# Problem 44

The Koch Curve is one of the first Lindenmayer fractals ever described. It is formed via a sequence of transformations which replace each line segment with the figure $A$. The $i$th iteration will have line segments of length $k_i$ each. Those lengths form a geometric sequence with common ratio $r \approx .293$ as derived earlier. If $k_0 = 1$, find the total length of the Koch Curve after the 20th iteration to the nearest integer.

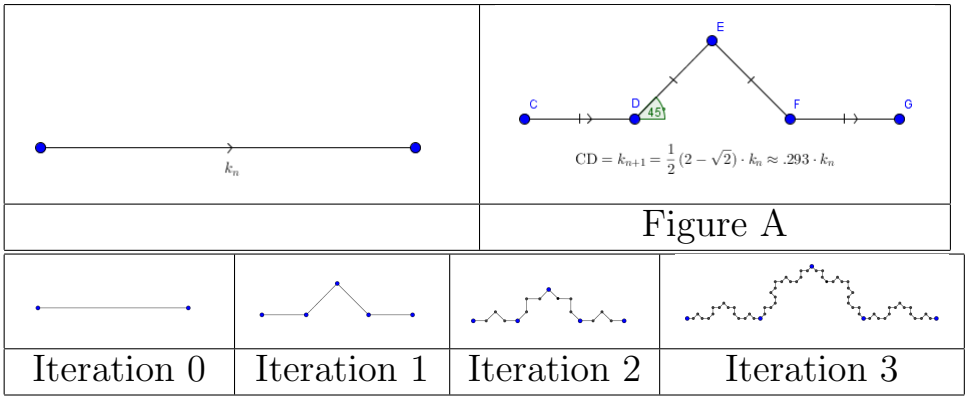


Figure A



Iteration 0 | Iteration 1 | Iteration 2 | Iteration 3

# Answer

$\boxed{24}$

## Explanation

Each line segment is replaced by 4 scaled line segments each .293 of the current size. Hence, the total length follows a geometric sequence with common ratio $r = 4 \cdot .293$. Thus, the answer is $(4 \cdot .293)^{20} \approx 23.9$.