

MATHCOUNTS[®] Problem of the Week Archive

Combination Locks – May 24, 2021

Problems & Solutions

A combination lock has some identical cylindrical tumblers each with the digits from 0-9 inclusive printed on each of the cylinders. The cylinders are aligned on a common axis. Each cylinder can be spun so that only one digit is visible on each cylinder. The digits, when read from left to right, form an integer. However, for these problems, we will allow an integer to start with a 0, such as 0123. If the displayed number is the correct combination, the lock can be opened. Use the clues to open each of the following locks.

The first lock has two cylinders.
The sum of the tens digit and ones digit is 9.
The tens digit is less than the ones digit.
The ones digit is a square number.
What is the two-digit number that opens this lock?

09

The second lock has three cylinders.
The product of the tens digit and the ones digit is 8.
The three-digit number is greater than 44.
The tens digit is the sum of the hundreds digit and the ones digit.
What is the three-digit number that opens this lock?

781

The third lock has four cylinders.
The hundreds digit is less than each of the other three digits.
The sum of the four digits is 7.
The four-digit number is a multiple of 5.
What is the four-digit number that opens this lock?

1015

The fourth lock has four cylinders.
The thousands digit is less than 8.
The hundreds digit is a square number.
The tens digit is twice the ones digit.
The difference between the greatest and least digit is 8.
The thousands digit is 200% greater than the ones digit.
What is the four-digit number that opens this lock?

3921

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The three-digit number is greater than 44.
The tens digit is the sum of the hundreds digit and the ones digit.
What is the three-digit number that opens this lock?

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