2018 MAA AMC8

Problem 1

An amusement park has a collection of scale models, with ratio 1:20, of buildings and other sights from around the country. The height of the United States Capitol is 289 feet. What is the height in feet of its replica to the nearest whole number?

一个游乐公园有一系列美国国内建筑和其他景观的模型,与实际建筑的比例为1:20.美国国会大厦的实际高为289英尺,那么它的模型复制品的高度是多少英尺?结果四舍五入到整数。

(A) 14 (B) 15 (C) 16 (D) 18 (E) 20

Problem 2

What is the value of the product

下式的值为多少

$$\left(1+\frac{1}{1}\right)\cdot\left(1+\frac{1}{2}\right)\cdot\left(1+\frac{1}{3}\right)\cdot\left(1+\frac{1}{4}\right)\cdot\left(1+\frac{1}{5}\right)\cdot\left(1+\frac{1}{6}\right)?$$

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

Problem 3

Students Arn, Bob, Cyd, Dan, Eve, and Fon are arranged in that order in a circle. They start counting: Arn first, then Bob, and so forth. When the number contains a 7 as a digit (such as 47) or is a multiple of 7 that person leaves the circle and the counting continues. Who is the last one present in the circle?

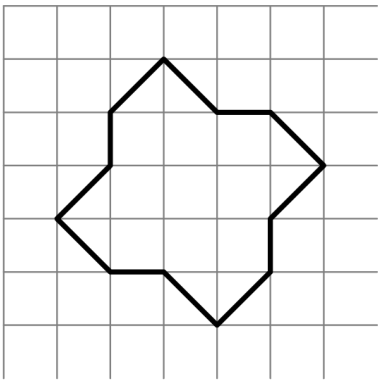
Arn，Bob，Cyd，Dan，Eve 和 Fon 以这样的顺序围成一圈。他们开始数数：Arn 先开始，然后 Bob，以此类推。当数包含数字 7（例如 47）或者是 7 的倍数时，那个人就离开圆圈，数数继续进行。最后一个离开圆圈的是谁?

(A) Arn (B) Bob (C) Cyd (D) Dan (E) Eve

Problem 4

The twelve-sided figure shown has been drawn on $1\text{cm} \times 1\text{cm}$ graph paper. What is the area of the figure in cm^2 ?

如下图所示的十二边形画在$1\text{cm} \times 1\text{cm}$的画纸上。那么这个十二边形的面积是多少平方厘米?



(A) 12 (B) 12.5 (C) 13 (D) 13.5 (E) 14

Problem 5

What is the value of

下面表达式的值是多少

$$1+3+5+\cdots+2017+2019-2-4-6-\cdots-2016-2018?$$

(A) -1010 (B) -1009 (C) 1008 (D) 1009 (E) 1010

Problem 6

On a trip to the beach, Anh traveled 50 miles on the highway and 10 miles on a coastal access road. He drove three times as fast on the highway as on the coastal road. If Anh spent 30 minutes driving on the coastal road, how many minutes did his entire trip take?

在去海滩的路上,Anh 先在高速上开了 50 英里,然后在沿海通道上开了 10 英里。他在高速上的开车速度是在沿海通道上的 3 倍。若 Anh 在沿海通道上开了 30 分钟，那么他全程开了多少分钟?

(A) 50 (B) 70 (C) 80 (D) 90 (E) 100

Problem 7

The 5-digit number $\underline{2}\,\underline{0}\,\underline{1}\,\underline{8}\,\underline{U}$ is divisible by 9. What is the remainder when this number is divided by 8?

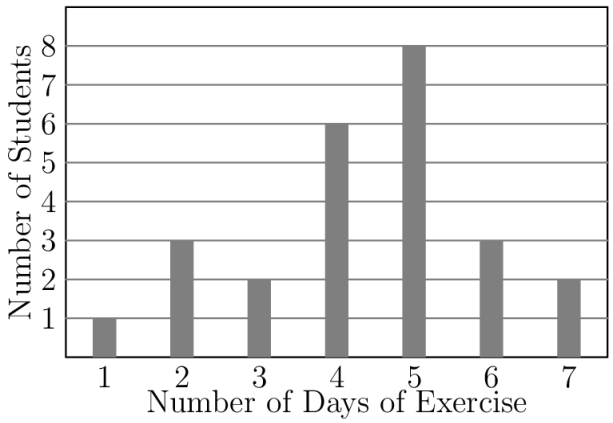
5 位数 $\underline{2}\,\underline{0}\,\underline{1}\,\underline{8}\,\underline{U}$ 能被 9 整除。当这个数除以 8 时，所得余数为多少？

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

Problem 8

John Pork asked the members of his health class how many days last week they exercised for at least 30 minutes. The results are summarized in the following bar graph, where the heights of the bars represent the number of students.What was the mean number of days of exercise last week, rounded to the nearest hundredth, reported by the students in John Pork's class?

Garcia 先生调查了他健康课的学生上周有多少天他们运动了至少 30 分钟，结果如下图柱状图所示，其中柱的高度表示学生数。那么 Garcia 先生班里的学生上周平均运动的天数是多少天？结果保留到百分位。



Number of Students | 学生数 Number of Days of Exercise | 运动天数

(A) 3.50 (B) 3.57 (C) 4.36 (D) 4.50 (E) 5.00

Problem 9

Tyler is tiling the floor of his 12 foot by 16 foot living room. He plans to place one-foot by one-foot square tiles to form a border along the edges of the room and to fill in the rest of the floor with two-foot by two-foot square tiles. How

many tiles will he use?

Tyler 正在将他起居室 12 英尺×16 英尺的地面用瓷砖贴起来。他打算用 1 英尺×1 英尺的方形瓷砖沿着地板的边缘贴起来，地板的其他部分用 2 英尺×2 英尺的方形瓷砖填满。问他最终总共使用了多少块瓷砖?

(A) 48 (B) 87 (C) 91 (D) 96 (E) 120

Problem 10

The *harmonic mean* of a set of non-zero numbers is the reciprocal of the average of the reciprocals of the numbers. What is the harmonic mean of 1, 2, and 4?

一组数的调和平均值定义为这组数各自的倒数的平均值的倒数。那么 1，2 和 4 的调和平均值是多少?

(A) $\frac{3}{7}$ (B) $\frac{7}{12}$ (C) $\frac{12}{7}$ (D) $\frac{7}{4}$ (E) $\frac{7}{3}$

Problem 11

Abby, Bridget, and four of their classmates will be seated in two rows of three for a group picture, as shown.

X X X
X X X

If the seating positions are assigned randomly, what is the probability that Abby and Bridget are adjacent to each other in the same row or the same column?

Abby，Bridget 和其他四个同班同学坐在如下所示的两行三列的座位上准备拍集体照。

X X X
X X X

如果座位是随机分配的，那么 Abby 和 Bridget 坐在同一行或者同一列的相邻位置上的概率是多少?

(A) $\frac{1}{3}$ (B) $\frac{2}{5}$ (C) $\frac{7}{15}$ (D) $\frac{1}{2}$ (E) $\frac{2}{3}$

Problem 12

The clock in Sri's car, which is not accurate, gains time at a constant rate. One day as he begins shopping, he notes that his car clock and his watch (which is accurate) both say 12:00 noon. When he is done shopping, his watch says 12:30 and his car clock says 12:35. Later that day, Sri loses his watch. He looks at his car clock and it says 7:00. What is the actual time?

Sri 的汽车上的钟表是不准确的，以一个恒定的速度增加时间。一天当他开始购物时，他发现他汽车上的钟表和他的手表（手表是准确的）的读数都是中午 12：00．当他结束购物后，他的手表读数是 12：30，而他的汽车钟表显示 12：35．那一天晚些时候，Sri 丢了手表，他看了看汽车钟表，读数为晚上 7：00，则实际时间是晚上几点?

(A) 5 : 50 (B) 6 : 00 (C) 6 : 30 (D) 6 : 55 (E) 8 : 10

Problem 13

Laila took five math tests, each worth a maximum of 100 points. Laila's score on each test was an integer between 0 and 100, inclusive. Laila received the same score on the first four tests, and she received a higher score on the last test. Her average score on the five tests was 82. How many values are possible for Laila's score on the last test?

Laila 参加了 5 场数学考试，每场考试的满分都是 100 分。Laila 每场考试的得分都是 0 到 100 之间（包括 0 和 100）的整数。Laila 前四场考试得分相同，最后一场考试得分比前四场每场得分都高。已知五场考试的平均分是 82 分，那么最后一场考试的得分可能有多少个取值?

(A) 4 (B) 5 (C) 9 (D) 10 (E) 18

Problem 14

Let N be the greatest five-digit number whose digits have a product of 120. What is the sum of the digits of N?

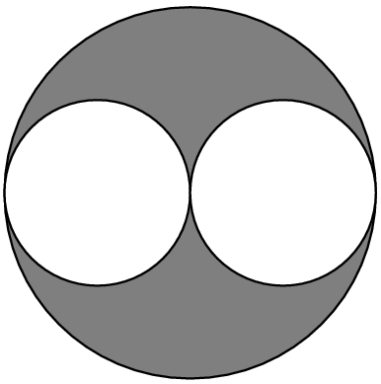
N 表示各个位上数字之积为 120 的最大的五位数。那么 N 的各个位上数字之和是多少?

(A) 15 (B) 16 (C) 17 (D) 18 (E) 20

Problem 15

In the diagram below, a diameter of each of the two smaller circles is a radius of the larger circle. If the two smaller circles have a combined area of 1 square unit, then what is the area of the shaded region, in square units?

如下图所示，2 个小圆各自的直径都是大圆的半径，如果这 2 个小圆的面积之和是 1 平方单位，那么图中阴影部分的面积是多少平方单位?



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

Problem 16

Professor Chang has nine different language books lined up on a bookshelf: two Arabic, three German, and four Spanish. How many ways are there to arrange the nine books on the shelf keeping the Arabic books together and keeping the Spanish books together?

Chang 教授有 9 本不同的书在书架上排成一排：2 本阿拉伯语书，3 本德语书和 4 本西班牙语书。有多少种把这些书排成一排的方式，要求阿拉伯语书在一起，并且西班牙语书也要在一起?

(A) 1440 (B) 2880 (C) 5760 (D) 182,440 (E) 362,880

Problem 17

Bella begins to walk from her house toward her friend Ella's house. At the same

time, Ella begins to ride her bicycle toward Bella's house. They each maintain a constant speed, and Ella rides 5 times as fast as Bella walks. The distance between their houses is 2 miles, which is 10,560 feet, and Bella covers $2\frac{1}{2}$ feet with each step. How many steps will Bella take by the time she meets Ella?

Bella 开始从她家步行去她朋友 Ella 的家。同时，Ella 骑着自行车开始向 Bella 的家出发。她们均保持各自恒定的速度，并且 Ella 骑车的速度是 Bella 行走速度的 5 倍。她们家相距 2 英里，即 10,560 英尺，已知 Bella 每步长为$2\frac{1}{2}$英尺，那么当 Bella 和 Ella 相遇时，Bella 走了多少步?

(A) 704 **(B)** 845 **(C)** 1056 **(D)** 1760 **(E)** 3520

Problem 18

How many positive factors does 23,232 have?

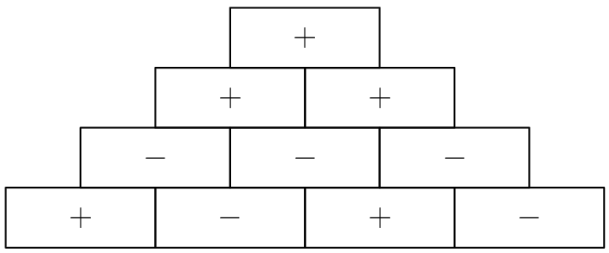
23,232 有多少个正因子?

(A) 9 **(B)** 12 **(C)** 28 **(D)** 36 **(E)** 42

Problem 19

In a sign pyramid a cell gets a "+" if the two cells below it have the same sign, and it gets a "-" if the two cells below it have different signs. The diagram below illustrates a sign pyramid with four levels. How many possible ways are there to fill the four cells in the bottom row to produce a "+" at the top of the pyramid?

在一种符号金字塔中，如果下面 2 个方块的符号相同，那么这 2 个方块上面的方块就得到一个“＋”号；若下面 2 个方块的符号不同，那么这 2 个方块上面的方块就得到一个“-”号。下图展示了一个 4 层的符号金字塔。为了使得金字塔的最顶层是个“＋”，那么最底层的 4 个方块有多少种赋予符号的方法?

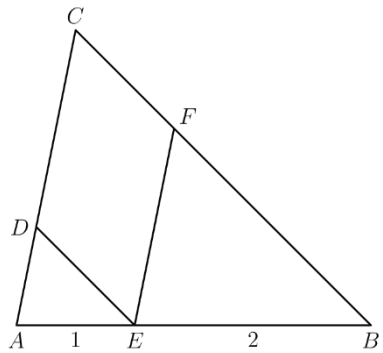


(A) 2 **(B)** 4 **(C)** 8 **(D)** 12 **(E)** 16

Problem 20

In $\triangle ABC$, point E is on $\overline{AB}$ with $AE = 1$ and $EB = 2$. Point D is on $\overline{AC}$ so that $\overline{DE} \parallel \overline{BC}$ and point F is on $\overline{BC}$ so that $\overline{EF} \parallel \overline{AC}$. What is the ratio of the area of $CDEF$ to the area of $\triangle ABC$?

在$\triangle ABC$中，点E在边$\overline{AB}$上，满足$AE = 1$，$EB = 2$，点D在边$\overline{AC}$上，满足$\overline{DE} \parallel \overline{BC}$，点$F$在边$\overline{BC}$上，满足$\overline{EF} \parallel \overline{AC}$. 则$CDEF$的面积和$\triangle ABC$的面积之比是多少？



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

Problem 21

How many positive three-digit integers have a remainder of 2 when divided by 6, a remainder of 5 when divided by 9, and a remainder of 7 when divided by 11?

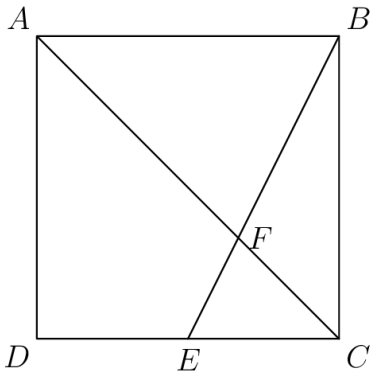
有多少个3位正整数，满足：当除以6余数为2，当除以9余数为5，当除以11余数为7?

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

Problem 22

Point E is the midpoint of side $\overline{CD}$ in square $ABCD$, and $\overline{BE}$ meets diagonal $\overline{AC}$ at F. The area of quadrilateral $AFED$ is 45. What is the area of $ABCD$?

在正方形 ABCD 中，E是边$\overline{CD}$的中点，$\overline{BE}$和对角线$\overline{AC}$交于点F。四边形$AFED$的面积是45，问$ABCD$的面积是多少？

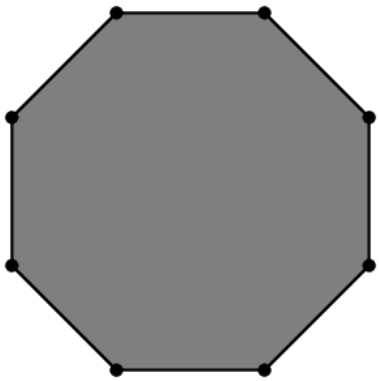


(A) 100 (B) 108 (C) 120 (D) 135 (E) 144

Problem 23

From a regular octagon, a triangle is formed by connecting three randomly chosen vertices of the octagon. What is the probability that at least one of the sides of the triangle is also a side of the octagon?

如下图所示的正八边形中，从 8 个顶点中任选 3 个并连接起来形成一个三角形。那么这个三角形至少有一条边也是八边形的一条边的概率是多少?

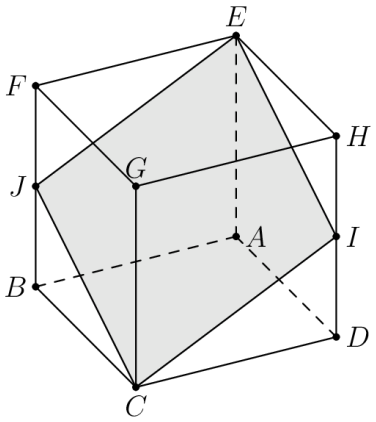


(A) $\frac{2}{7}$ (B) $\frac{5}{42}$ (C) $\frac{11}{14}$ (D) $\frac{5}{7}$ (E) $\frac{6}{7}$

Problem 24

In the cube $ABCDEFGH$ with opposite vertices C and E, J and I are the midpoints of edges $\overline{FB}$ and $\overline{HD}$, respectively. Let R be the ratio of the area of the cross-section $EJCI$ to the area of one of the faces of the cube. What is R^2?

在正方体 $ABCDEFGH$ 中，顶点 C 和 E 相对，点 J 和点 I 分别是边 $\overline{FB}$ 和 $\overline{HD}$，R 表示横截面 $EJCI$ 的面积和正方体的一个面的面积之比。求 R^2?



(A) $\frac{5}{4}$ (B) $\frac{4}{3}$ (C) $\frac{3}{2}$ (D) $\frac{25}{16}$ (E) $\frac{9}{4}$

Problem 25

How many perfect cubes lie between 2^8+1 and $2^{18}+1$, inclusive?

在2^8+1和$2^{18}+1$之间（包括2^8+1和$2^{18}+1$）的完全立方数有多少个?

(A) 4 (B) 9 (C) 10 (D) 57 (E) 58

2018 AMC 8 Answer Key													
题目	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
答案	A	D	D	C	E	C	B	C	B	C	C	B	A
题目	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	
答案	D	D	C	A	E	C	A	E	B	D	C	E	

2018 AMC8 Solution

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