King Edward VI Camp Hill School for Girls

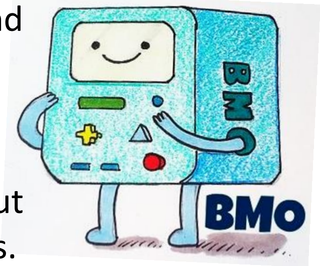
Maths Department Newsletter

5th April 2017

$1^1 + 2^2 + 3^3 = 32$

News

The results of the BMO[1] are in, and we're pleased to say that they're quite good. Kanakdurga Nanda and Maya Patel in year 9 were both awarded a merit for scoring 41 and 39 respectively out of a possible 60 marks.



Naiya Patel also achieved a merit in the year 10 Olympiad.

Puzzle

Here is a puzzle for you to try. A man wanted to get into his work building, but he had forgotten his five-digit entry code. He did, however, have five clues to help him remember the code if he forgot it.

These were the clues:

The fifth number plus the third number equals fourteen.

The fourth number is one more than the second number.

The first number is one less than twice the second number.

The second number plus the third number equals ten.

The sum of all five numbers is 30.

What was the five-digit entry code?

Let us know if you work it out. We'd also be interested in knowing the method you used to solve it.

Maths Word

In maths, one **googol** is the number 10^{100},

Googol

which is a 1 followed by 100 zeroes.[2] The company Google got its name by changing the spelling of this word. A **googolplex** is 10 to the power of one googol. They say there is not enough space in the universe to write out the number 1 googolplex in full. Can you check if this claim is correct?

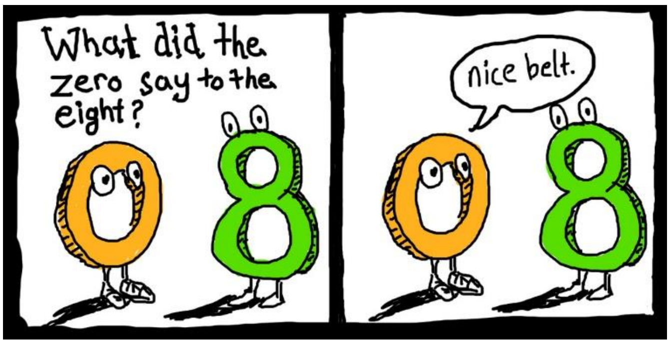
Another Puzzle

Here is another puzzle for you to try.
Can you find a number with the following properties?

When I divide it by 2, the remainder is 1.
When I divide it by 3, the remainder is 2.
When I divide it by 4, the remainder is 3.
When I divide it by 5, the remainder is 4.
When I divide it by 6, the remainder is 5.
When I divide it by 7, the remainder is 6.
When I divide it by 8, the remainder is 7.
When I divide it by 9, the remainder is 8.
When I divide it by 10, the remainder is 9.

Let us know if you work out the answer.

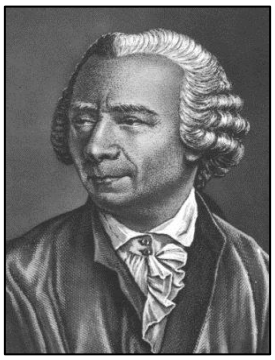
Joke



1. That's the British Mathematics Olympiad.
2. 10000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000.

The Königsberg Bridges

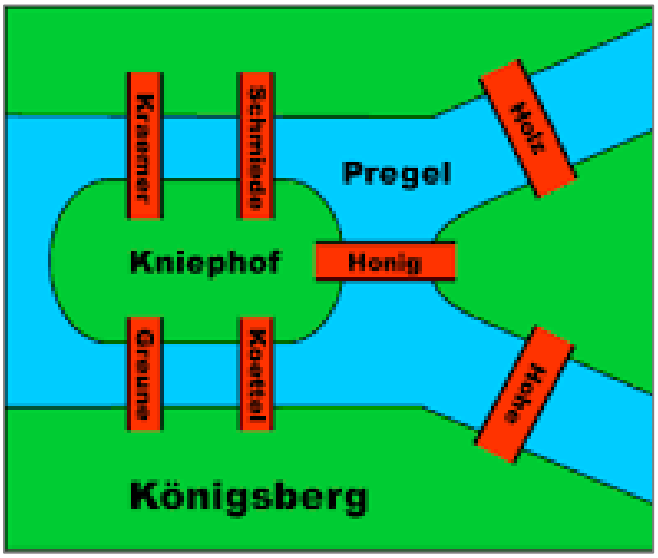
OK, well somehow I've managed to get to the 32nd maths newsletter without mentioning the famous Königsberg Bridge problem, made famous by Leonhard Euler, who I have mentioned quite a few times.



Leonhard Euler

If you've never seen this puzzle before, it basically goes like this. The city of Königsberg[3] used to have seven bridges that crossed over the river Pregel, as illustrated in the diagram below.

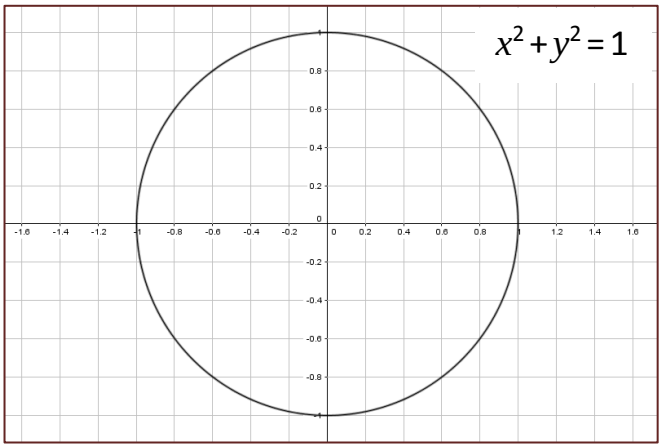
According to the story that goes with the puzzle, the people who lived in the city tried to find a way of walking around the city, so that they crossed each bridge once. What they found though is that there didn't seem to be a way to do this. Whatever route they tried, they always seemed to need to cross at least one bridge twice.



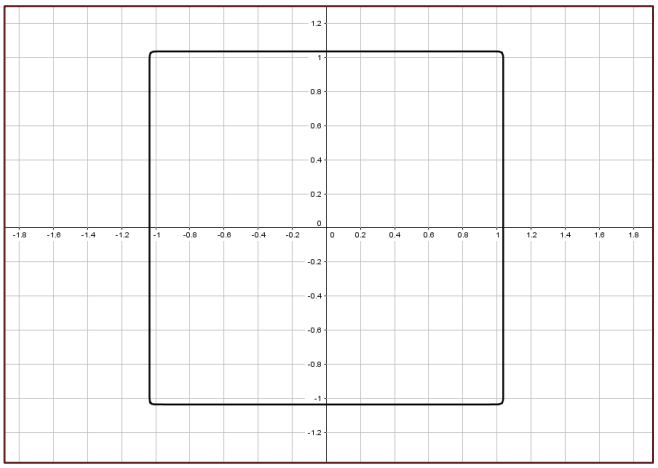
If you like maths but you've not seen this puzzle before, have a go at it and see if you can work out if it can be done. Don't spend too long on it though. Look it up on the internet and find out how Euler solved it. I'm sure you'll find the solution very interesting.

A Weird Equation

You may know that $x^2 + y^2 = r^2$ is the equation of a circle, with its centre at the origin[4] and with a radius of length r.



You will need to know about the equation of a circle for GCSE maths. But what about other shapes? Did you know that there was such a thing as the equation of a square? Just increase the powers that x and y are raised to (for example, $x^{100} + y^{100} = 1$) and you get the following graph.



The corners of the square will always be very slightly rounded, but as the power approaches infinity they will become more and more like true right-angles. Why not download some free graphing software like Geogebra and try this for yourself?

Happy Easter

Don't forget, if you see anything mathematical over the Easter holidays, make a note of it, and let us know about it when we get back. Have a good holiday ☺

3. Königsberg is in Russia and is now called Kaliningrad.
4. The origin just means the point (0,0). We don't know the origin of this term.