### **Core Content**

### Cluster Title: Write expressions in equivalent forms to solve problems.

**Standard A.SSE.4:** Derive the formula for the sum of a geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.* 

### **Concepts and Skills to Master**

- Derive the formula for the sum of a geometric series.
- Find the sum of a geometric series in context.

# Supports for Teachers

### **Critical Background Knowledge**

• Writing arithmetic and geometric sequences both recursively and with an explicit formula, and use them to model situations (I.F.BF.2)

### **Academic Vocabulary**

summation notation, Σ, sequence, series, infinite, finite, term

# Notice the regularity in the way terms are eliminated when expanding the products: (x - 1)(x + 1), (x-1)(x² + x+1) and (x-1)(x³ + x² + x+1). Discuss how this leads to the general formula for the sum of a geometric series. Use fractals (Sierpenski's Gasket, Koch Snowflake) to generate sequences and series. Resources NCTM: Navigating through Geometry in Grades 9-12 (Chapter 4, "Visualizing Limits in Our World)

## **Sample Formative Assessment Tasks**

### Skill-Based Task:

Write  $0.\overline{3}$  as an infinite geometric series. Represent this series using summation notation. Find the sum.

### **Problem Task:**

You are starting to save in a fixed rate savings account that earns 6% interest annually but is compounded monthly. Each month you deposit \$100. Write a formula for the total money saved after *n* months. Write a formula for the total money earned after *n* months.