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## SAMPLE LESSON: MATHEMATICS

**Class : Form 4**

**Title of Module 2:** Algebra and Logic

**Title of Chapter:** Sequence and Series

**Title of Lesson:** Sum of First  $n$  terms of an AP, Arithmetic Mean

**Duration of Lesson:** 60mins

**Name of Authors:** Nchinda Kennedy

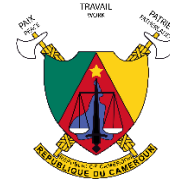


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SCHOOL: TTP COP

CLASS: **FORM 4**

ENROLMENT:----

MALE:---

FEMALE:---

AVERAGE AGE:---

DATE:----

LESSON DURATION: ---

MODULE 17: 17 ALGEBRA AND LOGIC

TOPIC: SEQUENCE AND SERIES

**LESSON:** SUM OF FIRST N TERMS OF AN AP AND ARITHMETIC MEAN

**LESSON OBJECTIVES:** By the end of the lesson students should be able to: r

- ✓ **Find the sum of the first n terms of an AP**
- ✓ **Find the arithmetic mean between terms of an AP**

**KEY QUESTIONS:** Do my learners know that the general term of a sequence may be considered the last term of the sequence

**PRE-REQUISITE KNOWLEDGE:** The students should be able to:

- ✓ Calculate areas of plane figures
- ✓ Carry out simple algebraic calculations
- ✓ Determine if a sequence or a series in an AP or not
- ✓ Write down the general term of a sequence

**RATIONAL/MOTIVATION:** The use of sequence and series in real life permit people to estimate and predict ahead of time depending on the sequence of event that unfold.

**DIDACTIC MATERIALS:** Activity Sheet

**REFERENCES:**

- ✓ August 2014 Mathematics teaching syllabus form 3 to 5. Ministry of secondary education, Cameroon.
- ✓ Andrew T.T and others Interactions in MATHEMATICS O/L
- ✓ Tatum Nico Atem Formbin and others ORDINARY LEVEL MATHEMATICS FOR CAMEROON SCHOOLS



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| Stages/Durations                                             | Teaching/Learning Activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Teacher's Activities                                                                                                                                                                                                                                                                                          | Learners' Activities                                                                                                                                                                                                                                  | Learning Points                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Obs |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <p>INTRODUCTION<br/>(PROBLEM<br/>SITUATION)</p> <p>10Min</p> | <p>A/- VERIFICATION OF PREREQUISITE<br/>KNOWLEDGE</p> <p>1. Calculate the area of the figures below:</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 150px; height: 50px; margin: 10px;"></div> <div style="margin-left: 20px;"> <p>5</p> <p>2</p> </div> </div> <p>2. Given the sequence: 2, 5, 8, 11, 14, 17 . . . , determine if the sequence is an AP or not and write down its general term</p> <p>B/- PROBLEM SITUATION</p> <p>In the prison of Ngaoundere, they consume three bags of rice every month. The Prison mate is projecting his budget for a four period. Help him to find the number of bags of rice they will need from January 2019 to December 2022</p> | <p>✓ Write the exercises on the chalkboard</p> <p>✓ Reads out the questions and calls up students to respond and solve the questions on the board</p> <p>✓ Reads out the problem situation to the students and notes the students' proposals.</p> <p>✓ Moves around and regulates the students' responses</p> | <p>✓ Listen</p> <p>✓ Respond to questions and follow up the work on the board and propose alternatives if any</p> <p>✓ Listen attentively</p> <p>✓ Discuss the problem with group/table members and propose solutions by show of hand if they can</p> | <p><b>Solution</b></p> <p>1. <math>Area(A) = Length(L) * Width(W)</math><br/> <math>L = 5, \quad W = 2</math><br/> <math>\Rightarrow A = 5 * 2 = 10 \text{ sq u}</math></p> <p>2. 2, 5, 8, 11, 14, 17 . . .<br/> For the sequence to be an AP, it must have a common difference(d) which is determine by<br/> <math>d = 5 - 2 = 8 - 5 = 11 - 8 \text{ etc} = 3</math><br/> Since d exist then the sequence is an AP</p> <p>Understanding the implication of the problem</p> |     |



| Stages/Durations               | Teaching/Learning Activities                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Teacher's Activities                                                                                                                                                                                                                                                                                                              | Learners' Activities                                                                                                                                                                                                                    | Learning Points                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Obs |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| LESSON<br>DEVELOPMENT<br>35Min | <p>ACTIVITY</p> <ol style="list-style-type: none"> <li>Consider the AP: 2, 5, 8, 11, 14, 17 . . .</li> <li>Find the general term of the AP call <math>a_n</math></li> </ol> <p>3. <b>Refer to the activity sheet:</b><br/>The rectangle represents the AP above, where the green area or the white area represent the sum of the first six terms of the AP. Answer the question follow;</p>                                                                                       | <ul style="list-style-type: none"> <li>✓Teacher groups the students into heterogeneous groups</li> <li>✓Supervises the activities of the students and guides them on what to do</li> <li>✓Request some groups to read out their results and compare their answers</li> <li>✓Copies dominions and concepts on the board</li> </ul> | <ul style="list-style-type: none"> <li>✓The students carry out the instructions, answering the questions on the activity sheet</li> <li>✓Read out their results upon request</li> <li>✓Copy summary notes in their notebooks</li> </ul> | <p><b>Remark</b><br/>Generally, given an AP, with first term <math>a</math>, common difference <math>d</math>. the general tern<br/><math>u_n = a + (n - 1)d</math></p> <p><b>Then the sum of the first <math>n</math> terms is given by</b> <math>s_n = \frac{n}{2}(a + u_n)</math><br/>where <math>u_n</math> is the last term<br/><b>This can be simplified as</b> <math>s_n = \frac{n}{2}(a + (a + (n - 1)d))</math><br/><math>\Rightarrow s_n = \frac{n}{2}(2a + (n - 1)d)</math></p> <p><b>ARITHMETIC MEAN</b><br/>If <math>a, b, c</math> are three consecutive terms of an AP, then <math>b - a = c - b \Rightarrow 2b = a + c \Rightarrow b = \frac{a+c}{2}</math></p> <p><b>Solution to Examples</b><br/>1. Given <math>a = 4, d = 5</math> and <math>n = 7</math><br/><math>s_n = \frac{n}{2}\{2a + (n - 1)d\}</math><br/><math>\Rightarrow s_7 = \frac{7}{2}\{2 \times 4 + (7 - 1)5\}</math><br/><math>= 133</math></p> <p>2. Given <math>a = 7, u_{14} = 12</math> <math>s_n = \frac{n}{2}(a + u_n) \Rightarrow s_{14} = \frac{14}{2}(7 + 12) = 7 * 19 = 133</math></p> |     |
| EXERCISE OF APPLICATION        | <p><b>Examples:</b></p> <ol style="list-style-type: none"> <li>Find the sum of the first seven terms of an AP with first term 4 and common difference 5.</li> <li>Find the sum of an AP with fourteen terms and first term 7 and last term 12.</li> <li>If 3, <math>a</math>, 7 are three consecutive terms of an AP, find the value of <math>a</math>.</li> </ol> <p><b>EXERCISES</b></p> <ol style="list-style-type: none"> <li>Find the sum of an AP with six terms</li> </ol> | <p>Gives students time to work amongst them selves</p> <p>Goes round and evaluate the students various reasoning</p>                                                                                                                                                                                                              | <p>Consider the problems, share ideas and propose their solutions</p>                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |



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|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|                    | <p>whose first term is 2 and the last term 36.</p> <p>2. If <math>11 + 15 + 19 + \dots</math> is an AP, find the sum if the first fifty terms.</p> <p>3. Given that <math>x + 2, x + 3, 2x^2 + 1</math> are three consecutive terms of an AP. Find the possible values of x.</p> <p>4. <math>1, b, 5</math> are three consecutive terms of an A.P. find the value of b</p> | <p>board</p> <p>✓ Corrects the exercises with the students</p> <p>✓ Go to the problem situation and answer the stated problem.</p> | <p>✓ Copy exercises in their individual exercise books</p> | <p>3. Given that <math>3, a, 7</math> are consecutive term of an AP <math>\Rightarrow a = \frac{3 + 7}{2} = \frac{10}{2} = 5</math></p>                                                                                                                              |     |
| CONCLUSION<br>5Min | <p><b>ASSIGNMENT</b></p> <p>1. Find the sum of <math>1 + 2 + 3 + \dots + 49 + 50</math>.</p> <p>2. Given that <math>t + 1, t + 2, 3t^2 + 1</math> are three consecutive terms of an AP, find the possible values of t and the sum of the first six terms.</p>                                                                                                              | Write homework on the board                                                                                                        | Copy down homework                                         | <p><b>ASSIGNMENT cont'd</b></p> <p>3. Find the sum of <math>1 + 2 + 3 + \dots + 49 + 50</math>.</p> <p>4. Given that <math>t + 1, t + 2, 3t^2 + 1</math> are three consecutive terms of an AP, find the possible values of t and the sum of the first six terms.</p> |     |



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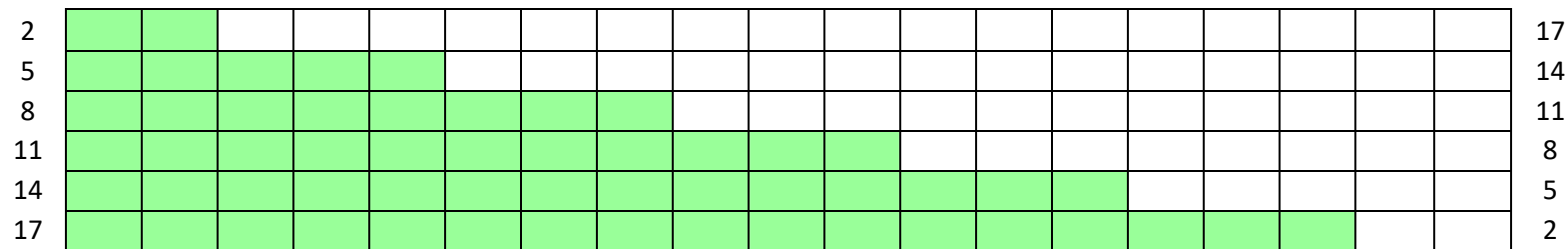


### ACTIVITY SHEET FOR THE SUM OF FIRST N TERMS IN AN AP (ARITHMETIC PROGRESSION).

Consider the AP: 2, 5, 8, 11, 14, 17, . . .

Find the general term of the AP call  $a_n$

The rectangle bellow represents the AP above, where the green area or the white area represent the sum of the first six terms of the AP. Answer the following question bellow:



- 1) How many green squares are there?
- 2) there at the base line?
- 3) How many white squares are there at the base line?
- 4) How many squares make up the width of the rectangle?
- 5) How many squares make up the base of the rectangle?
- 6) Write the result in d) above as the number of green square plus the number of white squares
- 7) Calculate the area of the rectangle
- 8) Find half of the result in f) above
- 9) Count the number of green square and thus of white that made up the rectangle
- 10) Compare the number green squares in the rectangle to your result in g) above
- 11) What is the significance of the number in g) above?
- 12) Add the first and third term and divide the result by two
- 13) Add the second term and the fourth term and divide by two
- 14) Add the third term and the fifth term and divide by two
- 15) What can you remark about the last three results?