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The Koch Snowflake

Start with this equaletrial triangle of length L, area A.

Iteration	No. of △	No. of sides	Length of each side	Total length	No. of small △ added	Area of each small △	Total area added	Total Area	Notes
1	1	3	L	3L				A	
2	6	$3\times4=12$	$\frac{1}{3}\times L$	$3\times4\times(\frac{1}{3}L)$	3	$\frac{1}{9}\times A$	$3\times(\frac{1}{9}A)$	$A+3\times(\frac{1}{9}\times A)$	each side — is replaced by a _/_ which has 4 sides. Refer to Notes *
3	$6+6\times2$ $=18$	$3\times4\times4$ $=3\times4^2$	$\frac{1}{3}\times(\frac{1}{3}\times L)$ $=(\frac{1}{3})^2L$	$3\times4^2\times(\frac{1}{3})^2\times L$	6×2	$\frac{1}{9}\times(\frac{1}{9}A)$ $=(\frac{1}{9})^2A$	$6\times2\times(\frac{1}{9})^2A$	$A+6\times2\times(\frac{1}{9})^2A$	
4	$6+6\times2\times2$ $=30$	$3\times4\times4\times4$ $=3\times4^3$	$\frac{1}{3}(\frac{1}{3}\times(\frac{1}{3}\times L))$ $(\frac{1}{3})^3L$	$3\times4^3\times(\frac{1}{3})^3\times L$	$6\times2\times2$	$\frac{1}{9}\times(\frac{1}{9})^2A$ $=(\frac{1}{9})^3A$	$6\times2\times2\times(\frac{1}{9})^3A$ $=6\times2^2(\frac{1}{9})^3A$	$A+6\times2^2(\frac{1}{9})^3A$	
n^{th}	$6+6\times2^{n-2}$	$3\times4^{n-1}$	$(\frac{1}{3})^{n-1}L$	$3\times4^{n-1}\times(\frac{1}{3})^{n-1}\times L$	$6\times2^{n-2}$	$(\frac{1}{9})^{n-1}A$	$6\times2^{n-2}(\frac{1}{9})^{n-1}A$	$A+6\times2^{n-2}(\frac{1}{9})^{n-1}A$ $(1+6\times2^{n-1}(\frac{1}{9})^{n-1})A$	

NOTES

△ ABC ≡ △ DEF } are the same

The small △ is $\frac{1}{9}$ of the big △