

2009 AMC10B 试题

Problem 1

Each morning of her five-day workweek, Jane bought either a 50-cent muffin or a 75-cent bagel. Her total cost for the week was a whole number of dollars. How many bagels did she buy?

Jane 每周工作 5 天，在每个工作日的早上，要么买一个 50 美分的松饼，要么买一个 75 美分的百吉饼。这周她的总花费是整数美元，问她买了多少个百吉饼？

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

Problem 2

Which of the following is equal to $\frac{\frac{\frac{1}{3} - \frac{1}{4}}{\frac{1}{2} - \frac{1}{3}}}{\frac{1}{2} - \frac{1}{3}}$?

下面哪个等于 $\frac{\frac{\frac{1}{3} - \frac{1}{4}}{\frac{1}{2} - \frac{1}{3}}}{\frac{1}{2} - \frac{1}{3}}$?

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

Problem 3

Paula the painter had just enough paint for 30 identically sized rooms. Unfortunately, on the way to work, three cans of paint fell off her truck, so she had only enough paint for 25 rooms. How many cans of paint did she use for the 25 rooms?

Paula 恰好有足够的油漆可以粉刷 30 个同样大小的房间。不幸的是，在去工作的路上，3 罐油漆从她的卡车上翻倒了，所以她剩下的油漆恰好可以粉刷 25 个房间。问粉刷这 25 个房间，她用了多少罐油漆？

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

Problem 4

A rectangular yard contains two flower beds in the shape of congruent isosceles right triangles. The remainder of the yard has a trapezoidal shape, as shown. The parallel sides of the trapezoid have lengths 15 and 25 meters. What fraction of the yard is occupied by the flower beds?

一个长方形的院子里有 2 个全等的等腰直角三角形形状的花床，院子的其余部分为一个梯形，如下图所示。梯形的两条平行边长度分别是 15 米和 25 米。问两个花床所占整个院子的比例是多少？



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

Problem 5

Twenty percent less than 60 is one-third more than what number?

比 60 少百分之二十的数比什么数大三分之一？

- (A) 16 (B) 30 (C) 32 (D) 36 (E) 48

Problem 6

Kiana has two older twin brothers. The product of their three ages is 128. What is the sum of their three ages?

Kiana 有 2 个双胞胎哥哥。他们三人年龄的乘积为 128。问他们三人的年龄之和是多少？

- (A) 10 (B) 12 (C) 16 (D) 18 (E) 24

Problem 7

By inserting parentheses, it is possible to give the expression $2 \times 3 + 4 \times 5$ several values. How many different values can be obtained?

通过给表达式 $2 \times 3 + 4 \times 5$ 加括号，可以获得多个不同的值。问一共可以得到多少种不同的值？

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

Problem 8

In a certain year the price of gasoline rose by 20% during January, fell by 20% during February, rose by 25% during March, and fell by $x\%$ during April.

The price of gasoline at the end of April was the same as it had been at the beginning of January. To the nearest integer, what is x ?

在某一年，汽油的价格在1月份升高20%，在二月份降低20%，在三月份升高25%，在四月份降低 $x\%$ 。在四月末汽油的价格和一月初的价格相同。则最接近 x 的整数是多少？

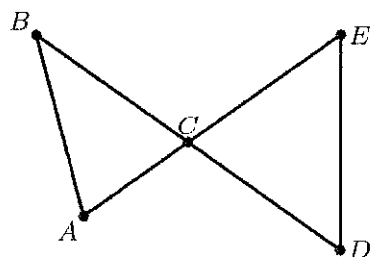
- (A) 12 (B) 17 (C) 20 (D) 25 (E) 35

Problem 9

Segment BD and AE intersect at C , as shown, $AB = BC = CD = CE$, and $\angle A = \frac{5}{2}\angle B$. What is the degree measure of $\angle D$?

如下图所示，线段 BD 和 AE 交于点 C ， $AB = BC = CD = CE$ ，且

$\angle A = \frac{5}{2}\angle B$ 。问 $\angle D$ 是多少度？



- (A) 52.5 (B) 55 (C) 57.5 (D) 60 (E) 62.5

Problem 10

A flagpole is originally 5 meters tall. A hurricane snaps the flagpole at a point x meters above the ground so that the upper part, still attached to the stump, touches the ground 1 meter away from the base. What is x ?

一根旗杆原本5米高。一场飓风将旗杆在离地高度为 x 米处折断，折断的旗杆上部分依然附着在旗杆上，顶部接触地面并且距离底座1米。问 x 是多少？

- (A) 2.0 (B) 2.1 (C) 2.2 (D) 2.3 (E) 2.4

Problem 11

How many 7-digit palindromes (numbers that read the same backward as forward) can be formed using the digits 2, 2, 3, 3, 5, 5, 5?

使用数字 2, 2, 3, 3, 5, 5, 5 能形成多少个 7 位的回环数? (回环数是指朝前读和朝后读都一样的数)

- (A) 6 (B) 12 (C) 24 (D) 36 (E) 48

Problem 12

Distinct points A , B , C , and D lie on a line, with $AB = BC = CD = 1$. Points E and F lie on a second line, parallel to the first, with $EF = 1$. A triangle with positive area has three of the six points as its vertices. How many possible values are there for the area of the triangle?

一条直线上有四个不同的点, A, B, C, D , 满足 $AB = BC = CD = 1$ 。点 E 和 F 位于另一条和此直线平行的直线上, 满足 $EF = 1$ 。从这 6 个点中选择 3 个点作为顶点, 形成一个面积为正的三角形。问这样的三角形, 它的面积有多少种可能的值?

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

Problem 13

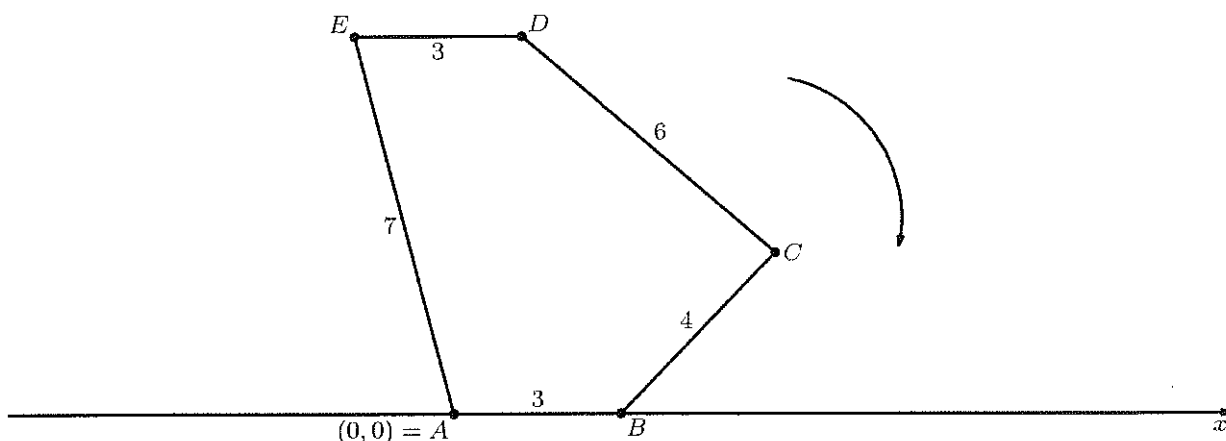
As shown below, convex pentagon $ABCDE$ has sides $AB = 3$, $BC = 4$, $CD = 6$, $DE = 3$, and $EA = 7$. The pentagon is originally positioned in the plane with vertex A at the origin and vertex B on the positive x -axis. The pentagon is then rolled clockwise to the right along the x -axis. Which side will touch the point $x = 2009$ on the x -axis?

如下所示, 凸五边形 $ABCDE$ 的边 $AB = 3$, $BC = 4$, $CD = 6$, $DE = 3$,

$EA = 7$ 。五边形的最初位置为: 顶点 A 与原点重合, 顶点 B 在 x 轴的正半轴

上。接着让五边形向右沿着 x 轴顺时针方向滚动。问哪一条边会碰到 x 轴上

$x = 2009$ 这个点?



- (A) $\overline{AB}$ (B) $\overline{BC}$ (C) $\overline{CD}$ (D) $\overline{DE}$ (E) $\overline{EA}$

Problem 14

On Monday, Millie puts a quart of seeds, 25% of which are millet, into a bird feeder. On each successive day she adds another quart of the same mix of seeds without removing any seeds that are left. Each day the birds eat only 25% of the millet in the feeder, but they eat all of the other seeds. On which day, just after Millie has placed the seeds, will the birds find that more than half the seeds in the feeder are millet?

周一，Millie 将重量为一夸脱的种子（其中 25% 是小米）放入鸟食器。在接下来的每一天，她都会再加入一夸脱同样的混合种子，而前一天没吃完剩下的种子不会倒掉。每天，这些鸟只吃喂食器中小米总量的 25%，但它们会吃完所有其他的种子。在哪一天，当 Millie 刚放完种子，鸟儿们会发现喂食器里一半以上的种子都是小米？

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

- (A) 周二 (B) 周三 (C) 周四 (D) 周五 (E) 周六

Problem 15

When a bucket is two-thirds full of water, the bucket and water weigh a kilograms. When the bucket is one-half full of water the total weight is b kilograms. In terms of a and b , what is the total weight in kilograms when the bucket is full of water?

当一个桶装了总容量的 $\frac{2}{3}$ 的水时，桶和水总重为 a 千克。当桶装了一半的水时，

总重是 b 千克。那么当桶装满水时，总重是多少千克？以 a 和 b 表示。

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

Problem 16

Points A and C lie on a circle centered at O , each of $\overline{BA}$ and $\overline{BC}$ are tangent to the circle, and $\triangle ABC$ is equilateral. The circle intersects $\overline{BO}$ at D . What is $\frac{BD}{BO}$?

点 A 和 C 均位于圆心为 O 的圆上。 $\overline{BA}$ 和 $\overline{BC}$ 均和圆相切，且 $\triangle ABC$ 是等边三

角形。圆交线段 $\overline{BO}$ 于 D 。求 $\frac{BD}{BO}$ 是多少？

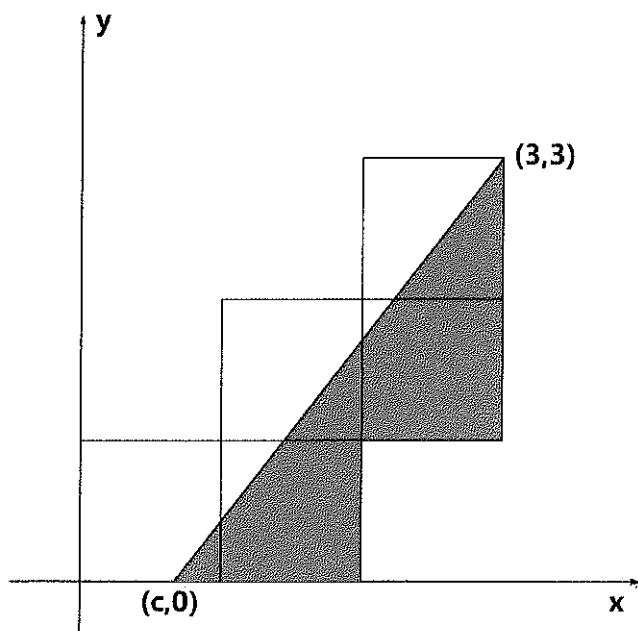
- (A) $\frac{\sqrt{2}}{3}$ (B) $\frac{1}{2}$ (C) $\frac{\sqrt{3}}{3}$ (D) $\frac{\sqrt{2}}{2}$ (E) $\frac{\sqrt{3}}{2}$

Problem 17

Five unit squares are arranged in the coordinate plane as shown, with the lower left corner at the origin. The slanted line, extending from $(c, 0)$ to $(3, 3)$, divides the entire region into two regions of equal area. What is c ?

五个正方形如图所示放在坐标平面内，左下角与坐标原点重合。连接 $(c, 0)$ 和

$(3, 3)$ 的直线，将整个区域分成面积相等的两个区域，则 c 是多少？



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

Problem 18

Rectangle $ABCD$ has $AB = 8$ and $BC = 6$. Point M is the midpoint of diagonal $\overline{AC}$, and E is on AB with $\overline{ME} \perp \overline{AC}$. What is the area of $\triangle AME$?

矩形 $ABCD$ 中, $AB = 8$, $BC = 6$ 。点 M 是对角线 $\overline{AC}$ 的中点, E 在 AB 上满足 $\overline{ME} \perp \overline{AC}$ 。则 $\triangle AME$ 的面积是多少?

- (A) $\frac{65}{8}$ (B) $\frac{25}{3}$ (C) 9 (D) $\frac{75}{8}$ (E) $\frac{85}{8}$

Problem 19

A particular 12-hour digital clock displays the hour and minute of a day. Unfortunately, whenever it is supposed to display a 1, it mistakenly displays a 9. For example, when it is 1:16 PM the clock incorrectly shows 9:96 PM. What fraction of the day will the clock show the correct time?

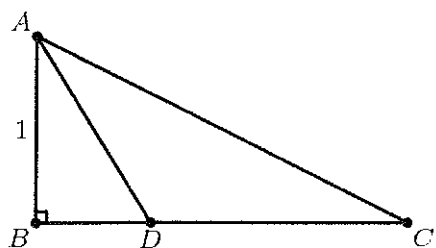
一种特殊的 12 小时电子钟可以显示一天里的小时和分钟。不幸的是, 凡是显示 1 的位置, 它错误的显示 9, 例如, 当时间是下午 1:16PM 时, 钟就显示下午 9:96PM。则一天内钟表显示正确的时间占了全天的几分之几?

- (A) $\frac{1}{2}$ (B) $\frac{5}{8}$ (C) $\frac{3}{4}$ (D) $\frac{5}{6}$ (E) $\frac{9}{10}$

Problem 20

Triangle ABC has a right angle at B , $AB = 1$, and $BC = 2$. The angle bisector of $\angle A$ intersects side $\overline{BC}$ at D . What is BD ?

三角形 ABC 的直角顶点为 B , $AB = 1$, $BC = 2$ 。 $\angle A$ 的角平分线和边 $\overline{BC}$ 交于 D 。则 BD 是多长?



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

Problem 21

What is the remainder when $3^0 + 3^1 + 3^2 + \cdots + 3^{2009}$ is divided by 8?

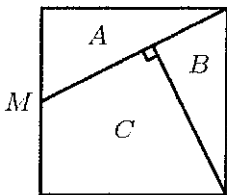
$3^0 + 3^1 + 3^2 + \cdots + 3^{2009}$ 除以 8 所得余数为多少?

- (A) 0 (B) 1 (C) 2 (D) 4 (E) 6

Problem 22

A cubical cake with edge length 2 inches is iced on the sides and the top. It is cut vertically into three pieces as shown in this top view, where M is the midpoint of a top edge. The piece whose top is triangle B contains c cubic inches of cake and s square inches of icing. What is $c + s$?

一块正方体形状的蛋糕棱长为 2 英寸，侧面和顶面都被冰覆盖。将这个蛋糕沿着竖直方向切成三块，如下图所示为蛋糕的顶视图，其中 M 为顶面一条棱的中点。以三角形 B 为顶面的那一块包含 c 立方英寸的蛋糕和 s 平方英寸的冰。问 $c + s$ 是多少？



- (A) $\frac{24}{5}$ (B) $\frac{32}{5}$ (C) $8 + \sqrt{5}$ (D) $5 + \frac{16\sqrt{5}}{5}$ (E) $10 + 5\sqrt{5}$

Problem 23

Rachel and Robert run on a circular track. Rachel runs counterclockwise and completes a lap every 90 seconds, and Robert runs clockwise and completes a lap

every 80 seconds. Both start from the same line at the same time. At some random time between 10 minutes and 11 minutes after they begin to run, a photographer standing inside the track takes a picture that shows one-fourth of the track, centered on the starting line. What is the probability that both Rachel and Robert are in the picture?

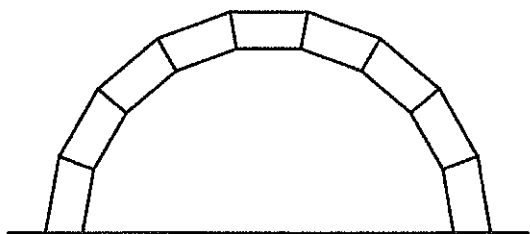
Rachel 和 Robert 在一个环形跑道上跑步。Rachel 逆时针方向跑，每 90 秒跑一圈，而 Robert 顺时针方向跑，每 80 秒跑一圈。两个人同时从同一起跑线开始跑。在他们开始后的 10 分钟和 11 分钟之间某个随机的时间点，一个站在跑道内的摄影师照了张相，恰好显示了以起跑线为中心的四分之一跑道。问 Rachel 和 Robert 同时在相片中的概率是多少？

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

Problem 24

The keystone arch is an ancient architectural feature. It is composed of congruent isosceles trapezoids fitted together along the non-parallel sides, as shown. The bottom sides of the two end trapezoids are horizontal. In an arch made with 9 trapezoids, let x be the angle measure in degrees of the larger interior angle of the trapezoid. What is x ?

拱顶石是一种古老的建筑特征。它是由一些全等的等腰梯形的非平行边相互连接形成，如图所示。建筑两端的梯形的底面是水平的。在某个由 9 个梯形构成的拱门中，令 x 表示每个梯形的较大内角的度数。则 x 为多少？



- (A) 100 (B) 102 (C) 104 (D) 106 (E) 108

Problem 25

Each face of a cube is given a single narrow stripe painted from the center of one edge to the center of the opposite edge. The choice of the edge pairing is made at random and independently for each face. What is the probability that there is a continuous stripe encircling the cube?

立方体的每一面都有一条连接一边中点和对边中点的窄条纹。每个面上对于这两条对边的选择是随机且独立的。问存在一条连续的环绕着立方体的条纹的概率是多少？

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