Subject Spotlight: Mathematics

Maths in the Media

Maths playing a significant role in fight against COVID-19 with important new project

In an important new project, researchers at the School of Mathematics and the University of Oxford are developing mathematical models that assess the transmission of COVID-19 in indoor spaces, and how this is affected by ventilation, masks and antiviral technologies.

The project is funded by the Sêr Cymru COVID-19 grant "Mathematical modelling and smart coatings: fighting the COVID-19 pandemic", funded by the Welsh government. It has been awarded to Dr Katerina Kaouri, Senior Lecturer at the School of Mathematics, Prof. Ian Griffiths from the University of Oxford's Mathematical Institute, and Dr Hugo Macedo, CEO of Smart Separations Ltd (SSL). Three postdoctoral researchers have also been recruited at Cardiff to work on the project.

With their mathematical models, the team are studying the transmission of COVID-19 in indoor spaces and investigating critical questions on airborne transmission and transmission through surfaces, focusing on classrooms and healthcare locations.

"Through the models we are trying to answer crucial questions on everyone's minds these days. What is the Safe Occupancy Time in a room to avoid infection? How long should the breaks be between lectures to allow sufficient decontamination? How much does the transmission risk decrease if we talk less? We have already obtained some answers and have relayed them to the Technical Advisory Group of the Welsh government", said Dr Kaouri.

"The models can also be customised to any other high-risk location, which is a great advantage of our methodology", said Prof. Griffiths.

Maths in the NSB Curriculum

Mathematical Proof

A proof is a sequence of logical statements, one implying another, which explains why a given statement is true. Previously established theorems may be used to deduce the new ones; one may also refer to axioms, which are the starting points, "rules" accepted by everyone. Mathematical proof is absolute, which means that

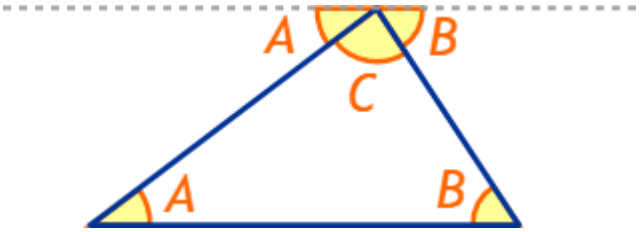
once a theorem is proved, it is proved for ever. Until proven though, the statement is never accepted as a true one.

In the **1780s** a provincial German schoolmaster gave his class the tedious assignment of summing the first 100 integers. The teacher's aim was to keep the students quiet for half an hour, but one young pupil almost immediately produced an answer: 1 + 2 + 3 + ... + 98 + 99 + 100 = 5,050. The smart student was **Carl Friedrich Gauss,** who would go on to join the short list of candidates for **greatest mathematician ever**.

Gauss was not a calculating prodigy who added up all those numbers in his head. He had a deeper insight: If you "fold" the series of numbers in the middle and add them in pairs—1 + 100, 2 + 99, 3 + 98, and so on—all the pairs sum to 101. There are 50 such pairs, and so the grand total is simply 50×101. The more general formula, for a list of consecutive numbers from 1 through *n*, is *n*(*n* + 1)/2.

Here at NSB we are very fortunate to have some very able and talented mathematicians. Last week I asked a group of Y7 students if they could prove that the sum of the angles in a triangle always added up to 180 degrees.

There were several interesting responses, such as cutting the angles at each corner and putting them next to each other to form a straight line. However, one of the boys, **Daniel Tilston**, explained the following technique.



Not only does this solution require a good understanding of the properties of angles in parallel lines, but it also uses algebra to generalise the result for any triangle. This shows that Daniel has the making of a Further Maths A level student in a few years' time. **Very well done.**

Parental Challenge

Some Y7 classes have been introduced to 24 Game. It is an excellent arithmetical game in which the objective is to find a way to manipulate four numbers so that the result is **24**.

For example, for the card with the numbers 4, 7, 8, 8, a possible solution is :

8 ÷ 8 = 1

7 – 1 = 6

$4 \times 6 = 24$

Have a go at this card. Remember you need to use all 4 numbers (only once) and using any of the basic operations +, -, × and ÷ to get 24.

Good luck!

M Mirnateghi
Team Leader Mathematics