inside MATHS

ll November 2026
Leeds City Varieties

CHALLENGE YOURSELF…

…Before/after the show. Solutions: insidemaths.co.uk/leeds26-puzzles

Ones and Zeros

How many whole numbers between l and l000, do not contain a l or a 0?

The answer is 584.

This is very hard!

There are lots of ways of doing this.

You could go through every number exhaustively from l – l000 deciding if you need to eliminate it or not.

Or you could speed that process up by grouping numbers together to eliminate. But you have to be very careful to check you've got them all, and that you've not eliminated any twice! See our way of doing this below.

Or there is a very advanced way of doing it, which is both quick and means you can more easily be sure you've not left any out, or counted any twice. We've shown you this method below too.

One possible method

We need to exclude the following:

All of the numbers from l00 to l99 **(l00 numbers).** We won't consider anything else in the hundreds.

Every other multiple of l00 - so 200, 300, 400, 500, 600, 700, 800, 900, l000) **(9 numbers)**. We won't consider multiples of l00 again.

Then consider all the numbers from l-99, eliminating all of the following:
l, l0 – l9, 20, 2l, 30, 3l, 40,4l, 50, 5l, 60, 6l, 70, 7l, 80, 8l, 90, 9l **(27 numbers)**

Then, 200 + each of these 27 numbers, also needs to be excluded. E.g 201, 210, 211 etc. And 300 + each of the numbers…and so on.
(8*27 = **216 numbers)**

The above doesn't catch three-digit numbers that have 0 as their second digit. E.g 202, 203…209
There are 8 of these in every set of 100 (from 200 to 1000).
(8*8 = 64 numbers).

There are 1000 numbers from 1 to 1000, and we need to eliminate 416 of these **(100+9+27+216+64 = 416).**

1000 – 416 = 584

A more sophisticated method

Let's consider the three digit numbers (from 100 to 999) first. There are 8 options that each digit could be so that it is not a 1 or a 0. If there are three digits, and 8 good options for each, we do 8*8*8=**512** to find out how many possible good three digit numbers there are.

So, there are **512** possible three digit numbers that do not contain a 1 or a 0.

Then we consider the two digit numbers (from 10 to 99). There are 8 options that each digit could be so that it is not a 1 or a 0. If there are two digits, and 8 good options for each, we do 8*8=**64** to find out how many possible good two digit numbers there are.

So, there are **64** possible two digit numbers that do not contain a 1 or a 0.

Then we consider the single digit numbers (from 1 to 9). There are 8 options that do not contain a 1 or a 0.

There are **512 + 64 + 8 = 584** numbers from 1 to 1000 that do not contain a 1 or a 0.

Letter Sums

$i = 1$
$n + i + n + e = 9$
$t + e + n = 10$

e, **i**, **n** and **t**, stand for different positive integers (whole numbers).
What does **t** stand for?

Answer: T=5

Solution:

Options for N + I + N + E = 9:

N=2, E = 4, 2 + l + 2 + 4 = 9
OR
N= 3, E =2, 3 + l + 3 + 2 = 9

Resulting in T + E + N = l0 as:
4 + 4 + 2 = l0 and T=4, (does not work as T cannot equal E)
OR
5 + 2 + 3 = l0 and T = 5, (this does work!)