

1 Problems

Problem 1 (AoPS). How many multiples of 10 are between 11 and 103?

Problem 2 (AoPS). How many positive integers less than 500 can be written as the sum of two positive perfect cubes?

Problem 3. How many 4-digit numbers have only odd digits?

Problem 4 (Mathcounts). The *digital sum* of a number is the sum of its digits. For how many of the positive integers 24-125 inclusive is the digital sum a multiple of 7?

Problem 5. The inhabitants of the island of Jumble use the standard Kobish alphabet (20 letters, A through T). Each word in their language is 4 letters or less, and for some reason, they insist that all words contain the letter A at least once. How many words are possible?

Problem 6. Two tour guides are leading six tourists. The guides decide to split up. Each tourist must choose one of the guides, but with the stipulation that each guide must take at least one tourist. How many different groupings of guides and tourists are possible?

Problem 7 (AoPS). How many positive three-digit integers less than 500 have at least two digits that are the same?

Problem 8. In how many ways can one write the numbers 1, 2, 3, 4, 5, and 6 in a row so that given any number in the row, all of its divisors (not including itself) appear to its left?

Problem 9. A house with a square floor plan is to have each of its four outer walls finished with brick, stone, stucco or wood. If no two adjacent outer walls are to have the same finish in how many ways can the house's walls be constructed? (One such way is to brick on the front and back and stone on the left and right.)

Problem 10. Using each of the digits $\{1, 2, 3, 4\}$ exactly once and using zero or more $+$ signs, how many different totals can be obtained? No digit can be used as a power, root, etc. Only addition can be done. When n digits are written next to each other, they represent an n -digit number and not the product of n factors. Four of the totals to be included are $\underline{1234}$, $\underline{55} = 12 + 43$, $\underline{127} = 123 + 4$ and $\underline{37} = 31 + 2 + 4$.