

# Mathematics is everywhere

Mathematics is everywhere in **science and technology**. A few examples:

- The success of search engines comes from their brilliant mathematical algorithms.
- Cryptography for secure communication relies on number theory
- Medical imaging devices like computed tomography scan (CT-scan) or magnetic resonance imaging (MRI) measure numerical data and a mathematical algorithm builds an image out of them.
- Artificial intelligence and machine learning are now transforming the world: for instance, computer vision, automatic translation, autonomous vehicles, etc.
- The decoding of the human genome is a triumph of mathematics, statistics, and computer science.
- Mathematics was used to create the first photo of a black hole.

Mathematics is everywhere in the **organization of the civilization**. A few examples:

- Mathematics is used to optimize transport and communication networks.
- Mathematics helps understanding and controlling the spread of epidemics.
- Statistics and optimization are used in efficient planning and managing of health, economic and social systems.
- Mathematics helps designing electoral system that better represent the people's will.
- Mathematics helps understanding the risks of natural disasters (floods, earthquakes, hurricanes) and preparing in advance.

Mathematics is essential to meet the **UN Sustainable Development Goals**. A few examples:

- Mathematics is a tool for development. Quoting Nelson Mandela (June 1990), "Education is the most powerful weapon which you can use to change the world." Mathematics is an essential part of education, which is necessary for better jobs.
- Mathematics is used to model the global changes and their consequences on biodiversity.
- Optimization techniques and data analysis are needed in the move to a sustainable use of the world resources.
- Artificial intelligence is used to extract data from satellite images and draw maps of urban, industrial, agricultural and forest areas, where traditional data are missing.
- Mathematics education empowers girls and women to a better future.
- Numeracy and scientific literacy help every citizen to better understand the planetary challenges.

Mathematics is **everywhere in whatever you do**. A few examples:

- Mathematics inspires artists and musicians: perspective symmetries, tilings, fractals, geometric curves, surfaces and shapes; patterns, scales and sounds in music.

- Mathematics is helpful in games of strategy from backgammon or chess to solving a Rubik's cube or playing Awale.
- Mathematics is useful in budgeting.
- Nearly everyone uses some mathematical concepts: the builder, the farmer, the shopkeeper, the craftsperson, the athlete, etc,

Tell me about some activity or area and I will tell you where mathematics is. A few examples:

- Mathematics is behind geolocation techniques, from navigations with the stars to GPS.
- Mathematics is behind the software of our smartphones.
- Mathematics makes your pension system sustainable.
- Mathematics makes realistic animation movies.
- Do you want to visit Mars one day? Without mathematics this will never be possible.