

# AMC 12 PRACTICE ARCHIVE

# 2025

## 12A and 12B papers + answer keys

### Contents

|                    |          |              |
|--------------------|----------|--------------|
| AMC 12A paper      | 13 pages | starts p. 2  |
| AMC 12A answer key | 1 page   | starts p. 15 |
| AMC 12B paper      | 12 pages | starts p. 16 |
| AMC 12B answer key | 1 page   | starts p. 28 |

### Source and use note

The contest papers are reproduced from the free ZIML AMC 12 practice archive. The questions remain copyrighted by the Mathematical Association of America. Answer keys were cross-checked against the MAA-authorized LIVE archive and MathHub.

Paper archive: [ZIML / Areteem](#)

Answer archive: [LIVE by Po-Shen Loh](#)

Cross-check: [MathHub](#)



# 2025 AMC 12A

Try this exam as a timed Mock Exam on the  
[ZIML Practice Page \(click here\)](#)

View answers and concepts tested in our  
[2025 AMC 10A+12A Blog Post \(click here\)](#)

The problems in the AMC-Series Contests are copyrighted  
by American Mathematics Competitions at Mathematical  
Association of America ([www.maa.org](http://www.maa.org)).



**Question 1**

Not yet answered

Points out of 6

Andy and Betsy both live in Mathville. Andy leaves Mathville on his bicycle at 1:30, traveling due north at a steady 8 miles per hour. Betsy leaves on her bicycle from the same point at 2:30, traveling due east at a steady 12 miles per hour. At what time will they be exactly the same distance from their common starting point?

(A) 3:30      (B) 3:45      (C) 4:00      (D) 4:15      (E) 4:30

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 2**

Not yet answered

Points out of 6

A box contains 10 pounds of a nut mix that is 50 percent peanuts, 20 percent cashews, and 30 percent almonds. A second nut mix containing 20 percent peanuts, 40 percent cashews, and 40 percent almonds is added to the box resulting in a new nut mix that is 40 percent peanuts. How many pounds of cashews are now in the box?

(A) 3.5      (B) 4      (C) 4.5      (D) 5      (E) 6

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 3**

Not yet answered

Points out of 6

A team of students is going to compete against a team of teachers in a trivia contest. The total number of students and teachers is 15. Ash, a cousin of one of the students, wants to join the contest. If Ash plays with the students, the average age on that team will increase from 12 to 14. If Ash plays with the teachers, the average age on that team will decrease from 55 to 52. How old is Ash?

(A) 28      (B) 29      (C) 30      (D) 32      (E) 33

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 4**

Not yet answered

Points out of 6

Agnes writes the following four statements on a blank piece of paper.

- At least one of these statements is true.
- At least two of these statements are true.
- At least two of these statements are false.
- At least one of these statements is false.

Each statement is either true or false. How many false statements did Agnes write on the paper?

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

Select one:

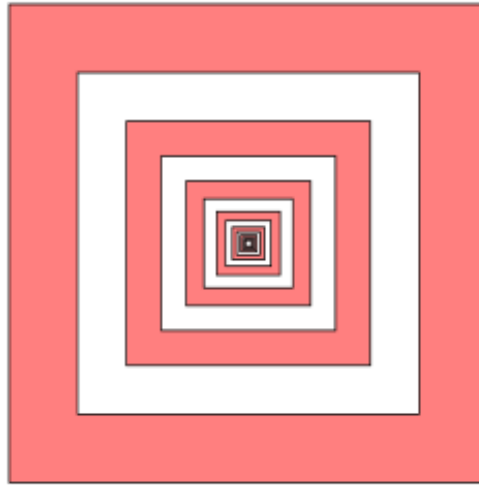
- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 5**

Not yet answered

Points out of 6

In the figure below, the outside square contains infinitely many squares, each of them with the same center and sides parallel to the outside square. The ratio of the side length of a square to the side length of the next inner square is  $k$ , where  $0 < k < 1$ . The spaces between squares are alternately shaded, as shown in the figure (which is not necessarily drawn to scale).



The area of the shaded portion of the figure is 64% of the area of the original square. What is  $k$ ?

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

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 6**

Not yet answered

Points out of 6

Six chairs are arranged around a round table. Two students and two teachers randomly select four of the chairs to sit in. What is the probability that the two students will sit in two adjacent chairs and the two teachers will also sit in two adjacent chairs?

- (A)  $\frac{1}{6}$       (B)  $\frac{1}{5}$       (C)  $\frac{2}{9}$       (D)  $\frac{3}{13}$       (E)  $\frac{1}{4}$

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 7**

Not yet answered

Points out of 6

In a certain alien world, the maximum running speed  $v$  of an organism is dependent on its number of toes  $n$  and number of eyes  $m$ . The relationship can be expressed as  $v = kn^am^b$  centimeters per hour, where  $k$ ,  $a$ ,  $b$  are integer constants. In a population where all organisms have 5 toes,  $\log v = 4 + 2 \log m$ ; and in a population where all organisms have 25 eyes,  $\log v = 4 + 4 \log n$ , where all logs are in base 10. What is  $k + a + b$ ?

(A) 20      (B) 21      (C) 22      (D) 23      (E) 24

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 8**

Not yet answered

Points out of 6

Pentagon  $ABCDE$  is inscribed in a circle, and  $\angle BEC = \angle CED = 30^\circ$ . Let line  $AC$  and line  $BD$  intersect at point  $F$ , and suppose that  $AB = 9$  and  $AD = 24$ . What is  $BF$ ?

(A)  $\frac{57}{11}$       (B)  $\frac{59}{11}$       (C)  $\frac{60}{11}$       (D)  $\frac{61}{11}$       (E)  $\frac{63}{11}$

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 9**

Not yet answered

Points out of 6

Let  $w$  be the complex number  $2 + i$ , where  $i = \sqrt{-1}$ . What real number  $r$  has the property that  $r$ ,  $w$ , and  $w^2$  are three collinear points in the complex plane?

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

Select one:

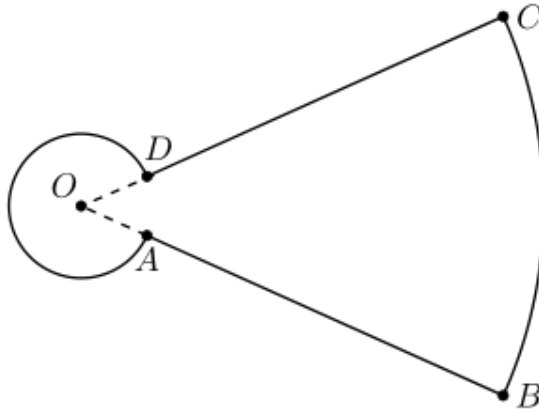
- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 10**

Not yet answered

Points out of 6

In the figure shown below, major arc  $\widehat{AD}$  and minor arc  $\widehat{BC}$  have the same center,  $O$ . Also,  $A$  lies between  $O$  and  $B$ , and  $D$  lies between  $O$  and  $C$ . Major arc  $\widehat{AD}$ , minor arc  $\widehat{BC}$ , and each of the two segments  $\overline{AB}$  and  $\overline{CD}$  have length  $2\pi$ . What is the distance from  $O$  to  $A$ ?



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

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 11**

Not yet answered

Points out of 6

The orthocenter of a triangle is the concurrent intersection of the three (possibly extended) altitudes. What is the sum of the coordinates of the orthocenter of the triangle whose vertices are  $A(2, 31)$ ,  $B(8, 27)$ , and  $C(18, 27)$ ?

- (A) 5      (B) 17      (C)  $10 + 4\sqrt{17} + 2\sqrt{13}$       (D)  $\frac{113}{3}$       (E) 54

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 12**

Not yet answered

Points out of 6

The *harmonic mean* of a collection of numbers is the reciprocal of the arithmetic mean of the reciprocals of the numbers in the collection. For example, the harmonic mean of 4, 4, and 5 is

$$\frac{1}{\frac{1}{3}\left(\frac{1}{4} + \frac{1}{4} + \frac{1}{5}\right)} = \frac{30}{7}.$$

What is the harmonic mean of all the real roots of the 4050th degree polynomial

$$\prod_{k=1}^{2025} (kx^2 - 4x - 3) = (x^2 - 4x - 3)(2x^2 - 4x - 3)(3x^2 - 4x - 3) \dots (2025x^2 - 4x - 3)?$$

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

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 13**

Not yet answered

Points out of 6

Let  $C = \{1, 2, 3, \dots, 13\}$ . Let  $N$  be the greatest integer such that there exists a subset of  $C$  with  $N$  elements that does not contain five consecutive integers. Suppose  $N$  integers are chosen at random from  $C$  without replacement. What is the probability that the chosen elements do not include five consecutive integers?

(A)  $\frac{3}{130}$       (B)  $\frac{3}{143}$       (C)  $\frac{5}{143}$       (D)  $\frac{1}{26}$       (E)  $\frac{5}{78}$

Select one:

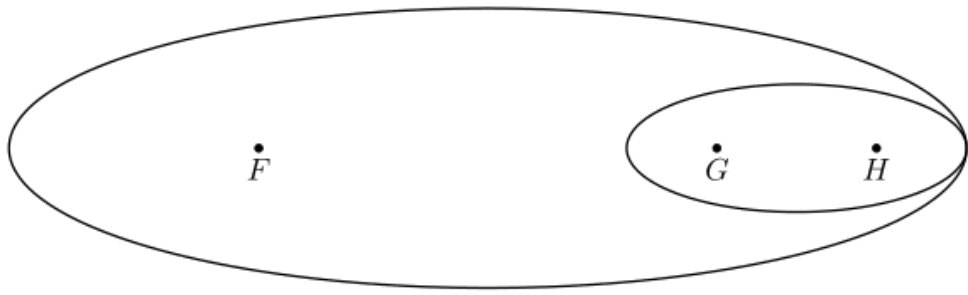
- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 14**

Not yet answered

Points out of 6

Points  $F$ ,  $G$ , and  $H$  are collinear with  $G$  between  $F$  and  $H$ . The ellipse with foci at  $G$  and  $H$  is internally tangent to the ellipse with foci at  $F$  and  $G$ , as shown below.



The two ellipses have the same eccentricity  $e$ , and the ratio of their areas is 2025. (Recall that the eccentricity of an ellipse is  $e = \frac{c}{a}$ , where  $c$  is the distance from the center to a focus, and  $2a$  is the length of the major axis.) What is  $e$ ?

- (A)  $\frac{3}{5}$       (B)  $\frac{16}{25}$       (C)  $\frac{4}{5}$       (D)  $\frac{22}{23}$       (E)  $\frac{44}{45}$

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 15**

Not yet answered

Points out of 6

A set of numbers is called *sum-free* if whenever  $x$  and  $y$  are (not necessarily distinct) elements of the set,  $x + y$  is not an element of the set. For example,  $\{1, 4, 6\}$  and the empty set are sum-free, but  $\{1, 4, 5\}$  is not. What is the greatest possible number of elements in a sum-free subset of  $\{1, 2, 3, \dots, 20\}$ ?

- (A) 8      (B) 9      (C) 10      (D) 11      (E) 12

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 16**

Not yet answered

Points out of 6

Triangle  $\triangle ABC$  has side lengths  $AB = 80$ ,  $BC = 45$ , and  $AC = 75$ . The bisector of  $\angle B$  and the altitude to side  $\overline{AB}$  intersect at point  $P$ . What is  $BP$ ?

(A) 18      (B) 19      (C) 20      (D) 21      (E) 22

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 17**

Not yet answered

Points out of 6

The polynomial  $(z + i)(z + 2i)(z + 3i) + 10$  has three roots in the complex plane, where  $i = \sqrt{-1}$ . What is the area of the triangle formed by these three roots?

(A) 6      (B) 8      (C) 10      (D) 12      (E) 14

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 18**

Not yet answered

Points out of 6

How many ordered triples  $(x, y, z)$  of different positive integers less than or equal to 8 satisfy  $xy > z$ ,  $xz > y$ , and  $yz > x$ ?

(A) 36      (B) 84      (C) 186      (D) 336      (E) 486

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 19**

Not yet answered

Points out of 6

Let  $a$ ,  $b$ , and  $c$  be the roots of the polynomial  $x^3 + kx + 1$ . What is the sum

$$a^3b^2 + a^2b^3 + b^3c^2 + b^2c^3 + c^3a^2 + c^2a^3?$$

- (A)  $-k$       (B)  $-k + 1$       (C)  $1$       (D)  $k - 1$       (E)  $k$

Select one:

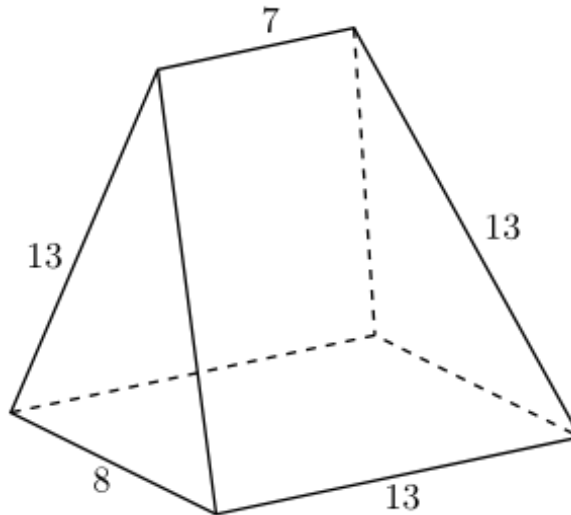
- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 20**

Not yet answered

Points out of 6

The base of the pentahedron shown below is a  $13 \times 8$  rectangle, and its lateral faces are two isosceles triangles with base of length 8 and congruent sides of length 13, and two isosceles trapezoids with bases of length 7 and 13 and nonparallel sides of length 13.



What is the volume of the pentahedron?

- (A) 416      (B) 520      (C) 528      (D) 676      (E) 832

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 21**

Not yet answered

Points out of 6

There is a unique ordered triple  $(a, k, m)$  of nonnegative integers such that

$$\frac{4^a + 4^{a+k} + 4^{a+2k} + \dots + 4^{a+mk}}{2^a + 2^{a+k} + 2^{a+2k} + \dots + 2^{a+mk}} = 964.$$

What is  $a + k + m$ ?

- (A) 8      (B) 9      (C) 10      (D) 11      (E) 12

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 22**

Not yet answered

Points out of 6

Three real numbers are chosen independently and uniformly at random between 0 and 1.

What is the probability that the greatest of these three numbers is greater than 2 times each of the other two numbers? (In other words, if the chosen numbers are  $a \geq b \geq c$ , then  $a > 2b$ .)

Three real numbers are chosen independently and uniformly at random between 0 and 1.

What is the probability that the greatest of these three numbers is greater than the sum of the other two numbers?

- (A)  $\frac{1}{12}$       (B)  $\frac{1}{9}$       (C)  $\frac{1}{8}$       (D)  $\frac{1}{6}$       (E)  $\frac{1}{4}$

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 23**

Not yet answered

Points out of 6

Call a positive integer fair if no digit is used more than once, it has no 0s, and no digit is adjacent to two greater digits. For example, 196, 23 and 12463 are fair, but 1546, 320, and 34321 are not. How many fair positive integers are there?

(A) 511      (B) 2584      (C) 9841      (D) 17711      (E) 19682

Select one:

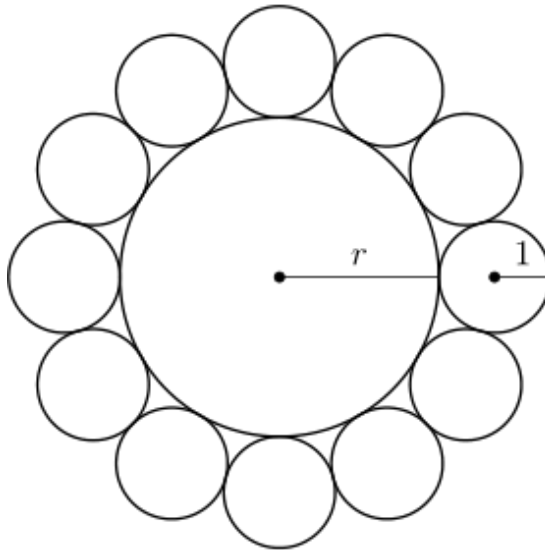
- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 24**

Not yet answered

Points out of 6

A circle of radius  $r$  is surrounded by 12 circles of radius 1, externally tangent to the central circle and sequentially tangent to each other, as shown. Then  $r$  can be written as  $\sqrt{a} + \sqrt{b} + c$ , where  $a, b, c$  are integers. What is  $a + b + c$ ?



(A) 3      (B) 5      (C) 7      (D) 9      (E) 11

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 25**

Not yet answered

Points out of 6

Polynomials  $P(x)$  and  $Q(x)$  each have degree 3 and leading coefficient 1, and their roots are all elements of  $\{1, 2, 3, 4, 5\}$ . The function  $f(x) = \frac{P(x)}{Q(x)}$  has the property that there exist real numbers  $a < b < c < d$  such that the set of all real numbers  $x$  such that  $f(x) \leq 0$  consists of the closed interval  $[a, b]$  together with the open interval  $(c, d)$ . How many functions  $f(x)$  are possible?

(A) 7      (B) 9      (C) 11      (D) 12      (E) 13

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

# 2025 AMC 12A

Answer key

|                |                |                |                |                |
|----------------|----------------|----------------|----------------|----------------|
| 1<br><b>E</b>  | 2<br><b>B</b>  | 3<br><b>A</b>  | 4<br><b>B</b>  | 5<br><b>D</b>  |
| 6<br><b>B</b>  | 7<br><b>C</b>  | 8<br><b>E</b>  | 9<br><b>E</b>  | 10<br><b>B</b> |
| 11<br><b>A</b> | 12<br><b>B</b> | 13<br><b>D</b> | 14<br><b>D</b> | 15<br><b>C</b> |
| 16<br><b>D</b> | 17<br><b>A</b> | 18<br><b>C</b> | 19<br><b>E</b> | 20<br><b>C</b> |
| 21<br><b>A</b> | 22<br><b>E</b> | 23<br><b>C</b> | 24<br><b>C</b> | 25<br><b>E</b> |

## 2025 AMC 12A, Question 25

The released key gives E as the intended answer. The item was later reported as voided for official score calculation because the question was flawed.



# 2025 AMC 12B

Try this exam as a timed Mock Exam on the  
[ZIML Practice Page \(click here\)](#)

View answers and concepts tested in our  
[2025 AMC 10B+12B Blog Post \(click here\)](#)

The problems in the AMC-Series Contests are copyrighted  
by American Mathematics Competitions at Mathematical  
Association of America ([www.maa.org](http://www.maa.org)).



**Question 1**

Not yet answered

Marked out of 6

The instructions on a 350-gram bag of coffee beans say that proper brewing of a large mug of pour-over coffee requires 20 grams of coffee beans. What is the greatest number of properly brewed large mugs of coffee that can be made from the coffee beans in that bag?

(A) 16      (B) 17      (C) 18      (D) 19      (E) 20

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 2**

Not yet answered

Marked out of 6

Jerry wrote down the ones digit of each of the first 2025 positive squares: 1, 4, 9, 6, 5, 6, ...  
What is the sum of all the numbers Jerry wrote down?

(A) 9025      (B) 9070      (C) 9090      (D) 9115      (E) 9160

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 3**

Not yet answered

Marked out of 6

What is the value of  $i(i - 1)(i - 2)(i - 3)$ , where  $i = \sqrt{-1}$ ?

(A)  $6 - 5i$       (B)  $-10i$       (C)  $10i$       (D)  $-10$       (E)  $10$

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 4**

Not yet answered

Marked out of 6

The value of the two-digit number  $\underline{a} \underline{b}$  in base seven equals the value of the two-digit number  $\underline{b} \underline{a}$  in base nine. What is  $a + b$ ?

(A) 7      (B) 9      (C) 10      (D) 11      (E) 14

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 5**

Not yet answered

Marked out of 6

Positive integers  $x$  and  $y$  satisfy the equation  $57x + 22y = 400$ . What is the least possible value of  $x + y$ ?

(A) 10      (B) 11      (C) 13      (D) 14      (E) 15

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 6**

Not yet answered

Marked out of 6

Emmy says to Max, "I ordered 36 math club sweatshirts today." Max asks, "How much did each shirt cost?" Emmy responds, "I'll give you a hint. The total cost was  $\$ \underline{A} \underline{B} \underline{B}. \underline{B} \underline{A}$ , where  $A$  and  $B$  are digits and  $A \neq 0$ ." After a pause, Max says, "That was a good price." What is  $A + B$ ?

(A) 7      (B) 8      (C) 11      (D) 14      (E) 15

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 7**

Not yet answered

Marked out of 6

What is the value of

$$\sum_{n=2}^{255} \frac{\log_2 \left(1 + \frac{1}{n}\right)}{(\log_2 n) (\log_2 (n+1))}?$$

- (A)  $\frac{3}{4}$       (B)  $1 - \frac{1}{\log_2 255}$       (C)  $\frac{7}{8}$       (D)  $\frac{15}{16}$       (E) 1

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 8**

Not yet answered

Marked out of 6

There are integers  $a$  and  $b$  such that the polynomial  $x^3 - 5x^2 + ax + b$  has  $4 + \sqrt{5}$  as a root. What is  $a + b$ ?

- (A) 13      (B) 17      (C) 20      (D) 30      (E) 68

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 9**

Not yet answered

Marked out of 6

What is the tens digit of  $6^{6^6}$ ?

- (A) 1      (B) 3      (C) 5      (D) 7      (E) 9

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 10**

Not yet answered

Marked out of 6

The altitude to the hypotenuse of a  $30^\circ - 60^\circ - 90^\circ$  is divided into two segments of lengths  $x < y$  by the median to the shortest side of the triangle. What is the ratio  $\frac{x}{x+y}$ ?

- (A)  $\frac{3}{7}$       (B)  $\frac{\sqrt{3}}{4}$       (C)  $\frac{4}{9}$       (D)  $\frac{5}{11}$       (E)  $\frac{4\sqrt{3}}{15}$

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 11**

Not yet answered

Marked out of 6

Nine athletes, no two of whom are the same height, try out for the basketball team. One at a time, they draw a wristband at random, without replacement, from a bag containing 3 blue bands, 3 red bands, and 3 green bands. They are divided into a blue group, a red group, and a green group. The tallest member of each group is named the group captain. What is the probability that the group captains are the three tallest athletes?

- (A)  $\frac{2}{9}$       (B)  $\frac{2}{7}$       (C)  $\frac{9}{28}$       (D)  $\frac{1}{3}$       (E)  $\frac{3}{8}$

Select one:

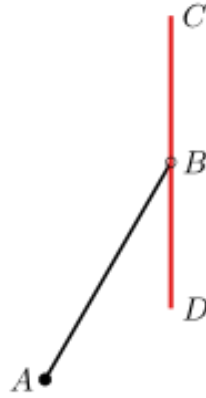
- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 12**

Not yet answered

Marked out of 6

The windshield wiper on the driver's side of a large bus is depicted below.



Arm  $\overline{AB}$  pivots back and forth around point  $A$ , sweeping out an arc of  $60^\circ$ , symmetric about the vertical line through  $A$ . The wiper blade  $\overline{CD}$  is attached to  $B$  at its midpoint and stays vertical as the arm moves. The arm is 3 feet long, and the wiper blade is 3.5 feet tall. What is the area of the windshield cleaned by the wiper, in square feet, to the nearest hundredth? (Assume that the windshield is a flat vertical surface.)

(A) 9.68      (B) 10.14      (C) 10.50      (D) 11.32      (E) 12.00

Select one:

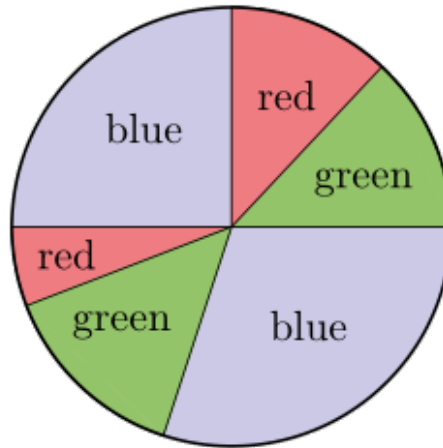
- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 13**

Not yet answered

Marked out of 6

A circle has been divided into 6 sectors of different sizes. Then 2 of the sectors are painted red, 2 painted green, and 2 painted blue so that no two neighboring sectors are painted the same color. One such coloring is shown below.



How many different colorings are possible?

- (A) 12      (B) 16      (C) 18      (D) 24      (E) 28

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 14**

Not yet answered

Marked out of 6

Consider a decreasing sequence of  $n$  positive integers

$$x_1 > x_2 > \cdots > x_n$$

that satisfies the following conditions:

What is the greatest possible value of  $n$ ?

- (A) 1013      (B) 1014      (C) 1016      (D) 2016      (E) 2025

Select one:

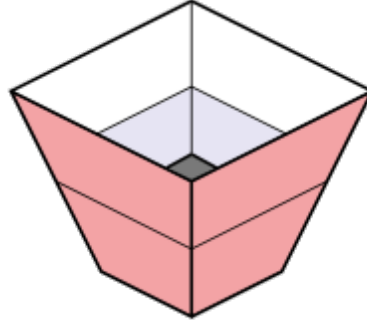
- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 15**

Not yet answered

Marked out of 6

A container has a  $1 \times 1$  square bottom, a  $3 \times 3$  open square top, and four congruent trapezoidal sides, as shown. Starting when the container is empty, a hose that runs water at a constant rate takes 35 minutes to fill the container up to the midline of the trapezoids.



How many more minutes will it take to fill the remainder of the container?

- (A) 70      (B) 85      (C) 90      (D) 95      (E) 105

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 16**

Not yet answered

Marked out of 6

An analog clock starts at midnight and runs for 2025 minutes before stopping. What is the tangent of the acute angle between the hour hand and the minute hand when the clock stops?

- (A) 0      (B)  $\sqrt{2} - 1$       (C)  $2 - \sqrt{2}$       (D)  $\frac{\sqrt{2}}{2}$       (E)  $3 - \sqrt{2}$

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 17**

Not yet answered

Marked out of 6

Each of the 9 squares in a  $3 \times 3$  grid is to be colored red, blue, or yellow in such a way that each red square shares an edge with at least one blue square, each blue square shares an edge with at least one yellow square, and each yellow square shares an edge with at least one red square. Colorings that can be obtained from one another by rotations and/or reflections are considered the same. How many different colorings are possible?

(A) 3      (B) 9      (C) 12      (D) 18      (E) 27

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 18**

Not yet answered

Marked out of 6

Awnik repeatedly plays a game that has a probability of winning of  $\frac{1}{3}$ . The outcomes of the games are independent. What is the expected value of the number of games he will play until he has both won and lost at least once?

(A)  $\frac{5}{2}$       (B) 3      (C)  $\frac{16}{5}$       (D)  $\frac{7}{2}$       (E)  $\frac{15}{4}$

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 19**

Not yet answered

Marked out of 6

A rectangular grid of squares has 141 rows and 91 columns. Each square has room for two numbers. Horace and Vera each fill in the grid by putting the numbers from 1 through  $141 \times 91 = 12,831$  into the squares. Horace fills the grid horizontally: he puts 1 through 91 in order from left to right into row 1, puts 92 through 182 into row 2 in order from left to right, and continues similarly through row 141. Vera fills the grid vertically: she puts 1 through 141 in order from top to bottom into column 1, then 142 through 282 into column 2 in order from top to bottom, and continues similarly through column 91. How many squares get two copies of the same number?

(A) 7      (B) 10      (C) 11      (D) 12      (E) 19

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 20**

Not yet answered

Marked out of 6

A frog hops along the number line according to the following rules:

- It starts at 0.
- If it is at 0, then it moves to 1 with probability  $\frac{1}{2}$  and it disappears with probability  $\frac{1}{2}$ .
- For  $n = 1, 2,$  or  $3$ , if it is at  $n$ , then it moves to  $n + 1$  with probability  $\frac{1}{4}$ , it moves to  $n - 1$  with probability  $\frac{1}{4}$ , and it disappears with probability  $\frac{1}{2}$ .

What is the probability that the frog reaches 4?

(A)  $\frac{1}{101}$       (B)  $\frac{1}{100}$       (C)  $\frac{1}{99}$       (D)  $\frac{1}{98}$       (E)  $\frac{1}{97}$

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 21**

Not yet answered

Marked out of 6

Two non-congruent triangles have the same area. Each triangle has sides of length 8 and 9, and the third side of each triangle has integer length. What is the sum of the lengths of the third sides?

(A) 20      (B) 22      (C) 24      (D) 26      (E) 28

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 22**

Not yet answered

Marked out of 6

What is the greatest possible area of the triangle in the complex plane with vertices  $2z$ ,  $(1 + i)z$ , and  $(1 - i)z$ , where  $z$  is a complex number satisfying  $|4z - 2| = 1$ ?

(A)  $\frac{1}{4}$       (B)  $\frac{1}{2}$       (C)  $\frac{9}{16}$       (D)  $\frac{3}{4}$       (E) 1

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 23**

Not yet answered

Marked out of 6

Let  $S$  be the set of all integers  $z > 1$  such that for all pairs of nonnegative integers  $(x, y)$  with  $x < y < z$ , the remainder when  $2025x$  is divided by  $z$  is less than the remainder when  $2025y$  is divided by  $z$ . What is the sum of the elements of  $S$ ?

(A) 3041      (B) 3542      (C) 3750      (D) 4044      (E) 4319

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 24**

Not yet answered

Marked out of 6

How many real numbers satisfy the equation  $\sin(20\pi x) = \log_{20}(x)$ ?

(A) 199      (B) 200      (C) 398      (D) 399      (E) 400

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

**Question 25**

Not yet answered

Marked out of 6

Three concentric circles have radii 1, 2, and 3. An equilateral triangle of side length  $s$  has one vertex on each circle. What is  $s^2$ ?

(A) 6      (B)  $\frac{25}{4}$       (C)  $\frac{13}{2}$       (D)  $\frac{27}{4}$       (E) 7

Select one:

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E
- ☐ Leave blank (1.5 points)

# 2025 AMC 12B

Answer key

|                |                |                |                |                |
|----------------|----------------|----------------|----------------|----------------|
| 1<br><b>B</b>  | 2<br><b>D</b>  | 3<br><b>D</b>  | 4<br><b>A</b>  | 5<br><b>E</b>  |
| 6<br><b>C</b>  | 7<br><b>C</b>  | 8<br><b>C</b>  | 9<br><b>C</b>  | 10<br><b>A</b> |
| 11<br><b>C</b> | 12<br><b>C</b> | 13<br><b>D</b> | 14<br><b>B</b> | 15<br><b>D</b> |
| 16<br><b>B</b> | 17<br><b>C</b> | 18<br><b>D</b> | 19<br><b>C</b> | 20<br><b>E</b> |
| 21<br><b>C</b> | 22<br><b>C</b> | 23<br><b>E</b> | 24<br><b>D</b> | 25<br><b>E</b> |