

T1.1 – Sequences & Series
Lesson 1

Math SL1 - Santowski

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Fast Five

- Find the sum of the first 100 numbers
- Outline a way to solve this problem and then carry out your plan
- Find the sum of the first 25 perfect squares
- Outline a way to solve this problem and then carry out your plan

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Unit 1.1 Lesson 1 Objectives

- The student will learn the key terms associated with sequences
- The student will predict patterns in sequences and then write algebraic expressions for these patterns

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(A) Definitions & Terms

- A **sequence** is a ordered set of numbers
 - **finite sequence**, meaning that it has a certain number of terms
 - **infinite sequence**, meaning it has an endless number of terms.
- Each number in the sequence is called a **term**.
- Each term is numbered and presented in the following notation: u_1 or t_1 is designated as the first term; u_n or t_n is referred to as the n th term.
- For example, in the sequence 3,5,8,2,5,89,4 $\rightarrow u_2 = 5$ and is referred to as the 4th term.

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(A) Definitions & Terms

- The terms of a sequence may or may not have a specific pattern.
- If there is a pattern, then we can come up with a **rule or an algebraic expression** to describe every term of the sequence.
- One way to express this rule is called **the general term** of the sequence.

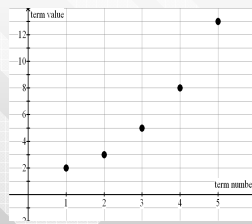
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(A) Definitions & Terms

- A sequence can be **graphically** visualized by plotting on a Cartesian plane, where the position of each term (the number of each term) is plotted on the x axis and the term value is plotted on the y axis.



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(B) Examples of Sequences

- ex 1. Write a sequence that shows Erin's earnings as she sells BMW motorcycles if she earns \$500/month plus \$500/motorcycle she sells.
- ex 2. Write a sequence that shows Nigel's annual value of an investment if he deposits \$5000 once and earns 5% interest on the balance at the end of each year

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(B) Examples of Sequences

- ex 3. Write a sequence that represents height of a bouncing basketball if Andrew bounces it from an initial height of 2 m and the ball bounces to a height of half the previous bounces' height.
- Ex 4. Write a sequence that represents the outcomes of a coin tossing experiment if Sean tosses a coin and records a 1 for heads and a 0 for tails

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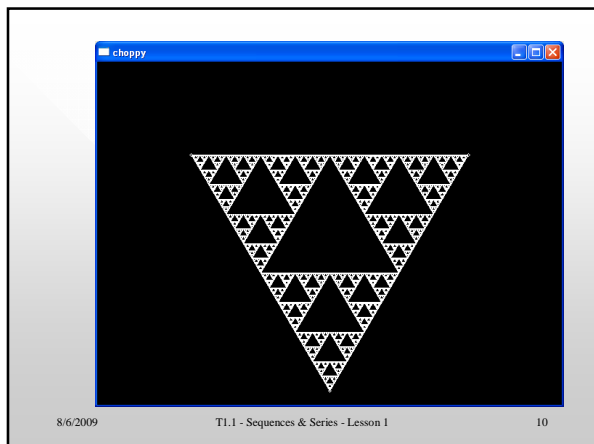
(B) Examples of Sequences

- ex 5. Write a sequence that represents the total number of triangles formed in the following situation:
- To make a Sierpinski's triangle, you take an equilateral triangle, divide it into four congruent triangles by joining the midpoints of the sides of the larger triangle. Then repeat the process in each of the three newly created triangles to make a third pattern and so on.....

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(B) Examples of Sequences

- ex 1. Given the sequence
1,5,25,125,625,.... find the next four terms
- ex 2. Given a formula, find the first 5 terms
 - » (i) $u_n = 3n - 2$
 - » (ii) $u_n = n^2 - 1$
 - » (iii) $u_n = (n-2)/(n+2)$
 - » (iv) $u_n = 5^{n-1}$

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(B) Examples of Sequences

- ex 3. Find the formula for the n th term (or the general term), then list the next three terms:
 - (i) 5,10,15,20
 - (ii) 2,3,4,5,.....
 - (iii) 1,4,9,16,.....
 - (iv) 2,4,6,8,.....
 - (v) -3,-6,-12,-24....
 - (vi) $1/2, 2/3, 3/4, 4/5,.....$

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(C) Patterns in Sequences

- Comment upon any pattern you see in these sequences
- \$100, \$110, \$120, \$130, \$140, \$150,
- 8, 12, 16, 20, 24,.....
- 11, 9, 7, 5, 3,.....
- Comment upon any pattern you see in the sequences
- 2,10,50,250,.....
- 5,-10,20,-40,80,.....
- 6, 0.6, 0.06, 0.006, 0.0006,.....
- 2,4,8,16,32,64,.....
- 100, 50, 25, 12.5, 6.25, ...

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(C) Algebraic Formulas

- Given the sequence 8,12,16,20,24,....., develop a formula that you can use to predict the 407th term
- EXPLAIN your prediction/formula
- Given the sequence 3,6,12,24,48,....., develop a formula that you can use to predict the 41st term
- EXPLAIN your prediction/formula

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(E) Homework

- From the HH textbook:
 - Ex 2A #2ch, 5af;
 - Ex 2B #1f, 2c;
 - Ex 2C #1, 3, 5af, 6a, 7a, 8, 9

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