



The sum of the first 53 primes is divisible by 53. The next number like this is 853.

News

Welcome to the latest maths newsletter! It has been brought to our attention that some people have been spreading rumours that Father Christmas doesn't actually exist, so we thought we'd start by proving he does exist, before moving on to other things.



Start by considering this sentence:

"If this sentence is true, then Father Christmas exists."

Now this sentence is either true or false. If this sentence were true, then what the sentence says would be true (because that's what a sentence being true means), and what the sentence says is that if the sentence is true, then Father Christmas exists. So we can see that if the sentence is true, then Father Christmas exists.

But what we've actually proved there is exactly what the sentence says! Therefore the sentence *is* true!

And the sentence itself (which we know is true) says that if the sentence is true (which we now know it is!), then Father Christmas exists!

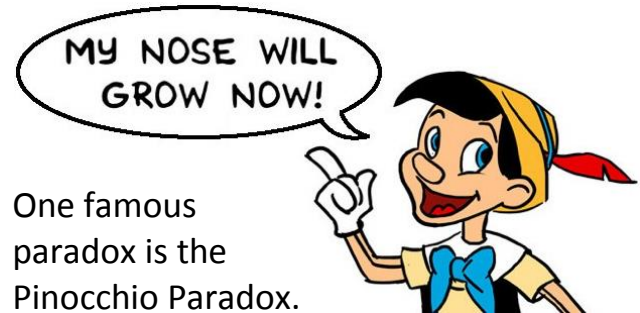
Therefore Father Christmas exists.

Right then, now we've got that out of the way, let's move on to other things...¹

1. If you think that surely it can't be that easy to prove the existence of Father Christmas, try to find a mistake in the logic. If you think you've found one, tell your maths teacher. If you can't find one, then mathematically you have no alternative other than to conclude that Father Christmas definitely exists. Maths doesn't lie.

Maths Word

A **paradox** is a statement that, despite apparently valid reasoning from true premises, leads to a logically unacceptable conclusion.



One famous paradox is the Pinocchio Paradox.

As you probably know, Pinocchio's nose grows whenever he tells a lie. What will happen to his nose then if he says the sentence, "My nose will grow now!"?

Maths Team Challenge

On Wednesday 21st November, four girls from our sixth form took part in the UKMT Senior Team Maths Challenge at Solihull Sixth Form College.



From left to right: Hannah Tatman, Ellie Barrell, Heidi Rhodes-James and Josie Futterer.

Unfortunately, we only managed 3rd place, but we have to let other schools win some competitions sometimes. It's only fair.

Joke

What does the equation $x^2 + 2x + 20 = 0$ and an artificial Christmas tree have in common?

Neither of them have any real roots.²



Maths Quote

GO DOWN
DEEP ENOUGH INTO
ANYTHING AND
YOU WILL FIND
Mathematics.

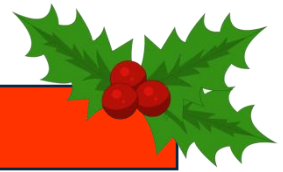
Competition Updates

Our year 8 team is through to the second round of the Explore Learning Young Mathematicians competition.

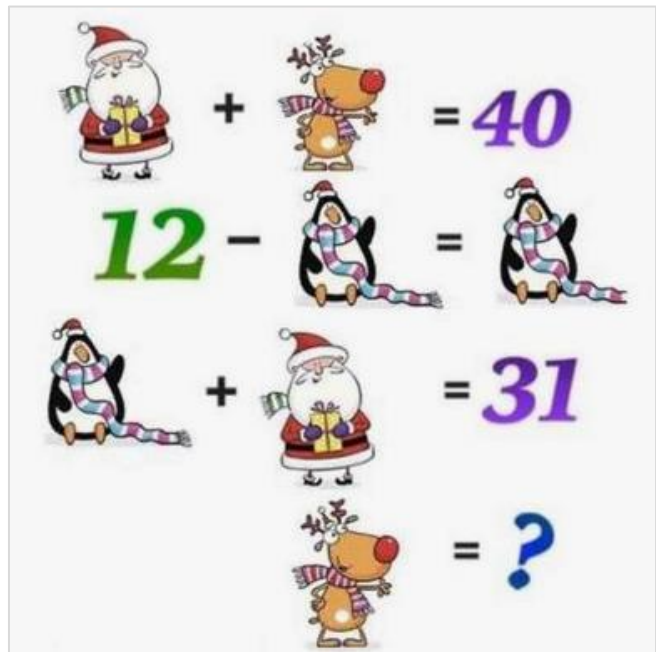
The Ritangle competition has been good again this year, although this will end in a few days' time.

Also, our code breaking team is still on full marks in the Southampton University Cipher Challenge after 8 of the 10 rounds. If you're interested in code breaking, please let your maths teacher know!

Puzzle



What number does the reindeer equal?



Geometry Puzzle

A Christmas tree, made out of an equilateral triangle and a small vertical line, has been drawn inside a circle. Prove that the vertical line (the trunk) is $\frac{1}{4}$ of the height of the whole tree.



Puzzle Hints

Enjoy the Christmas holidays. See you all again in the new year!

2. If this doesn't make sense to you, ask someone in year 11 to explain it to you. It will be good revision for them.