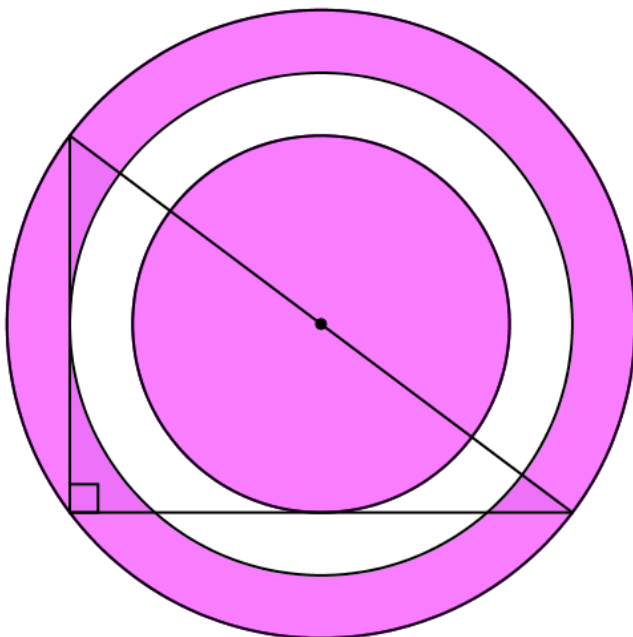**A set of 6 objects can be partitioned in 52 ways**

News

October 21st was[1] the birthday of Martin Gardner – a man who spent most of the the 20th century either writing books of maths puzzles, or publishing puzzles in newspapers. Although he is no longer with us, his books are still read by people all over the world and probably always will be. Because of this[2], we have decided to make this newsletter full of maths puzzles. If you're in year 7 or 8, why not take it along to maths puzzle club on Thursday lunchtime in room 26 with Dr Taylor?
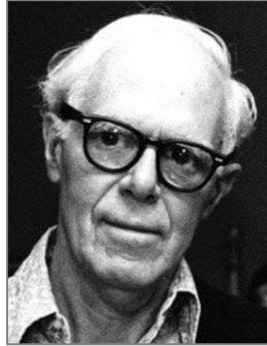
News

Here is the first puzzle. Prove that the two shaded regions have equal areas[3].

Maths Word

The **space diagonal** inside a cuboid is a straight line joining two corners that do not share a common face.

For example, this could be the line joining the front left bottom corner to the top right back corner.
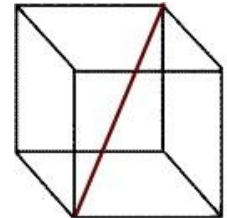
Euler Bricks

As you know by now, Euler was the best mathematician ever and he has loads of things named after him, even though he didn't invent all of them[4]. An Euler Brick is a cuboid where all the side lengths and the lengths of the diagonals are all whole numbers. The smallest Euler Brick has the 3 dimensions 44, 117 and 240. A perfect Euler Brick is one where the space diagonal is also a whole number. As far as we know, no such brick exists.

Maths Puzzle

Here is a really good maths puzzle.
Using only a pen and paper, work out which one of these is greater:

$$10^{1/10} \text{ or } 3^{1/3} ?$$

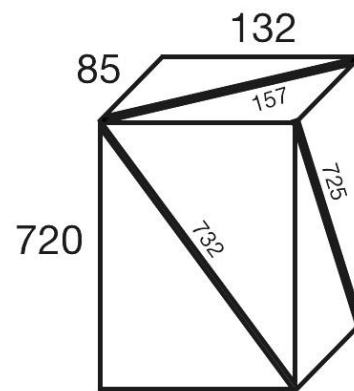If you get really stuck, there is a hint on the back of this sheet.

1. or should that be 'is'? Is it still your birthday after you have died?
2. Well sort of because of this – it's a bit of an excuse really.
3. This puzzle can be solved by combining your knowledge of Pythagoras' theorem and circles.
4. A bit like there used to be a band called Queen, but the Queen was never in it. An Euler Brick is one of these.

Divisibility Puzzle

A teacher wrote a large number on the board and asked the students to say something about its factors.

The 1st student said,
"The number is divisible by 2."
The 2nd student said,
"The number is divisible by 3."
The 3rd student said,
"The number is divisible by 4."
and so on, until the 30th student said,
"The number is divisible by 31."

The teacher then commented that exactly two students, who spoke consecutively, were wrong.

Which two students were wrong?

Maths Quote

A man once passed a note to his friend saying that the sign for his 'Fish And Chips' shop might be better if it said 'Fish-And-Chips'.

The note said, "I want to put a hyphen between the words Fish and And and And and Chips in my Fish-And-Chips sign."

His friend, who happened to be Martin Gardner, replied, "Wouldn't the sentence 'I want to put a hyphen between the words Fish and And and And and Chips in my Fish-And-Chips sign' have been clearer if quotation marks had been placed before Fish, and between Fish and and, and and and And, and And and and, and and and And, and And and and, and and and Chips, as well as after Chips?"[5]

5. This conversation probably never really happened.

Maths Support

Don't forget that, if you need any help with your maths, Maths Workshop this year is on Mondays and Thursdays, all through lunchtime in room 13.
Also, if you would like a sixth form maths mentor to help you with your work, please see Mr Taylor who will arrange this.
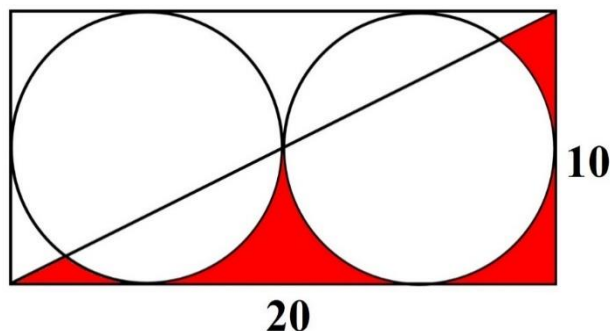
Number Puzzle

Khushali is thinking of two numbers.
Their highest common factor is 330.
Their lowest common multiple is 30030.
What are the two numbers?

Geometry Puzzle

This is another one of those puzzles that the internet says was given to 11 year old children in China.
What is the area of the part shaded red?

Puzzle Hints

For the puzzle about $10^{1/10}$ and $3^{1/3}$, first convince yourself that if $a > b$, then $a^n > b^n$. Then raise both of the numbers in the puzzle to the power of 30. You should then be able to solve it.
For the puzzle about HCF and LCM, use your knowledge of prime factorisations.
To see a solution to the geometry puzzle above, look at the YouTube video at
https://youtu.be/xnE_sO7PbBs