

ALGEBRA: SEQUENCES AND SERIES

4 FEBRUARY 2013

Lesson Description

In this lesson, we will

- Identify the different types of number patterns
- Look at the formulae needed to generate the general term
- Use formulae to do different calculations
- Identify converging number patterns

Key Concepts

In Grade 11 quadratic number patterns were studied.

This year we will also look at linear (arithmetic) number patterns and exponential (geometric) number patterns.

Arithmetic Number Patterns

- $T_2 - T_1 = T_3 - T_2$
- *There is a constant difference between terms*
- $T_n = a + (n - 1)d$
- $S_n = \frac{n}{2}(2a + (n - 1)d)$

Geometric Number Patterns

- $\frac{T_3}{T_2} = \frac{T_2}{T_1}$
- *There is a constant ratio between terms*
- $T_n = ar^{n-1}$
- $S_n = \frac{a(r^n - 1)}{r - 1}$

Convergent Geometric Number Patterns

- $-1 < r < 1$
- $S_\infty = \frac{a}{1-r}$

Questions

Question 1

Given the sequence 26; 24; 22;...; -12

- a.) Determine the number of terms in the sequence. (3)
- b.) How many terms must be added to get a sum of -1224? (5)

Question 2

Given the Arithmetic Sequence: 55; 48; 41; 34;.....

Determine:

- a.) the 42nd term. (3)
- b.) which term equals -379. (3)

Question 3

Alan was delighted to learn that he had won the "Customer of the month" award at his local bank. A computer would adjust his account on a daily basis by adding an amount according to the following sequence

R180 ; R160 ; R140 ; R120 ...

- a.) If Alan had R300 in his account on the day the first amount was added, calculate the amount in his account after the 9th prize payment. (4)
- b.) Alan was keen to know after how many days he would receive a total of R840 from the "Customer of the month" award. He is puzzled when he obtains two possible values for n .
Check his calculations and suggest whether there is a reason for rejecting 1 value. (6)
- c.) Alan's puzzlement turns to shock when he calculated the amount in his account on the 50th day. How much will he have in his account and explain what happened. (5)