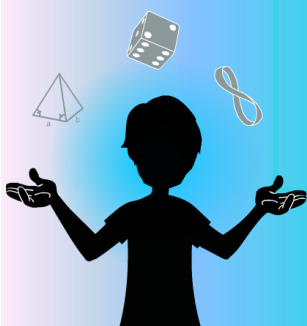


PUZZLING CARTOON

- MARBLES TWO BY TWO -



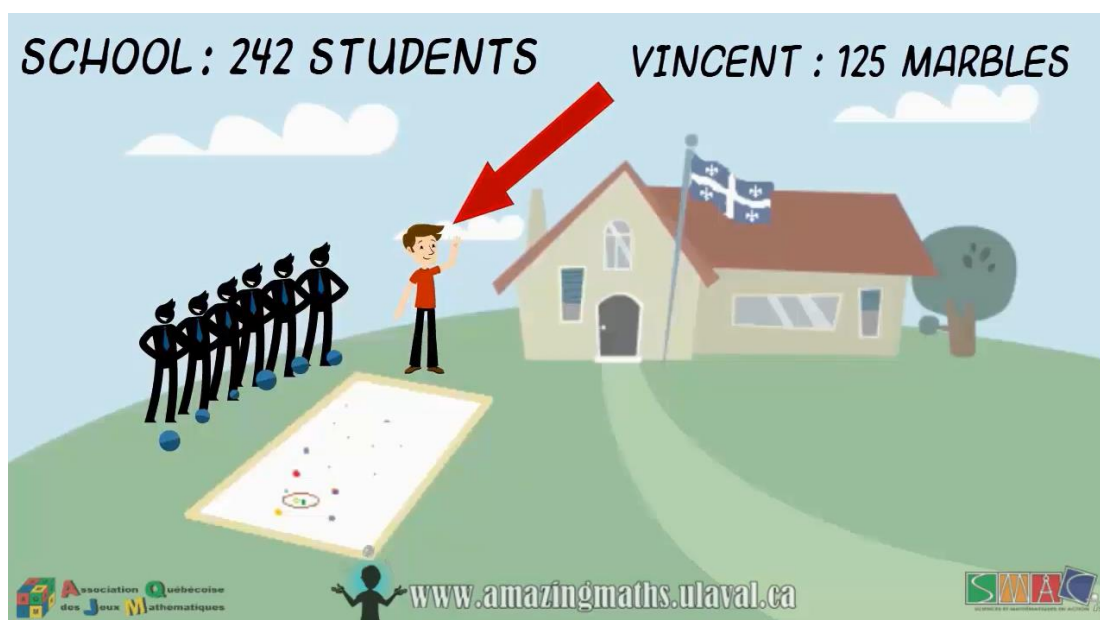
AMAZINGMATHS

Materials:

- Video of the puzzle
- Sheets of paper
- Pencils

The puzzle

Mathville's elementary school has 242 students. All of the students have marbles. We know that Vincent Matt, the best player, owns 125 marbles and no one has more marbles than him.



Can we be sure that at least two of the school's students have the same number of marbles?

Source : Inspired from MAZZA, Fabrice, *Le grand livre des énigmes*, « Un million de cheveux », Marabout, p.229.



PUZZLE SOLUTION



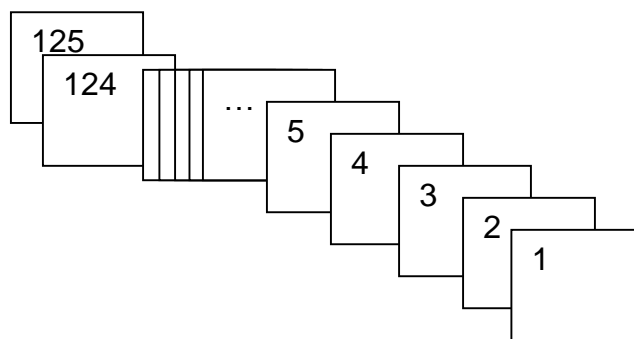
The answer:

Yes, we can be sure that two students have exactly the same number of marbles.

The solution:

Since the problem specifies that no one has more marbles than Vincent Matt, each student can have 1, 2, 3, ..., 123, 124, 125 marbles. So, there are 125 different marble quantities a student can have. But the school has 242 students. It is impossible that 242 students all have a different number of marbles, since there are 125 possibilities.

A more visual way of making sure of this is to use “boxes” that correspond to the number of marbles:



We number the students from 1 to 242. Since we want to have the biggest diversity possible in the number of marbles, we suppose that student 1 has one marble, student 2 has two... until 124 and we place Vincent Matt in the 125th box. ($242 - 125 = 117$), so 117 students still need to be placed in boxes. Since all of our boxes are occupied by a student, we are now obligated to put two students in the same box.

Therefore, it is absolutely certain that 2 students will be in the same box, so that two students will have exactly the same number of marbles.