

**Answer on Question #46748 – Math – Combinatorics | Number Theory**

**PROBLEM:**

The access code to a house's security system consists of eight digits. How many different codes are available if each digit can be repeated?

**SOLUTION:**

Consider one of eight positions separately from all others. There are 10 possible ways to choose a digit to place on this position since there are ten digits from 0 to 9, and this choice is independent of all other positions since each digit can be repeated and there is no restriction on how to choose digits.

So, we have 8 positions and each one is filled by a digit in 10 ways independently from each other, therefore the total number of possible codes equals to ways it can be done for each independent position multiplied altogether. This is  $10 \times 10 \times \dots \times 10 = 10^8$  (100 million).

**Answer:**  $10^8$  different codes.