12 Problems Appeared on Both the 2016AMC 10B and 12B

1. 2016 AMC 10B #1/2016 AMC 12B #1

What is the value of $\frac{2a^{-1}+\frac{a^{-1}}{2}}{a}$ when $a=\frac{1}{2}$?

$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 2 \qquad \textbf{(C)}\ \frac{5}{2} \qquad \textbf{(D)}\ 10 \qquad \textbf{(E)}\ 20$

2. 2016 AMC 10B #3/2016 AMC 12B #3

Let $x=-2016$. What is the value of

$$\Big|\big||x|-x\big|-|x|\Big|-x\ ?$$

$\textbf{(A)}\ -2016 \qquad \textbf{(B)}\ 0 \qquad \textbf{(C)}\ 2016 \qquad \textbf{(D)}\ 4032 \qquad \textbf{(E)}\ 6048$

3. 2016 AMC 10B #7/2016 AMC 12B #4

The ratio of the measures of two acute angles is $5:4$, and the complement of one of these two angles is twice as large as the complement of the other. What is the sum of the degree measures of the two angles?

$\textbf{(A)}\ 75 \qquad \textbf{(B)}\ 90 \qquad \textbf{(C)}\ 135 \qquad \textbf{(D)}\ 150 \qquad \textbf{(E)}\ 270$

4. 2016 AMC 10B #9/2016 AMC 12B #6

All three vertices of $\triangle ABC$ lie on the parabola defined by $y=x^2$, with A at the origin and $\overline{BC}$ parallel to the x-axis. The area of the triangle is 64. What is the length of BC?

$\textbf{(A)}\ 4 \qquad \textbf{(B)}\ 6 \qquad \textbf{(C)}\ 8 \qquad \textbf{(D)}\ 10 \qquad \textbf{(E)}\ 16$

5. 2016 AMC 10B #10/2016 AMC 12B #8

A thin piece of wood of uniform density in the shape of an equilateral triangle with side length 3 inches weighs 12 ounces. A second piece of the same type of wood, with the same thickness, also in the shape of an equilateral triangle, has side length of 5 inches. Which of the following is closest to the weight, in ounces, of the second piece?

$\textbf{(A)}\ 14.0 \qquad \textbf{(B)}\ 16.0 \qquad \textbf{(C)}\ 20.0 \qquad \textbf{(D)}\ 33.3 \qquad \textbf{(E)}\ 55.6$

6. 2016 AMC 10B #11/2016 AMC 12B #9

Carl decided to fence in his rectangular garden. He bought 20 fence posts, placed one on each of the four corners, and spaced out the rest evenly along the edges of the garden, leaving exactly 4 yards between neighboring posts. The longer side of his garden, including the corners, has twice as many posts as the shorter side, including the corners. What is the area, in square yards, of Carl's garden?

$\textbf{(A)}\ 256 \qquad \textbf{(B)}\ 336 \qquad \textbf{(C)}\ 384 \qquad \textbf{(D)}\ 448 \qquad \textbf{(E)}\ 512$

7. 2016 AMC 10B #13/2016 AMC 12B #10

At Megapolis Hospital one year, multiple-birth statistics were as follows: Sets of twins, triplets, and quadruplets accounted for 1000 of the babies born. There were four times as many sets of triplets as sets of quadruplets, and there was three times as many sets of twins as sets of triplets. How many of these 1000 babies were in sets of quadruplets?

$\textbf{(A)}\ 25 \qquad \textbf{(B)}\ 40 \qquad \textbf{(C)}\ 64 \qquad \textbf{(D)}\ 100 \qquad \textbf{(E)}\ 160$

8. 2016 AMC 10B #14/2016 AMC 12B #11

How many squares whose sides are parallel to the axes and whose vertices have coordinates that are integers lie entirely within the region bounded by the line $y = \pi x$, the line $y = -0.1$ and the line $x = 5.1$?

$\textbf{(A)}\ 30 \qquad \textbf{(B)}\ 41 \qquad \textbf{(C)}\ 45 \qquad \textbf{(D)}\ 50 \qquad \textbf{(E)}\ 57$

9. 2016 AMC 10B #15/2016 AMC 12B #12

All the numbers 1, 2, 3, 4, 5, 6, 7, 8, and 9 are written in a 3×3 array of squares, one number in each square, in such a way that if two numbers are consecutive then they occupy squares that share an edge. The numbers in the four corners add up to 18. What is the number in the center?

$\textbf{(A)}\ 5 \qquad \textbf{(B)}\ 6 \qquad \textbf{(C)}\ 7 \qquad \textbf{(D)}\ 8 \qquad \textbf{(E)}\ 9$

10. 2016 AMC 10B #16/2016 AMC 12B #14

The sum of an infinite geometric series is a positive number S, and the second term in the series is 1. What is the smallest possible value of S?

$\textbf{(A)}\ \frac{1+\sqrt{5}}{2} \qquad \textbf{(B)}\ 2 \qquad \textbf{(C)}\ \sqrt{5} \qquad \textbf{(D)}\ 3 \qquad \textbf{(E)}\ 4$

11. 2016 AMC 10B #17/2016 AMC 12B #15

All the numbers 2, 3, 4, 5, 6, and 7 are assigned to the six faces of a cube, one number to each face. For each of the eight vertices of the cube, a product of three numbers is computed, where the three numbers are the numbers assigned to the three faces that include that vertex. What is the greatest possible value of the sum of these eight products?

$\textbf{(A)}\ 312 \qquad \textbf{(B)}\ 343 \qquad \textbf{(C)}\ 625 \qquad \textbf{(D)}\ 729 \qquad \textbf{(E)}\ 1680$

12. 2016 AMC 10B #21/2016 AMC 12B #18

What is the area of the region enclosed by the graph of the equation $x^2 + y^2 = |x| + |y|$?

$\textbf{(A)}\ \pi + \sqrt{2} \qquad \textbf{(B)}\ \pi + 2 \qquad \textbf{(C)}\ \pi + 2\sqrt{2} \qquad \textbf{(D)}\ 2\pi + \sqrt{2} \qquad \textbf{(E)}\ 2\pi + 2\sqrt{2}$