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How maths is used in careers at Josephs

Mathematics teaches problem-solving, an invaluable skill in the workplace. Careers involving maths are found in almost every field, including medical, scientific and research communities. Each of these careers involves using some level of maths on a regular basis.

Maths is used throughout the entire world! If you travel, your maths and numeracy skills will be recognised anywhere, and will help you gain employment.

Robotics Engineer

Robotics engineers design, test, and maintain robots! It's a growing industry and the employment outlook is sunny. Before you quit your day job and run off to design a house-cleaning robot, hit the maths books. Most Robotics Engineers have a master's or doctorate. According to the article, "Learn About Robots" robotics may be the most inter-disciplinary of engineering endeavors.

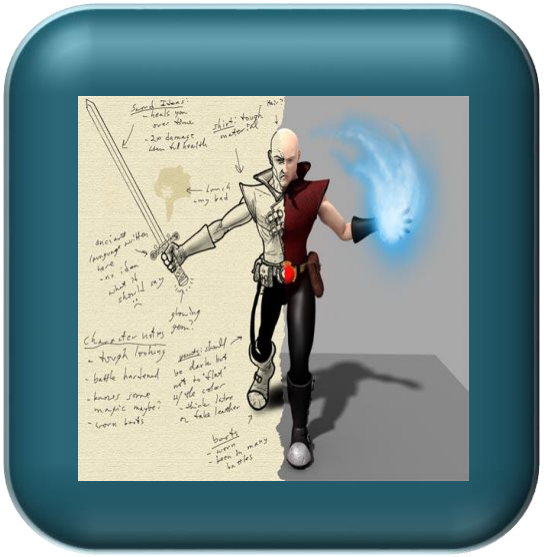
Medical Practitioner

Doctors use maths to write prescriptions for patients, to determine how much medication to distribute to patients based on weight, to determine Body Mass Index (BMI), and to interpret CAT scans. Physicians use maths in every day practice. For example, they use statistics and probability to interpret tests results. When a patient is treated for an illness, the probability is used to determine which type of treatment to use, if any. “Evidence-based medicine, the use of statistical models to guide diagnoses and treatment, is already changing how doctors practice.” - Ian Ayres

Computer Animator

While most animation might be considered an artistic discipline, computer-based animation relies on strong principles of mathematics. Trigonometry helps rotate and move characters, while algebra creates the special effects to make images shine. Even artists have to pay attention in maths class!

In most video game and film animation, models are built out of many planar surfaces called polygons, the concept being that if you increased the number of polygons by massive orders of magnitude, eventually the model would look organic and smooth. But even the most detailed polygon models can be seen, so they were placed with parabolic curves that would be continuous at any level of detail. But they too were difficult to calculate, so mathematicians created *subdivision surfaces*, which quickly generate smooth shapes but finding and dividing the midpoints of lines.



Game Designer

Designing board or video games is a cool job. Who wouldn't want to playtest Logo, Monopoly, or Cluedo? To build a computer game, with all its user generated levels, requires some serious maths skills. Programmers must understand algorithms and analyse how to make their programs work. Every game designer needs to have a good grasp of game theory – a branch of applied mathematics. Aspiring video game programmers should also study trigonometry, physics, and calculus. Chances are board game designers will need to know probability, even if they won't be designing math games.

Sports Person

Maths is used in many sports when people are creating plays, strategies, and for other reasons. Keeping score is another way maths is used. Some sports such as gymnastics involve complicated scoring systems where points are awarded for technique and artistic merit. Most people do not think about all the maths involved in watching and participating in a sporting event. When players are training, coaches will run scenario play through their heads and on paper and will use maths to determine the outcomes. A reliable coach takes into consideration all the variables adds up the possible outcomes. Using maths, the coach can determine whether the game will be won or not. Sports and maths go hand in hand for many reasons.

Architect

How to design buildings requires a host of mathematical skills – from construction methods, scale drawings finance and algebra. Maths is needed to analyse and calculate structural problems in order to engineer a solution that will assure that a structure will remain standing and stable. In addition, they need to calculate for things such as flooding and earthquakes to make buildings as safe as possible. The sizes and shapes of the elements of a design are possible to describe because of mathematical principles such as the Pythagorean Theorem.

Hairdresser

Hairdressers use ratios, fraction and proportions when mixing hair dyes in the correct proportion. An incorrect mix could lead to a hair disaster and an allergic reaction. It is essential hairdressers have good numeracy skills so they can calculate percentage discounts, total bills and give correct change. They will also need to convert units and control stock. A hairdresser will need to measure quantities accurately and estimate angles according to the shape of the head to create a natural fall for the hair.

Roller Coaster Designer

There are many different curves in a coaster and roller coaster engineers need to understand the mathematical properties of these curves, as well as physics, kinematics, and material strength. In the design, maths is used to calculate energy, momentum, motion, forces, electrical needs, safety, flow of crowds, physiological response measurements, forces, and geometry of the coaster (to name just a few

Jet Fighter Pilot

The thrilling life of a jet fighter pilot seems worlds away from the maths classroom. Movies like “Top Gun,” show pilots streaking through the sky in futuristic birds, not calculating how much fuel they have left or figuring out the direction and speed of the wind. But pilots have to complete major maths problems on the fly, and when they’re zipping through the air at 700 mph, maths skills are lifesaving. How high am I flying? What is my maximum speed? How much fuel do I have? How far can I fly on a full tank? What direction and speed is the wind? Which direction am I flying? What speed is supersonic? What is an altimeter? It's all maths!

Sports Announcer

What is his batting average? How many bases has he stolen? How do I calculate ERA? How fast was that last pitch? What is the score? How much time is left in the game? How many fouls does he have? How many outs are there? How many baskets has Michael Jordan made? What is his free throw percentage? How long was his longest field goal? When those sports personalities give the play-by-play, they have to pay attention to the numbers: percentages, player stats, the clock and sports casting is done live, which means there's no room for errors.

Professional Photographer

We think of shutterbugs as artists, not mathematicians. But professional photographers need mad maths skills. They have to calculate depth of field, determine the correct film speed, shutter speed, aperture, and exposure — and more. And to capture the moment, they need to do it all in a matter of minutes. Who knew so much maths went into one photograph?

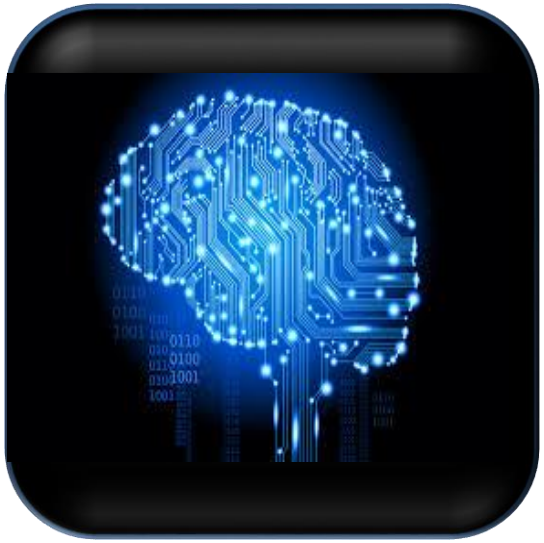
DJ

How many minutes is that next song? When is the next commercial? How many watts does this radio station generate? What does FM or AM mean? If a station is at 106 FM, what does that mean? What time is it? Can I really play 40 minutes of nonstop music?

A DJ has to mix two songs together to maintain a common beat between the tracks if they want to keep the audience dancing. If they do a bad job of the mix, the two beat lines from each song won't blend into each other. The most likely result of such a faux pas would be an instantly empty dance floor.

Racing Car Driver

How fast was that last lap? How many seconds am I behind or ahead? How many laps can I go on a tank of gas? How fast can I make a pit stop? How much horsepower am I making? What is horsepower? How many RPM's can my engine make before the redline? What is an RPM? How much air pressure do I need in my tires? What is my oil pressure? What do the numbers on all these dials mean? They have a lot of maths to think about!



Computer Scientist

Whether it's the millionaire behind Facebook, the secretive geniuses behind Google or the cool creative types at Apple, maths will be needed by those wanting to be part of creating the next generation of gadgets and apps.

Computer scientists use mathematics as they span a range of topics from theoretical studies of algorithms, and the computation of implementing computing systems in hardware and software. Many of the functions and operators in all programing languages require some knowledge in mathematics.

Forensic Scientist

A forensic scientist uses bloodstain pattern analysis in order to tell the story of the crime. It turns out that the location where the blood lands, and the shape of the blood on the landing surface, reveal both the direction in which the blood was moving and how much force was used to wound the victim. One area of maths that is crucial to forensic science is taking precise measurements at a crime scene. Knowing the exact length of a shoe print could later help rule out crime suspects whose shoes are the wrong size, for example. Investigators spend a great deal of time measuring distance, weight, temperature, volume and other aspects of evidence to get the numbers correct.

Cryptanalysts

Cryptography is the practice and study of hiding information. Cryptography is considered to be a branch of both mathematics and computer science. Not just for spies anymore, cryptography applications include the security of ATM cards and computer passwords. Cryptanalysts are code makers and code breakers. They use maths to among other things; follow mathematical theorems and formulas, encode and encrypt systems and databases and devise systems for companies to help keep hackers out and to protect the company and consumer. They may also work to decode intercepted messages or to analyse hidden data if a crime is suspected.

Stock Broker

Stock market traders spend all day looking at statistics and data to try and decide which stocks to buy and which to sell. Algebra plays a vital role in their job when they decide how much money to invest – and try to predict how much they will make. Mathematicians can build models to help explain and predict the behavior of financial markets

Business Person

All good business people need to be good at maths – or employ someone who is! What price to sell a product at? How many do you need to sell before you make a profit? How much tax should you pay? Mathematics usually used in commerce includes elementary arithmetic, such as fractions, decimals and percentages, elementary algebra, statistics and probability. Companies mainly use mathematics in accounting, inventory management, marketing, sales forecasting and financial analysis.

Movie Camera Operator

What size lens do I need? How far away should I be? How much light is there? What angle should I be shooting from? How far should I zoom in or out? How much film do I need? How much tape do I have left? It's all maths!

The cameraman uses mathematics to design the look of the film and to calculate the depth of field using “f stops” and focal lengths. A cameraman must be able to take the vision of the director and then plot a course for the equipment to follow that will bring life to a concept. They give instruction to other film crew members concerning set-up, distance, timing, angles and lighting.

Zoo Designer

A zoo designer will look at unit costs for the area of each enclosure and the ratio of land to water in each enclosure depending on the animals to be housed. Volume becomes important for enclosure for animals, such as orang-utans, as they need space to climb.

Zoo designers need a working knowledge of measurements for different species, such as appropriate dimensions of the enclosure, nearness to objects such as trees and how far an animal can jump to design an enclosure that is right for that animal. They use loci to design enclosures with natural barriers instead of bars.