

MATHS TREATS

BY LUCIANA
THE POSSUM

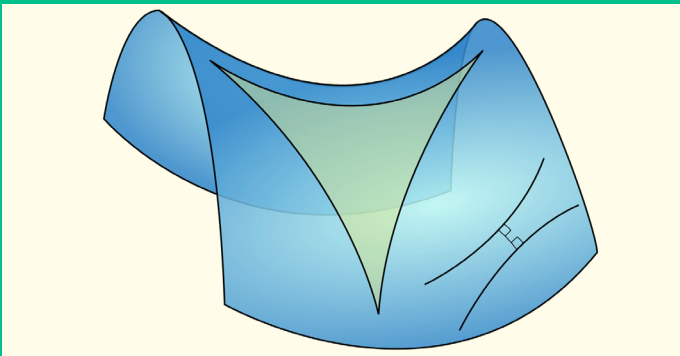


MARYAM MIRZAKHANI



Maryam Mirzakhani was a talented mathematician who, in 2014, became the first (and so far, only) woman to be awarded a Fields Medal, which is often referred to as ‘the Nobel prize of mathematics’. She grew up in Iran where she excelled in mathematics including winning gold medals for the Iranian Mathematics Olympiad and the International Mathematical Olympiad. She completed a Bachelor of Science in mathematics in Iran and a PhD at Harvard University. Her areas of interest included geometry, topology, and dynamical systems. Tragically, she died of cancer in 2017 at the age of 40.

GEOMETRIES



The geometry we learn at school, Euclidean geometry, is the geometry of flat planes. There are five axioms (assumptions): (1) we can connect any two points with a straight line; (2) the line can be extended beyond those two points; (3) we can create a circle around any point; (4) all right angles are equal and (5) given a straight line and a point, there is one parallel line through that point parallel to the line.

ACTIVITY

In the 1800s, the idea of non-Euclidean geometries arose leading to elliptic geometry (like the surface of the Earth) and hyperbolic geometry (above). What would a point, a line, and parallel lines mean in these geometries? Can you still draw a circle in each of these geometries? Do right angles exist? Can you draw a triangle and, if so, what would be the sum of its interior angles? What about other shapes?

REFERENCES AND FURTHER READING

ABOUT MARYAM

4 Things You Should Know about Maryam Mirzakhani https://en.wikipedia.org/wiki/Maryam_Mirzakhani

A Tribute to Maryam Mirzakhani www.ams.org/profession/mirzakhani
www.youtube.com/watch?v=Sx-kAlEpiZk

TOPOLOGY

<https://en.wikipedia.org/wiki/Topology>

Algebra, geometry and topology: What’s the difference? www.youtube.com/watch?v=xgKc7dFz-ko

TOPOLOGY



Topology, sometimes called ‘rubber sheet geometry’, is concerned with geometric objects and which properties remain when they are deformed, for example, by stretching, shrinking, twisting, crumpling, and bending, but not by tearing or gluing.

ACTIVITY

Think about the following objects and which ones can be deformed into others: sphere, torus (doughnut), pyramid, cube, rectangular prism, straw, scissors, pretzel, chain, coffee mug, and fidget spinner. Look at objects around you and think about grouping objects into different topological ‘types’ called manifolds. Can you think of any other manifolds?

Introduction to topology www.youtube.com/watch?v=C-eJW0gEm5w

<https://collected.jcu.edu/cgi/viewcontent.cgi?article=1075&context=mastersessays>

GEOMETRY

Non Euclidean geometry www.youtube.com/watch?v=Jvs_gTrP3wg

Search Wikipedia for Euclidean geometry, non-Euclidean geometry, spherical geometry, elliptical geometry and hyperbolic geometry.

IMAGES

Leadbeater possum - Steve Kuitert, doughnut - Pixabay, Hyperbolic paraboloid and Maryam Mirzakhani - Wikimedia Commons (public domain)