

MODELLING DISEASE SPREAD USING MATHEMATICS



MATHS AND SICKNESS

HAVE YOU EVER NOTICED HOW AT YOUR SCHOOL, ONE PERSON WILL BE SICK AND THE NEXT WEEK, **EVERYONE** ELSE IS TOO? SCIENTISTS CAN USE MATHS TO **PREDICT** HOW SICKNESS SPREADS.

TO DO THIS, THEY SPLIT EVERYONE INTO **THREE GROUPS**. THE **FIRST GROUP** IS EVERYBODY WHO IS NOT SICK, BUT CAN GET SICK. THE **SECOND GROUP** IS ALL THE PEOPLE WHO ARE SICK AND CAN MAKE OTHER PEOPLE SICK. THE **THIRD GROUP** IS ALL THE PEOPLE WHO WERE SICK BUT ARE NOW **IMMUNE**.



Immune

When you get better from a sickness and you can't get it anymore.

CATCHING FLU!

THIS GAME SHOWS HOW DISEASE SPREADS. YOU WILL NEED TO FIND A **BIG GROUP** OF PEOPLE TO PLAY - AT LEAST 15. HERE'S HOW TO PLAY:

1 ONE PERSON WHO IS "ON" MUST RUN AROUND WITH HIS OR HER HAND IN THE AIR WHILE THE OTHERS RUN NORMALLY. THE PERSON THAT IS "ON" MUST TOUCH THE OTHERS AND THEY BECOME "ON" WITH THE PEOPLE THAT ARE ALREADY "ON" AND MUST ALSO RUN AROUND WITH THEIR HAND IN THE AIR.



2 WHEN YOU GET TOUCHED, YOU MUST COUNT SLOWLY TO 30 WHILE YOU RUN AROUND TRYING TO CATCH PEOPLE. WHEN YOU REACH 30, SIT DOWN, YOU ARE NOW OUT OF THE GAME.



WHAT'S HAPPENING HERE?

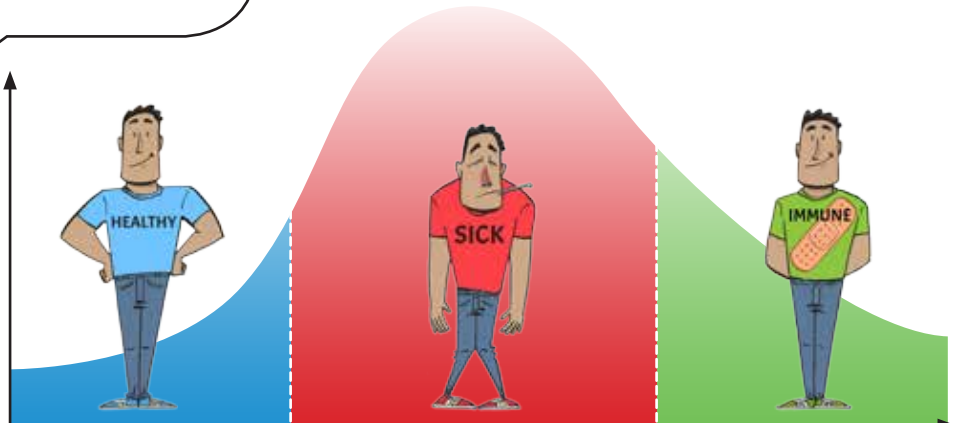
ALL THE PEOPLE WITH THEIR HANDS IN THE AIR WERE THE **SICK** GROUP OF PEOPLE. EVERYONE ELSE RUNNING AWAY FROM THEM WERE THE **HEALTHY** GROUP OF PEOPLE. ONCE YOU SAT DOWN, YOU WERE NOW THE **IMMUNE** GROUP OF PEOPLE.

WE CAN EXPLAIN THIS WITH MATHS. THIS GRAPH SHOWS HOW PEOPLE GET SICK OVER TIME. AT FIRST, THERE ARE NOT MANY PEOPLE WHO HAVE BECOME SICK, THEY'RE ALL **HEALTHY**.

AS TIME GOES ON, MORE PEOPLE BECOME **SICK**.

EVENTUALLY, AS PEOPLE GET BETTER, THERE ARE FEWER SICK PEOPLE, AND THERE ARE NOW MORE **IMMUNE** PEOPLE.

Number of infected people



Time



STOP THE SPREAD OF TB

In South Africa, **TB** is a sickness that spreads very quickly. **Maths** can be used to see how fast it spreads.

When someone with TB coughs or sneezes on someone else, the healthy person can become sick too.



CDC Public Health Image library ID 11162, James Gathany, 2009.

HERE ARE SOME **TIPS** TO KEEP YOURSELF HEALTHY AND AVOID MAKING OTHERS SICK:



- ✓ Wash your hands before you eat
- ✓ Cover your mouth when you cough
- ✓ Sneeze into your sleeve
- ✓ Open windows and doors to let the air move through your house.

CAREERS:

Mathematical modelling is where mathematics is used to investigate, analyse, and make predictions so that we can understand problems in the world. People in economics and finances, as well as tech companies use maths modelling.

Data scientists take data and turn it into useful information. Companies can then use this information to understand their customers and make decisions. To be a data scientist you need to be curious (to want to know what information you can get from data) and have good communication skills.

Statisticians collect, analyse, interpret and present information. They design experiments or surveys, and then collect and analyse it. To be a statistician you need to be able to work well with maths, have good computer skills and work well with people.



S'yanda Mungwe is currently working on his PhD studies. He has always had a love for maths. Because of this, he decided to get a Master's Degree in maths. S'yanda has used maths to study ways to fight HIV. He is now a junior lecturer at The University of Stellenbosch. He enjoys finding ways to solve problems using maths and developing people to help them change the world!

CURRICULUM LINKS

- **Grade 7: Life Orientation – Health, Social and Environmental Responsibility.**
- **Grade 7, 8 & 9: Life Orientation – Physical Education. Mathematics – Numbers, Operations and Relationships - graphs, Data Handling.**
- **Grade 8: Natural Sciences – Life and Living – micro-organisms.**

Knowledge is NCAW!



PUZZLE YOUR MIND!!!

WHEN TALKING ABOUT THE SPREAD OF A SICKNESS, YOU HAVE LEARNED THERE ARE THREE GROUPS OF PEOPLE - **HEALTHY**, **SICK** AND **IMMUNE**. EACH OF THESE GROUPS HAVE THEIR OWN GRAPH.

SEE IF YOU CAN MATCH THE GRAPHS TO THE DESCRIPTION ON THE LEFT.

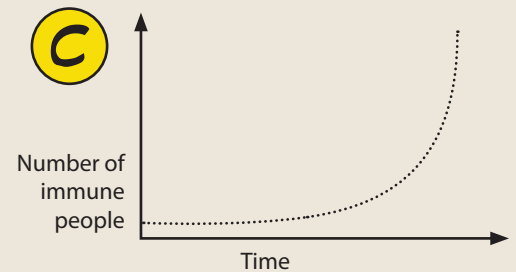
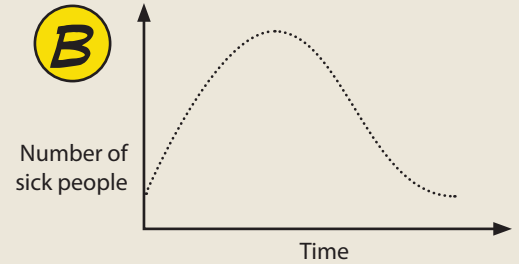
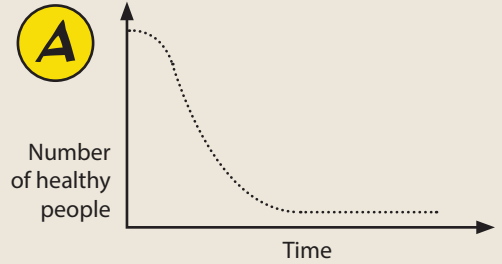
- 1** NOT MANY PEOPLE ARE **IMMUNE** TO A SICKNESS AT FIRST, BUT AS THEY GET SICK AND THEN WELL AGAIN, THE NUMBER OF IMMUNE PEOPLE GETS MORE.



- 2** LOTS OF PEOPLE ARE **HEALTHY** AT FIRST, BUT AS MORE GET SICK, THE NUMBER OF HEALTHY PEOPLE GETS LESS.



- 3** NOT MANY PEOPLE ARE **SICK** AT FIRST BUT MORE AND MORE GET SICK AS TIME GOES ON. THEN THEY GET BETTER AND THE NUMBER OF SICK PEOPLE GET LESS.



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Visit www.sciencespaza.org, email info@sciencespaza.org, sms or WhatsApp us on 076 173 7130 or write to us at PO Box 22106, Mayor's Walk, 3208.

WE WANT YOUR
FEEDBACK!

SEND US A PHOTO OF
YOUR CLUB PLAYING THE
"CATCH FLU" GAME.



The division of Applied Mathematics at Stellenbosch University focuses on research in numerical analysis and scientific computing, computer vision and machine learning, fluid dynamics and modelling, and applied discrete mathematics. Our mission is to formulate and solve problems in all walks of life by making use of mathematical skills in an innovative way.

The CoE for Mathematical and Statistical Sciences, hosted at Wits University, focuses on themes that reflect the pure and applied nature of the mathematical sciences. CoE-MaSS encourages cross-disciplinary research and develops national capacity in mathematics and statistics.



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