2026 AMC 10B

Time limit: 75 minutes

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https://live.poshenloh.com/past-contests/amc10/2026B

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1. What is the value of

$$\frac{2^{2026}+2^{2025}-2^{2023}}{2^{2024}-2^{2023}}?$$

A 5

B 7

C 9

D 11

E 13

2. A souvenir shop sells solid metal sculptures of Achilles in two sizes. One is 6 cm tall and one is 8 cm tall. Proportions between the two sculptures are preserved. The smaller sculpture has a mass of 486 grams. What is the mass, in grams, of the larger sculpture?

A 648

B 864

C 972

D 1152

E 1458

3. Bees occupy the 8 corners of a $1 \times 2 \times 3$ rectangular box. The bees can fly inside the box, but cannot fly farther than $\frac{1}{2}$ unit from their respective corners. What is the volume, in cubic units, of the region inside the box that cannot be reached by any bee?

A $6 - \frac{\pi}{3}$

B $6 - \frac{\pi}{4}$

C $6 - \frac{\pi}{6}$

D $6 - \frac{\pi}{8}$

E $6 - \frac{\pi}{12}$

4. What positive real number x satisfies the equation

$$\frac{3}{x+4} - \frac{4}{x+3} = \frac{4}{x-3} - \frac{3}{x-4}?$$

A $\sqrt{21}$

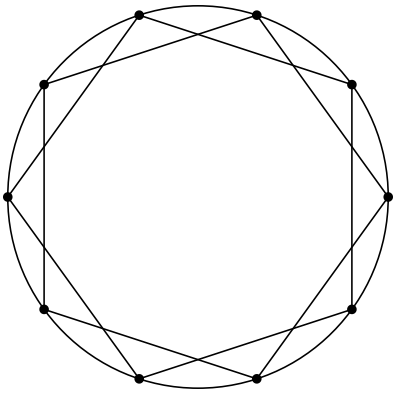
B $3+\sqrt{7}$

C 6

D $\sqrt{37}$

E $4+\sqrt{13}$

5. There are 2026 equally spaced points that all lie on a circle. A line segment is drawn between two points if there is exactly one point between them along the circle. Into how many regions will this divide the interior of the circle? The figure below shows an example with 10 equally spaced points, in which case there are 21 interior regions.



A 4052

B 4053

C 4054

D 6079

E 6081

6. For how many integers n is

$$\frac{n^2-1}{n+2}$$

also an integer?

A 2

B 3

C 4

D 6

E infinitely many

7. A circle in the coordinate plane passes through $(0,0)$, $(3,0)$, and $(0,4)$. The equation of the circle can be written in the form $x^2+y^2+ax+by+c=0$ for some constants a, b, and c. What is $a+b+c$?

A -7

B -2

C 0

D 5

E 7

8. Consider the infinite sequence of sets

$$\{1\}, \{2, 4\}, \{3, 5, 7\}, \{4, 6, 8, 10\}, \{5, 7, 9, 11, 13\}, \ldots.$$

Here the kth set contains one more element than the previous set, and its members are the terms of an arithmetic sequence beginning with k and having common difference 2. Let N be the number of these sets that contain the number 2026. What is the sum of the digits of N?

A 10

B 14

C 16

D 19

E 20

9. A library offers 5 desks arranged in a row from left to right for quiet studying. Students arrive one at a time and sit down at a desk. If possible, each student avoids sitting next to another student. Otherwise they will, if possible, sit next to one student rather than two. How many possible seating configurations (which seats are occupied) for one to five students are there?

A 14

B 17

C 20

D 22

E 24

10. What is the area of the region bounded by the graphs of $|x + y| \leq 4$ and $x^2 + y^2 - 4(x - y) \leq 2xy$?

A 4

B 8

C 10

D 12

E 16

11. In $\triangle ABC$, point D is $\frac{1}{3}$ of the way from A to B, point F is $\frac{1}{4}$ of the way from B to C, and point E is $\frac{1}{5}$ of the way from C to A. What is the ratio of the area of $\triangle DFE$ to the area of $\triangle ABC$?

Express your answer as a common fraction.

A $\frac{1}{3}$

B $\frac{5}{12}$

C $\frac{7}{15}$

D $\frac{1}{2}$

E $\frac{3}{5}$

12. Sharon tosses a fair coin six times and keeps track of how many heads and tails she has gotten. Her first toss is heads. What is the probability that after every toss Sharon's count of heads differs from her count of tails?

Express your answer as a common fraction.

A $\frac{1}{8}$

B $\frac{3}{16}$

C $\frac{1}{4}$

D $\frac{5}{16}$

E $\frac{3}{8}$

13. Two points P and Q are chosen independently and uniformly at random on the circle $x^2 + y^2 = 4$ in the coordinate plane. What is the probability that no point on $\overline{PQ}$ lies less than 1 unit from the origin?

Express your answer as a common fraction.

A $\frac{1}{3}$

B $1 - \frac{\pi}{6}$

C $\frac{1}{2}$

D $\frac{\pi}{6}$

E $\frac{2}{3}$

14. Real numbers r and s satisfy the equations $r + s = 2$ and $2^r + 2^s = 7$. What is $8^r + 8^s$?

A 199

B 209

C 221

D 237

E 259

15. Real numbers u and v are chosen independently and uniformly at random, with $0 \leq u \leq 30$ and $0 \leq v \leq 10$. What is the probability that the equation $x^2 + ux + v^2 = 0$ has a real solution?

Express your answer as a common fraction.

A $\frac{1}{4}$

B $\frac{1}{3}$

C $\frac{1}{2}$

D $\frac{2}{3}$

E $\frac{3}{4}$

16. The 4 squares in a 2×2 grid of squares are each colored either solid red, white, or blue. In how many ways can this be done so that no square colored red shares a side with a square colored blue?

A 29

B 30

C 32

D 34

E 35

17. A list contains 2026 statements, each of which is either true or false. The first statement is "The number of false statements in this list is at least 1001." The second statement is "The number of false statements in this list is at least 1002." In general, the kth statement in the list is "The number of false statements in this list is at least $k + 1000$." How many statements in the list are true?

A 342

B 513

C 1013

D 1026

E 1513

18. What is the least positive integer n such that $2026!$ is not a multiple of 2025^n?

A 251

B 252

C 253

D 254

E 255

19. A jar contains 12 green marbles and 8 red marbles. In a game, Anika and Ben take turns drawing a random marble from the jar, with replacement. If Ben ever draws a red marble, he wins, and if Anika ever draws a green marble, she wins. Otherwise, the game continues with the next player's turn. The probability that Ben eventually wins is A if Anika goes first and B if Ben goes first. What is $B - A$?

Express your answer as a common fraction.

A $\frac{2}{25}$

B $\frac{4}{25}$

C $\frac{4}{19}$

D $\frac{6}{19}$

E $\frac{9}{20}$

20. Annie, Bobby, and Casey each receive an integer, not necessarily distinct, from 1 through 10. In how many ways can the numbers be given so that their sum is divisible by 7?

A 139

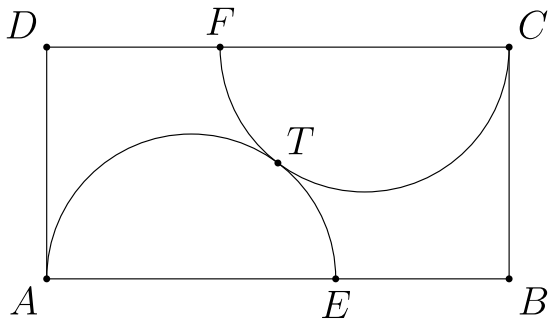
B 140

C 142

D 143

E 145

21. Rectangle $ABCD$ has $AB = 6$ and $BC = 3$. Inside the rectangle are two congruent semicircles, the first with diameter $\overline{AE}$, where E lies on $\overline{AB}$, and the second with diameter $\overline{CF}$, where F lies on $\overline{CD}$. The two semicircles are tangent at T. See the figure.



What is the radius of the semicircles?

Express your answer as a common fraction.

A $\frac{13}{8}$

B $\frac{7}{4}$

C $\frac{15}{8}$

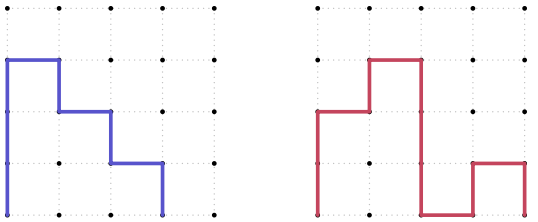
D 2

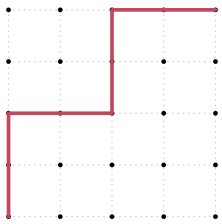
E $\frac{17}{8}$

22. Belinda follows a path on the plane that is entirely contained within the square region $0 \leq x \leq 4$ and $0 \leq y \leq 4$. Call her path *dignified* if and only if all of the following conditions are satisfied.

- Each step is one unit up, down, or to the right.
- The path does not revisit any vertex.
- The path starts at $(a, 0)$ and ends at $(b, 0)$, where a and b are integers with $a < b$, and touches the x-axis only at these two points.

The following figure shows some examples of dignified and not dignified paths.





How many dignified paths can Belinda follow?

A 174

B 340

C 448

D 512

E 970

23. The eight vertices of a cube are randomly and independently colored red, white, or blue. What is the expected number of faces of the cube that have at least two blue vertices?

Express your answer as a common fraction.

A $\frac{16}{27}$

B 2

C $\frac{58}{27}$

D $\frac{22}{9}$

E $\frac{212}{81}$

24. Starting with a list of three numbers, form a sequence in which each subsequent term is the average of the previous three terms. For example, starting with the sequence $(2, 4, 9)$, the next two terms are $\frac{2+4+9}{3} = 5$ and $\frac{4+9+5}{3} = 6$. Which of the following initial three terms will produce a sequence that has the greatest 2026th term?

A $(1, 2, 3)$

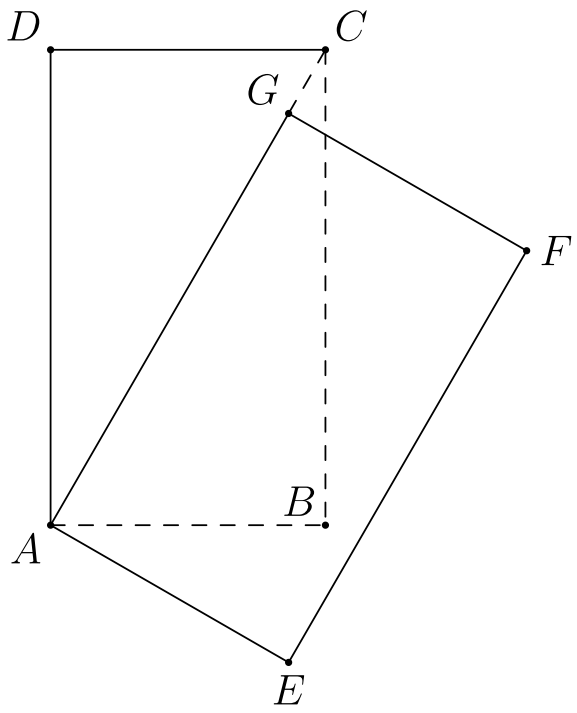
B $(2, 1, 1)$

C $(3, 4, 8)$

D $(4, 4, 7)$

E $(4, 5, 6)$

25. Rectangular card $ABCD$ has $AB = 1$ and $AC = 2$. As shown in the figure, a second card, $AEFG$, congruent to the first, is stacked onto it so that $\overline{AG}$ lies on $\overline{AC}$ and the two cards share corner A.



Additional cards are added, following the same pattern (with shared corner A), creating a fan of cards. The process stops when a new card fits exactly atop $ABCD$. The shape then created is a nonconvex polygon with rotational symmetry. What is the area of this polygon?

A $20\sqrt{3} - 24$

B $34\sqrt{3} - 48$

C $6 + 3\sqrt{3}$

D 12

E $8\sqrt{3}$

Solutions: https://live.poshenloh.com/past-contests/amc10/2026B/solutions

