TERM 2, 2020

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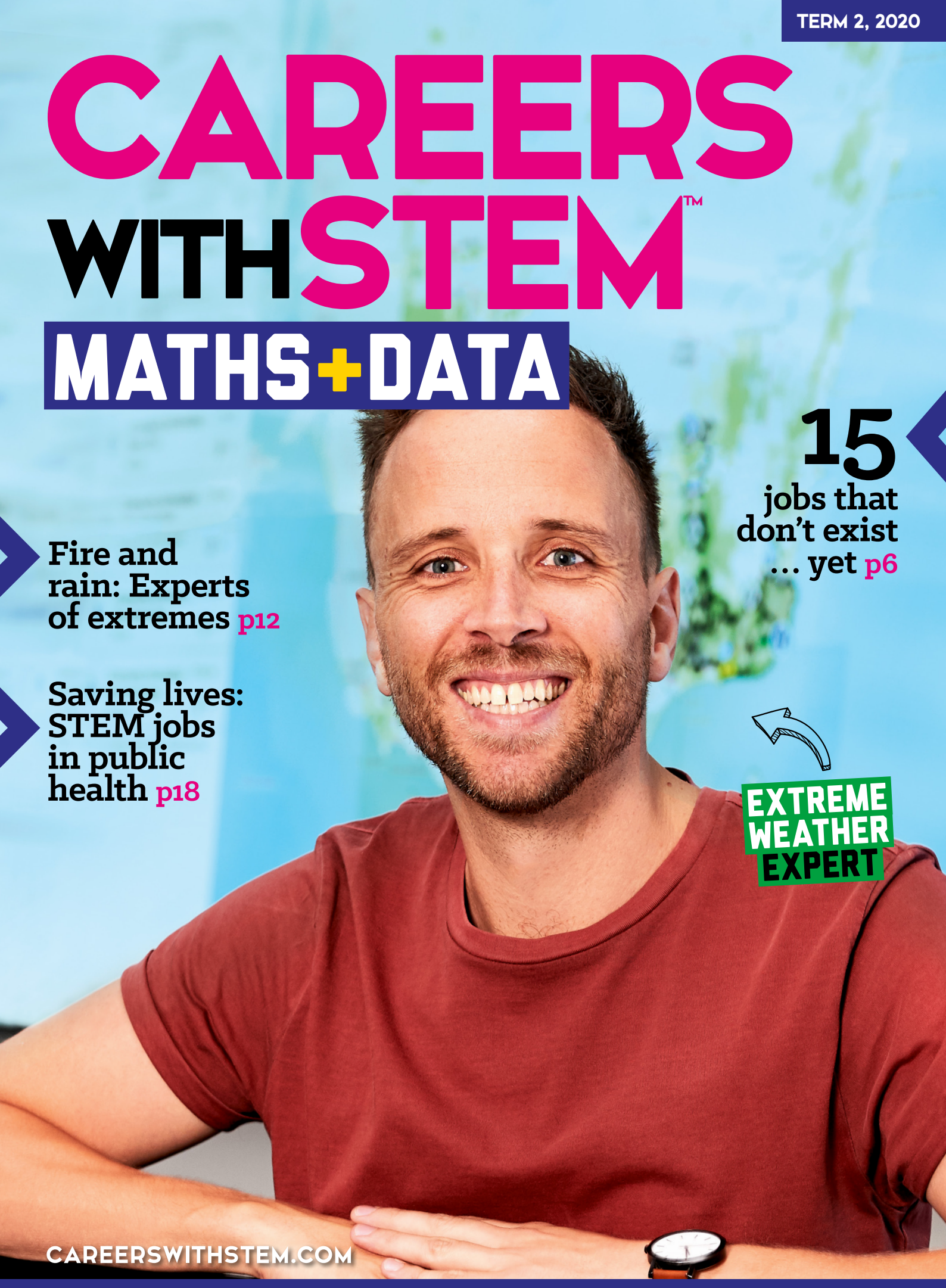

15 jobs that don't exist ... yet p6

Fire and rain: Experts of extremes p12

Saving lives: STEM jobs in public health p18

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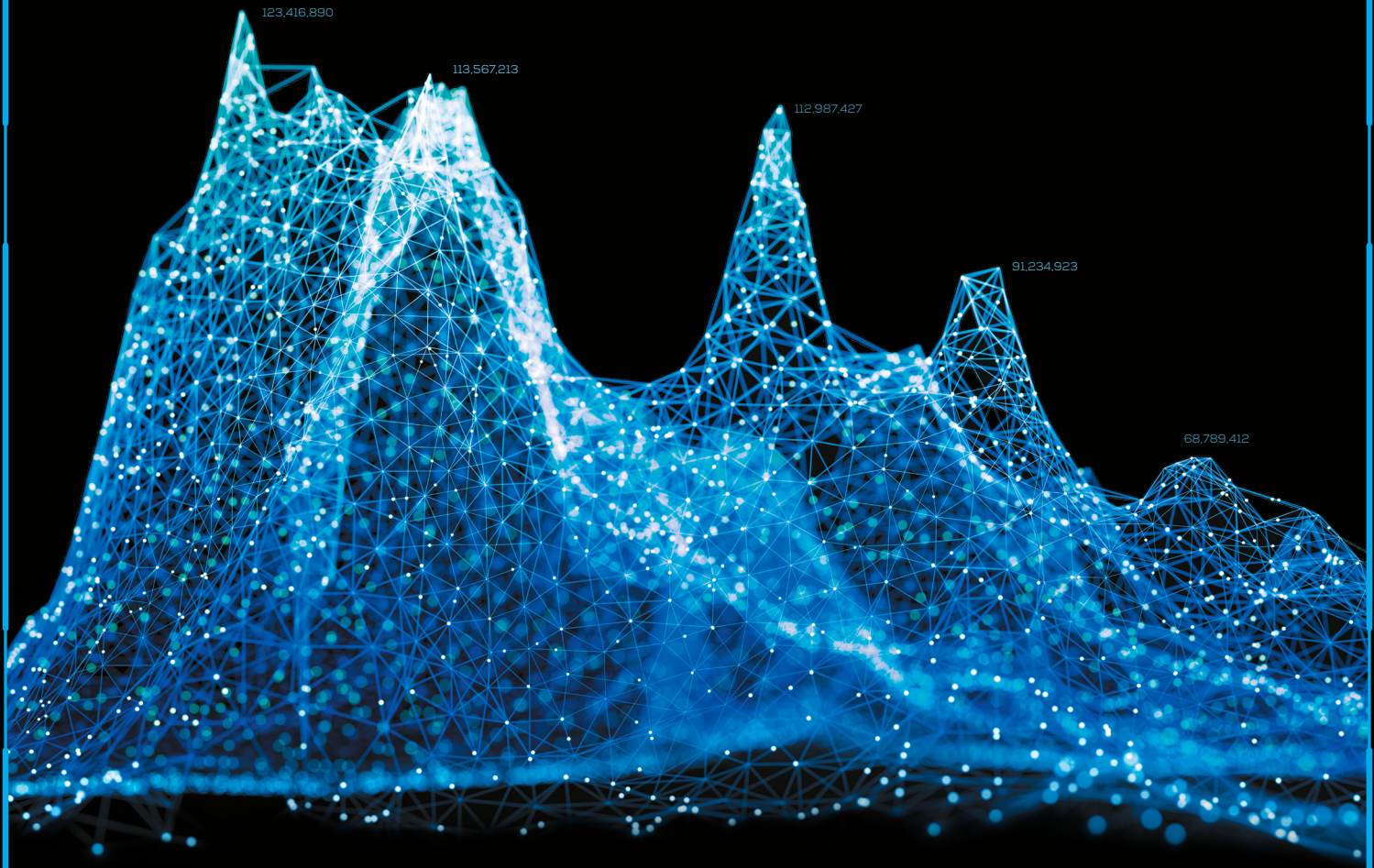

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GEMMA CHILTON
EDITOR

Maths is all around

In uncertain times, it's STEM to the rescue

The public health emergency the world has faced this year was terrifying. It has also reminded us that STEM (Science, Technology, Engineering and Maths) is central to everything we do.

From the tech that's enabled us all to study from home to the science that will eventually deliver us better diagnosis, treatments and a vaccine for COVID-19 – we're being reminded of the value of STEM everyday.

And perhaps most important to our understanding of the spread of this pandemic has been mathematics. Across the world experts have been poring over and analysing data to best figure out how COVID-19 spreads and how we can slow it down.

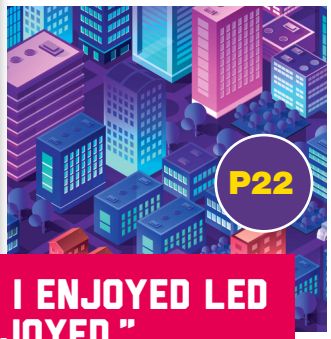
In this digital age everything we do generates data. It's been called the oil of the 21st century and industries from banks to retail and, yep, public health organisations, are looking for people who can analyse, understand and interpret that data to help them make smarter decisions.

In a report from LinkedIn, Data Scientist and Data Engineer both appeared in the top 15 jobs with the highest growth forecast in 2020, with other maths and data-heavy STEM jobs featuring including robotics engineers, Artificial Intelligence and cybersecurity specialists.

So read on and get inspired about how skilling up in maths and data can open up a world of career opportunities for you – and even save lives!

Gemma Chilton
Managing Editor, Careers with STEM

What's inside?



"STUDYING THINGS I ENJOYED LED TO A CAREER THAT I ENJOYED."
ADAM MORGAN, BUREAU OF METEOROLOGY

STEM + X = 😊

Looking for ways to combine maths & data (STEM) with your passion (X)? Start here!

Maths & data + ...

When maths gets real

#social-distancing

Three real-life maths lessons everyone is now getting from the COVID-19 pandemic

If it was ever the time for graphs to shine, the 2020 novel coronavirus pandemic is surely it. While 2020 is shaping up to be a pretty weird year so far – it's also been a reminder that maths is everywhere, and understanding maths and data can literally save lives in a public health emergency.

We've rounded up three of the biggest maths lessons that we've all learned from COVID-19.

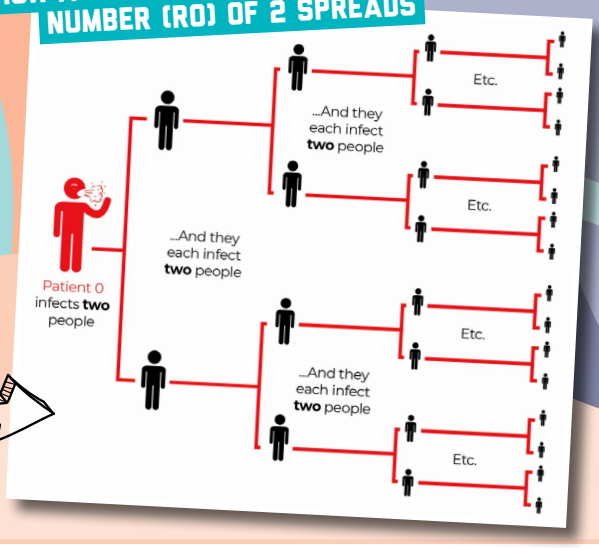
#1 R0 – MEASURING CONTAGION

R0 (pronounced R-nought) is a mathematical term that's been used a lot since the new coronavirus started taking over our news channels and social media feeds.

It's also called a basic reproduction rate (the R stands for reproduction), and it's the average rate at which an infectious disease like COVID-19 spreads between people.

The R0 of COVID-19 has been estimated at 2.2, which means an infected person passes the disease onto an average of 2.2 other people. Of course you can't have 0.2 of a person – averages is another useful mathematical concept to help understand all this!

HOW A VIRUS WITH A REPRODUCTION NUMBER (R0) OF 2 SPREADS



#stayhome

#2 EXPONENTIALS

When we imagine numbers getting bigger, we have a natural habit of imagining them doing so in a straight line - 1,2,3,4,5 or 10,20,30,40,50. That's called linear growth, and if you put it on a graph it's a straight line.

But exponentials are different, and they can be hard to get your head around. That's why people who remembered learning about exponentials in high school maths have probably been better able to understand why only small numbers of confirmed COVID-19 cases on one day could get very big, very fast.

Understanding exponentials has meant we can act when it seems too early, but before it's too late.

That means hand-washing, social isolating and all the other actions individuals and governments have taken all over the world to slow the spread of the virus.

#covid-19

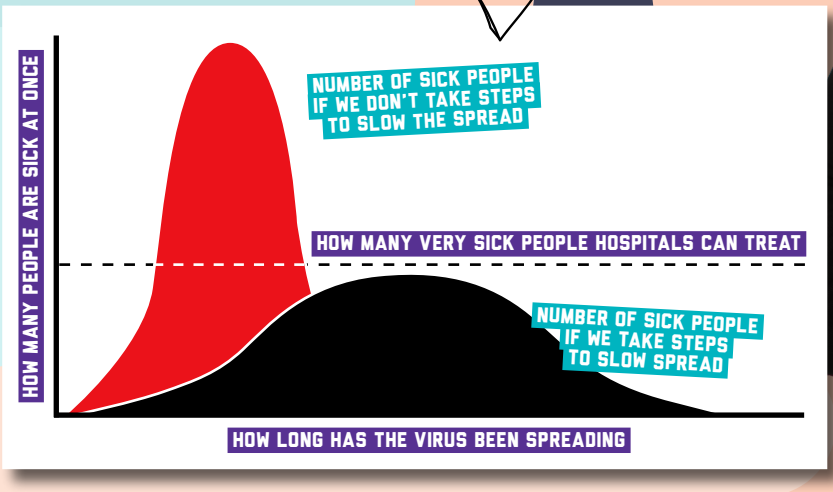
> "Mathematics is at the heart of understanding, tracking and fighting COVID-19.
>
> Sure 1000 cases doesn't seem like much. But if you double the infections every three days, in a big enough population, that 1000 would double up and up and up ... to more than ONE MILLION CASES in less than a month.
>
> Wash your hands. Stay sneeze smart. And realise every contact you choose not to have may be saving a life you will never know about."

Adam Spencer is a comedian, author and Ambassador for Mathematics and Science, University of Sydney

#3 #FLATTENTHECURVE

Our scientists and mathematicians can model the spread of a virus using data and computer algorithms. They know that if we don't do anything to slow it down cases will rise exponentially (maths lingo FTW) – that means our healthcare systems are overwhelmed, which is bad news.

The alternative is everyone acts fast to slow the spread and that rate of change decreases, spreading the cases over a longer timescale, and taking pressure off our hospitals because there are fewer sick people turning up all at once.



15 JOBS THAT DON'T EXIST... YET!

Skill up on the transferable smarts that'll land you one of these STEM roles of the future

What will a job search look like in 2050? No-one knows – but one popular estimate suggests 65% of primary school-aged kids will end up in yet-to-be-created careers. We're guessing packed with next-gen STEM gigs in cutting-edge fields like Augmented Reality (AR), data analytics, and Artificial Intelligence (AI)-based service roles.

We looked into our digital crystal balls and came up with 15 jobs we think you might find advertised in 30+ years. And yep, all of them require STEM skills! – *Cassie Steel*

POSITIONS VACANT

PLEASE SUBMIT YOUR RESUME VIA HOLOGRAM. APPLICANTS MUST BE EARTH-BASED TO APPLY.

1. AI ethicist

The job: Advocate for the ethical and legal matters regarding the creation and distribution of AI-based tech products.
The skills: Must be as into philosophy as robots. Fluency in analytics a plus.
Now hiring: Microsoft, Apple, Google.

2. Self-driving car mechanic

The job: Perform maintenance and repair jobs on autonomous self-driving vehicles.
The skills: Advanced software programming and data management.
Now hiring: Tesla, Porsche, Uber.

3. Human-technology integration specialist

The job: Collaborate with teachers to create future-focused learning environments that embrace the latest digital learning resources.
The skills: Research, communication, analytics and high-level tech smarts.
Now hiring: Every school in Australia.

4. Telesurgeon

The job: Operate on patients remotely via a surgical robotic system.
The skills: IT, robotics and medicine.
Now hiring: Hospitals – particularly those in regional areas.

5. Personal data broker

The job: Collect personal information about consumers and sell it to other brokers, companies or individuals.
The skills: Data science, ID analytics and sales.
Now hiring: You! Yep, this is generally a freelance-type gig.

6. 3D-printing chef

The job: A professional cook who whips up meals by programming a 3D printer.
The skills: Programming and software development, but also basic maths smarts because, recipes.
Now hiring: Heinz, Cadbury, Kellogg's.

7. Commercial space pilot

The job: Fly paying customers out into space... just for fun.
The skills: Geography, physics and mechanical aptitude. An interest in astrophysics, a bonus.
Now hiring: Qantas, Virgin, American Airlines.

SHUTTERSTOCK

8. Coding ethicist

The job: Ensuring companies adhere to global computing standards of ethics when creating technologies and their algorithms.
The skills: Coding and being a decent human.
Now hiring: Atlassian, Facebook, Tinder.

9. Human-machine team manager

The job: Develop and manage a system in the workplace where human and AI employees communicate to generate better business outcomes.
The skills: Experience in human resources (HR) and robotics.
Now hiring: The Commonwealth Bank, Spotify, The Iconic.

10. AR journey builder

The job: Collaborate with tech artists to create immersive 3D content that enhances users' experience of a product or service. Think: virtual tours and simulated interior design options.
The skills: Must be able to leverage AI and algorithms with design and usability.
Now hiring: LJ Hooker, Contiki, Ikea.

11. Garbage designer

The job: Deal with the world's massive waste problem by upcycling rubbish to create better quality items.
The skills: A background in materials science, engineering and industrial design.
Now hiring: Toyota, ASOS, Ray-Ban.

12. Healthcare navigator

The job: Assist families of patients undergoing extensive medical treatment by simplifying paperwork and processes, along with communicating complex medical information.
The skills: Health science and social work. Being a medical role, basic maths – addition, fractions, ratios and algebraic equations – are essential.
Now hiring: Hospitals and private practices.

13. Robot recruiter

The job: Source compatible AI for households, individuals and employers to fulfil requirements like cleaning, cooking, companionship, coffee ordering etc.
The skills: Robotics and customer service.
Now hiring: Big retailers like JB Hi-Fi, Amazon and Myer.

14. Cyber city analyst

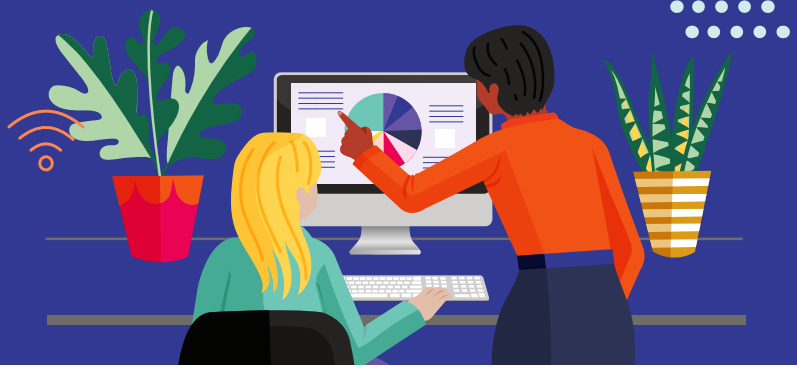
The job: Ensure the safety, security and functionality of a city by servicing its digital assets – including tech services and data flow.
The skills: Data analytics, statistics and tech maintenance capabilities.
Now hiring: Your local council.

15. Financial wellness coach

The job: Offer customers one-on-one coaching sessions to understand their digital banking options and ultimately improve their financial health.
The skills: Maths, maths and maths.
Now hiring: The Commonwealth Bank, NAB, ING.

THE GiST

Girls in STEM Toolkit



Did you know temperature is important for marine turtles as the sex of hatchlings is determined by the temperature of the sand where the eggs incubate?

Warmer temperatures will translate into more females, and colder into males. Data of sand temperature is analysed to understand the impact of rising global temperatures on turtle populations.

Within our oceans, just like in maths, there is always something to be discovered.

Visit The Girls in STEM Toolkit (The GiST) and see that maths isn't only about numbers.

Visit **thegist.edu.au** or check us out on Instagram, Facebook and Twitter.

This project is funded by the Australian Government Department of Industry, Innovation and Science. © Education Services Australia Ltd, unless otherwise indicated.

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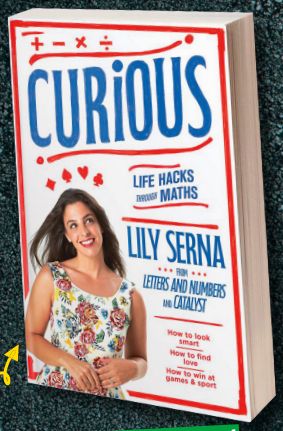
Life hacks through maths!

Celebrity mathematician Lily Serna let us in on some of her everyday life hacks using maths



This is an edited extract of *Curious: Life Hacks Through Maths* by Lily Serna (Pan Macmillan Australia; RRP $29.99)

HACK #1

HOW TO WIN AT MONOPOLY

There is a heap of mathematical data out there about how to win Monopoly. Even though a lot comes down to the roll of the dice, there are mathematically proven strategies you can adopt that have been shown to increase your chances of winning. I'm going to break it down for you to a few simple rules to follow.

WHICH PROPERTIES TO BUY?

Most people think the best properties are the ones with the highest rent. In fact, this isn't true, and it's because you are more likely to land on some properties than others.

For example, there are cards in the 'Chance' and 'Community Chest' piles that sometimes send people to certain squares, which increases the probability that a player will land on that square. Plus – and you may not be thrilled to hear this – Jail is one of the most probable places to end up. This is not only because players can land in 'Just Visiting' but because there are several different ways to end up in Jail, including rolling three doubles in a row, landing on the 'Go To Jail' square and pulling out a Chance card that sends you to Jail. This means that the orange and red properties, which are the most likely to fall within a double-dice roll of the Jail square, are generally the best investments because they have an increased chance of being landed on. And I'm only getting started.

Here's a list of properties that you should and shouldn't buy, and why:

- Railroads: you should buy these with the aim of getting three or four, or at least to stop your opponents getting a set. Railroads offer consistent income and become a cash cow.
- Don't bother with utilities (unless you can get a good deal for them off your opponents).
- Forget about Park Lane and Mayfair. Park Lane's expected return brings down the average income of the navy-blue sets because it's the least visited square in the game.

Secondly, where you focus your investments depends on how many people are playing:

- If you're playing against two other people, buy blue and orange properties.
- If you're playing against three other people, buy red and orange properties.
- If you're playing against more than three others, get the green properties.

Knowing the chance of you or the other players landing on a square is only the beginning of the story, because there is, of course, money involved.

By the way, this analysis doesn't account for house rules (i.e. rules that your friends/family make up and agree to).

QUENTIN JONES / SHUTTERSTOCK

HACK #2

HOW TO ORDER PIZZA

Ordering pizza is the ultimate crowd-pleaser – and it's way easier than cooking. But have you ever argued about whether you should order two mediums or one large-sized pizza? As it turns out, that decision is easy – the maths says that ordering the biggest pizza is the smartest thing to do because, for a few more dollars, the large pizza is often twice, yes twice the size of a medium pizza.

I'll use my local pizza shop as an example. Their medium pizza is 8 inches (20cm) and costs $12. Their large pizza is 12 inches (30cm) and costs $15, i.e. it costs 25 per cent more than a medium pizza. But am I getting 25 per cent more pizza for my extra cash? We can figure this out with some basic formulas.

	Medium 8-inch pizza	Large 12-inch pizza
Diameter =	8	12
Radius = (half the diameter)	4	6
Area = (πr^2)	- 3.14 Đ 4^2	- 3.14 Đ 6^2
	- 3.14 Đ (4 Đ 4)	- 3.14 Đ (6 Đ 6)
	- 3.14 Đ 16	- 3.14 Đ 36
	50.24 square inches od delicious, delicious pizza	113.04 square inches od delicious, delicious pizza: more than double the medium pizza!

12-INCH DIAMETER

6-INCH DIAMETER

The diameter of a circle (and a pizza!) is the distance from one side to the other passing through the centre. In the case of pizza, the diameter is often found in the title: a '12-inch pizza' is called that because it has a 12-inch (30cm) diameter.

The radius of a circle is the distance from the centre of the circle to the edge – half of the diameter.

Why do we need to know these things? Because they'll help us to calculate the area (i.e. the size) of a pizza. The area of a circle is equal to the number pi multiplied by the radius squared. So how does this look when we apply it to our pizzas?

As you can see, the 8-inch (20-cm) pizza, which costs $12, is around 50 square inches (just over 300 square cm), while the 12-inch pizza (30cm; $15) is over 113 square inches (700 square cm). So, a 12-inch (30cm) pizza is more than twice as big as an 8-inch pizza (20cm), but it's only 25 per cent more expensive. It's a no-brainer! Always get the largest pizza: it's the responsible thing to do.

MEET STUDENT LUCY MACE

Lucy is in year eight at Quakers Hill High School in Western Sydney. She spends most of her spare time dancing and is starting to think about her electives next year. While she had heard of The Iconic, she didn't know much about data science until now!

MEET YOUR MENTOR

WHAT WOULD YOU ASK AN EXPERT DATA SCIENTIST IF YOU HAD THE CHANCE?

Lucy: What does data science mean? What do you actually do?

Kshira: Data science is the ability to apply commonsense at a large scale to help a business make smarter decisions with data (information). In my job, I help with the part where we take a whole heap of data, condense and interrogate it enough to find out what to do next in a smarter way that is beneficial for all.

L: Do you need to be really good at maths and computers for that? 🙂

K: Not necessarily. You just have to be good at two things – an ability to learn new things and applying commonsense. Maths and computers are tools like everything else.

L: What were your favourite subjects in high school?

K: In high school, I absolutely adored maths and physics – these two subjects and the teachers who taught them made us appreciate maths and physics all around us in the real world.

L: What did you want to be when you grew up?

K: I wanted to grow up to be a marine engineer, thanks to all the Clive Cussler novels I read – but that adventure never happened.

L: Do you get free stuff from The Iconic your job?

K: We don't get free stuff, but we get an employee discount and access to internal sample sales.

L: What do you like to do when you're not at work?

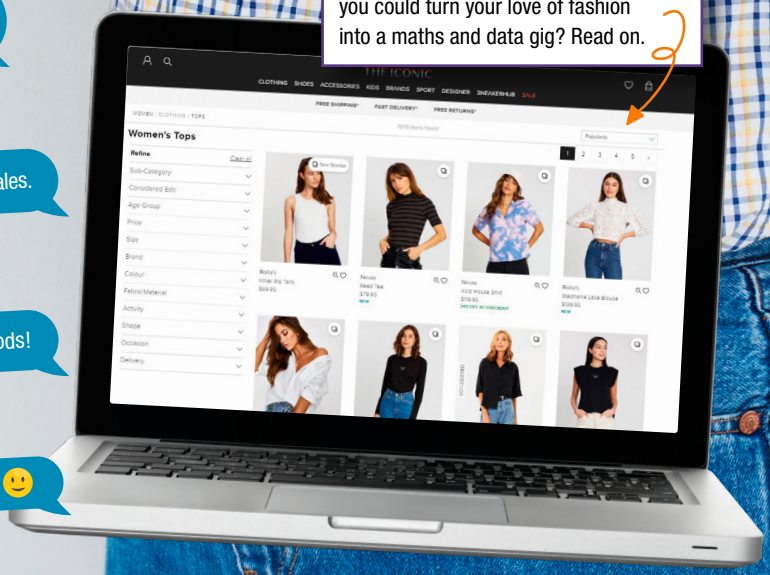
K: I love to feed my brain by reading a lot of books, cooking and eating my favourite foods!

L: What should I do if I want a job like yours one day?

K: Just keep an open mindset and be willing to learn new things every day. 🙂

MEET DATA SCIENTIST KSHIRA SAAGAR

Kshira is in charge of data science and analytics at the company that owns The Iconic – one of Australia's biggest online fashion retailers. Didn't know you could turn your love of fashion into a maths and data gig? Read on.



MULTIPLE CHOICE

REALISING THAT SHE COULD STUDY JUST MATHS HAS OPENED UP A WORLD OF POSSIBILITIES FOR ISABELLE GRECO

Isabelle Greco, from the University of Adelaide, has been a numbers fan since primary school

Isabelle had big plans to be an artist or a sports star, until Year 4 when she learned about fractions. "I remember dividing a bunch of random fractions," she says. "It was so exciting."

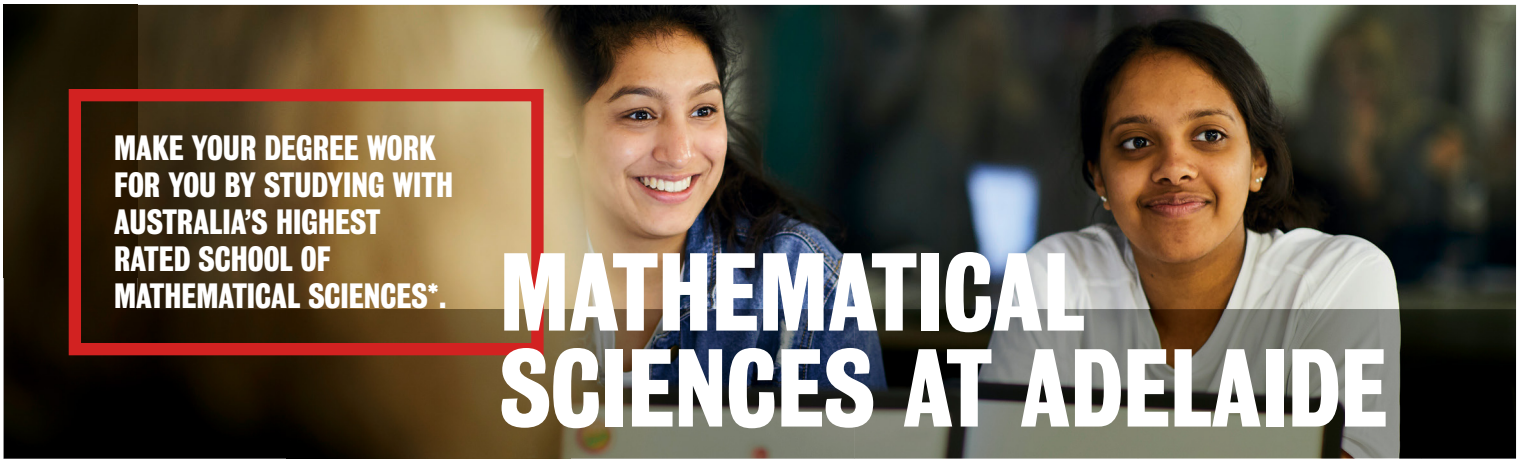
Isabelle's love of maths continued throughout school, but for a long time she thought she'd have to work in another STEM field. "If you're good at maths you become an engineer or a scientist, right?"

Fortunately, Isabelle discovered the Bachelor of Mathematical Sciences at the University of Adelaide, and now she studies her favourite subject full-time. She was president of the maths society last year, as well as being part of the university's Women in STEM Careers Program where she met many women with exciting and interesting jobs. "I've gone from having no idea what I want to do to having too many things I want to do!" she says.

Isabelle has worked on a summer research project deciphering Reddit posts, tried machine learning at a medical-imaging company and spent eight weeks in Sydney at trading firm, Optiver. Seeing how maths is applied to real-world problems was a highlight.

"The maths you do at school underpins a lot of stuff, it's just hard to see that at school," she says. "It's hard to see how the basics tie into things, but the more you do, the more creative it gets." – *Chloe Walker*

BACHELOR OF MATHEMATICAL SCIENCES (ADVANCED) AND DIPLOMA OF LANGUAGES, UNIVERSITY OF ADELAIDE >> SUMMER RESEARCHER, UNIVERSITY OF ADELAIDE >> INTERN, OPTIVER >> INTERN, ADELAIDE MRI



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Careers in climate

Meet two STEM experts making a difference on the frontline of extreme weather

SHUTTERSTOCK

#1 HEAD IN THE CLOUDS

ADAM MORGAN HAS BEEN INTERESTED IN WEATHER FOR AS LONG AS HE CAN REMEMBER – AND NOW HE'S TURNED IT INTO A CAREER

Adam says if you ask his mum she'll tell you he always had his head in the clouds! He never missed the weather on the news and when the topic was introduced in his year 9 science class, Adam was the only one who already knew what an isobar was (FYI, they're lines on a weather map connecting points of equal atmospheric pressure).

However, Adam didn't make the connection that he could turn his passion for all things rain, hail and shine into a career until he'd already started uni. "When I went to uni I just kept studying the things that I enjoyed, and that led to a career that I enjoyed," he says.

ADAM MORGAN
METEOROLOGIST

MANAGER, EXTREME WEATHER DESK, BOM

PHD IN METEOROLOGY, MONASH UNIVERSITY

GRADUATE DIPLOMA OF METEOROLOGY, BOM

BACHELOR OF ARTS/BACHELOR OF SCIENCE (HONOURS), MONASH UNIVERSITY

> "WHEN I WENT TO UNI I JUST KEPT STUDYING THE THINGS I ENJOYED, AND THAT LED TO A CAREER THAT I ENJOYED"

Charting a future job

Adam studied a combined Bachelor of Arts majoring in Japanese and German and a Bachelor of Science majoring in maths and physics at Monash University. He says his "lightbulb moment" for choosing meteorology as a career came when he took a six-week internship at the Bureau of Meteorology (BOM) during his third year of uni.

"I remember one day a BOM researcher was describing a particular weather phenomena and writing down these equations and I was like, 'oh my gosh, those equations are exactly what I'm learning at university!' – it was the first time I really felt like the stuff I was studying in maths and physics was directly applicable to things I could see and feel every day," he says.

Following an additional Honours year at Monash, Adam completed a 12-month Graduate Diploma of Meteorology at the BOM and is now manager of the Extreme Weather Desk there.

To the extreme

In this role, Adam leads a team of meteorologists that support state and territory weather forecasters in providing forecasts and warnings for severe and extreme weather – think cyclones, floods and dangerous fire conditions. There's also a communications aspect to his role, which means you might spot Adam on TV or a Twitter video when there's an extreme weather event going on.

And yes – being a meteorologist at a party will attract a lot of interest (when was the last time you met a weather forecaster in real life?). Adam says he's often asked the same three questions when he tells someone he's a meteorologist. What TV station do you work for? (Answer: None! The BOM is a government organisation.) Does that mean you study meteors? (Nope – that would be an astronomer.) And what will the weather be like at my wedding in two years' time? (Sorry, too far away to tell.). – *Gemma Chilton*

Maths+Meteorology= match made in the heavens?

Are you an obsessive cloud spotter, or do you get a thrill when a thunderstorm rolls in? According to Adam, a passion for weather is the number-one prerequisite for becoming a weather forecaster like him, but maths and physics are crucial, too.

You will need at least a minor in maths and physics at uni – but you don't have to be the top of your maths class to consider this career path. Adam reiterates that the best mathematicians aren't always the best weather forecasters and vice versa.

"Your interest and passion in weather will inspire you to learn more and dig deeper into things," he says.

#2 FIGHTING FIRE WITH DATA

CFA RESEARCHER RACHEL BESSELL CRUNCHES NUMBERS TO PREDICT WHERE AND WHEN BUSHFIRES WILL IMPACT

To analyse the threat of extreme conditions, scientists sometimes have to light fires to fight fires

Three months without rain. Forty degrees Celsius. Sixty-five kilometre per hour winds. You don't need to be a scientist or a mathematician to know what those numbers might mean – just an Australian who lived through the summer of 2019-20, where devastating bushfires took 33 lives, destroyed thousands of buildings and burned more than 500,000ha of bushland.

Yep, numbers like those can mean extreme fire conditions – and while they affect all of us, they're numbers that scientists like Rachel Bessell are particularly interested in.

LOCAL INSPO

Rachel says she always loved maths and science at school, so she signed up for a Bachelor of Science with Honours at the Australian National University in Canberra. She was at uni in 2003 when bushfires tore through Canberra and caused the city's worst natural disaster in history. It was this experience, she says, that inspired her to focus her Honours research on bushfire weather, which led to a career in bushfire research and disaster management.

BURNING FOR INFORMATION

In her current role as a senior researcher at the Country Fire Authority (CFA) in Victoria, it's Rachel's job to improve our understanding of how bushfires behave. On extreme weather days, if there are active fires burning, Rachel might be working in the State Control Centre as a fire behaviour analyst, helping emergency services predict the spread of fires in real-time.

Rachel is able to make these predictions by not only drawing on real-time weather and climate data, but also on data and findings generated from her research, which she conducts between emergencies.

This research can involve lighting fires under extreme conditions – and in an extremely controlled environment – to collect data and use it to better inform our understanding of fires and our ability to predict their behaviour.

START YOUR CAREER HERE

MATHS+DATA +CLIMATE STUDY

- Bachelor of Mathematics/Science, University of Queensland
- Bachelor of Mathematics (Advanced), University of Wollongong
- Bachelor of Science (Applied Mathematics and Statistics), RMIT
- Bachelor of Mathematical Sciences (Advanced), University of Adelaide

MATHS+DATA +CLIMATE JOBS

- Meteorologist: $63K–$106K
- Environmental scientist: $52K–$94K
- Atmospheric scientist: $52K–$94K
- Climate scientist: $52K–$94K*

*Source: salaries according to payscale.com

For example, a recent study Rachel was involved in was looking at crop fires. Working closely with the CSIRO – and with firefighters at the ready – Rachel would go into paddocks in central western Victoria and replicate real-life fires on small plots. Data is collected from weather stations located on-site as well as thermal loggers in the ground to measure variables associated with the spread of the fires across the grass. Her research has resulted in a change to fire danger ratings, after she found current models had been underestimating the rate of fire spread in partially dry grasslands.

Aside from helping save lives and property, Rachel says one of the best things about her job is the diversity – a typical day at work could mean being called on to make predictions during emergencies, spending 12-hour days conducting experimental burns and collecting data in the field, or working in an office reviewing, planning or meeting with stakeholders.

FIRM FOUNDATIONS

Rachel says she remembers studying maths at high school and wondering what it might all be useful for – but now she understands that maths underpins a lot of physical science research like hers.

"Maths has real-world applications and even though I didn't do maths at university, it's still a big part of physical sciences. The way weather patterns work, fire behaviour – it's all dependent on numbers," she says. – *Gemma Chilton*

RISKY BUSINESS

BUSINESSES ARE LOOKING FOR MATHS EXPERTS LIKE AVALON MARTINKUS TO HELP THEM ASSESS THE RISK OF CLIMATE CHANGE

Analysing how sea level rise might impact Australia's coastal areas was not something Avalon thought she would be using her maths degree for. But more banks, governments and other organisations are looking for people with maths skills to help them.

As a quantitative analyst with the Bank of Queensland (BOQ), Avalon's main job is to help build and maintain computer models to assess the credit risk of customers.

"My team and I do a lot of analysis to understand the bank's readiness for certain types of extreme events, and the money that could be needed to cover potential losses," Avalon explains.

As a child, Avalon loved puzzles and she became fascinated with maths in high school. "I never found maths to be impossible or a chore. When I was deciding on my uni study, I knew people who had studied maths and I talked to them about the career prospects," she says.

Her biggest inspiration, though, is her mum, who worked as a geologist in the 1980s when female geologists and engineers were rare. "Mum has worked in STEM roles her whole life and that passion has rubbed off on me," she says.

Day-to-day Avalon enjoys her time in the office, mainly coding in R or SAS software, and attending events run by the bank. "Financial risk is a growing area and I definitely foresee myself staying in the industry in the near future," she says. – *Claire Harris*

> **"MUM HAS WORKED IN STEM ROLES HER WHOLE LIFE AND THAT HAS RUBBED OFF ON ME"**

Count on me

Hospitals are employing experts like Jane Shrapnel to help them save lives by digging into the data

Jane Shrapnel uses her data skills to help doctors on the medical frontline

When patients present to the Emergency Department, it's the nurses' and doctors' jobs to look at their symptoms, figure out what's wrong and help them. But they don't work alone. In the background are experts contributing crucial knowledge – people like Jane Shrapnel, the principal data scientist at the Sydney Children's Hospital.

It's Jane's job to figure out how data can be used to improve patient care and outcomes. For example, as the pandemic unfolded in early 2020, she helped collect data on COVID-19 patients to inform decisions around bed capacity and demand for intensive care.

"In the future, we will be looking at implementing tools to support clinician decision-making for things like determining the patient's risk for severe coronavirus or what treatment plan might be best for that particular case," she says.

> "EVERY HOSPITAL JOB REQUIRES SOME LEVEL OF DATA LITERACY SKILLS"

Choose this career if you:

- > Love helping people
- > Want to work in a hospital
- > Love coding, math and data

Typical tasks:

- Liaising with hospital staff on project aims and expected outcomes.
- Sourcing data from a database and validating with doctors and nurses that the data is correct.
- Analysing data using statistical tools to develop insights into patient treatments and outcomes.

Care factor: high!

After finishing high school, Jane signed up for a Bachelor of Arts degree in psychology and international relations at Deakin University in Victoria.

She soon realised she wasn't keen on becoming a psychologist, but liked the statistics and human rights parts of the study. She combined those as part of her Masters in statistics research into reducing the mortality rate of children aged under five in Africa.

Jane says she loved maths at high school, and that maths is useful not just in her role as a data scientist, but in any healthcare job. "Every hospital job requires some level of data literacy skills," she says. – *Gemma Chilton*

START YOUR CAREER HERE

MATHS+DATA +HEALTH STUDY

Bachelor of Science (Applied Mathematics and Statistics), RMIT

Bachelor of Health Science, University of Technology Sydney

Bachelor of Statistics, Australian National University

MATHS+DATA +HEALTH JOBS

Data scientist: $63K–$142K

Data analyst: $50K–$103K

Healthcare consultant: $51K–$147K*

*Salaries according to payscale.com

PRINCIPAL DATA SCIENTIST, SYDNEY CHILDREN'S HOSPITAL NETWORK

DATA SCIENTIST, MCKINSEY + COMPANY

DATA + INSIGHTS MANAGER, WORKPLACE GENDER EQUALITY AGENCY

DATA ANALYST, MLC

MASTERS IN STATISTICS, MACQUARIE UNIVERSITY

BACHELOR OF ARTS, PSYCHOLOGY AND INTERNATIONAL RELATIONS, DEAKIN UNIVERSITY

SHUTTERSTOCK

SOLVING BIG PROBLEMS

MATHS JUST CLICKED FOR ONE GIRL IN RURAL THAILAND. NOW, NATALIE THAMWATTANA IS A WORLD-LEADING RESEARCHER IN NANOTECH

Natalie Thamwattana uses geometry and calculus in her nanotech research at the University of Newcastle

Growing up in rural Thailand, Ngamta "Natalie" Thamwattana had no idea she'd one day become a world-leading researcher. Her mother was a dressmaker and her father was a policeman. They encouraged her to study and attend university.

Natalie completed a science degree with First-Class Honours in Mathematics at Mahidol University in Bangkok, and completed her PhD at the University of Wollongong.

She is now a professor in applied mathematics at the University of Newcastle and has won several awards for her research. One area of research she is well-known for is looking at how we could build molecule-sized structures to deliver drugs into the human body.

Natalie loves looking at the world through the lens of maths, whether it's drug delivery using nanotechnology or how bulk materials, such as coal, flow out of a silo. "I believe that every kind of problem can be looked at using mathematics," she says.

As the first in her family to go on to higher education, Natalie understands how difficult this can be for students in similar situations. "It's important to find a network of friends, and talk to your teacher," she advises. "We are under-utilised by our students." – *Chloe Walker*

BACHELOR OF SCIENCE / MATHEMATICS (HONOURS), MAHIDOL UNIVERSITY, THAILAND >> PHD IN APPLIED MATHEMATICS, UNIVERSITY OF WOLLONGONG >> POST-DOCTORAL FELLOW, UNIVERSITY OF WOLLONGONG >> PROFESSOR, UNIVERSITY OF WOLLONGONG >> PROFESSOR, UNIVERSITY OF NEWCASTLE

BE ONE OF A KIND

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The University of Newcastle offers one of the few specialised mathematics degree programs available in Australia.

You can study a Bachelor of Mathematics, or our new Bachelor of Mathematics (Advanced).

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- Pure Mathematics
- Applied Mathematics
- Statistics
- Studies in Mathematics and Statistics

Michela Skipp
B. Mathematics / B. Science
Ma & Morley Scholar, 2020

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2020 1003 CRICOS Provider 00109J

5 STEM CAREERS IN PUBLIC HEALTH

CSIRO scientists are working on developing a vaccine for COVID-19, which would save hundreds of thousands of lives

Sometimes it takes a pandemic to remind us just how life-saving maths + health gigs can be

1 VACCINE SCIENTIST

One of the most important careers in the world right now is that of a vaccine scientist. On their to-do list? Preventing or curing diseases by developing, trialling and executing effective immunisation programs.

Skills: Advanced knowledge of maths, cellular biology, biochemistry and microbiology is essential.

Study: Bachelor of Science (Medical Science), University of Sydney

2 EPIDEMIOLOGIST

Health careers are often associated with stethoscopes and scrubs, but there are office-based medical roles that also save lives. During a pandemic, epidemiologists collect, dissect and summarise data – uncovering life-saving insights.

Skills: Seen those #flattenthecurve infographics? They're a visual example of how an epidemiologist's maths, stats and science skills can predict and illustrate alarming health trends.

Study: Master of Clinical Epidemiology, University of Newcastle

3 MEDICAL LAB TECHNICIAN

These STEM pros work alongside physicians in hospitals, general practices, private clinics and research labs, carrying out tests to diagnose and treat patients. An average day might involve collecting blood samples, performing blood counts, carrying out tests to determine blood type and analysing fluids.

Skills: A strong medical science background coupled with people skills are pretty standard prerequisites. Maths is key when performing tests – like blood count breakdowns – and when issuing dosages and prescriptions.

Study: Graduate Diploma of Science, James Cook University

4 BIOSTATISTICIAN

Biostatisticians fuse science and statistics, dividing their time between designing experiments and dissecting data. In this case of COVID-19 their research is behind the social distancing and travel limiting laws.

Skills: Stats, maths, biology and research brains.

Study: Master of Biostatistics, University of Melbourne

5 INFECTIOUS DISEASE PHYSICIAN

Infectious disease physicians primarily treate patients with rare and difficult-to-diagnose illnesses. During a pandemic they test as many suspected carriers as possible, interpret test results and medically manage the patient.

Skills: As well as biology, advanced maths is a serious plus.

Study: Master of Infectious Diseases, University of Western Australia – *Cassie Steel*

Stay social

Check out these global health experts on socials keeping us up to speed on everything COVID-19

- Ellie Murray, Epidemiologist, @EpiEllie
- Dr Ian Mackay, Virologist, @MackayIM
- Dr Tara C. Smith, Infectious Disease Epidemiologist, @aetiology
- Follow #CelebrateDoctors and #HappyAtHome on TikTok
- And check out @infobeautiful on Insta for all your COVID-19 graph needs

SHUTTERSTOCK

On trend

Ashley Chang's skills in maths and data analytics and his nose for cultural trends is the perfect fit at YouTube

As a culture and trends manager at YouTube, Ashley Chang gets to watch videos at work – yep, it's a job requirement. For the past year, he's been building a team across the Asia Pacific region to dig into the data and gain an understanding of pop culture through trends in the videos people are watching and making.

"You gain a greater insight into who we are as people," he says, adding that this is useful to determine how YouTube shapes and reflects culture.

Ashley describes himself as an "internet anthropologist" – sifting through information to find clues about how people interact and what they value.

Dream ride

Maths and data are central to Ashley's role, but his journey started with a double degree in journalism and business at Queensland University of Technology, before eventually landing a role at the then-newly established media outlet Pedestrian TV.

Ashley was the third employee hired, and says his role grew as the business did. He was eventually headhunted by the ABC to work as an editor for their iview platform, and moved on to become the social media lead at ABC TV. Then, a couple of years ago, Ashley landed his current role at YouTube, which he says turned out to be his dream job.

Ashley recommends that people aspiring to work in social media shouldn't undervalue what they can bring to an organisation. "Be willing to evolve and upskill, do things that will be hard for you," he says.

What's the story?

Ashley explains that most social media roles are around understanding data analytics – separating signals from noise to see which trends are important. "It's amazing what you can see in data, and data doesn't lie. It's up to you to draw the right insights," he says.

Around 50 per cent of Ashley's role is managing trends and culture for the Australian part of the YouTube platform, and the other half is helping other countries in the Pacific region identify significant viewing patterns.

"It's dividing the forest from the trees – which trends tell a story? How do we use these stories to achieve business goals and understand how YouTube is perceived?" he says.

Maths adds value

Although Ashley didn't go on to do a maths or science degree, he studied three-unit maths at high school.

For careers in the social and digital media space, Ashley says a good grounding in maths can help you interpret data to find stories about how people are using information, what those stories mean for society and how they affect organisations.

While a knack for numbers is a huge value-add, Ashley recommends that people looking to follow a similar career path also build skills in weaving them into stories that mean something to their audience.

"The volume of data is increasing exponentially. The value that current students will provide is being able to manage the systems that collect the data and interpret it in a way that machines never could," he says. – *Nadine Cranenburgh*

YOUTUBE CULTURE + TRENDS LEAD, APAC

SENIOR SOCIAL MEDIA PRODUCER, ABC TELEVISION

EXECUTIVE MBA, UTS

EDITOR-IN-CHIEF PEDESTRIAN.TV

BACHELOR OF JOURNALISM/ BACHELOR OF BUSINESS, QUT

START YOUR CAREER HERE

MATH+DATA+ SOCIAL MEDIA STUDY

Bachelor of Business Information Systems / Bachelor of Business (major in Data Analytics), Swinburne University

Bachelor of Communication (Digital and Social Media), University of Technology Sydney

Bachelor of Science (Data Science Major), Curtin University

MATH+DATA+ SOCIAL MEDIA JOBS

Social media manager: $44K–$82K

Social media strategist: $48K–$117K

Online marketing manager: $45K–$100K*

*Source: salaries according to payscale.com

"BE WILLING TO EVOLVE AND UPSKILL. DO THINGS THAT WILL BE HARD FOR YOU"

ASHLEY CHANG CULTURE AND TRENDS MANAGER

Choose this career if you:

> Live and breathe social media
> Know what's trending on socials RN
> Don't mind some maths, data and coding
> Like writing and comms

Ash's team has used viewing data to create a whole website looking back on the YouTube moments that defined 2019. **Check it out at rewind.youtube**

SHUTTERSTOCK

Run the numbers

3D skeletons, Formula 1 sailing boats and high-tech bikes – welcome to the sports data revolution

Ever wondered how our Aussie Olympians get the edge on the opposition? Sure, it's eating the right food, training hard and having a killer attitude, but now they have a new weapon: data analytics.

Sports science has changed massively in just a few years thanks to hundreds of millions of data records. This sports data revolution is creating a big demand for maths, stats and data scientists to help Australia stay on the top of the Olympic podium.

Stuart Morgan, head of analytics at the Australian Institute of Sport (AIS), says what the organisation needs is "people who understand sport, but it's those crucial data science skills and capabilities that will make their career in sports science right now".

Smooth sailing: Sailing is known sometimes as the 'Formula 1 of aquatic sports' because of its tech-driven approach to performance. Olympic yachts are rigged up with sensors measuring everything from humidity to hull strength. Wave after wave of data has to be interpreted in real-time.

(Don't) break a leg

Triathlon Australia uses data to protect athletes from injury

One recent successful sports data project has been with triathlons – an Olympic sport that includes running, swimming and cycling.

Triathlon Australia hired an athlete health specialist in 2018 to monitor health and training data and conduct daily surveys with athletes. Wade Hobbs, data analyst at Triathlon Australia, says that "injuries in triathletes who have been part of this athlete health system have plummeted".

"Bone stress injuries, which represent the highest cost in terms of training and competition time lost, have been reduced by 72%, so it's been a real win," he says.

WADE HOBBS
DATA ANALYST

TRIATHLON AUSTRALIA / ACT ACADEMY OF SPORT / SHUTTERSTOCK

START YOUR CAREER HERE

MATHS+DATA +SPORTS STUDY

Bachelor of Sport and Exercise Science, University of Canberra

Bachelor of Biomedical Science/Bachelor of Mathematics, Queensland University of Technology

Bachelor of Mathematics and Statistics, University of Western Australia

Master of Sport Analytics, La Trobe University

MATHS+DATA +SPORTS JOBS

Data analyst: $51K–$107K

Data scientist: $63K–$132K

Exercise physiologist: $47K–$73K*

*Source: salaries according to payscale.com

Teamwork with robots

Artificial Intelligence (AI) is emerging as a key tool in sports science

"The real battleground now is AI," says Stuart, "and the people doing this work are largely computer scientists who are providing us with algorithms that we can use to monitor and improve performance."

"We're building AI algorithms that can interpret what athletes are doing just from broadcast vision," explains Stuart, who also leads AIS's Computer Vision and Machine Learning group. "Our objective is to help our athletes but also to understand more about our opponents than they understand about themselves."

> **"OUR OBJECTIVE IS TO HELP OUR ATHLETES BUT ALSO TO UNDERSTAND MORE ABOUT OUR OPPONENTS THAN THEY UNDERSTAND ABOUT THEMSELVES."**
> ***STUART MORGAN, HEAD OF ANALYTICS, THE AUSTRALIAN INSTITUTE OF SPORT***

BRAINS AND BRAWN

CARA GRZESKOWIAK IS A DATA ANALYST AND CHAMPION ROWER HELPING ATHLETES IMPROVE THEIR PERFORMANCE

When she's not being a rowing champ, Cara Grzeskowiak works as a data analyst for the AIS's national Athlete Management System (AMS).

Between stints representing Australia in rowing – including a bronze medal at the 2019 World Rowing Cup – Cara completed a degree in Science and Economics (Maths major, Applied Statistics minor) at the Australian National University (ANU) in Canberra. She explains that her current role is "mainly about giving athletes useable data to improve performance standards".

"Since AMS launched, the data has grown exponentially and we have now recorded more than 1.5 million training sessions covering 42 sports," she says. The big challenge – and where Cara and her colleagues use their STEM skills the most – is what they do with this mass of data.

"Runners might need pace information but rowers might need distance or loading rowed stats, so we're working out what data is available and how we get the data into formats that people can use to improve training." – *Matthew Brace*

BACHELOR OF SCIENCE/BACHELOR OF ECONOMICS, ANU >> AMS OFFICER, ACT ACADEMY OF SPORT >> DATA ANALYST, AUSTRALIAN INSTITUTE OF SPORT

2019 AUSTRALIAN REPRESENTATIVE, WOMEN'S QUAD, WORLD ROWING CHAMPIONSHIPS >> 2019 AUSTRALIAN ROWING CHAMPIONSHIPS

Bricks and data

Mix IT with design skills to create better spaces

Information technology, engineering and design are merging into new and exciting career areas improving our cities and communities.

Data from cities, people, the environment and buildings are being combined in new ways that allow us to build whole 'digital twins' of urban space.

"Using data, we can visualise the changes in the area and to understand how a city is growing or changing and make sure we are not compromising the environment, society or the economy," says Dr Soheil Sabri, research fellow and senior project manager, Urban Analytics Data Infrastructure at the University of Melbourne.

Choose this career if you:

> Love coding, maths and data
> Are interested in helping to protect the environment
> Get excited about art, design and interactivity
> Want to improve access for people with disabilities
> Would like to design better urban spaces

START YOUR CAREER HERE

MATHS+DATA +SMART SPACES STUDY

Bachelor of City Planning, UNSW
Bachelor of Urban Design and Town Planning, University of Sunshine Coast
Bachelor of Design, University of Melbourne
Bachelor of Geospatial Science, RMIT
Diploma of Sustainable Practice, TAFE NSW

MATHS+DATA +SMART SPACES JOBS

Urban Designer: $53K–$101K
Environmental Planner: $50K–$107K
Geospatial Analyst: $55K–$126K*
*Source: salaries according to payscale.com

Digital twins

Soheil studied urban and regional planning, before living in Asia and developing analytical tools to measure livability. He's now at the University of Melbourne, working on the Fishermans Bend 'digital twin' project in collaboration with Land Use Victoria. Fishermans Bend is Australia's biggest urban redevelopment and will house 80,000 people and create 80,000 jobs by 2050.

Digital twins are replicas of physical areas in the digital space. They combine Artificial Intelligence, virtual reality and real-time data with 2D and 3D engineering data and geospatial data (like Google Maps) to reflect the current reality and allow people to better understand the consequences of decisions. This could be as simple as a person deciding how to get from A to B, or governments looking to understand the environmental or social impact of their policy decisions.

"You can look at the area over time, in peak hour, or if you're using different types of public transport, for example," says Prof Abbas Rajabifard, who leads the research and development of the Fishermans Bend 'digital twin' project. "If we can visualise the effect our decision makes, it lets us make better informed decisions." – *Heather Catchpole*

3D printing is helping people who plan urban spaces understand the physical space around them and make decisions based on visual evidence #handy

SHUTTERSTOCK

Typical tasks

- Work with industry to manage water and waste.
- Collaborate with a variety of people across government, business and community.
- Visualise and describe futuristic buildings, parks and workplaces.
- Design innovative urban spaces.

- Help to shape healthy and equitable spaces for people to work and live in.
- Prevent and mitigate the impacts of climate change.
- Measure, provide and analyse environmental and land use data.

SOFTWARE ENGINEER, GOOGLE

SOFTWARE ENGINEER, CONNECT.COM.AU

SYSTEMS ADMINISTRATOR, AUSTRALIAN ARTIFICIAL INTELLIGENCE INSTITUTE

ROBOTICS AND DIGITAL TECHNOLOGY, CHISHOLM INSTITUTE

REAL-TIME RISK

ANTHONY BAXTER WORKS ON GOOGLE'S CRISIS RESPONSE TEAM

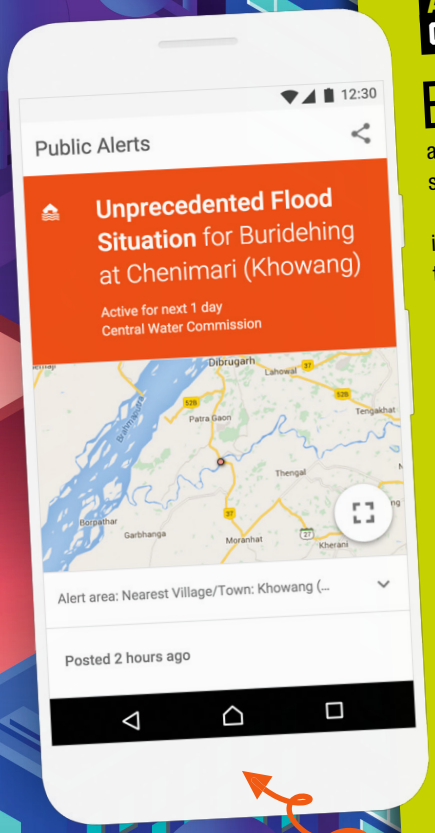
Every month more than a billion people use Google Maps services, mostly to find their way from A to B. But during natural disasters, the platform can also pull together trusted data from emergency service authorities to show the spread of a bushfire, or the track of a typhoon.

Anthony Baxter started working with the Google Crisis Response team back in the Black Saturday bushfires in Victoria in 2009, which killed 173 people. In the most recent 2019-20 bushfire season, he worked with a Google team to provide SOS alerts for areas impacted by the bushfires. The alerts provide the most up-to-date data from emergency service authorities on the severity of the fires, as well as visuals of the fire spread.

The Google team works with various agencies such as the Rural Fire Service to help craft the messages on the SOS alerts, so the best possible information gets out to the audience. Anthony explains how his team has to curate the emergency services data used for the alerts. "You need to think about what the data shows and whether it might be confusing, misleading or out of date. It's really vital to have these experts who know what they are talking about."

Day-to-day Anthony also works on the Android version of Google Maps, but there's heaps of other things he does in his work life, from helping out crisis agencies during times of natural disasters, to working with user interface designers to improve the way we use Google Maps on our phones.

"It's not just sitting at your desk coding with headphones!" says Anthony. "I'm working with people all across the organisation." – *Heather Catchpole*



> "YOU NEED TO THINK ABOUT WHAT THE DATA SHOWS AND IF IT MIGHT BE CONFUSING"

Do maths like a tradie

Think that if you're a budding tradesperson, dropping maths is no big deal? In actual fact, hands-on trades use numbers a lot more than you'd think

Trade gigs are often associated with tools, trucks and loads of physical labour, but there's a stack of basic maths skills involved in almost every type of maintenance, repair and construction role. From calculating quantities and determining floorspace ratios to ordering materials and converting measurements, most tradespeople rely on an advanced knowledge of numbers – something that sticking with high school maths can seriously help solidify.

Here, we look at how algebra, trig and basic area skills are just as important to a successful tradie's toolkit as a fancy drill. – *Cassie Steel*

Nope, it's not all meat pies and iced coffees. 80% of construction workers BYO their lunch to work

START YOUR CAREER HERE

MATHS+DATA +TRADES STUDY

Certificate III in Electrotechnology Electrician, Swinburne University of Technology

Certificate III in Bricklaying, TAFE NSW

Diploma of Building and Construction, Open Colleges

MATHS+DATA +TRADES JOBS

Electrician: $45K– $100K

Builder: $46K–$139K

Plumber: $41K–$91K*

*Source: salaries according to payscale.com

JOBS THAT COUNT

... LITERALLY. WE MATCH UP POPULAR TRADES WITH THEIR MATHS-BASED TOOLKITS

#1

THE JOB:

ELECTRICIAN

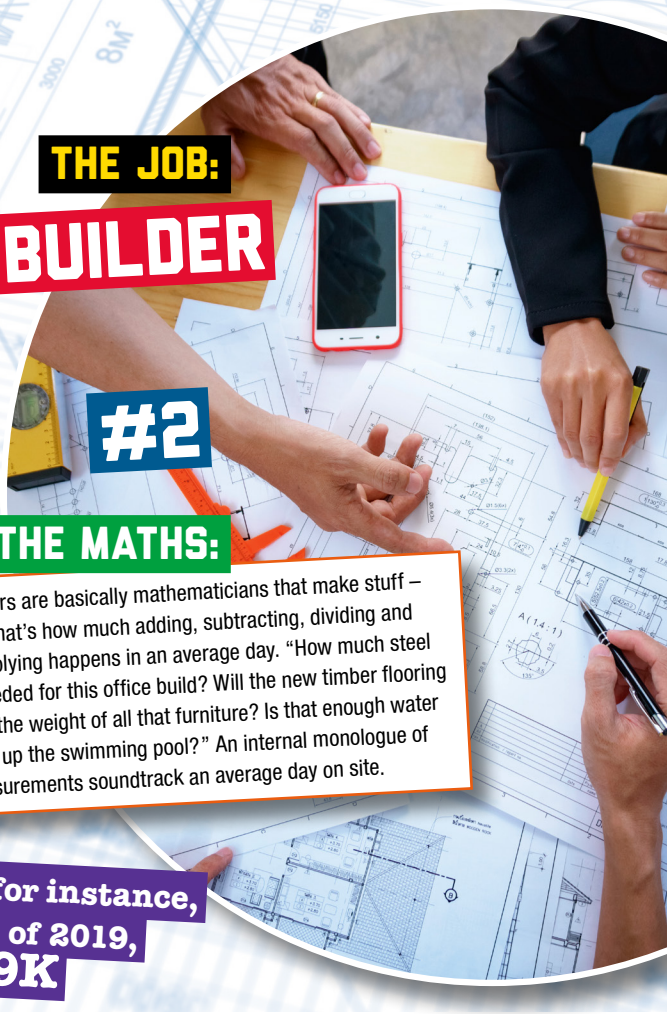
THE MATHS:

Apart from all the basic stuff – addition, subtraction, multiplication and division – electricians regularly use fractions, percentages and decimals when working out things like room dimensions, wiring lengths, watt to kilowatt conversions and load calculations. Ohm's Law (voltage = current x resistance) is a go-to equation when studying electrical circuits, and trigonometry comes in handy when figuring out the correct angle to bend a section of protective tubing.

THE JOB:

BUILDER

#2



THE MATHS:

Builders are basically mathematicians that make stuff – yep, that's how much adding, subtracting, dividing and multiplying happens in an average day. "How much steel is needed for this office build? Will the new timber flooring bear the weight of all that furniture? Is that enough water to fill up the swimming pool?" An internal monologue of measurements soundtrack an average day on site.

Tradies can get paid a lot. Boilermakers for instance, were the highest-paying trade professionals of 2019, with an average annual salary of $109K

SHUTTERSTOCK

THE JOB:

TILER

#3

THE MATHS:

Maths meets art and construction in a process that is literally all about being accurate, correct and symmetrical. Like a hypothetical problem out of a geometry textbook, a tiler regularly faces the challenge of calculating how many 2D objects (tiles) will fit into a particular space (a floor). Visualisation, spatial reasoning and geometric modelling along with an advanced understanding of the units, systems and processes of measurement are pretty standard prerequisites.

Among the top 10 most in-demand trades roles are cabinet makers, welders, plasterers and bricklayers

THE JOB:

CONCRETER

#4

THE MATHS:

Figuring out how much mixture is needed for a pour may seem like simple multiplication, but for a concreter there are some seriously complex area and volume formulas that go into each and every job. Sure, length x width x thickness = volume, but when things aren't rectangular – which they very rarely are – the gig calls for some pretty advanced geometry.

TRADIEGRAM

@LIFE_OF_A_MAINTENANCE_PLUMBER JOHN KOSTA HAS MORE THAN 37K INSTAGRAM FOLLOWERS

We DM'd an insta-famous plumber and asked him a bunch of questions.

Was plumbing something you always wanted to do? 😀

No! After finishing high school, I actually enrolled in an Advanced Diploma of Business Marketing, but realised that working in an office wasn't for me. Luckily, my brother was a plumber and I thought I'd try it out as it was more hands-on. 😜

What's an average day like?

So different! I can be doing anything from fixing people's taps to unblocking drains and installing gas heaters.

Did you enjoy maths in high school?

TBH I actually wasn't a big fan of it because I didn't think it was going to help me when I left school. I soon learnt though that [in plumbing] we use it daily!

Are there any maths lessons you wish you paid more attention to?

If I could go back in time I would have listened more in measurement and geometry classes. 😐 🙂

What kind of maths do you use on-the-job?

Everything! From working out volumes of material and calculating flow rates of gas appliances to size pipe work and basic accounting and invoicing. Some of the topics that I use and apply are a mix of all four operations (addition, subtraction, division and multiplication), algebra (definitely didn't think I would be using that) and geometry.

Any advice for wannabe plumbers?

Listen, ask lots of questions and show initiative – especially when trying to impress your boss.

You're insta-famous! How did you get so many followers? 😅

I started my account when I saw an opportunity to show people what plumbers like me get up to each day. At the time, no-one else was doing it on Instagram and I'd share video snippets of various jobs, no matter how small.

My followers just grew over time and people really enjoyed the videos I posted, especially the gory ones – unblocking toilets and, pulling hairs out of drains! 😂 💩 😜

LICENSED PLUMBER

CERTIFICATE IV IN PLUMBING

CERTIFICATE III IN PLUMBING (INCLUDING A FOUR-YEAR APPRENTICESHIP)

ADVANCED DIPLOMA OF BUSINESS MARKETING, TAFE

NOW TRENDING

Keen to keep up-to-date on all things STEM outside of the classroom? We've hunted down a bunch of stuff you should be liking, watching, reading and downloading

Watch.

Scientists on TikTok

LOLing along to your mate lip-syncing *The Lion King* while they wash up is awesome and all, but so are gene expressions explained via Nicki Minaj memes. Hit up anything tagged #tiktokscience and consider it homework.

Read.

'Ready, Set, Code!' CSIRO Publishing, $29.99

Keen to get clued up on coding minus snoozy theory and epic explanations? Packed with step-by-step instructions on how to master Scratch programming and easy-to-ace app-building tools, you'll be talking tech before you even apply for uni.

Pin.

Infographics

There's more to Pinterest than bed linen and house plants. Search 'infographics' and get hit with some cool visual analytics. Yeah maths!

Like.

NASA on Facebook

Career inspo + live streams + out-of-this world satellite images = A+ Facebook content. Warning: you may get the urge to study astrophysics!

Tag.

... us on socials! @careerswithstem

A tropical island, your bedroom or the back of the school bus? Show us where you're reading the mag and we'll give a double tap.

Follow.

@girlsinstemtoolkit on Instagram

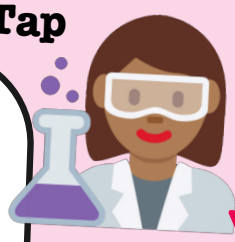
If inspiring women killing it in STEM careers is your thing, follow the GiST on the 'gram.

Download.

Citizen science apps

Gift your bee/bug/slug/shrub sightings to the science-verse so they can keep track of what is – and isn't – thriving in your area. There are loads of apps that allow you to upload images and info on any plant and animal species you come across. Try Frog ID, iNaturalist and OzAtlas.

Double Tap



Scientist emojis

Civil engineers that don't wear high vis

STEM pros on reality TV

Only applying for uni cos you think you have to. Spoiler: look into VET

Bad cybersecurity stock images. Why hoodies?

Having to defend your choice to major in maths. There are SO many jobs

Parents on social media

Choosing electives (Too. Many. Options.)

Group chats in code

Careers with STEM on socials

Citizen science

Unfollow

Listen.

'Her STEM Story', iTunes, free

Dedicated to sharing career stories from minorities in STEM, host Prasha also touches on "life" topics.

Shop.

'Under the Stars' merch, redbubble.com/people/lisaharveysmith/shop

Astrophysicist and Women in STEM ambassador Dr Lisa Harvey-Smith has released a line of awesome STEM merch, perfect for stargazers! – *Cassie Steel*

SHUTTERSTOCK

DISCOVER YOUR DREAM JOB USING MATHS & DATA

MATCH MATHS AND DATA WITH YOUR PASSION TO FIND YOUR PERFECT CAREER

MATHS+DATA+...

CLIMATE – EXTREME WEATHER, BUSHFIRES, METEOROLOGY, ENVIRONMENT

PAGE 12

QUT
>> Science (Earth Science)/Mathematics (Applied and Computational Mathematics)
>> Science (Physics)/Mathematics (Statistics)

University of Adelaide
>> Mathematical Sciences
>> Mathematical and Computer Sciences
>> Engineering (Environmental) (Renewable Energy)

University of Canberra
>> Science (Mathematics)

University of Melbourne
>> Science (Climate and Weather)
>> Science (Mathematical Physics)

University of Newcastle
>> Mathematics (Applied Mathematics)/Science (Earth Science)

University of Western Australia
>> Science (Mathematics and Statistics)

University of Wollongong
>> Mathematics

HEALTH – DATA SCIENCE, PUBLIC HEALTH, MEDICINE, HEALTHCARE

PAGE 16

Curtin University
>> Science (Exercise and Sport Science)
>> Science (Health Sciences)
>> Science (Health Promotion)

QUT
>> Biomedical Science/Mathematics (Operations Research)

University of Adelaide
>> Mathematical Sciences
>> Engineering (Electrical and Electronic) (Medical Technologies)
>> Engineering (Chemical) (Pharmaceutical Engineering)

University of Newcastle
>> Environmental and Occupational Health and Safety

University of Tasmania
>> Diploma of Dementia Care
>> Ageing and Dementia Studies

SOCIAL MEDIA – STATISTICS, TRENDS, MARKETING, DATA ANALYSIS

PAGE 19

Griffith University
>> Creative and Interactive Media/Bachelor of Business

Monash University
>> Media Communication/Bachelor of Marketing

QUT
>> Business (Marketing)/Mathematics (Statistics)
>> Games and Interactive Environments (Software Technologies)/Mathematics (Operations Research)

University of Adelaide
>> Mathematical Sciences
>> Mathematical and Computer Sciences
>> Computer Science

University of Newcastle
>> Graduate Certificate in Marketing

Did you know all these careers are basically fancy names for **mathematician**? Data Analyst, Data Scientist, Actuary, Statistician, Cryptographer

People with maths and data skills have been crucial to our understanding and management of the COVID-19 pandemic. **See P4 and P18**

SHUTTERSTOCK

SPORTS – SPORTS SCIENCE, ATHLETE PERFORMANCE, DATA ANALYTICS,

PAGE 20

QUT
>> Mathematics (Statistics)
>> Graduate Certificate of Data Analytics

University of Adelaide
>> Engineering (Mechanical) (Sports Engineering)
>> Mathematical Sciences
>> Engineering (Mechanical) (Medical Technologies)

University of Newcastle
>> Exercise and Sports Science

University of NSW
>> Data Science and Decisions

University of Southern Queensland
>> Science (Statistics)

Charles Darwin University
>> Graduate Certificate of Data Science

SMART SPACES – DESIGN, ARCHITECTURE, LIVEABILITY, SUSTAINABILITY

PAGE 22

University of Adelaide
>> Architectural Design
>> Engineering (Architectural and Structural)
>> Engineering (Civil))

University of Newcastle
>> Graduate Certificate in Data Science (online)

QUT
>> Engineering (Civil Engineering)/Mathematics (Operations Research)

UNSW
>> Engineering (Urban Design)

Charles Darwin University
>> Engineering (Civil Engineering)

DON'T FORGET VET!

>> Advanced Diploma of Marketing and Communication - **TAFE NSW**

>> Bachelor of Health Science (Dance) - **ACPE**

>> Certificate III in Data and Voice Communications - **Australian Trade Training College**

>> Certificate III in Surveying and Spatial Information Services - **TAFE NSW**

>> Certificate III in Indigenous Environmental Health - **TAFE Queensland**

>> Diploma of Social Media Marketing - **Transformed Pty Ltd**

>> Graduate Diploma in Data Science (Applied) - **University of Adelaide**

Still not sure which area of maths is for you? Take our ultimate maths career quiz to find out! Visit **careerswithstem.com/maths-careers-quiz**

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