/2, 5/4, 5/8	7, -3, 4, 1	3, -2, 4, 7	15, 20, 25, 30	108, 36, 12,
1, 2, 3, 4	65, 13, 13/5	90, 30, 10	15, 5, 5/3	1, 3/2, 2, 5/
-2, - 6, -18, -54	10, 20, 30, 40	10, 20, 40, 80	5, 50, 500	20, 10, 5, 5/

Activity 2:

PRAY	NOT	FOR	AN	EASY
2	½	1/3	1/5	–2
LIFE	;	INSTEAD	PRAY	TO
1	3	–3	2/3	4
BE	A	STRONG	PERSON	•
5	–1	20	–4	¼

MESSAGE : Pray not for an easy life; instead pray to be a strong person.

What I can Do (*in feet*)

Number of Swings	1	2	3	4	5	6
Height Reached	**4**	$\frac{17}{5}$	$\frac{289}{100}$	$\frac{4913}{2000}$	**2.089**	**1.775**

LESSON 2

What's New

1. Add 1 to the preceding terms.
2. Multiply 2 to the preceding terms.
3. Multiply $\frac{1}{2}$ to the preceding terms.
4. Add 5 to the preceding terms.
5. Add −6 to the preceding terms.

What's More

Assessment 1:

1. DO
2. DO
3. IT
4. DO
5. IT
6. JUST
7. JUST
8. JUST
9. DO
10. DO

Assessment 2:

1. I will agree with Ruben's claim.
2. Saving ₱5 in a piggy bank daily shows a constant number that is being added on the preceding days. Therefore, it shows an arithmetic sequence. On the other hand, depositing an amount in a bank acquires an interest depending on a constant value that is being multiplied to the preceding amount. Therefore, a geometric sequence is obtained.

What I have Learned

The numbers in set A present a geometric sequence while the ones in set B show an arithmetic sequence. The common ratio $\frac{1}{3}$, in set A, is multiplied to every preceding term to obtain each succeeding term. The common difference $\frac{1}{2}$, in set B on the other hand, is added to every preceding term to obtain each succeeding term.

What I can Do

1. It shows a geometric sequence.
2. The common ratio is $\frac{10,500}{10,000} = \frac{21}{20}$ or 1.05.
   The initial deposit is ₱10,000 which is compounded annually with a rate of 5%. To obtain the second term, multiply the initial deposit by 5%. Then the obtained value is the second term, so, divide the second term by the first term to get the common ratio.

Assessment

1. D	6. B	11. A
2. C	7. B	12. G
3. C	8. C	13. N
4. C	9. A	14. A
5. B	10. G	15. A

Additional Activity

1. 39. 0625 mph

1. Table of values (the speed of the car is *in mph*)

20-minute Intervals	0	20	40	60
Speed of the Car	20	26.67	35.56	47.41

2. The common ratio (r) is 1. 3333333.

References

Josephine Cabral, Julieta Bernabe and Efren Valencia.*New Trends in Math Series,Algebra II*. Araneta Avenue,Quezon City: Vibal Publishing House Incorporated, 2004.

Katiegard.wordpress.com, Saving for the What Ifs, accessed July 8, 2020, https://katiegard.wordpress.com/tag/interpretations/

Pngwave.com, Cinema Theater drapes and stage curtains, accessed July 7, 2021, https://www.pngwave.com/png-clip-art-aiuru

Yumpu.com, Applications to Geometric Sequences and Series to Financial Maths, accessed July 7, 2020, www.yumpu.com/en/document/read/35995428

https://firstpriority.net/152-qa-with-coach-phil-december-31-2019-12-days-of-xmas-new-years-resolutions-3-0/

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph: