

AMC 10 Statistics and Probability Problems- Year wise

American Mathematics contest 10 (AMC 10) - Statistics problems

AMC 10A 2019 Problem 20

The numbers $1, 2, \dots, 9$ are randomly placed into the 9 squares of a 3×3 grid. Each square gets one number, and each of the numbers is used once. What is the probability that the sum of the numbers in each row and each column is odd?

- (A) $\frac{1}{21}$ (B) $\frac{1}{14}$ (C) $\frac{5}{63}$ (D) $\frac{2}{21}$ (E) $\frac{1}{7}$

AMC 10A 2019 Problem 22

Real numbers between 0 and 1, inclusive, are chosen in the following manner. A fair coin is flipped. If it lands heads, then it is flipped again and the chosen number is 0 if the second flip is heads and 1 if the second flip is tails. On the other hand, if the first coin flip is tails, then the number is chosen uniformly at random from the closed interval $[0, 1]$. Two random numbers x and y are chosen independently in this manner. What is the probability that $|x - y| > \frac{1}{2}$?

- (A) $\frac{1}{3}$ (B) $\frac{7}{16}$ (C) $\frac{1}{2}$ (D) $\frac{9}{16}$ (E) $\frac{2}{3}$

AMC 10A 2018 Problem 11

When 7 fair standard 6-sided dice are thrown, the probability that the sum of the numbers on the top faces is 10 can be written as $\frac{n}{6^7}$, where n is a positive integer. What is n ?

- (A) 42 (B) 49 (C) 56 (D) 63 (E) 84

AMC 10A 2018 Problem 19

A number m is randomly selected from the set $11, 13, 15, 17, 19$, and a number n is randomly selected from $1999, 2000, 2001, \dots, 2018$. What is the probability that m^n has a units digit of 1?

- (A) $\frac{1}{5}$ (B) $\frac{1}{4}$ (C) $\frac{3}{10}$ (D) $\frac{7}{20}$ (E) $\frac{2}{5}$

AMC 10A 2020 Problem 11

What is the median of the following list of 4040 numbers?

$1, 2, 3, \dots, 2020, 1^2, 2^2, 3^2, \dots, 2020^2$

- (A) 1974.5 (B) 1975.5 (C) 1976.5 (D) 1977.5 (E) 1978.5

AMC 10A 2020 Problem 2

The numbers 3, 5, 7, a , and b have an average (arithmetic mean) of 15. What is the average of a and b ?

- (A) 0 (B) 15 (C) 30 (D) 45 (E) 60

AMC 10A 2020 Problem 13

A frog sitting at the point $(1, 2)$ begins a sequence of jumps, where each jump is parallel to one of the coordinate axes and has length 1, and the direction of each jump (up, down, right, or left) is chosen independently at random. The sequence ends when the frog reaches a side of the square with vertices $(0, 0)$, $(0, 4)$, $(4, 4)$, and $(4, 0)$. What is the probability that the sequence of jumps ends on a vertical side of the square?

- (A) $\frac{1}{2}$ (B) $\frac{5}{8}$ (C) $\frac{2}{3}$ (D) $\frac{3}{4}$ (E) $\frac{7}{8}$

AMC 10A 2020 Problem 15

A positive integer divisor of $12!$ is chosen at random. The probability that the divisor chosen is a perfect square can be expressed as $\frac{m}{n}$, where m and n are relatively prime positive integers. What is $m + n$?

- (A) 3 (B) 5 (C) 12 (D) 18 (E) 23

AMC 10A 2020 Problem 25

Jason rolls three fair standard six-sided dice. Then he looks at the rolls and chooses a subset of the dice (possibly empty, possibly all three dice) to reroll. After rerolling, he wins if and only if the sum of the numbers face up on the three dice is exactly 7. Jason always plays to optimize his chances of winning. What is the probability that he chooses to reroll exactly two of the dice?

- (A) $\frac{7}{36}$ (B) $\frac{5}{24}$ (C) $\frac{2}{9}$ (D) $\frac{17}{72}$ (E) $\frac{1}{4}$

AMC 10A 2019 Problem 4

A box contains 28 red balls, 20 green balls, 19 yellow balls, 13 blue balls, 11 white balls, and 9 black balls. What is the minimum number of balls that must be drawn from the box without replacement to guarantee that at least 15 balls of a single color will be drawn?

- (A) 75 (B) 76 (C) 79 (D) 84 (E) 91

AMC 10A 2019 Problem 14

For a set of four distinct lines in a plane, there are exactly N distinct points that lie on two or more of the lines. What is the sum of all possible values of N ?

- (A) 14 (B) 16 (C) 18 (D) 19 (E) 21

AMC 10A 2019 Problem 17



A child builds towers using identically shaped cubes of different colors. How many different towers can the child build with 2 red cubes, 3 blue cubes, and 4 green cubes? (One cube will be left out.)

- (A) 24 (B) 288 (C) 312 (D) 1,260 (E) 40,320

AMC 10B, 2019 Problem 7

Each piece of candy in a store costs a whole number of cents. Casper has exactly enough money to buy either 12 pieces of red candy, 14 pieces of green candy, 15 pieces of blue candy, or n pieces of purple candy. A piece of purple candy costs 20 cents. What is the smallest possible value of n ?

- (A) 18 (B) 21 (C) 24 (D) 25 (E) 28

AMC 10B 2019 Problem 9

The function f is defined by $[f(x) = \lfloor |x| \rfloor - \lfloor \lfloor x \rfloor \rfloor]$ for all real numbers x , where $\lfloor r \rfloor$ denotes the greatest integer less than or equal to the real number r . What is the range of f ?

- (A) $-1, 0$
 (B) The set of nonpositive integers
 (C) $-1, 0, 1$
 (D) 0
 (E) The set of nonnegative integers

AMC 10B 2019 Problem 13

What is the sum of all real numbers x for which the median of the numbers 4, 6, 8, 17, and x is equal to the mean of those five numbers?

- (A) -5 (B) 0 (C) 5 (D) $\frac{15}{4}$ (E) $\frac{35}{4}$

AMC 10B 2019 Problem 17

A red ball and a green ball are randomly and independently tossed into bins numbered with positive integers so that for each ball, the probability that it is tossed into bin k is 2^{-k} for $k = 1, 2, 3, \dots$. What is the probability that the red ball is tossed into a higher-numbered bin than the green ball?

- (A) $\frac{1}{4}$ (B) $\frac{2}{7}$ (C) $\frac{1}{3}$ (D) $\frac{3}{8}$ (E) $\frac{3}{7}$

AMC 10B 2019 Problem 19

Let S be the set of all positive integer divisors of 100,000. How many numbers are the product of two distinct elements of S ?

- (A) 98 (B) 100 (C) 117 (D) 119 (E) 121

AMC 10B, 2019 Problem 21

Debra flips a fair coin repeatedly, keeping track of how many heads and how many tails she has seen in total, until she gets either two heads in a row or two tails in a row, at which point she stops flipping. What is the probability that she gets two heads in a row but she sees a second tail before she sees a second head?

- (A) $\frac{1}{4}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) $\frac{2}{3}$ (E) $\frac{3}{4}$



(A) $\frac{1}{36}$ (B) $\frac{1}{24}$ (C) $\frac{1}{18}$ (D) $\frac{1}{12}$ (E) $\frac{1}{6}$

AMC 10A 2018 Problem 4

How many ways can a student schedule 3 mathematics courses -- algebra, geometry, and number theory -- over a 3-day period if no two mathematics courses can be taken in consecutive periods? (What courses the student takes during the 3 periods is of no concern here.)

(A) 3 (B) 6 (C) 12 (D) 18 (E) 24

AMC 10A 2018 Problem 5

Alice, Bob, and Charlie were on a hike and were wondering how far away the nearest town was. When Alice said, "We are at least 6 miles away," Bob replied, "We are at most 5 miles away." Charlie then remarked, "Actually the nearest town is at most 4 miles away." It turned out that none of the three statements were true. Let d be the distance in miles to the nearest town. Which of the following intervals is the set of all possible values of d ?

(A) $(0, 4)$ (B) $(4, 5)$ (C) $(4, 6)$ (D) $(5, 6)$ (E) $(5, \infty)$

AMC 10A 2018 Problem 11

When 7 fair standard 6-sided dice are thrown, the probability that the sum of the numbers on the top faces is 10 can be written as $\frac{n}{6^7}$, where n is a positive integer. What is n ?

(A) 42 (B) 49 (C) 56 (D) 63 (E) 84

AMC 10A 2018 Problem 17

Let S be a set of 6 integers taken from $1, 2, \dots, 12$ with the property that if a and b are elements of S with $a < b$, then b is not a multiple of a . What is the least possible value of an element in S ?

(A) 2 (B) 3 (C) 4 (D) 5 (E) 7

AMC 10A 2018 Problem 19

A number m is randomly selected from the set $11, 13, 15, 17, 19$, and a number n is randomly selected from $1999, 2000, 2001, \dots, 2018$. What is the probability that m^n has a units digit of 1?

(A) $\frac{1}{5}$ (B) $\frac{1}{4}$ (C) $\frac{3}{10}$ (D) $\frac{7}{20}$ (E) $\frac{2}{5}$

AMC 10B 2018 Problem 5

How many subsets of $2, 3, 4, 5, 6, 7, 8, 9$ contain at least one prime number?

(A) 128 (B) 192 (C) 224 (D) 240 (E) 256

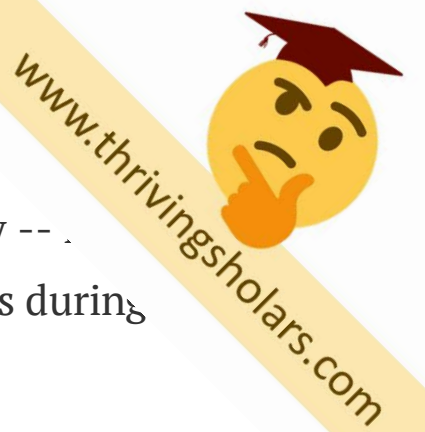
AMC 10B 2018 Problem 6

A box contains 5 chips, numbered 1, 2, 3, 4, and 5. Chips are drawn randomly one at a time without replacement until the sum of the values drawn exceeds 4. What is the probability that 3 draws are required?

(A) $\frac{1}{15}$ (B) $\frac{1}{10}$ (C) $\frac{1}{6}$ (D) $\frac{1}{5}$ (E) $\frac{1}{4}$

AMC 10B 2018 Problem 9

The faces of each of 7 standard dice are labeled with the integers from 1 to 6. Let p be the probability that when all 7 dice are rolled, the sum of the numbers on the top faces is 10. What other sum occurs with the same probability p ?



(A) 13 (B) 26 (C) 32 (D) 39 (E) 42

AMC 10B 2018 Problem 14

A list of 2018 positive integers has a unique mode, which occurs exactly 10 times. What is the least number of values that can occur in the list?

(A) 202 (B) 223 (C) 224 (D) 225 (E) 234

AMC 10B 2018 Problem 18

Three young brother-sister pairs from different families need to take a trip in a van. These six children will occupy the second and third rows in the van, each of which has three seats. To avoid disruptions, siblings may not sit right next to each other in the same row, and no child may sit directly in front of his or her sibling. How many seating arrangements are possible for this trip?

(A) 60 (B) 72 (C) 92 (D) 96 (E) 120

AMC 10B 2018 Problem 22

Real numbers x and y are chosen independently and uniformly at random from the interval $[0, 1]$. Which of the following numbers is closest to the probability that x , y , and 1 are the side lengths of an obtuse triangle?

(A) 0.21 (B) 0.25 (C) 0.29 (D) 0.50 (E) 0.79

AMC 10A 2017 Problem 12

Let S be a set of points (x, y) in the coordinate plane such that two of the three quantities 3, $x + 2$, and $y - 4$ are equal and the third of the three quantities is no greater than this common value. Which of the following is a correct description for S ?

(A) a single point (B) two intersecting lines
(C) three lines whose pairwise intersections are three distinct points (D) a triangle
(E) three rays with a common endpoint

AMC 10A 2017 Problem 15

Chloé chooses a real number uniformly at random from the interval $[0, 2017]$. Independently, Laurent chooses a real number uniformly at random from the interval $[0, 4034]$. What is the probability that Laurent's number is greater than Chloé's number? (Assume they cannot be equal)

(A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) $\frac{3}{4}$ (D) $\frac{5}{6}$ (E) $\frac{7}{8}$

AMC 10A 2017 Problem 18

Amelia has a coin that lands heads with probability $\frac{1}{3}$, and Blaine has a coin that lands on heads with probability $\frac{2}{5}$. Amelia and Blaine alternately toss their coins until someone gets a head; the first one to get a head wins. All coin tosses are independent. Amelia goes first. The probability that Amelia wins is $\frac{p}{q}$, where p and q are relatively prime positive integers. What is $q - p$?

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

AMC 10A 2017 Problem 19

Alice refuses to sit next to either Bob or Carla. Derek refuses to sit next to Eric. How many ways are there for the five of them to sit in a row of 5 chairs under these conditions?

(A) 12 (B) 16 (C) 28 (D) 32 (E) 40

AMC 10A 2017 Problem 9

A radio program has a quiz consisting of 3 multiple-choice questions, each with 3 choices. A contestant wins if he gets 2 or more of the questions right. The contestant answers randomly to each question. What is the probability of winning?

(A) $\frac{1}{27}$ (B) $\frac{1}{9}$ (C) $\frac{2}{9}$ (D) $\frac{7}{27}$ (E) $\frac{1}{2}$

AMC 10A 2017 Problem 25

How many integers between 100 and 999, inclusive, have the property that some permutation of its digits is a multiple of 11 between 100 and 999? For example, both 121 and 211 have this property.

(A) 226 (B) 243 (C) 270 (D) 469 (E) 486

AMC 10B 2017 Problem 14

An integer N is selected at random in the range $1 \leq N \leq 2020$. What is the probability that the remainder when N^{16} is divided by 5 is 1?

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

AMC 10B 2017 Problem 18

In the figure below, 3 of the 6 disks are to be painted blue, 2 are to be painted red, and 1 is to be painted green. Two paintings that can be obtained from one another by a rotation or a reflection of the entire figure are considered the same. How many different paintings are possible?

(A) 6 (B) 8 (C) 9 (D) 12 (E) 15

AMC 10B 2017 Problem 20

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?

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

AMC 10A 2016 Problem 7

The mean, median, and mode of the 7 data values 60, 100, x , 40, 50, 200, 90 are all equal to x . What is the value of x ?

(A) 50 (B) 60 (C) 75 (D) 90 (E) 100

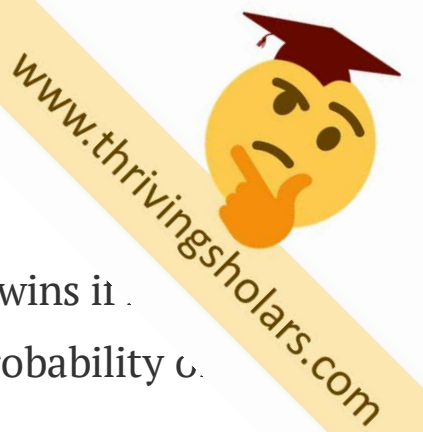
AMC 10A 2016 Problem 12

Three distinct integers are selected at random between 1 and 2016, inclusive. Which of the following is a correct statement about the probability p that the product of the three integers is odd?

(A) $p < \frac{1}{8}$ (B) $p = \frac{1}{8}$ (C) $\frac{1}{8} < p < \frac{1}{3}$ (D) $p = \frac{1}{3}$ (E) $p > \frac{1}{3}$

AMC 10A 2016 Problem 14

How many ways are there to write 2016 as the sum of twos and threes, ignoring order? (For example, $1008 \cdot 2 + 0 \cdot 3$ and $402 \cdot 2 + 404 \cdot 3$ are two such ways.)



(A) 236 (B) 336 (C) 337 (D) 403 (E) 672

AMC 10A 2016 Problem 17

Let N be a positive multiple of 5. One red ball and N green balls are arranged in a line in random order. Let $P(N)$ be the probability that at least $\frac{3}{5}$ of the green balls are on the same side of the red ball. Observe that $P(5) = 1$ and that $P(N)$ approaches $\frac{4}{5}$ as N grows large. What is the sum of the digits of the least value of N such that $P(N) < \frac{321}{400}$?

(A) 12 (B) 14 (C) 16 (D) 18 (E) 20

AMC 10A 2016 Problem 18

Each vertex of a cube is to be labeled with an integer 1 through 8, with each integer being used once, in such a way that the sum of the four numbers on the vertices of a face is the same for each face. Arrangements that can be obtained from each other through rotations of the cube are considered to be the same. How many different arrangements are possible?

(A) 1 (B) 3 (C) 6 (D) 12 (E) 24

AMC 10B 2016 Problem 6

Laura added two three-digit positive integers. All six digits in these numbers are different. Laura's sum is a three-digit number S . What is the smallest possible value for the sum of the digits of S ?

(A) 1 (B) 4 (C) 5 (D) 15 (E) 20

AMC 10B 2016 Problem 12

Two different numbers are selected at random from $(1, 2, 3, 4, 5)$ and multiplied together. What is the probability that the product is even?

(A) 0.2 (B) 0.4 (C) 0.5 (D) 0.7 (E) 0.8

AMC 10B 2016 Problem 16

The sum of an infinite geometric series is a positive number S , and the second term in the series is 1. What is the smallest possible value of S ?

(A) $\frac{1+\sqrt{5}}{2}$ (B) 2 (C) $\sqrt{5}$ (D) 3 (E) 4

AMC 10B 2016 Problem 17

All the numbers 2, 3, 4, 5, 6, 7 are assigned to the six faces of a cube, one number to each face. For each of the eight vertices of the cube, a product of three numbers is computed, where the three numbers are the numbers assigned to the three faces that include that vertex. What is the greatest possible value of the sum of these eight products?

(A) 312 (B) 343 (C) 625 (D) 729 (E) 1680

AMC 10B 2016 Problem 22

A set of teams held a round-robin tournament in which every team played every other team exactly once. Every team won 10 games and lost 10 games; there were no ties. How many sets of three teams A, B, C were there in which A beat B , B beat C , and C beat A ?

(A) 385 (B) 665 (C) 945 (D) 1140 (E) 1330

AMC 10A 2015 Problem 10

How many rearrangements of $abcde$ are there in which no two adjacent letters are also adjacent letters in the alphabet? For



How many rearrangements of $abca$ are there in which no two adjacent letters are also adjacent in $abca$? For example, no such rearrangements could include either ab or ba .

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

AMC 10A 2015 Problem 25

Let S be a square of side length 1. Two points are chosen at random on the sides of S . The probability that the straight distance between the points is at least $\frac{1}{2}$ is $\frac{a-b\pi}{c}$, where a , b , and c are positive integers with $\gcd(a, b, c) = 1$. What is $a + b + c$?

- (A) 59 (B) 60 (C) 61 (D) 62 (E) 63

AMC 10B 2015 Problem 11

How many ways are there to write 2016 as the sum of twos and threes, ignoring order? (For example, $1008 \cdot 2 + 0 \cdot 3$ and $402 \cdot 2 + 404 \cdot 3$ are two such ways.)

- (A) 236 (B) 336 (C) 337 (D) 403 (E) 672

AMC 10B 2015 Problem 15

The town of Hamlet has 3 people for each horse, 4 sheep for each cow, and 3 ducks for each person. Which of the following could not possibly be the total number of people, horses, sheep, cows, and ducks in Hamlet?

- (A) 41 (B) 47 (C) 59 (D) 61 (E) 66

AMC 10B 2015 Problem 16

Al, Bill, and Cal will each randomly be assigned a whole number from 1 to 10, inclusive, with no two of them getting the same number. What is the probability that Al's number will be a whole number multiple of Bill's and Bill's number will be a whole number multiple of Cal's?

- (A) $\frac{9}{1000}$ (B) $\frac{1}{90}$ (C) $\frac{1}{80}$ (D) $\frac{1}{72}$ (E) $\frac{2}{121}$

AMC 10B 2015 Problem 18

Johann has 64 fair coins. He flips all the coins. Any coin that lands on tails is tossed again. Coins that land on tails on the second toss are tossed a third time. What is the expected number of coins that are now heads?

- (A) 32 (B) 40 (C) 48 (D) 56 (E) 64

AMC 10A 2014 Problem 4

Walking down Jane Street, Ralph passed four houses in a row, each painted a different color. He passed the orange house before the red house, and he passed the blue house before the yellow house. The blue house was not next to the yellow house. How many orderings of the colored houses are possible?

- (A) 2 (B) 3 (C) 4 (D) 5 (E) 6

AMC 10A 2014 Problem 17

Three fair six-sided dice are rolled. What is the probability that the values shown on two of the dice sum to the value shown on the remaining die?

- (A) $\frac{1}{6}$ (B) $\frac{13}{72}$ (C) $\frac{7}{36}$ (D) $\frac{5}{24}$ (E) $\frac{2}{9}$

AMC 10B 2014 Problem 16



Four fair six-sided dice are rolled. What is the probability that at least three of the four dice show the same number?

- (A) $\frac{1}{36}$ (B) $\frac{7}{72}$ (C) $\frac{1}{9}$ (D) $\frac{5}{36}$ (E) $\frac{1}{6}$

AMC 10B 2014 Problem 18

A list of 11 positive integers has a mean of 10, a median of 9, and a unique mode of 8. What is the largest possible value of an integer in the list?

- (A) 24 (B) 30 (C) 31 (D) 33 (E) 35

AMC 10B 2014 Problem 24

The numbers 1, 2, 3, 4, 5 are to be arranged in a circle. An arrangement is bad if it is not true that for every n from 1 to 15 one can find a subset of the numbers that appear consecutively on the circle that sum to n . Arrangements that differ only by a rotation or a reflection are considered the same. How many different bad arrangements are there?

- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

AMC 10B 2014 Problem 25

In a small pond there are eleven lily pads in a row labeled 0 through 10. A frog is sitting on pad 1. When the frog is on pad N , $0 < N < 10$, it will jump to pad $N - 1$ with probability $\frac{N}{10}$ and to pad $N + 1$ with probability $1 - \frac{N}{10}$. Each jump is independent of the previous jumps. If the frog reaches pad 0 it will be eaten by a patiently waiting snake. If the frog reaches pad 10 it will exit the pond, never to return. What is the probability that the frog will escape without being eaten by the snake?

- (A) $\frac{32}{79}$ (B) $\frac{161}{384}$ (C) $\frac{63}{146}$ (D) $\frac{7}{16}$ (E) $\frac{1}{2}$

AMC 10A 2013 Problem 7

A student must choose a program of four courses from a menu of courses consisting of English, Algebra, Geometry, History, Art, and Latin. This program must contain English and at least one mathematics course. In how many ways can this program be chosen?

- (A) 6 (B) 8 (C) 9 (D) 12 (E) 16

AMC 10A 2013 Problem 11

A student council must select a two-person welcoming committee and a three-person planning committee from among its members. There are exactly 10 ways to select a two-person team for the welcoming committee. It is possible for students to serve on both committees. In how many different ways can a three-person planning committee be selected?

- (A) 10 (B) 12 (C) 15 (D) 18 (E) 25

AMC 10A 2013 Problem 24

Central High School is competing against Northern High School in a backgammon match. Each school has three players, and the contest rules require that each player play two games against each of the other school's players. The match takes place in six rounds, with three games played simultaneously in each round. In how many different ways can the match be scheduled?

- (A) 540 (B) 600 (C) 720 (D) 810 (E) 900

AMC 10B 2013 Problem 12



Let S be the set of sides and diagonals of a regular pentagon. A pair of elements of S are selected without replacement. What is the probability that the two chosen segments have the same length?

- (A) $\frac{2}{5}$ (B) $\frac{4}{9}$ (C) $\frac{1}{2}$ (D) $\frac{5}{9}$ (E) $\frac{4}{5}$

AMC 10A 2012 Problem 9

A pair of six-sided dice are labeled so that one die has only even numbers (two each of 2, 4, and 6), and the other die has only odd numbers (two of each 1, 3, and 5). The pair of dice is rolled. What is the probability that the sum of the numbers on the tops of the two dice is 7?

- (A) $\frac{1}{6}$ (B) $\frac{1}{5}$ (C) $\frac{1}{4}$ (D) $\frac{1}{3}$ (E) $\frac{1}{2}$

AMC 10A 2012 Problem 20

A 3×3 square is partitioned into 9 unit squares. Each unit square is painted either white or black with each color being equally likely, chosen independently and at random. The square is then rotated 90° clockwise about its center, and every white square in a position formerly occupied by a black square is painted black. The colors of all other squares are left unchanged. What is the probability the grid is now entirely black?

- (A) $\frac{49}{512}$ (B) $\frac{7}{64}$ (C) $\frac{121}{1024}$ (D) $\frac{81}{512}$ (E) $\frac{9}{32}$

AMC 10A 2012 Problem 23

Adam, Benin, Chiang, Deshawn, Esther, and Fiona have internet accounts. Some, but not all, of them are internet friends with each other, and none of them has an internet friend outside this group. Each of them has the same number of internet friends. In how many different ways can this happen?

- (A) 60 (B) 170 (C) 290 (D) 320 (E) 660

AMC 10A 2012 Problem 25

Real numbers x , y , and z are chosen independently and at random from the interval $[0, n]$ for some positive integer n . The probability that no two of x , y , and z are within 1 unit of each other is greater than $\frac{1}{2}$. What is the smallest possible value of n ?

- (A) 7 (B) 8 (C) 9 (D) 10 (E) 11

AMC 10B 2012 Problem 11

A dessert chef prepares the dessert for every day of a week starting with Sunday. The dessert each day is either cake, pie, ice cream, or pudding. The same dessert may not be served two days in a row. There must be cake on Friday because of a birthday. How many different dessert menus for the week are possible?

- (A) 729 (B) 972 (C) 1024 (D) 2187 (E) 2304

AMC 10B 2012 Problem 15

In a round-robin tournament with 6 teams, each team plays one game against each other team, and each game results in one team winning and one team losing. At the end of the tournament, the teams are ranked by the number of games won. What is the maximum number of teams that could be tied for the most wins at the end of the tournament?

- (A) 2 (B) 3 (C) 4 (D) 5 (E) 6

AMC 10B 2012 Problem 24



Amy, Beth, and Jo listen to four different songs and discuss which ones they like. No song is liked for each of the three pairs of the girls, there is at least one song liked by those girls but disliked by the other. In how many different ways is this possible?

- (A) 108 (B) 132 (C) 671 (D) 846 (E) 1105

AMC 10A 2011 Problem 6

Set A has 20 elements, and set B has 15 elements. What is the smallest possible number of elements in $A \cup B$, the union of A and B ?

- (A) 5 (B) 15 (C) 20 (D) 35 (E) 300

AMC 10A 2011 Problem 14

A pair of standard 6-sided fair dice is rolled once. The sum of the numbers rolled determines the diameter of a circle. What is the probability that the numerical value of the area of the circle is less than the numerical value of the circle's circumference?

- (A) $\frac{1}{36}$ (B) $\frac{1}{12}$ (C) $\frac{1}{6}$ (D) $\frac{1}{4}$ (E) $\frac{5}{18}$

AMC 10A 2011 Problem 20

Two points on the circumference of a circle of radius r are selected independently and at random. From each point a chord of length r is drawn in a clockwise direction. What is the probability that the two chords intersect?

- (A) $\frac{1}{6}$ (B) $\frac{1}{5}$ (C) $\frac{1}{4}$ (D) $\frac{1}{3}$ (E) $\frac{1}{2}$

AMC 10A 2011 Problem 21

Two counterfeit coins of equal weight are mixed with 8 identical genuine coins. The weight of each of the counterfeit coins is different from the weight of each of the genuine coins. A pair of coins is selected at random without replacement from the 10 coins. A second pair is selected at random without replacement from the remaining 8 coins. The combined weight of the first pair is equal to the combined weight of the second pair. What is the probability that all 4 selected coins are genuine?

- (A) $\frac{7}{11}$ (B) $\frac{9}{13}$ (C) $\frac{11}{15}$ (D) $\frac{15}{19}$ (E) $\frac{15}{16}$

AMC 10B 2011 Problem 13

Two real numbers are selected independently at random from the interval $[-20, 10]$. What is the probability that the product of those numbers is greater than zero?

- (A) $\frac{1}{9}$ (B) $\frac{1}{3}$ (C) $\frac{4}{9}$ (D) $\frac{5}{9}$ (E) $\frac{2}{3}$

AMC 10B 2011 Problem 16

A dart board is a regular octagon divided into regions as shown. Suppose that a dart thrown at the board is equally likely to land anywhere on the board. What is probability that the dart lands within the center square?

- (A) $\frac{\sqrt{2}-1}{2}$ (B) $\frac{1}{4}$ (C) $\frac{2-\sqrt{2}}{2}$ (D) $\frac{\sqrt{2}}{4}$ (E) $2 - \sqrt{2}$

AMC 10A 2010 Problem 18

Bernardo randomly picks 3 distinct numbers from the set 1, 2, 3, 4, 5, 6, 7, 8, 9 and arranges them in descending order to form a 3-digit number. Silvia randomly picks 3 distinct numbers from the set 1, 2, 3, 4, 5, 6, 7, 8 and also arranges them in descending order to form a 3-digit number. What is the probability that Bernardo's number is larger than Silvia's number?



descending order to form a 5-digit number. What is the probability that Bernardo's number is a

- (A) $\frac{47}{72}$ (B) $\frac{37}{56}$ (C) $\frac{2}{3}$ (D) $\frac{49}{72}$ (E) $\frac{39}{56}$

AMC 10A 2010 Problem 23

Each of 2010 boxes in a line contains a single red marble, and for $1 \leq k \leq 2010$, the box in the k th position also contains $k-1$ white marbles. Isabella begins at the first box and successively draws a single marble at random from each box, in order, until she draws a red marble. Let $P(n)$ be the probability that Isabella stops after drawing exactly n marbles. What is the smallest value of n for which $P(n) < \frac{1}{2010}$?

- (A) 45 (B) 63 (C) 64 (D) 201 (E) 1005

AMC 10A 2010 Problem 25

Jim starts with a positive integer n and creates a sequence of numbers. Each successive number is obtained by subtracting the largest possible integer square less than or equal to the current number until zero is reached. For example, if Jim starts with $n = 55$, then his sequence contains 5 numbers:

$$55 - 7^2 = 66 - 2^2 = 22 - 1^2 = 11 - 1^2 = 0$$

Let N be the smallest number for which Jim's sequence has 8 numbers. What is the units digit of N ?

- (A) 1 (B) 3 (C) 5 (D) 7 (E) 9

AMC 10B 2010 Problem 3

A drawer contains red, green, blue, and white socks with at least 2 of each color. What is the minimum number of socks that must be pulled from the drawer to guarantee a matching pair?

- (A) 3 (B) 4 (C) 5 (D) 8 (E) 9

[et_pb_team_member][et_pb_team_member name=

AMC 10B 2010 Problem 17

Every high school in the city of Euclid sent a team of 3 students to a math contest. Each participant in the contest received a different score. Andrea's score was the median among all students, and hers was the highest score on her team. Andrea's teammates Beth and Carla placed 37th and 64th, respectively. How many schools are in the city?

- (A) 22 (B) 23 (C) 24 (D) 25 (E) 26

AMC 10B 2010 Problem 18

Positive integers a , b , and c are randomly and independently selected with replacement from the set $1, 2, 3, \dots, 2010$. What is the probability that $abc + ab + a$ is divisible by 3?

- (A) $\frac{1}{3}$ (B) $\frac{29}{81}$ (C) $\frac{31}{81}$ (D) $\frac{11}{27}$ (E) $\frac{13}{27}$

AMC 10B 2010 Problem 21

A palindrome between 1000 and 10,000 is chosen at random. What is the probability that it is divisible by 7?

- (A) $\frac{1}{10}$ (B) $\frac{1}{9}$ (C) $\frac{1}{7}$ (D) $\frac{1}{6}$ (E) $\frac{1}{5}$

AMC 10B 2010 Problem 22

Seven distinct pieces of candy are to be distributed among three bags. The red bag and the blue bag must each receive at



least one piece of candy; the white bag may remain empty. How many arrangements are possible

(A) 1930 (B) 1931 (C) 1932 (D) 1933 (E) 1934

AMC 10B 2010 Problem 23

The entries in a 3×3 array include all the digits from 1 through 9, arranged so that the entries in every row and column are in increasing order. How many such arrays are there?

(A) 18 (B) 24 (C) 36 (D) 42 (E) 60

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