OMC Lecture Problems 10/7/2025 - Probability

Problem 2006 AMC 10 B 21

For a particular peculiar pair of dice, the probabilities of rolling 1, 2, 3, 4, 5, and 6, on each die are in the ratio $1:2:3:4:5:6$. What is the probability of rolling a total of 7 on the two dice?

$(\mathrm{A})\ \frac{4}{63} \quad (\mathrm{B})\ \frac{1}{8} \quad (\mathrm{C})\ \frac{8}{63} \quad (\mathrm{D})\ \frac{1}{6} \quad (\mathrm{E})\ \frac{2}{7}$

Problem 16 (2017 AMC 12B)

The number $21! = 51,090,942,171,709,440,000$ has over $60,000$ positive integer divisors. One of them is chosen at random. What is the probability that it is odd?

$(\mathbf{A})\ \frac{1}{21} \quad (\mathbf{B})\ \frac{1}{19} \quad (\mathbf{C})\ \frac{1}{18} \quad (\mathbf{D})\ \frac{1}{2} \quad (\mathbf{E})\ \frac{11}{21}$

2017 AMC 12B Problems/Problem 17

Problem

A coin is biased in such a way that on each toss the probability of heads is $\frac{2}{3}$ and the probability of tails is $\frac{1}{3}$. The outcomes of the tosses are independent. A player has the choice of playing Game A or Game B. In Game A she tosses the coin three times and wins if all three outcomes are the same. In Game B she tosses the coin four times and wins if both the outcomes of the first and second tosses are the same and the outcomes of the third and fourth tosses are the same. How do the chances of winning Game A compare to the chances of winning Game B?

$(\mathbf{A})$ The probability of winning Game A is $\frac{4}{81}$ less than the probability of winning Game B.

$\textbf{(B)}$ The probability of winning Game A is $\frac{2}{81}$ less than the probability of winning Game B.

$\textbf{(C)}$ The probabilities are the same.

$\textbf{(D)}$ The probability of winning Game A is $\frac{2}{81}$ greater than the probability of winning Game B.

$\textbf{(E)}$ The probability of winning Game A is $\frac{4}{81}$ greater than the probability of winning Game B.

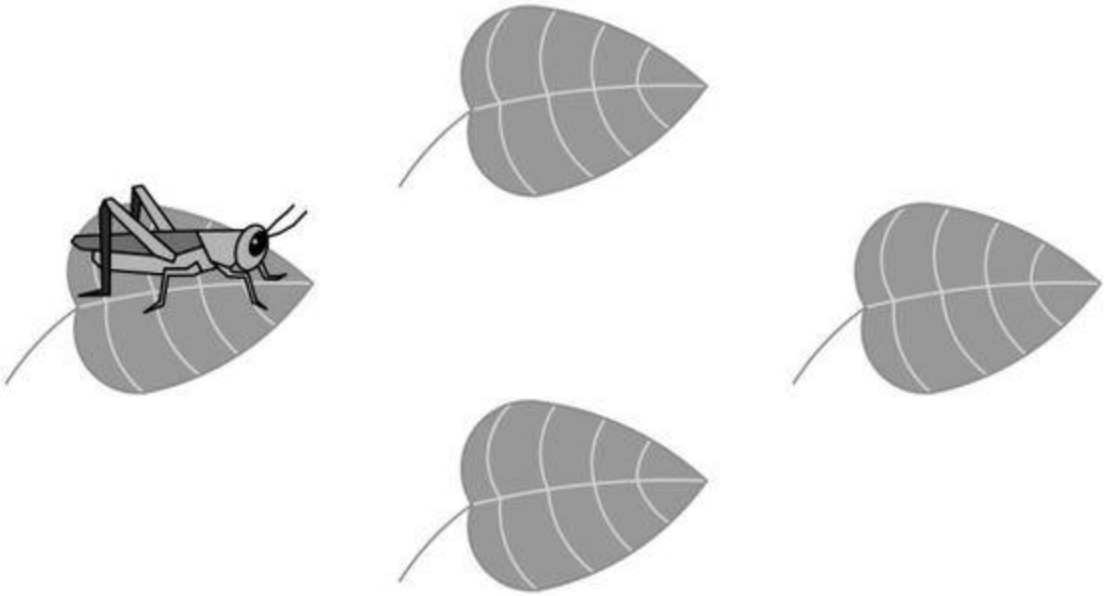
Problem 2000 AMC 12 #23

Professor Gamble buys a lottery ticket, which requires that he pick six different integers from 1 through 46, inclusive. He chooses his numbers so that the sum of the base-ten logarithms of his six numbers is an integer. It so happens that the integers on the winning ticket have the same property— the sum of the base-ten logarithms is an integer. What is the probability that Professor Gamble holds the winning ticket?

$\textbf{(A)}\ 1/5 \qquad \textbf{(B)}\ 1/4 \qquad \textbf{(C)}\ 1/3 \qquad \textbf{(D)}\ 1/2 \qquad \textbf{(E)}\ 1$

Problem 2022 AMC 8 #25

A cricket randomly hops between 4 leaves, on each turn hopping to one of the other 3 leaves with equal probability. After 4 hops what is the probability that the cricket has returned to the leaf where it started?



$\textbf{(A)}\ \frac{2}{9} \qquad \textbf{(B)}\ \frac{19}{80} \qquad \textbf{(C)}\ \frac{20}{81} \qquad \textbf{(D)}\ \frac{1}{4} \qquad \textbf{(E)}\ \frac{7}{27}$

Problem 17 (2021 Fall 12B)

A bug starts at a vertex of a grid made of equilateral triangles of side length 1. At each step the bug moves in one of the 6 possible directions along the grid lines randomly and independently with equal probability. What is the probability that after 5 moves the bug never will have been more than 1 unit away from the starting position?

$\textbf{(A)}\ \frac{13}{108} \qquad \textbf{(B)}\ \frac{7}{54} \qquad \textbf{(C)}\ \frac{29}{216} \qquad \textbf{(D)}\ \frac{4}{27} \qquad \textbf{(E)}\ \frac{1}{16}$

Answers:

21-2006 AMC10B - C

16-2017 AMC12B - B

17-2017 AMB12B – D

23-2000 AMC 12 - B

25-2022 AMC 8)- E

17-2021 Fall 12B) - A