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1990 Q21

21. A list of 8 numbers is formed by beginning with two given numbers. Each new number in the list is the product of the two previous numbers. Find the first number if the last three are shown:

$\underline{?}, \underline{\quad}, \underline{\quad}, \underline{\quad}, \underline{\quad}, \underline{16}, \underline{64}, \underline{1024}$

A) $\frac{1}{64}$ B) $\frac{1}{4}$ C) 1 D) 2 E) 4

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1998 Q22

22. Terri produces a sequence of positive integers by following three rules. She starts with a positive integer, then applies the appropriate rule to the result, and continues in this fashion.
Rule 1: If the integer is less than 10, multiply it by 9.
Rule 2: If the integer is even and greater than 9, divide it by 2.
Rule 3: If the integer is odd and greater than 9, subtract 5 from it.

A sample sequence: 23, 18, 9, 81, 76, ...
Find the 98^{th} term of the sequence that begins 98, 49, ...

(A) 6 **(B)** 11 **(C)** 22 **(D)** 27 **(E)** 54

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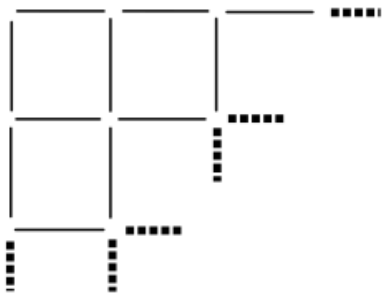
2013 Q22

22. Toothpicks are used to make a grid that is 60 toothpicks long and 32 toothpicks high. How many toothpicks are used altogether?



(A) 1920 **(B)** 1952 **(C)** 1980 **(D)** 2013 **(E)** 3932

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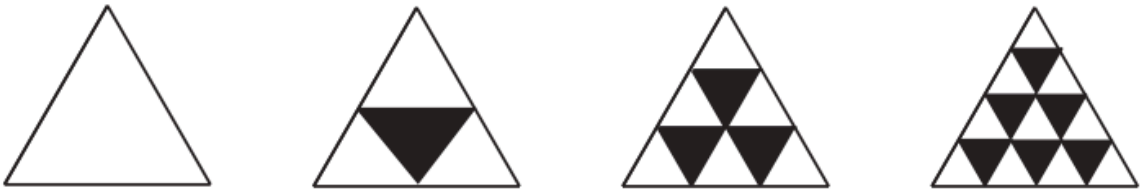
1998 Q23

23. If the pattern in the diagram continues, what fraction of the interior would be shaded in the eighth triangle?



(A) $\frac{3}{8}$ **(B)** $\frac{5}{27}$ **(C)** $\frac{7}{16}$ **(D)** $\frac{9}{16}$ **(E)** $\frac{11}{45}$

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1991 Q25

25. An equilateral triangle is originally painted black. Each time the triangle is changed, the middle fourth of each black triangle turns white. After five changes, what fractional part of the original area of the black triangle remains black?

(A) $\frac{1}{1024}$ (B) $\frac{15}{64}$ (C) $\frac{243}{1024}$ (D) $\frac{1}{4}$ (E) $\frac{81}{256}$