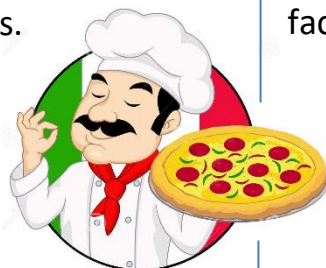**65** is the magic constant in a 5 by 5 magic square

News

The owner of a pizza restaurant in the USA has been making a lot of money recently by ordering their own pizzas. The restaurant had started receiving complaints about pizzas that had been delivered to customers, even though the restaurant did not actually provide a delivery service. They discovered that a delivery app called DoorDash had been buying pizzas from them for the regular price of $24, then selling them on to customers for just $16. The aim was to encourage customers to buy pizzas using the app, rather than directly from the restaurant. When the restaurant – who had already asked not to be put on the app – found out what was going on, they started to order their own pizzas from themselves using the DoorDash app. They would pay DoorDash $16 for each pizza, and DoorDash would pay them $24 per pizza and deliver the pizza back to them, making a profit of $8 per pizza for the restaurant. Then the restaurant realised that since the pizza they were selling was coming straight back to them, it didn't even need to be an actual pizza. They just boxed up a pizza base without any toppings, to make even more profit![1]

By the way, how can you cut a pizza into 8 pieces using only 3 cuts? Think about it for a few minutes, then google the answer. There are several ways, and it's quite interesting.

Kaprekar's Constant

In 1949, the recreational mathematician[2] D. R. Kaprekar discovered an interesting fact about the number 6174. Try this:

1. **Choose any four-digit number** (using at least two different digits)

2. **Arrange the digits in descending and then in ascending order to get two new four-digit numbers**

3. **Subtract the smaller number from the bigger number, to get a new 4-digit number** (adding leading zeros if necessary)

4. **Go back to step 2 and repeat**

Weirdly, this process will always reach 6174 in at most 7 iterations.

Joke?

We can't work out whether Alan Sugar was joking or not. What do you think?[3]

> **Lord Sugar** @Lord_Sugar
> Strange but seems correct.
>
> Happy Birthday 🥳
> Today every person in the whole world is the same age! 👉
> Today is a very special day. There's only one chance every 1,000 years.
> Your age this year + your year of birth, the total for every person is = 2020.
> It's so strange that even experts cant explain it! You figure it out and see if its 2020. Its a thousand-year wait! Take a shot! Let everyone calculate it!

1. You can read the original article here: https://www.bbc.co.uk/news/technology-52724062
2. A 'recreational mathematician' is someone who does maths that has no obvious use, just because it's fun.
3. I'm finding the missing apostrophe in 'cant' quite stressful – but it would feel like cheating to fix it because this was a real tweet from Alan Sugar.

Magic Square

Can you put the numbers from 1 to 25 into this grid, so that every row and every column adds up to 65?[4]
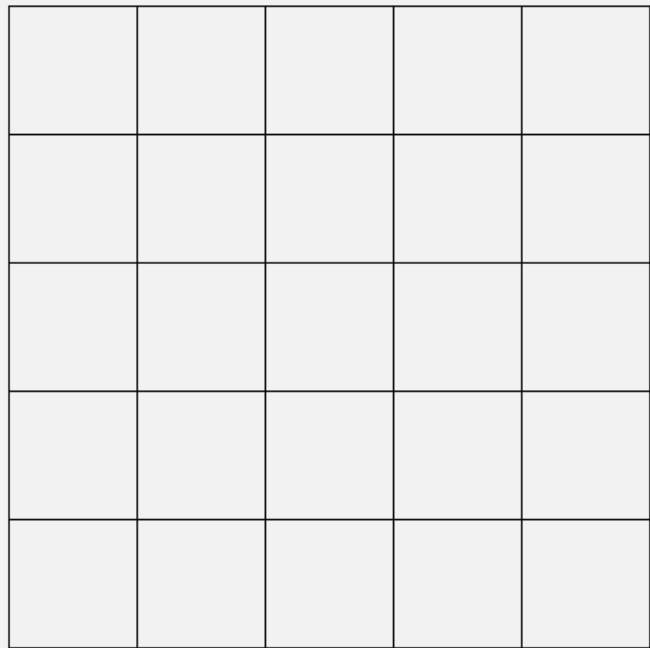
Did You Know?

Archimedes showed that if the volumes of the cone and the sphere are added, the result is the volume of the cylinder.

The volumes are in the ratio 1:2:3.

Another Puzzle...

Here's a puzzle from Cliff Pickover.[5]

Cliff Pickover @pickover
A bat and a ball cost one dollar and ten cents in total. The bat costs a dollar more than the ball. How much does the ball cost?
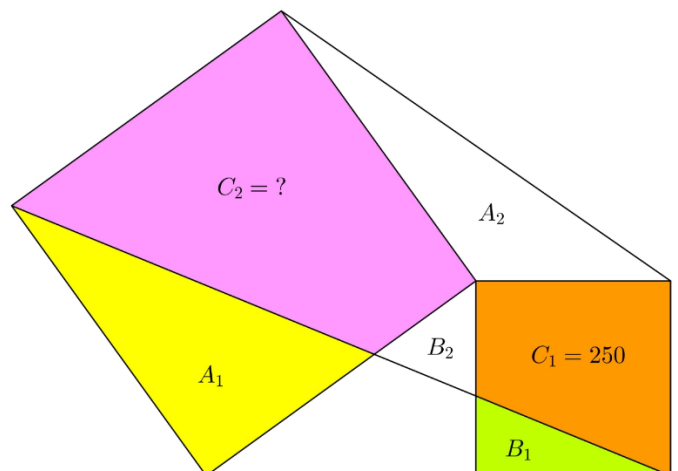
Consecutive Numbers

Here's a puzzle I've seen quite a few times recently. Put the numbers from 1 to 8 into these boxes so that no two consecutive numbers are touching – either horizontally, vertically or diagonally.[6]
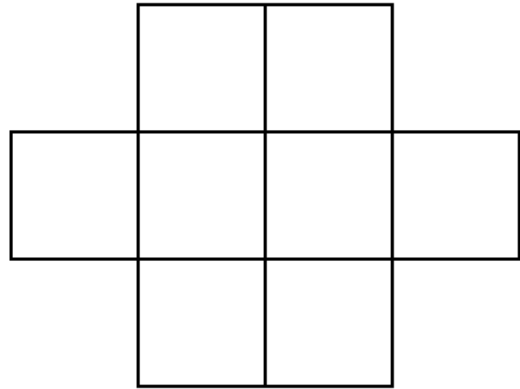
Geometry

For those who like geometrical problems…

Two squares. $A_1 = A_2$ and $B_1 = B_2$.

$C_2 = ?$

A_2

B_2

$C_1 = 250$

A_1

B_1

Crossword Solutions

Here are the solutions to the crossword from Newsletter 63.

4. This is difficult and should only be attempted by people who don't get frustrated very easily!
5. If you like interesting maths, then you really must follow Cliff Pickover.
6. Can you think of a logical way to solve this, rather than just a trial and error approach – not that a trial and error approach is necessarily a bad thing. Ideally you need to be good at both.