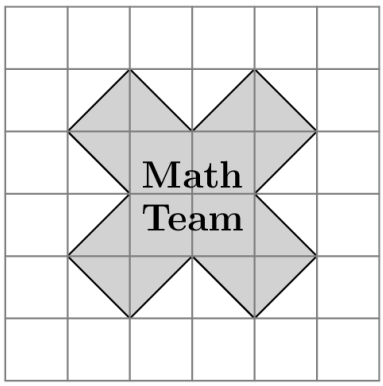
2022 MAA AMC8

Problem 1

The Math Team designed a logo shaped like a multiplication symbol, shown below on a grid of 1-inch squares. What is the area of the logo in square inches?

在由边长为 1 英寸的正方形组成的方格纸上，数学小组设计了一个类似乘法符号的标志，如下图所示。问该标志的面积是多少平方英寸?



（A） 10 **（B）** 12 **（C）** 13 **（D）** 14 **（E）** 15

Problem 2

Consider these two operations:

$$a◆b = a^2 - b^2$$

$$a★b = (a - b)^2$$

What is the value of (5◆3)★6?

考虑这样两种运算:

$$a◆b = a^2 - b^2$$

$$a★b = (a - b)^2$$

问(5◆3)★6 的值是多少?

（A） -20 **（B）** 4 **（C）** 16 **（D）** 100 **（E）** 220

Problem 3

When three positive integers a, b, and c are multiplied together, their product is 100. Suppose $a < b < c$. In how many ways can the numbers be chosen?

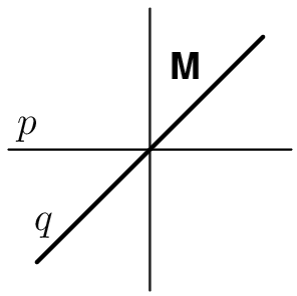
当三个正整数a 、b 和 c 相乘时，它们的乘积是 100。假设$a < b < c$。问这些数共有多少种选择方法?

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

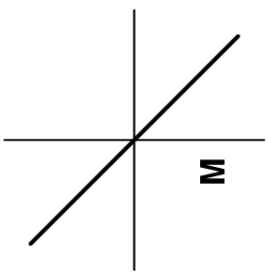
Problem 4

The letter **M** in the figure below is first reflected over the line q and then reflected over the line p. What is the resulting image?

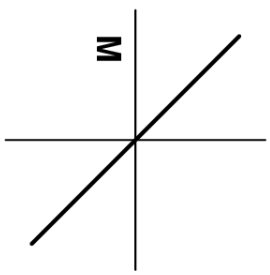
下图中的字母 **M** 首先沿着直线 q 反射，然后沿着直线 p 反射。问所得到的图像是怎样的?



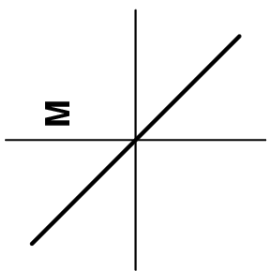
(A)



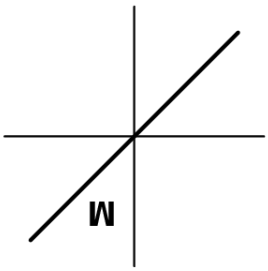
(B)



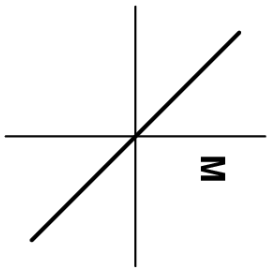
(C)



(D)



(E)



Problem 5

Anna and Bella are celebrating their birthdays together. Five years ago, when

Bella turned 6 years old, she received a newborn kitten as a birthday present. Today the sum of the ages of the two children and the kitten is 30 years. How many years older than Bella is Anna?

Anna 和 Bella 正在一起庆祝她们的生日。五年前，当 Bella 到 6 岁的时候，她收到了一只新生的小猫作为生日礼物。今天，两个孩子与小猫的年龄之和是 30 岁。问 Anna 比 Bella 大多少岁？

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

Problem 6

Three positive integers are equally spaced on a number line. The middle number is 15, and the largest number is 4 times the smallest number. What is the smallest of these three numbers?

三个正整数在数轴线上等距排列。中间的数是 15，最大的数是最小的数的 4 倍。问这三个数中最小的数是多少？

（A）4 **（B）**5 **（C）**6 **（D）**7 **（E）**8

Problem 7

When the World Wide Web first became popular in the 1990s, download speeds reached a maximum of about 56 kilobits per second. Approximately how many minutes would the download of a 4.2-megabyte song have taken at that speed? (Note that there are 8000 kilobits in a megabyte.)

当全球互联网刚开始在 20 世纪 90 年代流行时，下载速度最高为每秒 56 千比特。以这样的速度下载一首 4.2 兆字节的歌曲大约需要多少分钟？（请注意，一兆字节相当于 8000 千比特）

（A）0.6 **（B）**10 **（C）**1800 **（D）**7200 **（E）**36000

Problem 8

What is the value of $\frac{1}{3}\cdot\frac{2}{4}\cdot\frac{3}{5}\cdots\frac{18}{20}\cdot\frac{19}{21}\cdot\frac{20}{22}$?

算式 $\frac{1}{3}\cdot\frac{2}{4}\cdot\frac{3}{5}\cdots\frac{18}{20}\cdot\frac{19}{21}\cdot\frac{20}{22}$ 的值是多少？

(A) $\frac{1}{462}$ **(B)** $\frac{1}{231}$ **(C)** $\frac{1}{132}$ **(D)** $\frac{2}{213}$ **(E)** $\frac{1}{22}$

Problem 9

A cup of boiling water (212°F) is placed to cool in a room whose temperature remains constant at 68°F. Suppose the difference between the water temperature and the room temperature is halved every 5 minutes. What is the water temperature, in degrees Fahrenheit, after 15 minutes?

一杯开水(212 华氏度)被放置在一个温度恒定为 68 华氏度的房间里进行冷却。假设水的温度和房间温度的差值每 5 分钟减半。问在 15 分钟后，水的温度是多少华氏度?

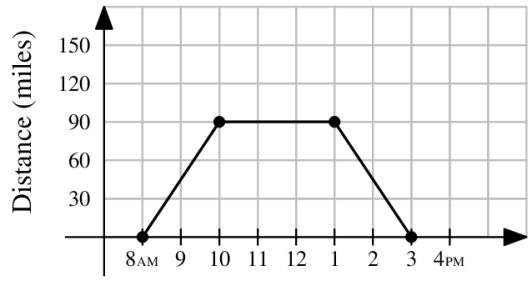
(A) 77 **(B)** 86 **(C)** 92 **(D)** 98 **(E)** 104

Problem 10

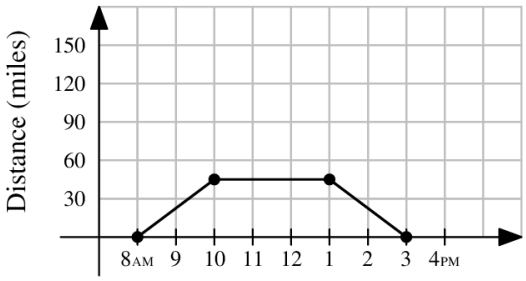
One sunny day, Ling decided to take a hike in the mountains. She left her house at 8AM, drove at a constant speed of 45 miles per hour, and arrived at the hiking trail at 10AM. After hiking for 3 hours, Ling drove home at a constant speed of 60 miles per hour. Which of the following graphs best illustrates the distance between Ling's car and her house over the course of her trip?

在一个晴朗的日子，Ling 决定去山里远足。她早上 8 时离开家，以每小时 45 英里的恒定速度开车，在早上 10 时到达登山径。徒步运动 3 小时后，Ling 以每小时 60 英里的恒定速度开车回家。以下哪张图最好的表达了 Ling 的行程中她的汽车和她家之间的距离?

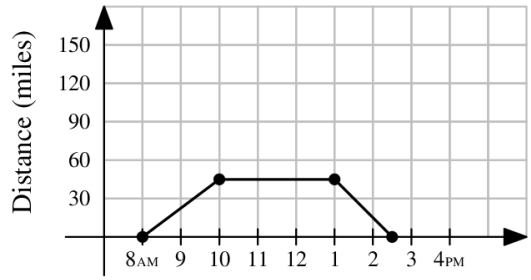
(A)



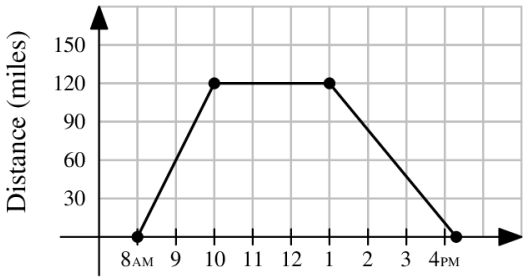
(B)



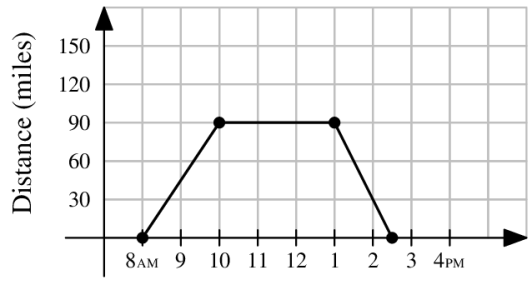
(C)



(D)



(E)



Problem 11

Henry the donkey has a very long piece of pasta. He takes a number of bites of pasta, each time eating 3 inches of pasta from the middle of one piece. In the end, he has 10 pieces of pasta whose total length is 17 inches. How long, in inches, was the piece of pasta he started with?

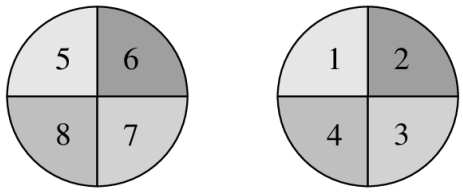
Henry 有一根很长的面条。他咬了几口面条，每次都是从一段面条的中间吃掉 3 英寸。最后，他还有 10 段面条，总长度为 17 英寸。问他开始吃的时候，那根面条的长度是多少英寸?

(A) 34 **(B)** 38 **(C)** 41 **(D)** 44 **(E)** 47

Problem 12

The arrows on the two spinners shown below are spun. Let the number N equal 10 times the number on Spinner A, added to the number on Spinner B. What is the probability that N is a perfect square number?

下图所示的两个转盘上的箭头可自由旋转。数 N 等于 10 乘以转盘 A 上箭头所指的数，再加上转盘 B 上箭头所指的数。问 N 是完全平方数的概率是多少?



Spinner A　　Spinner B

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

Problem 13

How many positive integers can fill the blank in the sentence below?

"One positive integer is _____ more than twice another, and the sum of the two numbers is 28."

有多少个正整数可以填在下面句子的横线上?

"一个正整数是另一个的两倍加上_____，并且这两个数的和是 28"。

(A) 6　　**(B)** 7　　**(C)** 8　　**(D)** 9　　**(E)** 10

Problem 14

In how many ways can the letters in **BEEKEEPER** be rearranged so that two or more **E**s do not appear together?

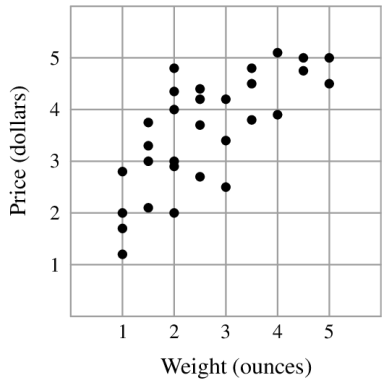
将 **BEEKEEPER** 中的字母重新排列，使得没有两个或更多的 **E** 连排在一起，共有多少种排列方式?

(A) 1　　**(B)** 4　　**(C)** 12　　**(D)** 24　　**(E)** 120

Problem 15

Laszlo went online to shop for black pepper and found thirty different black pepper options varying in weight and price, shown in the scatter plot below. In ounces, what is the weight of the pepper that offers the lowest price per ounce?

Laszlo 在网上选购黑胡椒，发现有三十种不同的黑胡椒，重量和价格不尽相同，如下面的散点图所示。问每盎司价格最低的那种胡椒的重量是多少盎司?



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

Problem 16

Four numbers are written in a row. The average of the first two is 21, the average of the middle two is 26, and the average of the last two is 30. What is the average of the first and last of the numbers?

四个数写在一行。前两个数的平均值是 21，中间两个数的平均值是 26，最后两个数的平均值是 30。问第一个数和最后一个数的平均值是多少?

(A) 24 **(B)** 25 **(C)** 26 **(D)** 27 **(E)** 28

Problem 17

If n is an even positive integer, the *double factorial* notation $n!!$ represents the product of all the even integers from 2 to n. For example, $8!! = 2 \cdot 4 \cdot 6 \cdot 8$. What is the units digit of the following sum?

$$2!! + 4!! + 6!! + \cdots + 2018!! + 2020!! + 2022!!$$

如果 n 是一个正整数，那么双阶乘记号 $n!!$ 代表从 2 到 n 的所有偶整数的乘积。例如，$8!! = 2 \cdot 4 \cdot 6 \cdot 8$。问下面和式的个位数字是几?

$$2!! + 4!! + 6!! + \cdots + 2018!! + 2020!! + 2022!!$$

（A）0　　**（B）**2　　**（C）**4　　**（D）**6　　**（E）**8

Problem 18

The midpoints of the four sides of a rectangle are (-3,0), (2,0), (5,4), and (0,4).

What is the area of the rectangle?

一个长方形的四条边的中点是(-3，0)，(2，0)，(5，4)和(0，4)。问这个长方形的面积是多少?

（A）20　　**（B）**25　　**（C）**40　　**（D）**50　　**（E）**80

Problem 19

Mr. Ramos gave a test to his class of 20 students. The dot plot below shows the distribution of test scores.

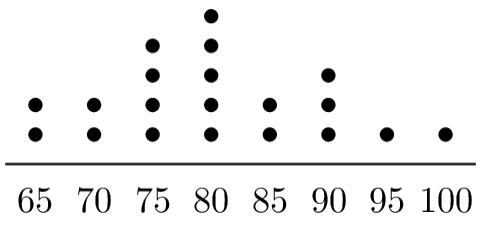
Later Mr. Ramos discovered that there was a scoring error on one of the questions. He regraded the tests, awarding some of the students 5 extra points, which increased the median test score to 85. What is the minimum number of students who received extra points?

(Note that the *median* test score equals the average of the 2 scores in the middle if the 20 test scores are arranged in increasing order.)

Ramos 先生给他班上的 20 名学生进行了一次测试。下面的点图显示了考试成绩的分布。

后来，Ramos 先生发现有一道题的评分有误。他重新批改，给一些学生各加了 5 分，使得考试成绩的中位数增加到了 85。问最少有多少名学生获得了加分?

（请注意，如果 20 个考试成绩按递增顺序排列，那么中位数等于中间 2 个考试成绩的平均值。）



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

Problem 20

The grid below is to be filled with integers in such a way that the sum of the numbers in each row and the sum of the numbers in each column are the same. Four numbers are missing. The number x in the lower left corner is larger than the other three missing numbers. What is the smallest possible value of x?

在下面的方格表中要填入整数，使得每行的各数之和与每列的各数之和都相同。现在有四个数缺失。左下角的数 x 比其他三个缺失的数都大。问 x 的最小可能值是多少?

-2	9	5
		-1
x		8

(A) -1 **(B)** 5 **(C)** 6 **(D)** 8 **(E)** 9

Problem 21

Steph scored 15 baskets out of 20 attempts in the first half of a game, and 10 baskets out of 10 attempts in the second half. Candace took 12 attempts in the first half and 18 attempts in the second. In each half, Steph scored a higher percentage of baskets than Candace. Surprisingly they ended with the same overall percentage of baskets scored. How many more baskets did Candace score in the second half than in the first?

Steph 在一场比赛的上半场有 20 次上篮，其中 15 次得分；下半场有 10 次上篮，并且 10 次都得分。Candace 在上半场有 12 次上篮，在下半场有 18 次上篮。在每个半场，Steph 的上篮得分率都比 Candace 高。但令人惊讶的是，他们整场的上篮得分率是相同的。问 Candace 在下半场比上半场上多得分几次?

	First Half	Second Half
Steph	$\frac{15}{20}$	$\frac{10}{10}$
Candace	$\frac{\square}{12}$	$\frac{\square}{18}$

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

Problem 22

A bus takes 2 minutes to drive from one stop to the next, and waits 1 minute at each stop to let passengers board. Zia takes 5 minutes to walk from one bus stop to the next. As Zia reaches a bus stop, if the bus is at the previous stop or has already left the previous stop, then she will wait for the bus. Otherwise she will start walking toward the next stop. Suppose the bus and Zia start at the same time toward the library, with the bus 3 stops behind. After how many minutes will Zia board the bus?

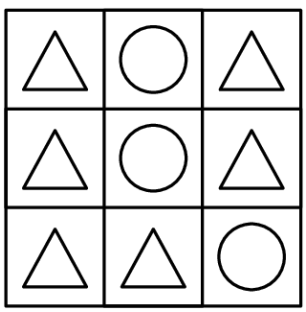


(A) 17 **(B)** 19 **(C)** 20 **(D)** 21 **(E)** 23

Problem 23

A △ or ○ is placed in each of the nine squares in a 3-by-3 grid. Shown below is a sample configuration with three △s in a line. How many configurations will have three △s in a line and three ○s in a line?

在 3×3 方格表的九个单元格的每个中放置△或○。下图是一种有三个△在一条线上的放置方法。问在有三个△在一条线上，并且有三个○在一条线上的放置方法有多少种?

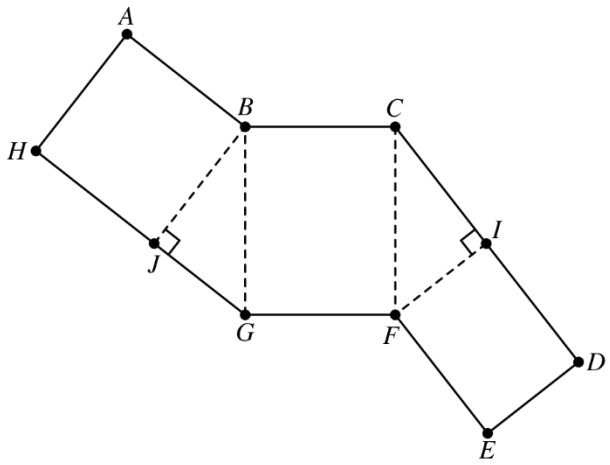


(A) 39 **(B)** 42 **(C)** 78 **(D)** 84 **(E)** 96

Problem 24

The figure below shows a polygon *ABCDEFGH* , consisting of rectangles and right triangles. When cut out and folded on the dotted lines, the polygon forms a triangular prism. Suppose that *AH=EF=8* and *GH=14*. What is the volume of the prism?

下图所示的多边形 ABCDEFGH 由长方形和直角三角形组成。当把它剪出并沿虚线折叠后，该多边形可以形成一个底面是三角形的棱柱。假设 AH=EF=8，GH=14。问该棱柱的体积是多少？

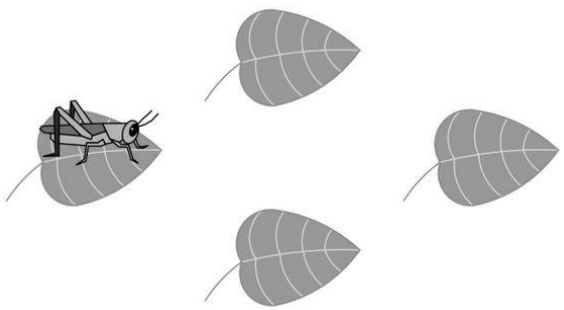


(A) 112 **(B)** 128 **(C)** 192 **(D)** 240 **(E)** 288

Problem 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?

一只蟋蟀随机地在 4 片叶子之间跳来跳去，每次都以相同的概率跳到其它的 3 片叶子上。问经过 4 次跳跃，蟋蟀回到它开始的那片叶子的概率是多少？



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

2022 AMC 8 Answer Key													
题目	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
答案	A	D	E	E	C	C	B	B	B	E	D	B	D
题目	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	
答案	D	C	B	B	C	C	D	C	A	D	C	E	

2022 AMC8 Solution

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