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SAMPLE LESSON: MATHEMATICS

Class: Form 4

Title of Module: ALGEBRA AND LOGIC

Title of Chapter: Sequences

Title of Lesson: Arithmetic Progression

Duration of Lesson: 55mins

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School: AIMS TTP COP

Class: Form 5

Enrolment: Male:

Female:

Total:

Term:

Date:

Duration: 55 minutes

Module: ALGEBRA AND LOGIC

Topic: SEQUENCES

Lesson: ARITHMETIC SEQUENCE (PROGRESSION)

Lesson Objectives: At the end of this lesson, students should be able to:

- Identify an arithmetic sequence or progression.
- Find the first term and the common difference of a given arithmetic progression.
- Finding the n^{th} term of an arithmetic progression (general term).
- Solve real life situations using the notions of arithmetic progression.

Pre-requisite Knowledge: The students can:

- Identify number patterns or sequence
- Generalize and make predictions.

Rational/Motivation: Mathematical skills to explore number patterns are applied to our daily life such as in design of clothes and ornaments. Also, the idea of sequences is applied in calculating simple and compound interest and accumulated amount in banks and in many other areas of life. Other sectors of application are health, sports and in agriculture etc.

Didactic materials: Matchsticks, work sheets and chart.

Preparations: Buy boxes of matchsticks depending on the number of groups to be formed, print out and photocopy worksheet.

References:

- Mathematics Teaching Syllabus Form 4, MINESEC Cameroon, August 2014.
- Understanding Modern mathematics for Ordinary Level, Nsanyu et al, 2015, Second Edition, Peaceberg Printers Metta Quarter, Bamenda.
- Interactions in Mathematics, Andrew T. Tamambang, 2017, First Edition, Cambridge University Press.

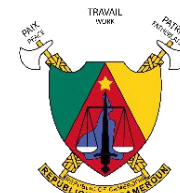


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Stages/Duration	Teaching/Learning Activities	Teacher's Activities	Learner's Activities	Learning Points	Observations
Introduction 15mins	Present Motivation of lesson Control of Pre-requisite Knowledge i) Which of the following number patterns is(are) sequence(s): (a) 4, 9, 14, 19, ... (b) 1, 5, 8, 11, 17, ... (c) 8, 4, 0, -4, ... ii) Give the next two terms of the sequences below: 4, 7, 10, ... 3, 8, 13, ... 2, 4, 8,	-Tells them some real life applications to capture interest. -Verifies pre-requisite knowledge	Demonstrate prerequisites by answering questions	Expected answers i)a) It is a sequence. The next number is got by adding 5. b) Not a sequence c) Is a sequence. The next number is got by subtracting 4. ii) the next two terms of the sequences are as below: 4, 7, 10, 13, 16 , (Add 3) 3, 8, 13, 18, 23 , (add 5) 2, 4, 8, 16, 32 , (Mult by 2)	
	Problem Situation Mary and Abdu play a game of cards in which the first to win has 3 points and a subsequent winner gets 2 additional points each time he/she wins. Given that Mary wins the first game, how many points will she have after winning 61 times?	Presents Problem Situation Asks students to discuss	Students discuss problem among themselves		Give them 1-2 mins to think
Lesson Development (20mins)	Activity 1: Generating a sequence (group work) Instructions: With the matchsticks provided, i) Produce figures a triangle as on the worksheet. Count the number of matchsticks and write ii) Add one more triangle by adding 2 matchsticks. Count the number and write iii) Make an additional triangle by adding two more matchsticks. Count the number of matchsticks and write. iv) Continue to make more triangles and write the number of matchsticks used. Hence complete the table below:	Asks students to get into groups Remind them of responsible group behaviour Teacher explains to students the activity and	Learners in groups make more triangles and draw them as in the worksheet. Learners note down the number of match sticks	The first term $a = 3$ The common difference $d = 2$ General term $a + 2d$ i) 3 matchsticks to make one triangle. Thus $a = 3$ ii) 5 matchsticks to make 2 triangles is $3 + (1)2$ iii) 7 matchsticks to make 3 triangles $3 + (2)2$ iv) See table v) The first term $a = 3$; The common difference $d = 2$	Verify that all group members are participating Make sure that students use normal

Stages/Duration	Teaching/Learning Activities					Teacher's Activities	Learner's Activities	Learning Points	Observations
	Triangle	No of Triangles	N° of matchsticks	How to find N°	Formula	demonstrates how to make the first three triangles.	Students complete the table	General term is $a + (n-1)d$	voice when discussing so that the noise does not get too loud.
		1	3	3	a			vi) The first five terms are :3, 5, 7, 9, 11, ...	
		2	5	$3+(1)2$	$a + d$		Identify the pattern of number of matchsticks being added.	Summary An Arithmetic Progression (A.P) is a sequence in which the difference between any two consecutive terms is a constant. called the common difference d . For any Arithmetic sequence with first term a and common difference d . The n^{th} term is given by $a + (n-1)d$	
		3	7	$3 + (2)2$	$a + 2d$	Asks students to do work in groups.		The third term is written T_3 , the tenth term is written T_{10} etc. The n^{th} term of an A.P is denoted by T_n or U_n . That is, the first term is T_1 , the second term is T_2 and so on. From the activity,	Provide guidance without giving solutions
		4					Learners find a general term for finding the number of match sticks.	$T_1 = 3 = a$ $T_2 = 5 = a + d$ $T_3 = 7 = a + 2d$ $T_4 = 9 = a + 3d$ $\vdots$ $T_n = a + (n-1)d$	
		5						Therefore, in general, for an Arithmetic sequence with first term a and common difference d , the n^{th} term is given by	
		...							
		n				Distributes worksheets			
	v) What is the first term a , the common difference d and the formula for the general term? vi) Hence, write out the first five terms of the sequence.								
	Summary An Arithmetic Progression (A.P) is a sequence in which the difference between any two consecutive terms is a constant called the common difference d . The first term is denoted by a . While the n^{th} term of an A.P is denoted by T_n or U_n .					Circulate among groups to listen and provide more insight if needed	Learners get the number of match sticks needed to make n triangles.		
						Have one group			M

$$T_n = a + (n-1)d$$



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	That is, the first term is T_1, the second term is T_2 and so on. For any Arithmetic sequence with first term a and common difference d. The n^{th} term is given by $T_n = a + (n-1)d$ We can write down an Arithmetic sequence if we know the first term and the rule for finding the next term. If we consider the sequence 1, 3, 5, 7, 9, ..., the first term is 1 and the rule is "add 2" (the common difference therefore is $d = 2$)	representative explain each solution to rest of class Wrap up activity by summarizing points learned.	Share group solution to the whole class	We can write down an Arithmetic sequence if we know the first term and the rule for finding the next term. If we consider the sequence 1, 3, 5, 7, 9, ..., the first term is 1 and the rule is "add 2" (the common difference therefore is $d = 2$)	
Exercises for Application	1.Let us go back to our problem situation. Given that Mary wins the first game, how many points will she have after winning 61 times? 2-Given the A.P with terms as: 20, 15,10,5,0, -5, ... Calculate the 10th term.	-Copies the exercises on the board - Corrects the exercises with the students	Copies the exercises in their exercise books Solve exercises individually Those who finish first can compare their answers	1-Solve the problem situation. <u>solution</u> $T_n = a + (n - 1)(d)$ $a = 3, d = 2, n = 61$ $T_{61} = 3 + (61 - 1)(2)$ $T_{61} = 3 + (60)(2)$ $T_{61} = 123$ Therefore, Mary will have 123 points after winning 61 times. 2- $T_n = a + (n - 1)d$ $a = 20, d = -5, n = 10$ $T_{10} = 20 + (10 - 1)(-5)$ $\therefore T_{10} = -25$ 3- Mr. Moussa's first salary is our first term, $a = 200000$ The salary increases by 15000 which is the common difference, d	



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	3- Mr Moussa is employed as a bank manager with an initial salary of 200,000FCFA with an agreement that his salary is to be increased by 15,000FCFA after each month. How much will be his salary on the 12 th month?			So, the salary for the 12 th month is: $T_{12} = 200000 + (12 - 1) 15000$ $T_{12} = 365000$ The salary for the 12 th month is 365000frs.	
Conclusion	<u>Assignment</u> a) Exercise 15d,n ^o 4, pg 319 b) Exercise 15c,n ^o 2, pg 317 (Interactions in Mathematic, Andrew T. Tamambang et al) c) Write down in simplest form, the n th term of the A.P: 25, 22, 19, . . . d) Mrs Fadimatou owns a poultry in which she collects eggs on daily basis. She assigns her son, Bello to supply 15 eggs every day to a store owner. <i>Task 1:</i> How many eggs will Bello have supplied to the store on the 99 th day. <i>Task2:</i> If he supplies an egg for 60frs each, how much will Bello have sold. e) Find the sum of the following series: 4+10+16+...up to the 20 th term.	Refers students to homework in textbook Copies or dictates the other homework for students to copy.	Copies the assignment in their exercise books	Solution to Assignment a)Exercise 15d,n ^o 4, pg 319 b)Exercise 15c,n ^o 2, pg 317 (Interactions in Mathematic, Andrew T. Tamambang et al) c)a=25; d=-3. The nth term will be $25 + (n-1)(-3)$ d)Mrs Fadimatou owns a poultry in which she collects eggs on daily basis. She assigns her son, Bello to supply 15 eggs every day to a store owner. <i>Task 1:</i> Bello have supplied 1485 eggs by the 99 th day. <i>Task2:</i> Bello have sold 1485 eggs at 89100frs. e) this will lead to the next lesson.	



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Worksheet for Activity

Instructions:

With the matchsticks provided,

- i) Produce a triangle as on the worksheet. Count the number of matchsticks and write down in the table
- ii) Add one more triangle by adding 2 matchsticks to the already existing triangle. Count the number of matchsticks and write in the table
- iii) Make an additional triangle by adding two more matchsticks. Count the number of matchsticks and write.
- iv) a) Continue to make two more triangles and write the number of matchsticks used.
b) Hence, complete the table below:



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Figure	Shape number	Number of matchsticks used	Way of calculating the number of matchsticks	If the first number of sticks is a and the number of sticks added each time is d, complete the table
	1	3	3	a
	2	5	$3 + (1)2$	$a + (1)d$
	3	7	$3 + (2)2$	$a + (2)d$
	4			
	5			
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
	n			

v) What is the first term a, the common difference d and the formula for the general term?

vi) Hence, write out the first five terms of the sequence.