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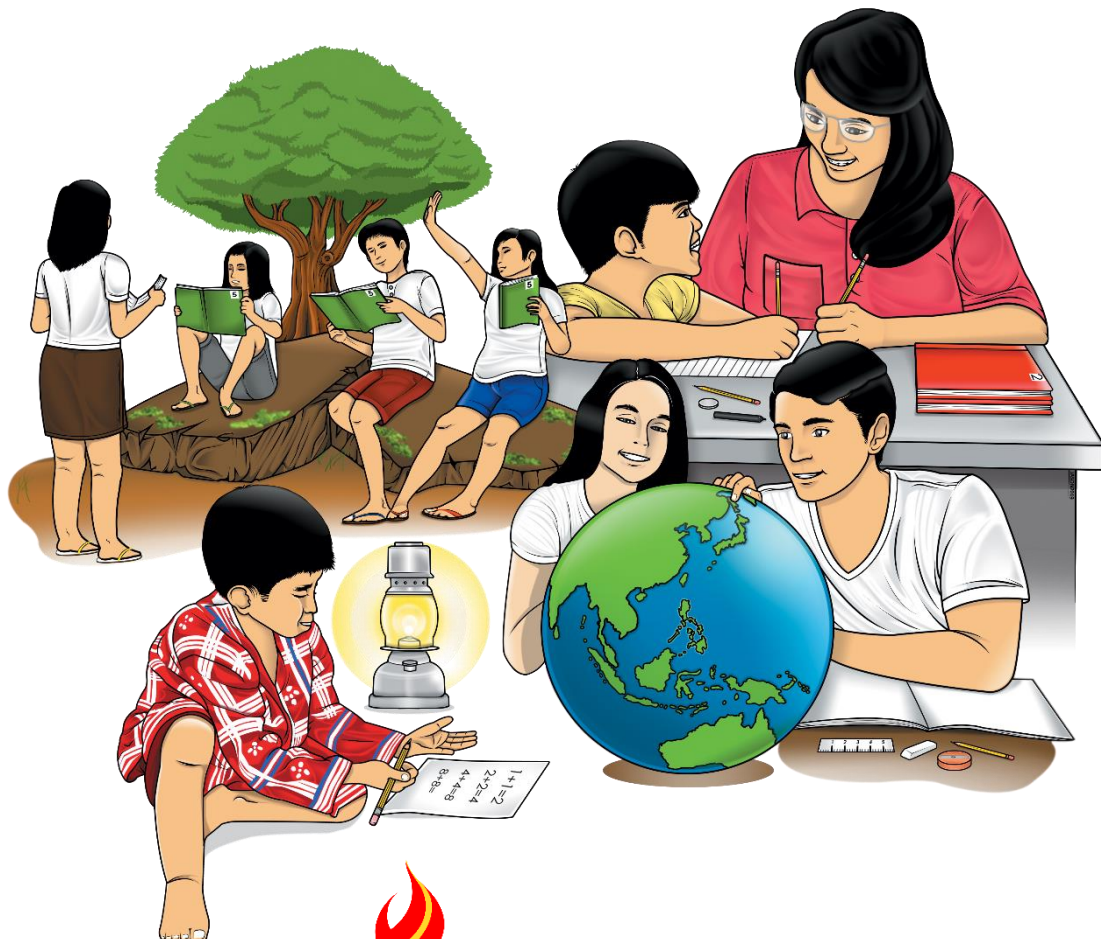# Mathematics
Quarter 3 – Module 13:
Formulating the Rule in Finding the Next Term in a Sequence

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Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 13: Formulating the Rule in Finding the Next Term in a Sequence
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Mathematics
Quarter 3 – Module 13:
Formulating the Rule in Finding the Next Term in a Sequence

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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 master the concepts on sequences. The lessons are arranged to follow the standard sequence of the course.

Hi, mathletes! In this module, you are going to test your ability to formulate the rule in finding the next term in a sequence. Knowledge and skills in patterns and sequences enable you to make predictions and create rules. You will also learn to use different problem-solving strategies to solve math problems easier.

After going through this module, you are expected to:

1) formulate the rule in finding the next term in a sequence.

What I Know

Hello, everyone! Patterns and sequences can be found in so many designs and objects in real life such as carpets, necklaces, table runners, floor tiles, and many others. Before proceeding to the next page, answer the test below to find out how well you know the topics to be discussed in this module.

Multiple Choice

Directions: Read each item carefully. Choose the letter of the best answer. Write your answers on a separate sheet of paper.

1) What is the next number in the sequence 2, 3, 4, 5, …?
   A. 6   B. 7   C. 8   D. 9

2) Find the rule in the sequence 10, 20, 30, 40, 50.
   A. Add 2   B. Multiply by 2   C. Add 10   D. Multiply by 5

3) 3, 10, 17, 24, 31, 38,… what is the next number in the sequence?
   A. 43   B. 44   C. 45   D. 46

4) What is the missing value in this sequence: 2, 5, 8, 11, 14, ____?
   A. 15   B. 16   C. 17   D. 18

5) What is the next number in the sequence 2, 6, 18, 54…?
   A. 108   B. 152   C. 162   D. 216

6) What are the next two terms in the sequence 2, 10, 18, ____, ____?
   A. 20, 28   B. 22, 30   C. 24, 32   D. 26, 34

7) Which among the sequences has the pattern of squaring the natural numbers?
   A. 1, 2, 3, 4, 5   B. 2, 4, 6, 8, 10   C. 1, 6, 11, 16, 21   D. 1, 4, 9, 16, 25

8) What is the next number in the sequence 1, 4, 13, 40,…, if the rule for the sequence is "multiply the previous term by 3 and add 1".
   A. 131   B. 121   C. 111   D. 91

9) What are the missing numbers in the sequence 2, ____, 10, 14, ____?
   A. 4, 20   B. 6, 18   C. 5, 17   D. 8, 20

10) Five days before Valentine's Day, Arnel decided to give Maria flowers according to a certain pattern. On the first day, he sent one red rose; on the second day, three red roses; on the third day, 5 red roses and on so on. How many roses did Maria receive during the fifth day?
   A. 7   B. 8   C. 9   D. 10

What's In

A **sequence** is an ordered list of numbers. Each number in the sequence is called a **term**. The three dots (...) mean to continue forward in the pattern. To fill in the missing numbers or symbols in a given sequence, we need to find out the rule or pattern for generating the next term.

SEQUENCE:
3, 5, 7, 9, ...
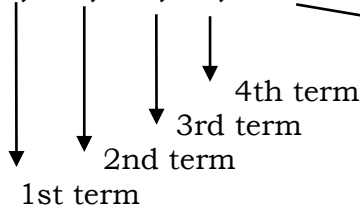
Three dots – this is read as "and so on"

4th term
3rd term
2nd term
1st term

RULE:

A sequence usually has a **rule**, which is a pattern or a way to find the value of each term.

Example:
{3, 5, 7, 9, ...}
Starts at 3 and goes up 2 every time.

RULE: Add 2.

$$3 + 2 = 5$$
$$5 + 2 = 7$$
$$7 + 2 = 9$$

Let me see if you can identify the rule and find the next term in a sequence.

Directions: Find the next three terms in the sequence. Number 1 is done for you.

1) 10, 15, 20, 25, **30**, **35**, **40**
2) 3, 5, 7, 9, ____, ____, ____
3) 1, 3, 9, 27, ____, ____, ____
4) 2, 5, 8, 11, ____, ____, ____
5) 1, 8, 27, ____, ____, ____

What's New

Study the situation below.

For the first year, Mang Juan harvested 50 kilograms of lanzones. If every year, he harvested 5 more kilograms than the previous year, how many kilograms of lanzones did he harvest on the 8th year?

REMEMBER: In finding the next term in a sequence, we will look for a pattern. Let us construct a table to look at the pattern in the sequence of numbers and fill in the unknown parts of the table.

Sequence (Year)	Number of Kilograms of Lanzones
1st year	50
2nd year	50+5=55
3rd year	55+5=60
4th year	
5th year	
6th year	
7th year	
8th year	

So, how many kilograms of lanzones did Mang Juan harvest on the 8th year? Yes. He harvested 85 kilograms of lanzones.

Very good. You did it right!

What is It

There are problems in mathematics that can be solved by observing sequences and patterns. A sequence is a list of numbers or objects in a defined or logical order. Patterns and repetitive sequences can be found in nature, shapes, events, sets of numbers and anywhere. Studying sequences is not that difficult. You simply need to analyze the given terms and identify the rule for generating the next term in the sequence.

Study the table below:

Sequence	Rule	Next Three Terms
a) 3, 6, 9, 12,...	Every term after the first is obtained by adding 3 to the number preceding it. 0 + 3= 3; 3 + 3= 6; 6 + 3= 9, ...	15, 18, 21
b) 1,4,9, 16,...	Multiply the counting numbers by itself, that is, square the counting numbers. 1 x 1=1; 2 x 2= 4; 3 x 3= 9, ...	25, 36, 49
c) 1, 2, 4, 7,...	After 1 and 2, add the previous two numbers, then plus 1 1+2+1= 4; 2+4+1= 7	12, 20, 33
d) 1, 2, 4, 8, 16,...	Multiply the previous term by 2. 1 x 2=2; 2 x 2=4; 4 x 2=8; 8 x 2=16, ...	32, 64, 128

Did you understand the lesson?
Very good. Try to answer the activity below.

Activity: Fill Me In

Directions: Find the next three terms in each sequence. Then, write the rule in finding the next term. Write your answer on separate sheet of paper.

Sequence	Next Three Terms	Rule
1) 3,6,12,24, ...		
2) 2, 9, 16, 23, ...		
3) 53, 46, 39, 32, ...		
4) 5, 12, 26, 54, ...		
5) 5, 20, 50,110, ...		

What's More

In this section, you will use the concepts and examples that were presented earlier to answer the different activites provided.

Activity 1: Match Me

Directions: Match the sequence in Column A to the rule that generates the terms of the sequence in Column B. Write your answer on a separate sheet of paper.

Column A (Sequence)	Column B (Rules)
1) 8, 11, 14, 17, …	**A.** Multiply by 3 and subtract 1
2) 12, 24, 48, 96, …	**B.** Subtract by 7
3) 7, 15, 31, 63, …	**C.** Multiply by 2 and add 1
4) 56, 49, 42, 35, …	**D.** Multiply by 2
5) 14, 41, 122, 365, …	**E.** Add 3

Activity 2: Complete Me

Directions: Given the first term and the rule, make a sequence consisting of four (4) terms. Write your answer on a separate sheet of paper.

First Term	Rule	First 4 terms of the Sequence
1) 2	Add 4 and minus 3	
2) 3	Multiply by 2 and subtract 1	
3) 4	Add 3 and minus 2	
4) 5	Subtract 2 and plus 5	
5) 1	Add 1 times 2	

Activity 3: Define Me
Directions: Give the pattern or rule for generating each sequence. Write your answer on a separate sheet of paper.

1) 1, 4, 7, 10, 13,…   Rule: _____
2) 3, 8, 18, 38, 78,…   Rule: _____
3) 60, 56, 52, 48, 44,…   Rule: _____
4) 2, 8, 32, 128, 512,…   Rule: _____
5) 2, 9, 44, 219, 1094,…   Rule: _____

Congratulations! You made it this far.

What I Have Learned

To check how well you understood the lesson in this module, answer the activities below.

Activity: True or False

Directions: Read each statement carefully. Write **True** if the statement is correct. If the statement is incorrect, write False and change the underlined word, number, or symbol to make it correct. Write your answer on a separate sheet of paper.

_____1) In the sequence 3, 7, 15 and 31, you have to multiply by 2 and add 1 to get the next term which is 63.

_____2) The first term in a sequence is 4. If the rule is "add 5 and subtract by 2", the first 5 terms of this sequence are 4, 7, 10, 13, and 15".

_____3) A pattern is a list of numbers or objects in a defined or logical order.

_____4) 4, 8, 12, 16 and 20 form a sequence. 8 is called the second term.

_____5) The rule of the sequence 4, 9, 19, 40, 79... is "multiply by 2 and add 1".

What I Can Do

The concept of sequences can also be used in solving word problems. Below is an activity that needs application of the knowledge you acquired in the lesson.

Activity:

Directions: Read each problem carefully. Answer it to the best that you can and write your answers on separate sheet of paper.

1) Nicole is writing a poem. She writes 7 words on the first line, 14 words on the second line, 28 words on the third line, and 56 words on the fourth line. If this pattern continues, how many words will Nicole write on the fifth line?

2) Cindy is making a tally of the people visiting her art gallery. She noticed that 25 people visited her art gallery on the first day, 35 people visited on the second day, and 45 people visited on the third day. Given the same pattern, on what day did 65 people visit her art gallery?

3) Iriss sorted pens in small boxes. He put 1 pencil in the first box, 4 pencils in the 2nd box, 16 pencils in the 3rd box, and 64 pencils in the 4th box. Following the same pattern, how many pencils did Iriss place in the 5th box?

4) Chandy was given an allowance of P750. He spent P100 on the 1st day, P150 on the 2nd day, P200 on the 3rd day and so on. In how many days will his allowance last?

5) Christian saved Php 14 on Saturday, Php 17 on Sunday, Php 20 on Monday, Php 23 on Tuesday. If this pattern continues, how much will he save next Sunday?

Assessment

At this point, since the lesson is already done and its concept was discussed exhaustively with different activities, it is time to assess the knowledge you gained from this module.

Multiple Choice

Directions: Read each statement carefully. Choose the letter of your best answer and write the chosen letter on a separate sheet of paper.

1) What are the next shapes?

$\square , \triangle, \square, \triangle, \triangle, \square, \triangle, \triangle, \_\_\_\_, \_\_\_$

A. $\square \triangle$ B. $\triangle \square$ C. $\triangle \triangle$ D. $\square , \square$

2) What is the next term in the sequence 42, 40, 38, ...?
   A. 36   B. 35   C. 34   D. 33

3) 5, 10, 15, 20, 25, ... What is the next number in the sequence?
   A. 28   B. 30   C. 32   D. 35

4) By observing the pattern, what is the missing value?
              5, 7, ____, 11, 13
   A. 6   B. 8   C. 9   D. 10

5) What is the next number in the sequence 0, 4, 8, 12, 16, ____?
   A. 32   B. 28   C. 24   D. 20

6) Determine the next term in the sequence 1, 10, 100, 1 000, ____?
   A. 10 000   B. 100 000   C. 1 000 000   D. 10 000 000

7) What is the sequence formed having the rule of multiplying by 2?
   A. 1, 2, 3, 4, 5   B. 2, 4, 6, 8, 10   C. 1, 2, 4, 8, 16   D. 2, 6, 10, 14, 18

8) Which sequence is generated by the rule "multiply the first term by 2 and add 1"?
   A. 1, 3, 7, 15   B. 3, 6, 9, 12   C. 2, 4, 6, 8   D. 0, 4, 8, 12

9) What numbers will complete the sequence 0, ____, 8, 15, 24, ____?
   A. 2, 28   B. 5, 30   C. 6, 34   D. 3, 35

10) Renalyn's weekly savings from her school allowance are as follows: P10 on the first week, P15 on the second week, P20 on the third week, and so on. How much will she save on the fifth week?
   A. P 25   B. P30   C. P35   D. P40

Additional Activities

To enhance your knowledge and skills on this lesson, answer the activity below.

Find the missing term and give the pattern rule of the following sequences.

1)

14	17	20	23	

Rule: _____

2)

24	30	36	42	

Rule: _____

3)

132	121	110	99	

Rule: _____

4)

5	10	20	40	

Rule: _____

5)

4	19	94	469	

Rule: _____

Answer Key

What's New
65, 70, 75, 80, 85

What's In
1. 30, 35, 40
2. 11, 13, 15
3. 81, 243, 729
4. 14, 17, 20
5. 64, 125, 216

What I Know
1. A
2. C
3. C
4. C
5. C
6. D
7. D
8. B
9. B
10. A

What's More

Define Me
1. Add 3
2. Multiply by 2 and add 1 or add 1 multiply by 2
3. Minus 4
4. Multiply by 4
5. Multiply by 5 and minus 1

What Is It
1. 48, 96, 192 — Multiply by 2
2. 30, 37, 44 — Add 7
3. 25, 18, 11 — Subtract 7
4. 110, 222, 446 — Multiply by 2 and add 2 or Add 1 and multiply by 2
5. 230, 470, 950 — Add 5 and multiply by 2

What's More

Match Me	Complete Me
1. E	1, 2, 3, 4, 5
2. D	2, 3, 5, 9, 17
3. C	3, 4, 5, 6, 7
4. B	4, 5, 8, 11, 14
5. A	5, 1, 4, 10, 22

What I Have Learned
1. True
2. False, 16
3. False, Sequence
4. True
5. False, 39

What Can I Do
1. 112 words
2. 5th day
3. 256 pencils
4. 4 days
5. P38

Additional Activities
1. 26 — Add 3
2. 48 — Add 6
3. 88 — Subtract 11
4. 80 — Multiply by 2
5. 2344 — Multiply by 5 and minus 1

Assessment
1. B
2. A
3. B
4. C
5. D
6. A
7. C
8. A
9. D
10. B

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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