

2015-2019年AMC10B真题汇编含答案

2015 AMC 10B**Problem 1**

What is the value of $2 - (-2)^{-2}$?

$2 - (-2)^{-2}$ 的值是多少?

- (A) -2 (B) $\frac{1}{16}$ (C) $\frac{7}{4}$ (D) $\frac{9}{4}$ (E) 6

Problem 2

Marie does three equally time-consuming tasks in a row without taking breaks. She begins the first task at 1:00 PM and finishes the second task at 2:40 PM. When does she finish the third task?

Marie 连续做了 3 项耗时相同的任务，中间没有休息。她从下午 1:00 开始做第一个任务，在下午 2:40 完成第二个任务。她何时完成第三个任务？

- (A) 3:10 PM (B) 3:30 PM (C) 4:00 PM (D) 4:10 PM (E) 4:30 PM

Problem 3

Isaac has written down one integer two times and another integer three times. The sum of the five numbers is 100, and one of the numbers is 28. What is the other number?

Isaac 把一个整数写了 2 遍，另一个整数写了 3 遍，这 5 个数之和为 100. 其中一个数是 28，另一个数是多少？

- (A) 8 (B) 11 (C) 14 (D) 15 (E) 18

Problem 4

Four siblings ordered an extra large pizza. Alex ate $\frac{1}{5}$, Beth $\frac{1}{3}$, and Cyril $\frac{1}{4}$ of the pizza. Dan got the leftovers. What is the sequence of the siblings in decreasing order of the part of pizza they consumed?

4 个兄弟姐妹订购了一块大的比萨饼。Alex 吃了整块的 $\frac{1}{5}$ ，Beth 吃了 $\frac{1}{3}$ ，Cyril 吃了 $\frac{1}{4}$ ，Dan 吃了剩下的。下面那个选项是将这 4 个兄弟姐妹按照他们所吃的比萨饼的量降序排列？

- (A) Alex, Beth, Cyril, Dan (B) Beth, Cyril, Alex, Dan (C) Beth, Cyril, Dan, Alex
(D) Beth, Dan, Cyril, Alex (E) Dan, Beth, Cyril, Alex

Problem 5

David, Hikmet, Jack, Marta, Rand, and Todd were in a 12-person race with 6 other people. Rand finished 6 places ahead of Hikmet. Marta finished 1 place behind Jack. David finished 2 places behind Hikmet. Jack finished 2 places behind Todd. Todd finished 1 place behind Rand. Marta finished in 6th place. Who finished in 8th place?

David, Hikmet, Jack, Marta, Rand, Todd 和其他 6 人参加了一场 12 人的比赛。Rand 排在 Hikmet 前面 6 位，Marta 排在 Jack 后面 1 位，David 排在 Hikmet 的后面 2 位，Jack 排在 Todd 后面 2 位，Todd 排在 Rand 后面 1 位。Marta 排名第 6。排在第 8 的是谁？

- (A) David (B) Hikmet (C) Jack (D) Rand (E) Todd

Problem 6

Marley practices exactly one sport each day of the week. She runs three days a week but never on two consecutive days. On Monday she plays basketball and two days later golf. She swims and plays tennis, but she never plays tennis the day after running or swimming. Which day of the week does Marley swim?

Marley 每周每天仅练习一项运动。她每周有三天跑步，但是不会有连续的两天都跑步，周一她打篮球，两天后打高尔夫球，她也游泳和打网球，但是不会在跑步或游泳的后一天打球。Marley 是周几游泳的？

- (A) Sunday (B) Tuesday (C) Thursday (D) Friday (E) Saturday

Problem 7

Consider the operation "minus the reciprocal of," defined by $a \diamond b = a - \frac{1}{b}$. What is $((1 \diamond 2) \diamond 3) - (1 \diamond (2 \diamond 3))$?

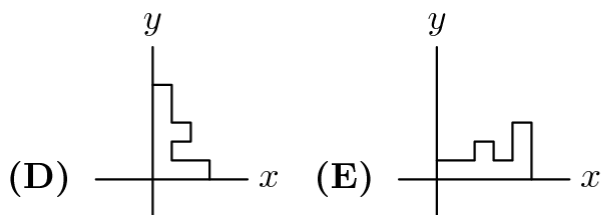
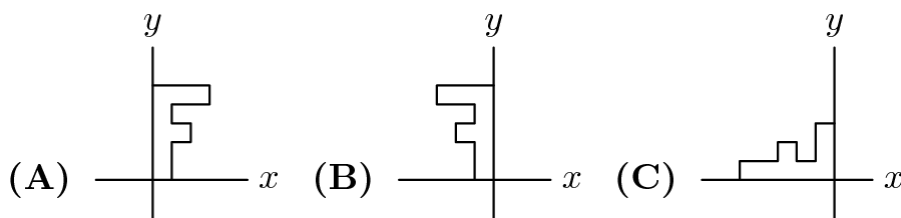
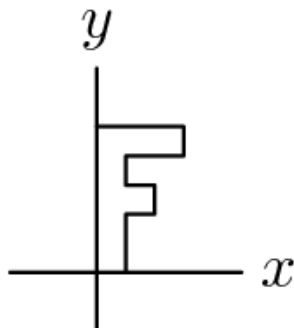
考虑操作符“减去某个数的倒数”，定义为 $a \diamond b = a - \frac{1}{b}$ 。那么 $((1 \diamond 2) \diamond 3) - (1 \diamond (2 \diamond 3))$ 是多少？

- (A) $-\frac{7}{30}$ (B) $-\frac{1}{6}$ (C) 0 (D) $\frac{1}{6}$ (E) $\frac{7}{30}$

Problem 8

The letter F shown below is rotated 90° clockwise around the origin, then reflected in the y -axis, and then rotated a half turn around the origin. What is the final image?

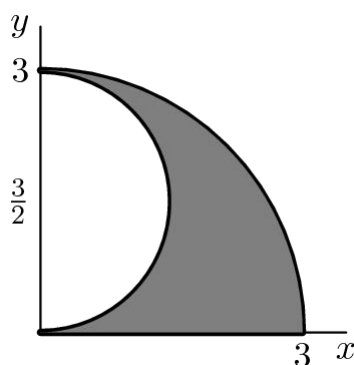
如下所示的字母 F 先绕着原点顺时针旋转 90° ，然后关于 y 轴作对称图像，最后绕着原点转半圈，哪个是最后的图形？



Problem 9

The shaded region below is called a shark's fin falcata, a figure studied by Leonardo da Vinci. It is bounded by the portion of the circle of radius 3 and center $(0, 0)$ that lies in the first quadrant, the portion of the circle with radius $\frac{3}{2}$ and center $(0, \frac{3}{2})$ that lies in the first quadrant, and the line segment from $(0, 0)$ to $(3, 0)$. What is the area of the shark's fin falcata?

下图阴影部分区域称作鲨鱼的鱼鳍弯刀。是达芬奇研究的一个图形。它是由圆心在 $(0, 0)$ ，半径为 3 的圆在第一象限的部分，圆心在 $(0, \frac{3}{2})$ ，半径为 $\frac{3}{2}$ 的圆在第一象限的部分，和连接 $(0, 0)$ 与 $(3, 0)$ 的线段所包围而成。鲨鱼的鱼鳍弯刀的面积是多少？



- (A) $\frac{4\pi}{5}$ (B) $\frac{9\pi}{8}$ (C) $\frac{4\pi}{3}$ (D) $\frac{7\pi}{5}$ (E) $\frac{3\pi}{2}$

Problem 10

What is the sign and units digit of the product of all the odd negative integers strictly greater than -2015 ?

严格大于-2015 的所有负奇数的乘积的符号和个位数是什么？

- (A) It is a negative number ending with a 1. | 它是一个负数，以 1 结尾.
 (B) It is a positive number ending with a 1. | 它是一个正数，以 1 结尾.
 (C) It is a negative number ending with a 5. | 它是一个负数，以 5 结尾.
 (D) It is a positive number ending with a 5. | 它是一个正数，以 5 结尾.
 (E) It is a negative number ending with a 0. | 它是一个负数，以 0 结尾.

Problem 11

Among the positive integers less than 100, each of whose digits is a prime number, one is selected at random. What is the probability that the selected number is prime?

在所有各个位上数字都是质数，且小于 100 的正整数中，随机选择 1 个数。所选择的数是个质数的概率是多少？

- (A) $\frac{8}{99}$ (B) $\frac{2}{5}$ (C) $\frac{9}{20}$ (D) $\frac{1}{2}$ (E) $\frac{9}{16}$

Problem 12

For how many integers x is the point $(x, -x)$ inside or on the circle of radius 10 centered at $(5, 5)$?

有多少个这样的整数的 x ，使得点 $(x, -x)$ 在圆心为 $(5, 5)$ ，半径为 10 的圆上或其内部？

- (A) 11 (B) 12 (C) 13 (D) 14 (E) 15

Problem 13

The line $12x + 5y = 60$ forms a triangle with the coordinate axes. What is the sum of the lengths of the altitudes of this triangle?

直线 $12x + 5y = 60$ 与坐标轴形成一个三角形。这个三角形的三条高的长度之和为多少？

- (A) 20 (B) $\frac{360}{17}$ (C) $\frac{107}{5}$ (D) $\frac{43}{2}$ (E) $\frac{281}{13}$

Problem 14

Let a , b , and c be three distinct one-digit numbers. What is the maximum value of the sum of the roots of the equation $(x - a)(x - b) + (x - b)(x - c) = 0$?

a , b , c 是 3 个不同的 1 位数，方程 $(x - a)(x - b) + (x - b)(x - c) = 0$ 的根的和的最大值是多少？

- (A) 15 (B) 15.5 (C) 16 (D) 16.5 (E) 17

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?

哈姆雷特小镇上，每匹马和 3 个人搭配，每头牛和 4 只绵羊搭配，每个人和 3 只鸭子搭配，下面哪个数不可能是哈姆雷特小镇上人、马、绵羊、牛和鸭子的总数？

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

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?

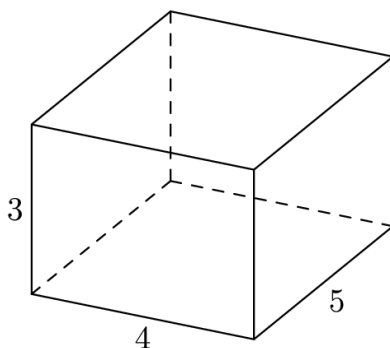
Al, Bill 和 Cal 每个人被随机分配一个 1 到 10 之间（包含 1 和 10）的整数，且每个人的数字都不一样。Al 的数正好是 Bill 的数的整数倍，同时 Bill 的数也是 Cal 的数的整数倍的概率是多少？

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

Problem 17

When the centers of the faces of the right rectangular prism shown below are joined to create an octahedron, what is the volume of the octahedron?

当如下图所示的长方形的每个面的中心用直线连起来形成一个八边形，这个八边形的体积是多少？



- (A) $\frac{75}{12}$ (B) 10 (C) 12 (D) $10\sqrt{2}$ (E) 15

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?

Johann 有 64 枚标准硬币，她把这些硬币一起扔，如果有反面朝上的硬币，她就将这些反面朝上的硬币重新再扔一次。第二次扔了之后若仍然有反面朝上的硬币，她就将这些反面朝上的硬币再扔第三次，那么现在正面朝上的硬币的个数的期望值是多少？

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

Problem 19

In $\triangle ABC$, $\angle C = 90^\circ$ and $AB = 12$. Squares $ABXY$ and $ACWZ$ are constructed outside of the triangle. The points X, Y, Z , and W lie on a circle. What is the perimeter of the triangle?

$\triangle ABC$ 中， $\angle C = 90^\circ$ 且 $AB = 12$ 。在三角形的外部作出正方形 $ABXY$ 和 $ACWZ$ 。点 X, Y, Z 和 W 在同一个圆上，这个三角形的周长是多少？

- (A) $12 + 9\sqrt{3}$ (B) $18 + 6\sqrt{3}$ (C) $12 + 12\sqrt{2}$ (D) 30 (E) 32

Problem 20

Erin the ant starts at a given corner of a cube and crawls along exactly 7 edges in such a way that she visits every corner exactly once and then finds that she is unable to return along an edge to her starting point. How many paths are there meeting these conditions?

蚂蚁 Erin 从正方体的某个给定的顶点开始出发，爬过恰好 7 条棱，必须满足她每个顶点都经过恰好一次，而且最后她发现无法沿着某条棱再回到她出发的顶点。满足这些条件的所有可能的路径有多少条？

- (A) 6 (B) 9 (C) 12 (D) 18 (E) 24

Problem 21

Cozy the Cat and Dash the Dog are going up a staircase with a certain number of steps. However, instead of walking up the steps one at a time, both Cozy and Dash jump. Cozy goes two steps up with each jump (though if necessary, he will just jump the last step). Dash goes five steps up with each jump (though if necessary, he will just jump the last steps if there are fewer than 5 steps left). Suppose Dash takes 19 fewer jumps than Cozy to reach the top of the staircase. Let s denote the sum of all possible numbers of steps this staircase can have. What is the sum of the digits of s ?

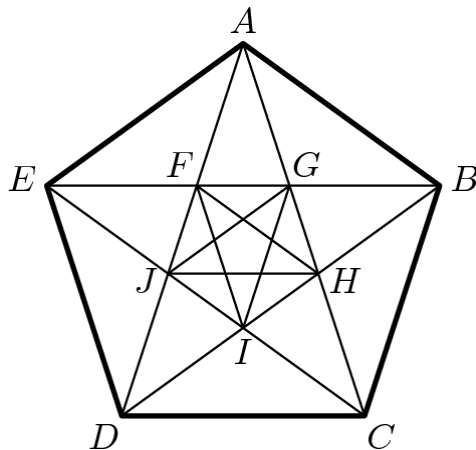
Cozy 这只猫和 Dash 这条狗在有一定数目台阶的楼梯上爬楼梯，然而，Cozy 和 Dash 都是跳着爬楼梯，而不是一次一个台阶的走。Cozy 每跳一次就爬 2 个台阶（如果最后只剩一个台阶，他就直接跳过最后这个台阶）。Dash 每跳一次就爬 5 个台阶（如果最后剩下不足 5 个台阶，他就直接一步跳过去）。假设最终到达楼梯的顶部，Dash 跳的次数比 Cozy 少了 19 次。 s 表示这个楼梯所有可能的台阶数的和。那么 s 的各个位上数字之和为多少？

- (A) 9 (B) 11 (C) 12 (D) 13 (E) 15

Problem 22

In the figure shown below, $ABCDE$ is a regular pentagon and $AG = 1$. What is $FG + JH + CD$?

如下图所示， $ABCDE$ 是一个正五边形， $AG=1$ 。那么 $FG + JH + CD$ 等于多少？



- (A) 3 (B) $12 - 4\sqrt{5}$ (C) $\frac{5 + 2\sqrt{5}}{3}$ (D) $1 + \sqrt{5}$ (E) $\frac{11 + 11\sqrt{5}}{10}$

Problem 23

Let n be a positive integer greater than 4 such that the decimal representation of $n!$ ends in k zeros and the decimal representation of $(2n)!$ ends in $3k$ zeros. Let s denote the sum of the four least possible values of n . What is the sum of the digits of s ?

n 是一个大于 4 的正整数, 满足 $n!$ 的十进制表示以 k 个 0 结尾, $(2n)!$ 的十进制表示以 $3k$ 个 0 结尾。 s 表示 n 的最小的 4 个值之和, 则 s 的各个位上数字之和是多少?

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

Problem 24

Aaron the ant walks on the coordinate plane according to the following rules. He starts at the origin $p_0 = (0, 0)$ facing to the east and walks one unit, arriving at $p_1 = (1, 0)$.

For $n = 1, 2, 3, \dots$, right after arriving at the point p_n , if Aaron can turn 90° left and walk one unit to an unvisited point p_{n+1} , he does that. Otherwise, he walks one unit straight ahead to reach p_{n+1} .

Thus the sequence of points continues $p_2 = (1, 1)$, $p_3 = (0, 1)$, $p_4 = (-1, 1)$, $p_5 = (-1, 0)$, and so on in a counterclockwise spiral pattern. What is p_{2015} ?

蚂蚁 Aaron 在坐标平面上依照下面的规则爬行:他从原点 $p_0 = (0, 0)$, 出发, 面朝东, 向前走一个单位, 到达 $p_1 = (1, 0)$ 。对于 $n=1, 2, 3$, 在到达点 p_{n+1} 后, 若 Aaron 可以向左转 90° , 向前走一个单位到达一个以前没访问过的点, 那么他就这样做。否则, 他就直接向前走一步到 p_{n+1} 。因此接下来他经过的点是 $p_2 = (1, 1)$, $p_3 = (0, 1)$, $p_4 = (-1, 1)$, $p_5 = (-1, 0)$, 以此类推, 形成一个逆时针螺旋状, p_{2015} 的坐标是多少?

- (A) $(-22, -13)$ (B) $(-13, -22)$ (C) $(-13, 22)$ (D) $(13, -22)$ (E) $(22, -13)$

Problem 25

A rectangular box measures $a \times b \times c$, where a, b , and c are integers and $1 \leq a \leq b \leq c$. The volume and surface area of the box are numerically equal. How many ordered triples (a, b, c) are possible?

一个长方形的盒子大小是 $a \times b \times c$ ，其中 a, b, c 都是整数，且 $1 \leq a \leq b \leq c$ 。盒子的体积和表面积相等。那么可能的有序对 (a, b, c) 有多少个？

- (A) 4 (B) 10 (C) 12 (D) 21 (E) 26

2015 AMC 10B Answer Key

1	2	3	4	5	6	7	8	9	10	11	12	13
C	B	A	C	B	E	A	E	B	C	B	A	E
14	15	16	17	18	19	20	21	22	23	24	25	
D	B	C	B	D	C	A	D	D	B	D	B	

2016 AMC 10B

Problem 1

What is the value of $\frac{2a^{-1} + \frac{a^{-1}}{2}}{a}$ when $a = \frac{1}{2}$?

求当 $a = \frac{1}{2}$ 时, $\frac{2a^{-1} + \frac{a^{-1}}{2}}{a}$ 的值?

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

Problem 2

If $n \heartsuit m = n^3 m^2$, what is $\frac{2 \heartsuit 4}{4 \heartsuit 2}$?

如果 $n \heartsuit m = n^3 m^2$, $\frac{2 \heartsuit 4}{4 \heartsuit 2}$ 是多少?

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

Problem 3

Let $x = -2016$. What is the value of $\left| \left| |x| - x \right| - |x| \right| - x$?

令 $x = -2016$, 求 $\left| \left| |x| - x \right| - |x| \right| - x$ 的值?

- (A) -2016 (B) 0 (C) 2016 (D) 4032 (E) 6048

Problem 4

Zoey read 15 books, one at a time. The first book took her 1 day to read, the second book took her 2 days to read, the third book took her 3 days to read, and so on, with each book taking her 1 more day to read than the previous book. Zoey finished the first book on a Monday, and the second on a Wednesday. On what day of the week did she finish her 15th book?

Zoey 读 15 本书，一次读一本。第一本书花了 1 天时间读完，第二本书花了 2 天读完，第三本书花了 3 天读完，以此类推，每本书所花的时间都比前一本所花时间多 1 天。Zoey 在某个周一读完了第一本书，在某个周三读完了第二本书，那么在她读完第 15 本书是在周几？

- (A) Sunday (B) Monday (C) Wednesday (D) Friday (E) Saturday

Problem 5

The mean age of Amanda's 4 cousins is 8, and their median age is 5. What is the sum of the ages of Amanda's youngest and oldest cousins?

Amanda 的 4 个表妹的平均年龄是 8 岁，她们年龄的中位数是 5。那么 Amanda 最小和最大的表妹的年龄之和是多少？

- (A) 13 (B) 16 (C) 19 (D) 22 (E) 25

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 ?

Laura 把两个三位的正整数相加。这两个数中的 6 位数字都不同。Laura 得到的和是一个三位数 S 。则 S 的各个位上数字之和的最小可能值是多少？

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

Problem 7

The ratio of the measures of two acute angles is $5 : 4$, and the complement of one of these two angles is twice as large as the complement of the other. What is the sum of the degree measures of the two angles?

两个锐角的度数比值是 $5:4$ ，且其中一个角的余角是另一个角的余角的 2 倍。那么这 2 个角的度数之和是多少？

- (A) 75 (B) 90 (C) 135 (D) 150 (E) 270

Problem 8

What is the tens digit of $2015^{2016} - 2017$?

$2015^{2016} - 2017$ 的十位数字是多少?

- (A) 0 (B) 1 (C) 3 (D) 5 (E) 8

Problem 9

All three vertices of $\triangle ABC$ are lying on the parabola defined by $y = x^2$, with A at the origin and $\overline{BC}$ parallel to the x -axis. The area of the triangle is 64. What is the length of BC ?

$\triangle ABC$ 的 3 个顶点位于抛物线 $y = x^2$ 上, 其中点 A 在原点, $\overline{BC}$ 和 x 轴平行。三角形的面积为 64, 问 BC 的长度为多少?

- (A) 4 (B) 6 (C) 8 (D) 10 (E) 16

Problem 10

A thin piece of wood of uniform density in the shape of an equilateral triangle with side length 3 inches weighs 12 ounces. A second piece of the same type of wood, with the same thickness, also in the shape of an equilateral triangle, has side length of 5 inches. Which of the following is closest to the weight, in ounces, of the second piece?

一个形状为正三角形, 密度均匀的薄木板边长为 3 英寸, 重量为 12 盎司。第二块同样木质, 相同厚度, 形状也为正三角形的薄木板边长为 5 英寸。下面哪个数字最接近第二块木板的重量 (单位为盎司)?

- (A) 14.0 (B) 16.0 (C) 20.0 (D) 33.3 (E) 55.6

Problem 11

Carl decided to fence in his rectangular garden. He bought 20 fence posts, placed one on each of the four corners, and spaced out the rest evenly along the edges of the garden, leaving exactly 4 yards between neighboring posts. The longer side of his garden, including the corners, has twice as many posts as the shorter side, including the corners. What is the area, in square yards, of Carl's garden?

Carl 决定把他的长方形花园用栅栏围起来。他买了 20 个栅栏木桩，在 4 个角落各放 1 个，剩余的木桩则沿着花园的边缘均匀放置，相邻木桩之间的距离恰好是 4 码。花园的长边（包括角落）所插的木桩的数目是短边（包含角落）所插木桩数目的 2 倍。那么 Carl 的花园的面积是多少平方码？

- (A) 256 (B) 336 (C) 384 (D) 448 (E) 512

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?

从集合 $\{1, 2, 3, 4, 5\}$ 中随机选择两个不同的数字并相乘，乘积是偶数的概率是多少？

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

Problem 13

At Megapolis Hospital one year, multiple-birth statistics were as follows: Sets of twins, triplets, and quadruplets accounted for 1000 of the babies born. There were four times as many sets of triplets as sets of quadruplets, and there was three times as many sets of twins as sets of triplets. How many of these 1000 babies were in sets of quadruplets?

Megapolis 医院某一年多胞胎的出生数据如下：总共有 1000 个新生儿是双胞胎，三胞胎，和四胞胎。三胞胎组数是四胞胎组数的 4 倍，双胞胎组数是三胞胎组数的 3 倍。这 1000 个婴儿里，有多少人是四胞胎？

- (A) 25 (B) 40 (C) 64 (D) 100 (E) 160

Problem 14

How many squares whose sides are parallel to the axis and whose vertices have coordinates that are integers lie entirely within the region bounded by the line $y = \pi x$, the line $y = -0.1$ and the line $x = 5.1$?

有多少个这样的正方形，这些正方形的边和坐标轴平行，顶点的坐标都是整数，且正方形位于直线 $y = \pi x$ ，直线 $y = -0.1$ 和直线 $x = 5.1$ 所包围的区域内？

- (A) 30 (B) 41 (C) 45 (D) 50 (E) 57

Problem 15

All the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9 are written in a 3×3 array of squares, one number in each square, in such a way that if two numbers are consecutive then they occupy squares that share an edge. The numbers in the four corners add up to 18. What is the number in the center?

1, 2, 3, 4, 5, 6, 7, 8, 9 这 9 个数被写入 1 个 3×3 的方格阵列中，每个小方格一个数字，满足如果两个数是连续的，那么这两个数所在的方格共享一条边。四个角落的数字之和为 18。中心的那个数字是多少？

- (A) 5 (B) 6 (C) 7 (D) 8 (E) 9

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 ?

一个无限等比数列所有项之和为一个正实数 S ，数列的第二项是 1。 S 的最小值是多少？

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

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?

2, 3, 4, 5, 6, 7 这 6 个数被分配给一个立方体的 6 个面。每个面一个数。对于立方体的 8 个顶点，计算出包含每个顶点的 3 个面上的数字的乘积，这 8 个乘积相加所得和的最大值是多少？

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

Problem 18

In how many ways can 345 be written as the sum of an increasing sequence of two or more consecutive positive integers?

有多少种方法可以把 345 写成 2 个或更多个连续正整数组成的递增数列的所有项之和?

- (A) 1 (B) 3 (C) 5 (D) 6 (E) 7

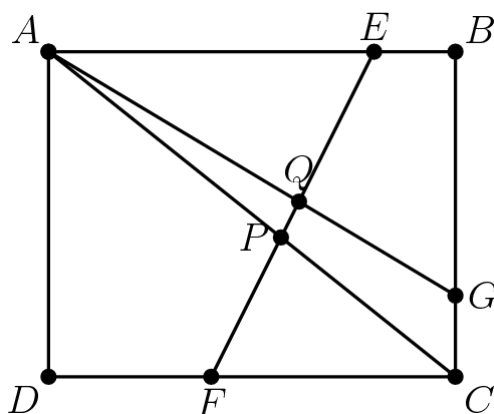
Problem 19

Rectangle $ABCD$ has $AB = 5$ and $BC = 4$. Point E lies on $\overline{AB}$ so that $EB = 1$, point G lies on $\overline{BC}$ so that $CG = 1$, and point F lies on $\overline{CD}$ so that $DF = 2$.

Segments $\overline{AG}$ and $\overline{AC}$ intersect $\overline{EF}$ at Q and P , respectively. What is the value of $\frac{PQ}{EF}$?

长方形 $ABCD$ 的边 $AB=5$, $BC=4$ 。点 E 在线段 $\overline{AB}$ 上满足 $EB=1$, 点 G 在边 $\overline{BC}$ 上满足 $CG=1$ 。

点 F 在边 $\overline{CD}$ 上满足 $DF=2$ 。线段 $\overline{AG}$ 和 $\overline{AC}$ 分别交 $\overline{EF}$ 于 Q 和 P 。 $\frac{PQ}{EF}$ 的值是多少?



- (A) $\frac{\sqrt{13}}{16}$ (B) $\frac{\sqrt{2}}{13}$ (C) $\frac{9}{82}$ (D) $\frac{10}{91}$ (E) $\frac{1}{9}$

Problem 20

A dilation of the plane—that is, a size transformation with a positive scale factor—sends the circle of radius 2 centered at $A(2, 2)$ to the circle of radius 3 centered at $A'(5, 6)$. What distance does the origin $O(0, 0)$, move under this transformation?

平面的位似变换—即尺寸比例系数为正数的一种尺度变换—将圆心在 $A(2, 2)$ 半径为 2 的圆，变到了圆心在 $A'(5, 6)$ 且半径为 3 的圆。在这个位似变换下，原点 $O(0, 0)$ 移动了多少距离？

- (A) 0 (B) 3 (C) $\sqrt{13}$ (D) 4 (E) 5

Problem 21

What is the area of the region enclosed by the graph of the equation $x^2 + y^2 = |x| + |y|$?

由方程 $x^2 + y^2 = |x| + |y|$ 的图像所围成的区域的面积是多少？

- (A) $\pi + \sqrt{2}$ (B) $\pi + 2$ (C) $\pi + 2\sqrt{2}$ (D) $2\pi + \sqrt{2}$ (E) $2\pi + 2\sqrt{2}$

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 ?

若干支队伍举行循环赛，在循环赛中，每支队伍和其他每支队伍恰好打一场比赛。每支队伍赢了 10 场比赛，输了 10 场比赛，且没有平局。有多少个这样的 $\{A, B, C\}$ 三支队伍的组，满足 A 打败了 B ， B 打败了 C ， C 打败了 A ？

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

Problem 23

In regular hexagon $ABCDEF$, points W , X , Y , and Z are chosen on sides $\overline{BC}$, $\overline{CD}$, $\overline{EF}$, and $\overline{FA}$ respectively, so lines AB , ZW , YX , and ED are parallel and equally spaced. What is the ratio of the area of hexagon $WCXYFZ$ to the area of hexagon $ABCDEF$?

在正六边形 $ABCDEF$ 中，点 W , X , Y 和 Z 分别在边 $\overline{BC}$, $\overline{CD}$, $\overline{EF}$ 和 $\overline{FA}$ 上，满足直线 AB , ZW , YX 和 ED 相互平行且间隔相等。那么六边形 $WCXYFZ$ 的面积与六边形 $ABCDEF$ 的面积之比是多少？

- (A) $\frac{1}{3}$ (B) $\frac{10}{27}$ (C) $\frac{11}{27}$ (D) $\frac{4}{9}$ (E) $\frac{13}{27}$

Problem 24

How many four-digit integers $abcd$, with $a \neq 0$, have the property that the three two-digit integers $ab < bc < cd$ form an increasing arithmetic sequence? One such number is 4692, where $a = 4$, $b = 6$, $c = 9$, and $d = 2$.

有多少个 4 位整数 $abcd$ ，其中，满足三个两位数 $ab < bc < cd$ 形成一个递增的等其中一个这样的数是 4692，其中 $a=4$, $b=6$, $c=9$, $d=2$ 。

- (A) 9 (B) 15 (C) 16 (D) 17 (E) 20

Problem 25

Let $f(x) = \sum_{k=2}^{10} ([kx] - k[x])$, where $[r]$ denotes the greatest integer less than or equal to r .

How many distinct values does $f(x)$ assume for $x \geq 0$?

令 $f(x) = \sum_{k=2}^{10} ([kx] - k[x])$ ，其中 $[r]$ 表示取小于或者等于 r 的最大整数。若 $x \geq 0$ ， $f(x)$ 可以取多少种不同的值？

- (A) 32 (B) 36 (C) 45 (D) 46 (E) infinitely many

2016 AMC 10B Answer Key

1	2	3	4	5	6	7	8	9	10	11	12	13
D	B	D	B	D	B	C	A	C	D	B	D	D
14	15	16	17	18	19	20	21	22	23	24	25	
D	C	E	D	E	D	C	B	A	C	D	A	

2017 AMC 10B**Problem 1**

Mary thought of a positive two-digit number. She multiplied it by 3 and added 11. Then she switched the digits of the result, obtaining a number between 71 and 75, inclusive. What was Mary's number?

Mary 想出了一个 2 位正数。她把它乘以 3 再加上 11.之后把所得结果的两位数字交换位置,得到了一个在 71 和 75 之间的数(包含 71 和 75)。Mary 原来想出的数是多少?

- (A) 11 (B) 12 (C) 13 (D) 14 (E) 15

Problem 2

Sofia ran 5 laps around the 400-meter track at her school. For each lap, she ran the first 100 meters at an average speed of 4 meters per second and the remaining 300 meters at an average speed of 5 meters per second. How much time did Sofia take running the 5 laps?

Sofia 沿着她学校的 400 米跑道跑了 5 圈。她每一圈前 100 米的平均速度是 4 米每秒, 剩余 300 米的平均速度是 5 米每秒, 那么 Sofia 跑 5 圈总共花了多少时间?

- (A) 5 minutes and 35 seconds | 5 分钟 35 秒
(B) 6 minutes and 40 seconds | 6 分钟 40 秒
(C) 7 minutes and 5 seconds | 7 分钟 5 秒
(D) 7 minutes and 25 seconds | 7 分钟 25 秒
(E) 8 minutes and 10 seconds | 8 分钟 10 秒

Problem 3

Real numbers x , y , and z satisfy the inequalities $0 < x < 1$, $-1 < y < 0$, and $1 < z < 2$. Which of the following numbers is necessarily positive?

实数 x , y , z 满足不等式 $0 < x < 1$, $-1 < y < 0$ 和 $1 < z < 2$, 下面哪个数字是正数?

- (A) $y + x^2$ (B) $y + xz$ (C) $y + y^2$ (D) $y + 2y^2$ (E) $y + z$

Problem 4

Suppose that x and y are nonzero real numbers such that $\frac{3x+y}{x-3y} = -2$. What is the value

of $\frac{x+3y}{3x-y}$?

假设 x 和 y 是非零实数，满足 $\frac{3x+y}{x-3y} = -2$ 。则 $\frac{x+3y}{3x-y}$ 的值为多少？

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

Problem 5

Camilla had twice as many blueberry jelly beans as cherry jelly beans. After eating 10 pieces of each kind, she now has three times as many blueberry jelly beans as cherry jelly beans. How many blueberry jelly beans did she originally have?

Camilla 原先拥有的蓝莓味软心豆粒糖的数量是樱桃味软心豆粒糖的 2 倍。当她 2 种口味都分别吃了 10 块后，现在她的蓝莓味软心豆粒糖的数量是樱桃味软心豆粒糖的 3 倍。那么她原先有多少块蓝莓味软心豆粒糖？

- (A) 10 (B) 20 (C) 30 (D) 40 (E) 50

Problem 6

What is the largest number of solid 2 in. by 2 in. by 1 in. blocks that can fit in a 3 in. by 2 in. by 3 in. box?

将 2 in. 乘 2 in. 乘 1 in. 的方块放入 3 in. 乘 2 in. 乘 3 in. 的盒子里，最多可以装多少块？

- (A) 3 (B) 4 (C) 5 (D) 6 (E) 7

Problem 7

Samia set off on her bicycle to visit her friend, traveling at an average speed of 17 kilometers per hour. When she had gone half the distance to her friend's house, a tire went flat, and she walked the rest of the way at 5 kilometers per hour. In all it took her 44 minutes to reach her friend's house. In kilometers rounded to the nearest tenth, how far did Samia walk?

Samia 骑着自行车去访问她的朋友，平均速度为 17 公里每小时，当她走了一半的路程，一个轮胎坏了，之后她以 5 公里每小时的速度步行走完了剩余的路程，最终到她朋友家总共花了 44 分钟。Samia 步行了多少公里路程？结果保留一位小数。

- (A) 2.0 (B) 2.2 (C) 2.8 (D) 3.4 (E) 4.4

Problem 8

Points $A(11, 9)$ and $B(2, -3)$ are vertices of $\triangle ABC$ with $AB = AC$. The altitude from A meets the opposite side at $D(-1, 3)$. What are the coordinates of point C ?

点 $A(11, 9)$ 和点 $B(2, -3)$ 是 $\triangle ABC$ 的顶点，且 $AB=AC$ 。从 A 引出的高和对边交于 $D(-1, 3)$ 。点 C 的坐标为多少？

- (A) $(-8, 9)$ (B) $(-4, 8)$ (C) $(-4, 9)$ (D) $(-2, 3)$ (E) $(-1, 0)$

Problem 9

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

一个广播节目有一项由 3 道选择题组成的测试，每道选择题有 3 个选项。参赛者若能做对 2 道或者更多道题目，那么他或她就赢了，参赛者每道选择题都是随机作答。那么赢得测试的概率是多少？

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

Problem 10

The lines with equations $ax - 2y = c$ and $2x + by = -c$ are perpendicular and intersect at $(1, -5)$. What is c ?

两条直线 $ax - 2y = c$ 和 $2x + by = -c$ 互相垂直且交于点 $(1, -5)$ 。 c 是多少?

- (A) -13 (B) -8 (C) 2 (D) 8 (E) 13

Problem 11

At Typico High School, 60% of the students like dancing, and the rest dislike it. Of those who like dancing, 80% say that they like it, and the rest say that they dislike it. Of those who dislike dancing, 90% say that they dislike it, and the rest say that they like it. What fraction of students who say they dislike dancing actually like it?

在 Typico 高中, 60% 的学生喜欢跳舞, 剩余的人不喜欢。在那些喜欢跳舞的人中, 80% 的人说他们喜欢跳舞, 剩余的人说他们不喜欢跳舞, 而在那些不喜欢跳舞的人中, 90% 的人说他们不喜欢跳舞, 其余的人说他们喜欢跳舞, 那些说自己不喜欢跳舞的学生当中, 求实际喜欢跳舞的人占比多少?

- (A) 10% (B) 12% (C) 20% (D) 25% (E) $33\frac{1}{3}\%$

Problem 12

Elmer's new car gives 50% better fuel efficiency. However, the new car uses diesel fuel, which is 20% more expensive per liter than the gasoline the old car used. By what percent will Elmer save money if he uses his new car instead of his old car for a long trip?

Elmer 的新车的燃油效率提高了 50%, 单位是公里每升。然而, 新车使用的是柴油, 每升的价格比旧车使用的汽油高了 20%。若他使用新车代替旧车进行长途旅行, 他将省百分之多少钱?

- (A) 20% (B) $26\frac{2}{3}\%$ (C) $27\frac{7}{9}\%$ (D) $33\frac{1}{3}\%$ (E) $66\frac{2}{3}\%$

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