



2013 AMC 12A

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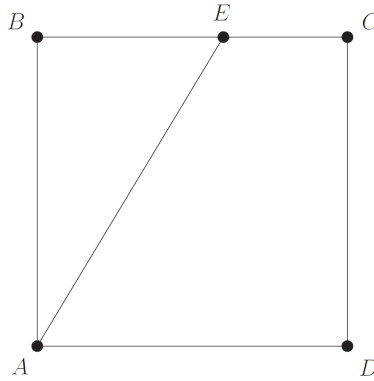


Question 1

Not yet answered

Points out of 6

Square $ABCD$ has side length 10. Point E is on \overline{BC} , and the area of $\triangle ABE$ is 40.



What is BE ?

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

Select one:

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

Question 2

Not yet answered

Points out of 6

A softball team played ten games, scoring 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 runs. They lost by one run in exactly five games. In each of the other games, they scored twice as many runs as their opponent. How many total runs did their opponents score?

- (A) 35 (B) 40 (C) 45 (D) 50 (E) 55

Select one:

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

Question 3

Not yet answered

Points out of 6

A flower bouquet contains pink roses, red roses, pink carnations, and red carnations. One third of the pink flowers are roses, three fourths of the red flowers are carnations, and six tenths of the flowers are pink. What percent of the flowers are carnations?

- (A) 15 (B) 30 (C) 40 (D) 60 (E) 70

Select one:

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

Question 4

Not yet answered

Points out of 6

What is the value of

$$\frac{2^{2014} + 2^{2012}}{2^{2014} - 2^{2012}}?$$

- (A) -1 (B) 1 (C) $\frac{5}{3}$ (D) 2013 (E) 2^{4024}

Select one:

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

Question 5

Not yet answered

Points out of 6

Tom, Dorothy, and Sammy went on a vacation and agreed to split the costs evenly. During their trip Tom paid \$105, Dorothy paid \$125, and Sammy paid \$175. In order to share the costs equally, Tom gave Sammy t dollars, and Dorothy gave Sammy d dollars. What is $t - d$?

(A) 15 (B) 20 (C) 25 (D) 30 (E) 35

Select one:

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

Question 6

Not yet answered

Points out of 6

In a recent basketball game, Shenille attempted only three-point shots and two-point shots. She was successful on 20% of her three-point shots and 30% of her two-point shots. Shenille attempted 30 shots. How many points did she score?

(A) 12 (B) 18 (C) 24 (D) 30 (E) 36

Select one:

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

Question 7

Not yet answered

Points out of 6

The sequence $S_1, S_2, S_3, \dots, S_{10}$ has the property that every term beginning with the third is the sum of the previous two. That is,

$$S_n = S_{n-2} + S_{n-1} \text{ for } n \geq 3.$$

Suppose that $S_9 = 110$ and $S_7 = 42$. What is S_4 ?

(A) 4 (B) 6 (C) 10 (D) 12 (E) 16

Select one:

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

Question 8

Not yet answered

Points out of 6

Given that x and y are distinct nonzero real numbers such that $x + \frac{2}{x} = y + \frac{2}{y}$, what is xy ?

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

Select one:

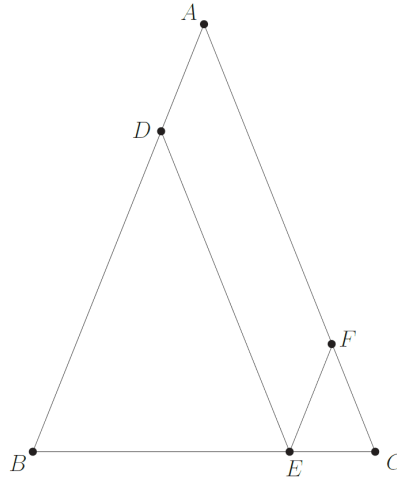
- A
- B
- C
- D
- E
- Leave blank (1.5 points)

Question 9

Not yet answered

Points out of 6

In $\triangle ABC$, $AB = AC = 28$ and $BC = 20$. Points D , E , and F are on sides \overline{AB} , \overline{BC} , and \overline{AC} , respectively, such that \overline{DE} and \overline{EF} are parallel to \overline{AC} and \overline{AB} , respectively.



What is the perimeter of parallelogram $ADEF$?

- (A) 48 (B) 52 (C) 56 (D) 60 (E) 72

Select one:

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

Question 10

Not yet answered

Points out of 6

Let S be the set of positive integers n for which $\frac{1}{n}$ has the repeating decimal representation $0.\overline{ab} = 0.ababab\cdots$, with a and b different digits. What is the sum of the elements of S ?

- (A) 11 (B) 44 (C) 110 (D) 143 (E) 155

Select one:

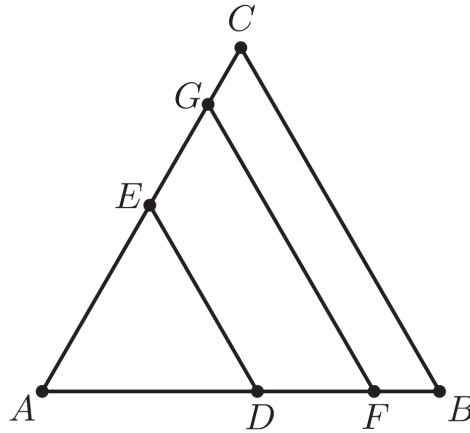
- A
 B
 C
 D
 E
 Leave blank (1.5 points)

Question 11

Not yet answered

Points out of 6

Triangle ABC is equilateral with $AB = 1$. Points E and G are on \overline{AC} and points D and F are on \overline{AB} such that both \overline{DE} and \overline{FG} are parallel to \overline{BC} . Furthermore, triangle ADE and trapezoids $DFGE$ and $FBCG$ all have the same perimeter.



What is $DE + FG$?

- (A) 1 (B) $\frac{3}{2}$ (C) $\frac{21}{13}$ (D) $\frac{13}{8}$ (E) $\frac{5}{3}$

Select one:

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

Question 12

Not yet answered

Points out of 6

The angles in a particular triangle are in arithmetic progression, and the side lengths are 4, 5, x . The sum of the possible values of x equals $a + \sqrt{b} + \sqrt{c}$ where a , b , and c are positive integers. What is $a + b + c$?

- (A) 36 (B) 38 (C) 40 (D) 42 (E) 44

Select one:

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

Question 13

Not yet answered

Points out of 6

Let points $A = (0, 0)$, $B = (1, 2)$, $C = (3, 3)$, and $D = (4, 0)$. Quadrilateral $ABCD$ is cut into equal area pieces by a line passing through A . This line intersects \overline{CD} at point $\left(\frac{p}{q}, \frac{r}{s}\right)$, where these fractions are in lowest terms. What is $p + q + r + s$?

- (A) 54 (B) 58 (C) 62 (D) 70 (E) 75

Select one:

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

Question 14

Not yet answered

Points out of 6

The sequence

 $\log_{12} 162, \log_{12} x, \log_{12} y, \log_{12} z, \log_{12} 1250$ is an arithmetic progression. What is x ?

- (A) $125\sqrt{3}$ (B) 270 (C) $162\sqrt{5}$ (D) 434 (E) $225\sqrt{6}$

Select one:

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

Question 15

Not yet answered

Points out of 6

Rabbits Peter and Pauline have three offspring—Flopsie, Mopsie, and Cotton-tail. These five rabbits are to be distributed to four different pet stores so that no store gets both a parent and a child. It is not required that every store gets a rabbit. In how many different ways can this be done?

(A) 96 (B) 108 (C) 156 (D) 204 (E) 372

Select one:

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

Question 16

Not yet answered

Points out of 6

A , B , C are three piles of rocks. The mean weight of the rocks in A is 40 pounds, the mean weight of the rocks in B is 50 pounds, the mean weight of the rocks in the combined piles A and B is 43 pounds, and the mean weight of the rocks in the combined piles A and C is 44 pounds. What is the greatest possible integer value for the mean in pounds of the rocks in the combined piles B and C ?

(A) 55 (B) 56 (C) 57 (D) 58 (E) 59

Select one:

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

Question 17

Not yet answered

Points out of 6

A group of 12 pirates agree to divide a treasure chest of gold coins among themselves as follows. The k^{th} pirate to take a share takes $\frac{k}{12}$ of the coins that remain in the chest. The number of coins initially in the chest is the smallest number for which this arrangement will allow each pirate to receive a positive whole number of coins. How many coins does the 12th pirate receive?

- (A) 720 (B) 1296 (C) 1728 (D) 1925 (E) 3850

Select one:

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

Question 18

Not yet answered

Points out of 6

Six spheres of radius 1 are positioned so that their centers are at the vertices of a regular hexagon of side length 2. The six spheres are internally tangent to a larger sphere whose center is the center of the hexagon. An eighth sphere is externally tangent to the six smaller spheres and internally tangent to the larger sphere. What is the radius of this eighth sphere?

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

Select one:

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

Question 19

Not yet answered

Points out of 6

In $\triangle ABC$, $AB = 86$, and $AC = 97$. A circle with center A and radius AB intersects \overline{BC} at points B and X . Moreover \overline{BX} and \overline{CX} have integer lengths. What is BC ?

(A) 11 (B) 28 (C) 33 (D) 61 (E) 72

Select one:

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

Question 20

Not yet answered

Points out of 6

Let S be the set $\{1, 2, 3, \dots, 19\}$. For $a, b \in S$, define $a \succ b$ to mean that either $0 < a - b \leq 9$ or $b - a > 9$. How many ordered triples (x, y, z) of elements of S have the property that $x \succ y$, $y \succ z$, and $z \succ x$?

(A) 810 (B) 855 (C) 900 (D) 950 (E) 988

Select one:

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

Question 21

Not yet answered

Points out of 6

Consider $A = \log(2013 + \log(2012 + \log(2011 + \log(\dots + \log(3 + \log 2) \dots))))$. Which of the following intervals contains A ?

(A) $(\log 2016, \log 2017)$ (B) $(\log 2017, \log 2018)$ (C) $(\log 2018, \log 2019)$
(D) $(\log 2019, \log 2020)$ (E) $(\log 2020, \log 2021)$

Select one:

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

Question 22

Not yet answered

Points out of 6

A palindrome is a nonnegative integer number that reads the same forwards and backwards when written in base 10 with no leading zeros. A 6-digit palindrome n is chosen uniformly at random. What is the probability that $\frac{n}{11}$ is also a palindrome?

- (A) $\frac{8}{25}$ (B) $\frac{33}{100}$ (C) $\frac{7}{20}$ (D) $\frac{9}{25}$ (E) $\frac{11}{30}$

Select one:

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

Question 23

Not yet answered

Points out of 6

$ABCD$ is a square of side length $\sqrt{3} + 1$. Point P is on \overline{AC} such that $AP = \sqrt{2}$. The square region bounded by $ABCD$ is rotated 90° counterclockwise with center P , sweeping out a region whose area is $\frac{1}{c}(a\pi + b)$, where a , b , and c are positive integers and $\gcd(a, b, c) = 1$. What is $a + b + c$?

- (A) 15 (B) 17 (C) 19 (D) 21 (E) 23

Select one:

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

Question 24

Not yet answered

Points out of 6

Three distinct segments are chosen at random among the segments whose end-points are the vertices of a regular 12-gon. What is the probability that the lengths of these three segments are the three side lengths of a triangle with positive area?

- (A) $\frac{553}{715}$ (B) $\frac{443}{572}$ (C) $\frac{111}{143}$ (D) $\frac{81}{104}$ (E) $\frac{223}{286}$

Select one:

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

Question 25

Not yet answered

Points out of 6

Let $f: \mathbb{C} \rightarrow \mathbb{C}$ be defined by $f(z) = z^2 + iz + 1$. How many complex numbers z are there such that $\text{Im}(z) > 0$ and both the real and the imaginary parts of $f(z)$ are integers with absolute value at most 10?

- (A) 399 (B) 401 (C) 413 (D) 431 (E) 441

Select one:

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