Finding Patterns in the Sierpinski Tetrahedron

Stage	Number of tetrahedra	Length of one edge	Total length of edges	Area of one face	Total Surface Area	Volume of one tetrahedron	Total volume
0							
1							
2							
3							
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
n							

Developed through the National Science Foundation Project *Pattern Exploration: Integrating Mathematics and Science for the Middle Grades, 1999*

Answer Keys for
The Sierpinski Triangle Unit 4

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Finding Patterns in the Sierpinski Tetrahedron Answer Key

Stage	Number of tetrahedra	Length of one edge	Total length of edges	Area of one face	Total Surface Area	Volume of one tetrahedron	Total volume
0	1	e	$6e$	A	$4A$	V	V
1	4	$\frac{1}{2}e$	$4 \cdot 6 \cdot \frac{1}{2}e$	$\frac{1}{4}A$	$4 \cdot 4 \cdot \frac{1}{4} \cdot A = 4A$	$\frac{1}{8}V$	$4 \cdot \left(\frac{1}{8}\right)V$
2	16	$\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)e$	$16 \cdot 6 \cdot \frac{1}{4}e$	$\left(\frac{1}{4}\right)\left(\frac{1}{4}\right)A$	$16 \cdot 4 \cdot \frac{1}{16} \cdot A = 4A$	$\left(\frac{1}{8}\right)\left(\frac{1}{8}\right)V$	$16 \cdot \left(\frac{1}{8}\right)^2 V$
3	64	$\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)e$	$64 \cdot 6 \cdot \frac{1}{8}e$	$\left(\frac{1}{4}\right)\left(\frac{1}{4}\right)\left(\frac{1}{4}\right)A$	$64 \cdot 4 \cdot \frac{1}{64} \cdot A = 4A$	$\left(\frac{1}{8}\right)\left(\frac{1}{8}\right)\left(\frac{1}{8}\right)V$	$64 \cdot \left(\frac{1}{8}\right)^3 V$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
n	4^n	$\left(\frac{1}{2}\right)^n e$	$4^n \cdot 6 \cdot \left(\frac{1}{2}\right)^n e = 6 \cdot 2^n$	$\left(\frac{1}{4}\right)^n A$	$4^n \cdot 4 \cdot \frac{1}{4^n} A = 4A$	$\left(\frac{1}{8}\right)^n V$	$4^n \cdot \left(\frac{1}{8}\right)^n V = \left(\frac{1}{2}\right)^n V$