MATH 8

THE MATH BATTLE!

DEC 21, 2025

1. A 10×10 table is filled with whole numbers, some of them negative. You are allowed to perform the following operations

- Change sign of all the numbers in some row of the table
- Change sign of all the numbers in some column of the table

Is it true that by using these operations, you can make the sum of numbers in each row and in each column non-negative?

2. We place 101 points inside a unit square so that no 3 points are on the same line. Is it true that you can always find a triangle with vertices at these points whose area is at least 1/100?

3. Below you will find several numbers written in one of the languages of Polynesian islands.

thabung ke nua lo
thabung ke nua vak
libenyita ke nua khasa
libenyita ke nua kun
libenyita ke nua thabung
libenyita ke nua thabung ke nua lo
libenyita ke nua thabung ke nua vak

It is known that each number is obtained from the previous one by adding 2 (e.g., it could be sequence 2, 4, 6, ...) What are these numbers?

4. A bacteria is placed at point 0 on a line. Every minute, the bacteria divides into 2: if a bacteria is in position k, then the new ones will appear at position $k-1$, $k+1$. If two bacteria appear at the same point, they both die.

Can you draw where the bacteria will be after 2 hours and 8 minutes?

5. We are given 11 mineral samples. It is known that 2 of them are radioactive. We can test any group of samples with a tester, and the tester will tell us if this group contains a radioactive sample (but won't tell us if there is 1 or 2 of them in this group).

Show how you can find both radioactive samples using the tester 7 times.