

April 18, 2021

Math battle 9.

1. Is it possible to put in each vertex of any given triangle ABC a number such that for every edge, its length is equal to the sum of numbers at its endpoints?
2. 10 students are solving problems of a math competition. Each of 10 problems was solved by the same number of students, but no two students have solved the same number of problems. One of the students, Max, has solved problems 1 through 5 and has not solved problems 6 through 9. Has Max solved problem 10?
3. Does there exist a polynomial $P(x)$ with integer coefficients such that $P(6) = 5$ and $P(14) = 9$?
4. Solve the following equation: 2021 *fractions* $\left\{ \frac{1}{1 - \frac{1}{1 - \frac{1}{\dots - \frac{1}{1 - \frac{1}{1-x}}}}} \right\} = 2021$
5. Using Math 9 and below (no calculus), find what is the largest possible area of a rectangle with the diagonal of fixed length, d .
6. Using Math 9 and below (no calculus), find what is the largest possible perimeter of a rectangle with the diagonal of fixed length, d .