

2004 AMC10B 试题

Problem 1

Each row of the Misty Moon Amphitheater has 33 seats. Rows 12 through 22 are reserved for a youth club. How many seats are reserved for this club?

雾蒙蒙月亮圆形露天剧场的每排都有 33 个座位。第 12 排到第 22 排是为某个青年俱乐部保留的。那么总共为这个俱乐部预留了多少张座位？

- (A) 297 (B) 330 (C) 363 (D) 396 (E) 726

Problem 2

How many two-digit positive integers have at least one 7 as a digit?

有多少个两位正整数，其中至少有一个位上的数字是 7？

- (A) 10 (B) 18 (C) 19 (D) 20 (E) 30

Problem 3

At each basketball practice last week, Jenny made twice as many free throws as she made at the previous practice. At her fifth practice she made 48 free throws. How many free throws did she make at the first practice?

在上周的每次篮球练习中，珍妮每次的罚球次数总是上次罚球次数的两倍。在第五次练习时，她有 48 次罚球。那么她第一次练习时有多少次罚球？

- (A) 3 (B) 6 (C) 9 (D) 12 (E) 15

Problem 4

A standard six-sided die is rolled, and P is the product of the five numbers that are visible. What is the largest number that is certain to divide P ?

掷一个标准的六面骰子， P 表示可以看到的 5 个面上数字的乘积。则一定能够整除 P 的最大的数是多少？

- (A) 6 (B) 12 (C) 24 (D) 144 (E) 720

Problem 5

In the expression $c \cdot a^b - d$, the values of a , b , c , and d are 0, 1, 2, and 3, although not necessarily in that order. What is the maximum possible value of the result?

在表达式 $c \cdot a^b - d$ 中, a , b , c , 和 d 的值是 0, 1, 2, 和 3 (不一定是这样的顺序)。

那么结果的最大可能值是多少?

- (A) 5 (B) 6 (C) 8 (D) 9 (E) 10

Problem 6

Which of the following numbers is a perfect square?

下面哪个数是个完全平方数?

- (A) $98! \cdot 99!$ (B) $98! \cdot 100!$ (C) $99! \cdot 100!$ (D) $99! \cdot 101!$ (E) $100! \cdot 101!$

Problem 7

On a trip from the United States to Canada, Isabella took d U.S. dollars. At the border she exchanged them all, receiving 10 Canadian dollars for every 7 U.S. dollars. After spending 60 Canadian dollars, she had d Canadian dollars left. What is the sum of the digits of d ?

在从美国到加拿大的旅行中, Isabella 带了 d 美元。在边境处, 她把它们全部兑换

了, 每 7 美元可以兑换 10 加元。当她花了 60 加元之后, 还剩下 d 加元。那么 d 的

所有位数字之和是多少?

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

Problem 8

Minneapolis-St. Paul International Airport is 8 miles southwest of downtown St. Paul and 10 miles southeast of downtown Minneapolis. Which of the following is closest to the number of miles between downtown St. Paul and downtown Minneapolis?

明尼阿波利斯-圣保罗国际机场在圣保罗市中心的西南方向 8 英里处, 并且在明

尼阿波利斯市中心的东南方向 10 英里处。以下哪项最接近圣保罗市中心和明尼

阿波利斯市中心之间的英里数?

- (A) 13 (B) 14 (C) 15 (D) 16 (E) 17

Problem 9

A square has sides of length 10, and a circle centered at one of its vertices has radius 10. What is the area of the union of the regions enclosed by the square and the circle?

一个正方形的边长为 10，以其顶点之一为中心的圆半径为 10。那么正方形和圆形所包围的区域的并集的面积是多少？

- (A) $200 + 25\pi$ (B) $100 + 75\pi$ (C) $75 + 100\pi$ (D) $100 + 100\pi$ (E) $100 + 125\pi$

Problem 10

A grocer makes a display of cans in which the top row has one can and each lower row has two more cans than the row above it. If the display contains 100 cans, how many rows does it contain?

杂货商展示的罐头中，最上面一排有一个罐头，下面每排都比它上面一排多两个罐头。如果这堆罐头总共有 100 个，那么一共堆了多少排？

- (A) 5 (B) 8 (C) 9 (D) 10 (E) 411

Problem 11

Two eight-sided dice each have faces numbered 1 through 8. When the dice are rolled, each face has an equal probability of appearing on the top. What is the probability that the product of the two top numbers is greater than their sum?

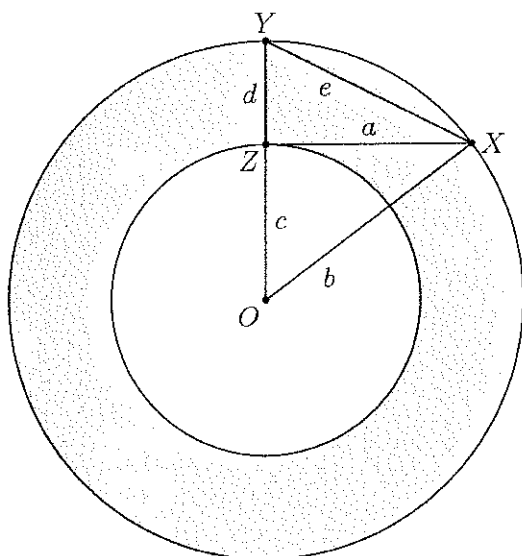
有两个八面骰子，每个骰子的八个面编号为 1 到 8。当掷这两个骰子时，每个面出现在顶部的概率都相等。问两个顶面上数字的乘积大于它们的和的概率是多少？

- (A) $\frac{1}{2}$ (B) $\frac{47}{64}$ (C) $\frac{3}{4}$ (D) $\frac{55}{64}$ (E) $\frac{7}{8}$

Problem 12

An annulus is the region between two concentric circles. The concentric circles in the figure have radii b and c , with $b > c$. Let OX be a radius of the larger circle, let XZ be tangent to the smaller circle at Z , and let OY be the radius of the larger circle that contains Z . Let $a = XZ$, $d = YZ$, and $e = XY$. What is the area of the annulus?

环形空间是两个同心圆之间的区域。图中的两个同心圆的半径分别是 b 和 c ，且 $b > c$ 。设 OX 为较大圆的一条半径，作 XZ 与小圆相切于 Z ， OY 为大圆的半径且通过 Z 点。令 $a = XZ$ ， $d = YZ$ ， $e = XY$ 。那么环形空间的面积是多少？



- (A) πa^2 (B) πb^2 (C) πc^2 (D) πd^2 (E) πe^2

Problem 13

In the United States, coins have the following thicknesses: penny, 1.55 mm; nickel, 1.95 mm; dime, 1.35 mm; quarter, 1.75 mm. If a stack of these coins is exactly 14 mm high, how many coins are in the stack?

在美国，硬币有如下厚度：便士，1.55 毫米；镍币，1.95 毫米；一角硬币，1.35 毫米；25 分硬币，1.75 毫米。如果一叠这些硬币的高度正好是 14 毫米，那么这叠硬币一共有多少枚？

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

Problem 14

A bag initially contains red marbles and blue marbles only, with more blue than red.

Red marbles are added to the bag until only $\frac{1}{3}$ of the marbles in the bag are blue. Then yellow marbles are added to the bag until only $\frac{1}{5}$ of the marbles in the bag are blue.

Finally, the number of blue marbles in the bag is doubled. What fraction of the marbles now in the bag are blue?

一个袋子最初只包含红色玻璃球和蓝色玻璃球，且蓝色比红色多。将红色玻璃球

不断添加到袋子中，直到袋子中蓝色玻璃球占了总数的 $\frac{1}{3}$ 。然后将黄色玻璃球不

断添加到袋子中，直到袋子中蓝色玻璃球占了总数的 $\frac{1}{5}$ 。最后，将袋子里蓝色玻

璃球的数量变成原来的 2 倍。那么现在袋子里蓝色玻璃球所占总数的比例是多

少？

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

Problem 15

Patty has 20 coins consisting of nickels and dimes. If her nickels were dimes and her dimes were nickels, she would have 70 cents more. How much are her coins worth?

Patty 有 20 枚硬币，它们都是五分镍币和一角硬币。如果她的五分镍币都变成一角硬币，而她的一角硬币都变成五分镍币，那么她将多出 70 美分。问她的这些硬币总面值是多少？

- (A) \$1.15 (B) \$1.20 (C) \$1.25 (D) \$1.30 (E) \$1.35

Problem 16

Three circles of radius 1 are externally tangent to each other and internally tangent to a larger circle. What is the radius of the large circle?

三个半径为 1 的圆相互外切，且均与一个大圆相内切。那么大圆的半径是多少？

- (A) $\frac{2 + \sqrt{6}}{3}$ (B) 2 (C) $\frac{2 + 3\sqrt{2}}{2}$ (D) $\frac{3 + 2\sqrt{3}}{3}$ (E) $\frac{3 + \sqrt{3}}{2}$

Problem 17

The two digits in Jack's age are the same as the digits in Bill's age, but in reverse order. In five years Jack will be twice as old as Bill will be then. What is the difference in their current ages?

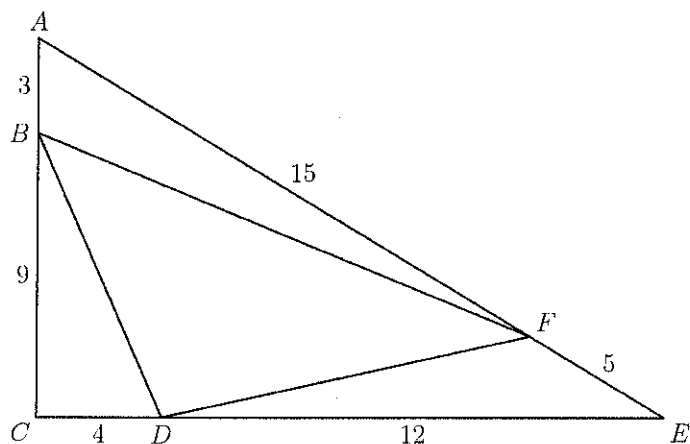
Jack 年龄的两位数字与 Bill 年龄的两位数字相同，但顺序相反。五年后，Jack 的年龄将是那时候 Bill 的两倍。他们现在的年龄相差多少？

- (A) 9 (B) 18 (C) 27 (D) 36 (E) 45

Problem 18

In the right triangle $\triangle ACE$, we have $AC = 12$, $CE = 16$, and $EA = 20$. Points B , D , and F are located on AC , CE , and EA , respectively, so that $AB = 3$, $CD = 4$, and $EF = 5$. What is the ratio of the area of $\triangle DBF$ to that of $\triangle ACE$?

在直角 $\triangle ACE$ 中，我们有 $AC = 12$, $CE = 16$ ，以及 $EA = 20$ 。点 B , D 和 F 分别在 AC , CE , 和 EA 上，满足 $AB = 3$, $CD = 4$, $EF = 5$ 。则 $\triangle DBF$ 的面积和 $\triangle ACE$ 的面积比值是多少？



- (A) $\frac{1}{4}$ (B) $\frac{9}{25}$ (C) $\frac{3}{8}$ (D) $\frac{11}{25}$ (E) $\frac{7}{16}$

Problem 19

In the sequence 2001, 2002, 2003, ..., each term after the third is found by subtracting the previous term from the sum of the two terms that precede that term. For example, the fourth term is $2001 + 2002 - 2003 = 2000$. What is the 2004th term in this sequence?

在数列 2001, 2002, 2003, ... 中，从第三项开始，后面的每一项都是由该项前一项之前的两项之和减去该项的前一项得到的。例如，第四项是

$2001 + 2002 - 2003 = 2000$ 。那么这个数列的第 2004 项是多少？

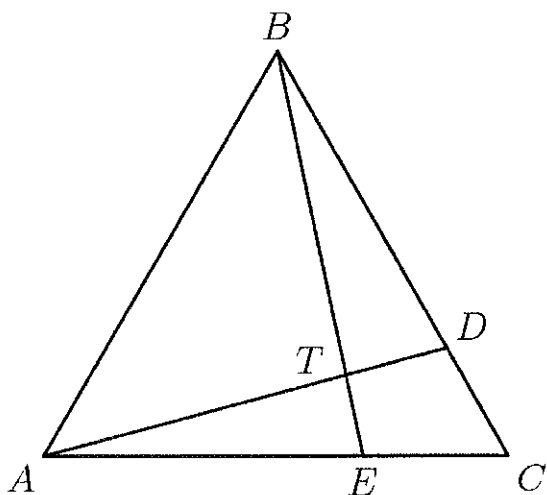
- (A) -2004 (B) -2 (C) 0 (D) 4003 (E) 6007

Problem 20

In $\triangle ABC$ points D and E lie on BC and AC , respectively.

If AD and BE intersect at T so that $AT/DT = 3$ and $BT/ET = 4$, what is CD/BD ?

在 $\triangle ABC$ 中, 点 D 和 E 分别在边 BC 和 AC 上。若 AD 和 BE 交于 T , 满足 $AT/DT = 3$, 且 $BT/ET = 4$ 。问 CD/BD 是多少?



- (A) $\frac{1}{8}$ (B) $\frac{2}{9}$ (C) $\frac{3}{10}$ (D) $\frac{4}{11}$ (E) $\frac{5}{12}$

Problem 21

Let $1; 4; \dots$ and $9; 16; \dots$ be two arithmetic progressions. The set S is the union of the first 2004 terms of each sequence. How many distinct numbers are in S ?

数列 $1; 4; \dots$ 以及 $9; 16; \dots$ 是两个等差数列。集合 S 是这 2 个数列各自前 2004 项的并集。那么 S 中有多少个不同的数?

- (A) 3722 (B) 3732 (C) 3914 (D) 3924 (E) 4007

Problem 22

A triangle with sides of length 5, 12, and 13 has both an inscribed and a circumscribed circle. What is the distance between the centers of those circles?

一个三边长为5, 12, 和13的三角形有一个内切圆和外接圆。则这两个圆的圆心距是多少?

- (A) $\frac{3\sqrt{5}}{2}$ (B) $\frac{7}{2}$ (C) $\sqrt{15}$ (D) $\frac{\sqrt{65}}{2}$ (E) $\frac{9}{2}$

Problem 23

Each face of a cube is painted either red or blue, each with probability $1/2$. The color of each face is determined independently. What is the probability that the painted cube can be placed on a horizontal surface so that the four vertical faces are all the same color?

一个立方体的每一面都涂成红色或蓝色, 概率均为 $1/2$ 。每个面的颜色是独立确定的。问能够将绘制后的立方体放置在水平表面上, 使得四个垂直面都具有相同颜色的概率是多少?

- (A) $\frac{1}{4}$ (B) $\frac{5}{16}$ (C) $\frac{3}{8}$ (D) $\frac{7}{16}$ (E) $\frac{1}{2}$

Problem 24

In $\triangle ABC$ we have $AB = 7$, $AC = 8$, and $BC = 9$. Point D is on the circumscribed circle of the triangle so that AD bisects $\angle BAC$. What is the value

$\frac{AD}{CD}$ of $\overline{CD}$?

在 $\triangle ABC$ 中, $AB = 7$, $AC = 8$, $BC = 9$ 。点 D 在三角形的外接圆上, 满足 AD

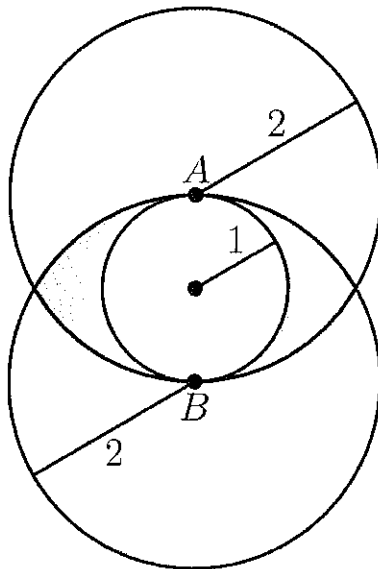
平分 $\angle BAC$ 。那么 $\frac{AD}{CD}$ 的值是多少?

- (A) $\frac{9}{8}$ (B) $\frac{5}{3}$ (C) 2 (D) $\frac{17}{7}$ (E) $\frac{5}{2}$

Problem 25

A circle of radius 1 is internally tangent to two circles of radius 2 at points A and B , where AB is a diameter of the smaller circle. What is the area of the region, shaded in the picture, that is outside the smaller circle and inside each of the two larger circles?

一个半径为 1 的圆和两个半径均为 2 的圆相内切，切点为 A 和 B ，且 AB 为小圆的直径。那么图中位于两个大圆之内而在小圆之外的阴影区域的面积是多少？



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