

Exercises

Exercise 1: Let M1 be the set of all four-digit numbers of the form "abab" (a and b are digits; a and b may also be the same: 1717, but also 1111 are therefore numbers from M1), let M2 be the set of all four-digit numbers of the form "abba", M3 the set of all four-digit set of all four-digit numbers of the form "aabb".

1. How many different numbers does each of these sets contain ?
2. All the numbers in M2 and M3 are divisible by 11. Show this!
3. Which number divides all the numbers in the set M1? (Note: "abab" can be written as $1000 \times a + 100 \times b + 10 \times a + b$).
4. What is the only square number among all the numbers of these three sets?
5. Investigate the sets of six-digit numbers of the form "ababab", "aabbba", in the same manner!

Exercise 2: The following is known about a six-digit number n:

1. The number n consists of three two-digit prime numbers written one after the other (e.g. 43 53 29), which are all different.
 2. The three prime numbers are arranged in descending order of size (i.e. in the example 53 43 29).
 3. The number n has exactly two different digits.
 4. The number n is divisible by 9.
- Find the number n you are looking for.

Exercise 3: The game 100 wins!

Two players take turns naming any number from 1 to 10. All these numbers are added up consecutively. The winner is the player to reach the sum of 100, when adding their number.

1. Play a few rounds and note the results.
2. Investigate whether there is a winning strategy for one of the players!
3. Change the rules of the game and look for winning strategies!

1. Solve the exercises.
2. Write down similarities and differences.
3. Decide in what way the exercises are suitable for mentor groups.