

Unit 1 Lesson 8: The n^{th} Term

1 Which One Doesn't Belong: Repeated Operations (Warm up)

Student Task Statement

Which one doesn't belong?

A. $5 + 2 + 2 + 2 + 2 + 2 + 2$

B. $5 + 6 \cdot 2$

C. $5 \cdot 2^6$

D. $5 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

2 More Paper Slicing

Student Task Statement

1. Clare takes a piece of paper with length 8 inches and width 10 inches and cuts it in half. Then she cuts it in half again, and again. . .
 - a. Instead of writing a recursive definition, Clare writes $C(n) = 80 \cdot \left(\frac{1}{2}\right)^n$, where C is the area, in square inches, of the paper after n cuts. Explain where the different terms in her expression came from.
 - b. Approximately what is the area of the paper after 10 cuts?

2. Kiran takes a piece of paper with length 8 inches and width 10 inches and cuts away one inch of the width. Then he does it again, and again. . .

a. Complete the table for the area of Kiran's paper $K(n)$, in square inches, after n cuts.

n	$K(n)$
0	80
1	
2	$80 - 8 - 8 = 80 - 8(2) = 64$
3	
4	
5	

b. Kiran says the area after 6 cuts, in square inches, is $80 - 8 \cdot 6$. Explain where the different terms in his expression came from.

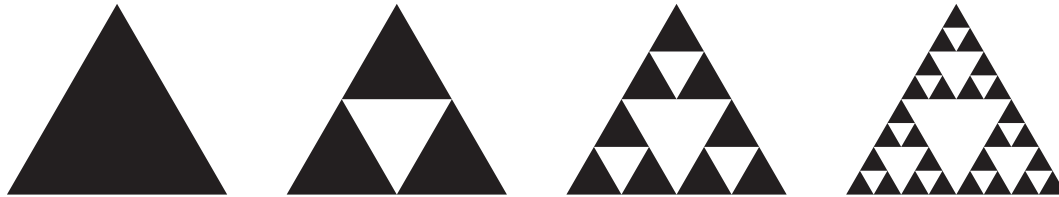
c. Write a definition for $K(n)$ that is not recursive.

3. Which is larger, $K(6)$ or $C(6)$?

3 A Sierpinski Triangle

Student Task Statement

A Sierpinski triangle can be created by starting with an equilateral triangle, breaking the triangle into 4 congruent equilateral triangles, and then removing the middle triangle. Starting from a single black equilateral triangle:



1. Let S be the number of black triangles in Step n . Define $S(n)$ recursively.
2. Andre and Lin are asked to write an equation for S that isn't recursive. Andre writes $S(n) = 3^n$ for $n \geq 0$ while Lin writes $S(n) = 3^{n-1}$ for $n \geq 1$. Whose equation do you think is correct? Explain or show your reasoning.