



Mini-Map for M.EE.HS.A.SSE.4

Subject: Mathematics

Algebra—Seeing Structure in Expressions (A.SSE)

Grade: 11

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.HS.A.SSE.4 Determine the successive term in a geometric sequence given the common ratio.	M.A.SSE.4 Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
<p>Group together objects by attribute values such as shape or size (e.g., group together a square, a rectangle, and a rhombus, as they all have four sides).</p> <p>Contrast or distinguish objects based on attributes, such as shape, size, texture, and numerical pattern.</p> <p>Order objects by following a specific rule (e.g., arrange three objects with different sizes from the smallest to largest).</p>	<p>Recognize patterns (i.e., repeating, growing, shrinking) involving numbers or letters (e.g., a, b, b, a, b, b...; 2, 5, 8, 11...). Identify a sequence as an ordered list of numbers that adheres to a common rule between corresponding numbers (e.g., 2, 4, 6, 8...).</p>	<p>Recognize a geometric sequence as an ordered list of numbers, such that each term after the first is determined by multiplying or dividing the preceding term by a constant amount (e.g., 2, 4, 8, 16...). Recognize the recursive rule in geometric sequences by determining how each term in the sequence differs from the preceding term (e.g., the recursive rule in the sequence 2, 4, 8, 16... is "multiply by 2").</p>	<p>Communicate the next term in a geometric sequence by determining how each term in a sequence is obtained from the previous term (e.g., the next term in the geometric sequence 2, 4, 8, 16... is 32).</p>	<p>Determine any term in a geometric sequence when the first term, common ratio, and the nth term formula of a geometric sequence are given [e.g., given the nth term formula, $a_n = ar^{(n-1)}$, first term as 2 and the common ratio 3, the 4th term will be $2 \times 3^{(4-1)} = 2 \times 3^3 = 54$].</p>

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

In order to determine a geometric sequence (e.g., 2, 4, 8, 16, 32), students begin by learning to notice what is new. The educator draws the students' attention to new objects or stimuli, labels them (e.g., “there are two cubes”, “this is a circle”, “this fidget is big and this fidget is small”), and the student observes, feels, or otherwise interacts with them. Educators encourage students to begin placing like objects together, drawing attention to the characteristics that make an item the same or different.

How is the Distal Precursor related to the Target?

As students develop their understanding of attributes and work toward geometric sequences, educators provide interactive lessons around patterns using attributes like shape, size, and color. At this level, students are also expected to recognize symbolic (e.g., number) patterns. This also requires that students recognize numerals in order (i.e., 1, 2, 3...). Educators should take care to use number names while defining and demonstrating symbolic sequences. While students do not need to say these words, they do need to learn the meanings and the sequence.

Instructional Resources

Released Testlets
See the Guide to Practice Activities and Released Testlets .
Using Untested (UN) Nodes
See the document Using Mini-Maps to Plan Instruction .

[Link to Text-Only Map](#)

M.EE.HS.A.SSE.4 Determine the successive term in a geometric sequence given the common ratio.

