King Edward VI Camp Hill School for Girls

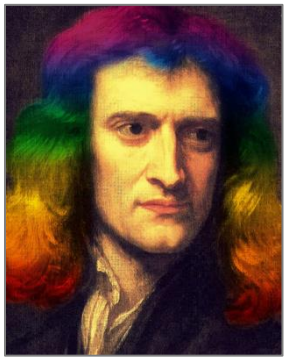
Maths Department Newsletter

26th March 2020

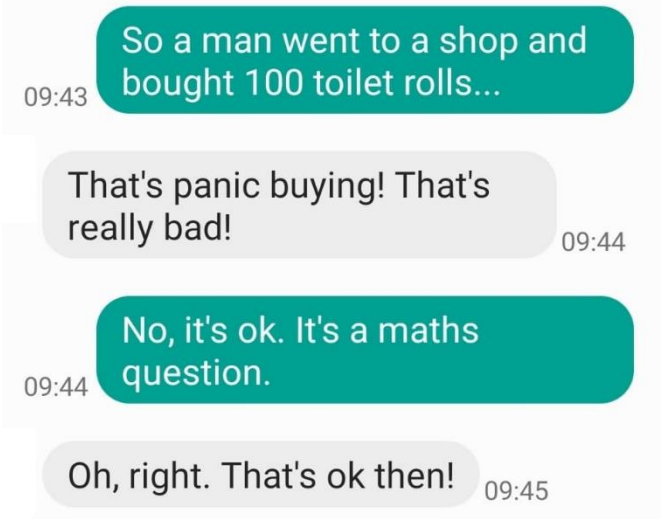
1 radian = 57.2958 degrees

News

In 1665, Isaac Newton had to work from home when the University of Cambridge temporarily closed due to the bubonic plague causing havoc all over the country.[1] It turned out to be the most productive period of his life, and he used that time to develop his theories on calculus, optics and gravity. Why not try to be like Isaac Newton and do something great while you're having to work from home? Maybe you could create a whole new branch of mathematics that totally changes the way we look at the world? If you can't manage that, maybe you can solve some of the puzzles in the maths newsletter. That's good too.



Joke



Social Distancing

ITV REPORT 22 March 2020 at 5:14pm

'Stay two metres apart': Boris Johnson urges people to follow coronavirus social distancing advice

The ITV website reported that Boris Johnson told everyone to stay exactly two metres away from everyone else, but is this possible?[2] Two people can stand two metres away from each other, but can three people stand so they are all exactly two metres away from each of the other two? Can you show why it is impossible for more than three people to stand so that they are all exactly two metres away from all the other people?

The Candles Puzzle

Here's a puzzle from Katie Steckles.[3] It is Tom's 7th birthday and he has a cake with 7 candles on it arranged in a circle - but they are trick candles. If you blow on a lit candle, it will go out, but if you blow on an unlit candle, it will relight itself. Since Tom is only 7, his aim isn't brilliant. Any time he blows on a candle, the two either side also get blown on. How can Tom blow out all the candles? What is the fewest number of puffs he can do it in?[4]

1. Does this sound familiar? By the way, why do you think someone has coloured Newton's hair like a rainbow?
2. I know this isn't really what he meant, but you should never let facts get in the way of a good maths puzzle!
3. I know that means nothing to you and you don't know who she is. I'm just trying credit people if I can!
4. Unfortunately, he can't get his friends to help him, because he's in lockdown at the moment.

The Ravens Paradox

I'm sure you're all wondering what your teachers are doing while you're all at home working, so here's a little story for you to give you some idea.

Mr Bettison was sitting at home yesterday working when his wife asked him, "Is it true that all ravens are black?" He didn't know, so he looked out of the window and, as luck would have it, two ravens flew past. They were both black.
"The evidence so far suggests that the statement is true," he said.
"Does that mean all ravens are black then?" asked his wife.
"No," said Mr Bettison. "I can't conclude that all ravens are black just by looking at two ravens." His wife looked a bit disappointed.
"Can't you go outside and look at some more then?" she said. "I'd really like to know the answer." Mr Bettison shook his head sadly.
"I can't go out at the moment. Boris Johnson said we should only go outside if it's absolutely necessary and I don't think carrying out an investigation into the blackness of ravens really falls into that category."
"Fair enough," said Mrs Bettison, who was not an unreasonable person. "I suppose we'll have to wait until we're allowed out of the house before we can start doing normal things again like collecting evidence about ravens."
Mr Bettison nodded.

Suddenly though, Mr Bettison had an idea! He realised that the statement 'all ravens are black' is logically equivalent to the statement 'everything that is not black is not a raven.'[5] He picked up a pen. It was blue. It was not a raven. He picked up his mug. It was white. It was not a raven. He picked up his cat. It was black… but that was OK, because the statement doesn't say that all black things have to be ravens – it just says that all non-black things are not ravens. He put the cat down again.
What Mr Bettison had realised was that although there wasn't any more evidence in his house to support the statement 'all ravens are black', there was a massive amount of evidence to support the statement 'everything that is not black is not a raven', and since the two statements were logically equivalent[6], evidence for one statement must surely count as evidence for the other statement too!

"It's fine," Mr Bettison said to his wife. "It turns out I'm actually surrounded by lots of evidence that suggests that all ravens are black!"
Mr Bettison then spent the rest of the day gathering evidence from all around his house and, at the end of the day, concluded that all ravens probably are black.
But was there something wrong with his logic?[7]

Working From Home

Don't forget to email us with all your thoughts about these things and any ideas you might have for future newsletters!
Also, if you have any problems with the work you have been set, please email your teacher who will do what they can to help you. Have fun and keep doing maths! It's good for you![8]

5. This is true. This is **not** a trick. Think about it carefully if you're not sure.
6. They really are. They are two statements that say exactly the same thing. It's really not a trick.
7. You can look this up online. Just google the ravens paradox. It's quite famous.
8. Seriously, I've collected loads of evidence that suggests that all things that aren't good for you are not maths.