AMC 10A, 2021, Problem 10

Which of the following is equivalent to

$$(2+3)\left(2^2+3^2\right)\left(2^4+3^4\right)\left(2^8+3^8\right)\left(2^{16}+3^{16}\right)\left(2^{52}+3^{32}\right)\left(2^{64}+3^{64}\right)?$$

(A) $3^{127}+2^{127}$
(B) $3^{127}+2^{127}+2\cdot 3^{63}+3\cdot 2^{63}$
(C) $3^{128}-2^{128}$
(D) $3^{128}+2^{128}$
(E) 5^{127}

AMC 10A, 2021, Problem 11

For which of the following integers b is the base- b number 2021_b-221_b not divisible by 3 ?
(A) 3
(B) 4
(C) 6
(D) 7
(E) 8

AMC 10A, 2021, Problem 16

In the following list of numbers, the integer n appears n times in the list for $1 \leq n \leq 200$.

$$1,2,2,3,3,3,4,4,4,4,\ldots,200,200,\ldots,200$$

What is the median of the numbers in this list?
(A) 100.5
(B) 134
(C) 142
(D) 150.5
(E) 167

AMC 10A, 2021, Problem 19

The area of the region bounded by the graph of

$$x^2+y^2=3|x-y|+3|x+y|$$

is $m+n\pi$, where m and n are integers. What is $m+n$?
(A) 18
(B) 27
(C) 36
(D) 45
(E) 54

AMC 10B, 2021, Problem 1

How many integer values of x satisfy $|x|<3\pi$?
(A) 9
(B) 10
(C) 18
(D) 19
(E) 20

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AMC 10B, 2021, Problem 13

Let n be a positive integer and d be a digit such that the value of the numeral $32d$ in base n equals 263 , and the value of the numeral 324 in base n equals the value of the numeral $11d1$ in base six. What is $n + d$?
(A) 10
(B) 11
(C) 13
(D) 15
(E) 16

AMC 10B, 2021, Problem 16

Call a positive integer an uphill integer if every digit is strictly greater than the previous digit. For example, $1357, 89$, and 5 are all uphill integers, but $32, 1240$, and 466 are not. How many uphill integers are divisible by 15 ?
(A) 4
(B) 5
(C) 6
(D) 7
(E) 8

AMC 10B, 2021, Problem 19

Suppose that S is a finite set of positive integers. If the greatest integer in S is removed from S, then the average value (arithmetic mean) of the integers remaining is 32 . If the least integer in S is also removed, then the average value of