Sequences   May 27

The Sierpinski gasket is a fractal created from an equilateral triangle. At each stage, the "middle" is cut out of each remaining equilateral triangle. The first three stages are shown.
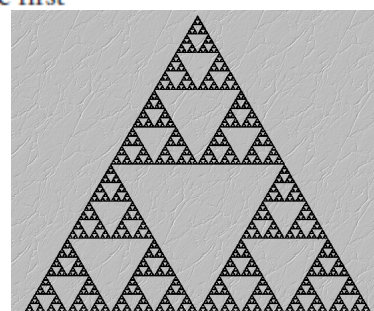
stage 1   stage 2   stage 3

a) If the process continues indefinitely, the stages get closer to the Sierpinski gasket. How many shaded triangles would be present in the sixth stage?
b) If the triangle in the first stage has an area of 80 cm², what is the area of the shaded portion of the 20th stage?

$$\#\triangle = 3^{n-1}$$

STAGE n	1	2	3	4	5	6	20
#SHADED △	1 3^0	3 3^1	9 3^2	27 3^3	81 3^4	243 3^5	1162261467 3^{19}

STAGE n	1	2	3	4	5	6	20
# NON SHADED △	0	1	4	13	40	121	581130733

1   3   9   27   81

$(t-1) \div 2$

$$A_{\substack{SHADED \\ IN\ STAGE \\ 20}} = \left(\frac{1162261467}{1162261467 + 581130733} \right) 80 = 53.\overline{3}\,cm^2$$

7.1 Arithmetic Sequences

-sequences with a common difference

a — FIRST TERM

d — COMMON DIFFERENCE

t_n — GENERAL TERM.

$$a \,,\, a+d \,,\, a+2d \,,\, a+3d \,,\, \cdots\cdots \,,\, a+(n-1)d$$
$$t_1 \quad t_2 \quad\quad t_3 \quad t_4 \quad\quad\quad\quad\quad t_n$$

$$\boxed{t_n = a + (n-1)d}$$

Determine the 100th term of the sequence 3,12,21,30,....

$$a = 3, \ d = 9$$

$$t_n = a + (n-1)d$$

$$t_{100} = 3 + (100-1)9 = \underline{\underline{894}}$$

The 7th term of an arithmetic sequence is 53. The 11th term is 97. Determine the 100th term.

$$t_7 = 53 \longrightarrow 53 = a + 6d \quad ① \quad n-1$$
$$t_{11} = 97 \longrightarrow 97 = a + 10d \quad ②$$

$$② - ① \quad 44 = 4d \longrightarrow d = 11$$
$$d \rightarrow ① \quad 53 = a + 6(11) \longrightarrow a = -13$$

$$t_n = a + (n-1)d$$
$$t_{100} = -13 + (100-1)(11) = 1076$$

How many terms are in the sequence, 6,17,28,39,......,435

$$a = 6$$
$$d = 11$$

$$t_n = a + (n-1)d$$
$$435 = 6 + (n-1)11$$
$$429 = 11(n-1)$$
$$\frac{429}{11} = n-1$$
$$39 = n-1$$
$$\boxed{40 = n}$$

p. 424#3,4,8i,iii,9,10,13abc,15,,17