We are more than numbers

CHOOSEMATHS

AN AMSI SCHOOLS PROJECT












CHOOSE**MATHS**

AN **AMSI** SCHOOLS PROJECT

The Australian Mathematical Sciences Institute (AMSI) and the BHP Billiton Foundation aim to empower Australian students to pursue mathematics through their five-year national project CHOOSE**MATHS**. The program aims to turn around public perception of mathematics and will contribute to the health of the mathematics pipeline in Australia from school through university and out to industry and the workplace.

The program works with students, parents and teachers to turn around community attitude and participation of mathematics and statistics as a career choice, especially for girls and young women.

DELIVERED BY AMSI

SUPPORTED BY bhpbilliton Foundation

Maths is the basis of lots of jobs like engineering, finance, medical research and all areas of science. In the following pages you will meet mathematically capable professionals who made the choice to study maths and have gone on to use it in their work on a daily basis.

These people are interested in the world around them, passionate about finding solutions and creating a better world. And they all CHOOSE**MATHS**.

Charles Gray

If I can get this far, then it would be fair to say that any girl possessed with a fascination of mathematics can as well. I think my life has proven anything is possible.

I was only in Year 8 when I left home and dropped out of school. After a few years on the streets, I realised education was my gateway to the stability I craved. In the end my Year 12 results surprised even me. Asked what I'd like to do next, I responded "mathematics". I was quickly told it was a silly idea and I wasn't smart enough. I don't think I am unique in this experience. I first entered the University of Melbourne intent on helping others through social work, but instead ended up drawn to music's mathematical axioms and a musicology degree. While I loved many things about music, and still do, surviving from gig to gig and through piano teaching was very uncertain.

I was inspired to return to my maths dream after watching my housemate complete her physics degree in her thirties. I remember thinking, well if she can, I can. It has been a lot of work but maths has given me a wonderful sense of community, a chance to be part of something bigger and a platform to make a difference for others. Initially I studied pure mathematics but decided to transition to mathematical statistics for my PhD. I am in love with my field. On any given day I could be working on code, deriving mathematical equations, creating interactive simulations or discovering data visualisation.

We need role models at every level, I want to share this magical world of numbers that I've discovered. I want everyone to know that you can solve the problems of today and tomorrow while doing something endlessly fun and exquisitely beautiful.

The study and practice of mathematics is more creative than I ever thought was possible.

A FORMER MUSICIAN AND A PASSIONATE ADVOCATE FOR WOMEN IN SCIENCE, CHARLES IS CURRENTLY COMPLETING A PhD AT LA TROBE UNIVERSITY WITH A FOCUS ON MATHEMATICAL STATISTICS. ■

KARIN DITCHFIELD

While I am originally from Brazil, my childhood spanned many countries as my family was often on the move. Looking back now I can see the gifts of this experience but at the time it was a challenge. It was hard learning new languages, adapting to new cultures and making new friends. Differences between education systems posed challenges in some subjects, but not maths. It was constant. Equations and numbers are always the same in every language, so it was something I was always drawn towards.

On finishing school, I moved to London to study mathematics and economics. These skills have become a foundation to an international career that has opened many opportunities and challenges. After university I joined BHP Billiton's London team and three years ago had the opportunity to transfer to Melbourne, Australia.

I am a Specialist in BHP Billiton's Portfolio Strategy and Development team. My team considers business development opportunities, acquisitions and divestments. In simple terms, we look at buying or selling new mines or companies in the mining sector. We ensure that BHP Billiton has the right mix of assets to optimise its long-term portfolio. My team is involved in large, complex, strategic projects, which makes it an exciting job. I work on many different projects so every day is different and unique. I could never get bored, which is what I love about it.

A universal language, maths has allowed me to travel the world. I have met amazing people and seen extraordinary places as well as learned to have an open mind and view the world from different perspectives.

It's hard to know exactly what career you want to pursue straight after school. Often the career you think you might want now might not be what you're doing in 10 years so choose a variety of subjects that you can apply to all sorts of career pathways. The best thing you can do is arm yourself with the skills you will need for a global, fast-paced world – maths does that.

KARIN DITCHFIELD HAS A BACHELOR OF MATHEMATICS WITH ECONOMICS FROM UNIVERSITY COLLEGE LONDON. SHE IS A SPECIALIST IN THE PORTFOLIO STRATEGY AND DEVELOPMENT TEAM AT BHP BILLITON. ■

AUSTRALIA IS ALREADY A GLOBAL LEADER IN SCIENCE. IMAGINE WHAT WE COULD ACHIEVE IF **WOMEN** & MEN **FELT EQUALLY WELCOMED** & APPRECIATED **IN STEM PROFESSIONS.**

DR ALAN FINKEL

AUSTRALIA'S CHIEF SCIENTIST - 2016

The Unrecognised potential of Women

CHOOSE**MATHS**.ORG.AU

ALLY WATSON

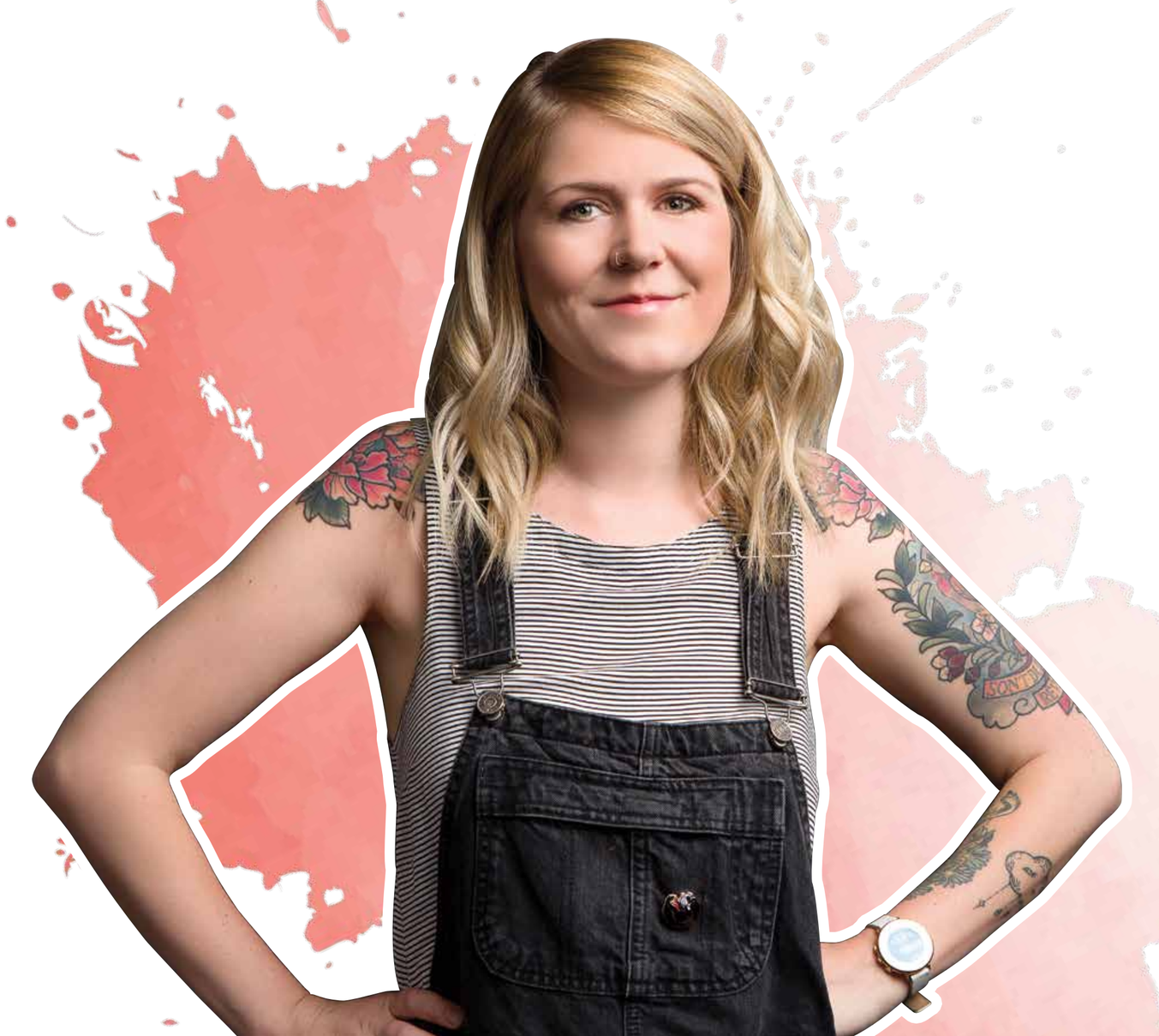
Growing up in Airdrie, Scotland, I was surrounded by women with three older sisters and a single mother. In high school my big dream was to get into art school. However, after two years of consecutive rejections I decided I had to abandon art and give something else a go. In a dramatic change I enrolled in computer science at Glasgow University. At this point my only exposure to programming was sprucing up my MySpace page.

After six months I was hooked. Studying interactive systems, my creative side became a real strength. I realised humans play a huge part in programming. There's so much psychology involved, from picking a particular button to choosing layouts, the design element is crucial to the user experience. I became inspired by this marriage of creativity and science as well as the intellectual excitement of computer science.

By day I work on creative online projects, coding websites for a Melbourne digital agency. My evenings and weekends are devoted to 'Code Like a Girl', which provides girls with the support, tools and knowledge to enter and flourish in the world of coding. Founded in 2015, 'Code Like a Girl' designs and hosts targeted tech events and coding workshops. These roles really complement one another as working in the industry keeps me up-to-date with the latest technologies, knowledge and experience which is reflected in our cutting edge workshops and events.

First and foremost mathematics is about problem solving, this makes it a great foundation for budding programmers. Most ordinary problems can be recast as mathematical and solved using a computer. Different areas of programming have a varying degree of mathematics involved. Working as a web developer touches on basic maths such as using equations and formulas, but more complex areas of programming like artificial intelligence and machine learning require a much deeper mathematical understanding. That's why maths is great for everyone, no matter what your skill level.

FOUNDER OF CODE LIKE A GIRL, ALLY WATSON ALSO WORKS FOR MELBOURNE DIGITAL AGENCY DEEPEND. ALLY HAS A DEGREE IN COMPUTER SCIENCE FROM GLASGOW UNIVERSITY IN SCOTLAND. ■



Lyndal Henden

When I was about 15 I wanted to be a weather reporter. To do this, I was told I would need to become a meteorologist, which meant studying maths at university. From then on that was my goal.

One of the hardest things I've done is complete my Bachelor of Science majoring in mathematics and statistics. I almost dropped out in first year because I didn't think I was smart enough. Initially, I struggled with the work and really didn't think I could do it. If it weren't for a lot of encouragement and 'sticking with it' I wouldn't be doing what I'm doing today.

As I progressed though university I discovered a world of new things that interested me, particularly medical data. Weather reporting quickly gave way to a new way of helping people and I decided to study a PhD at a medical research institute.

My research focuses on finding relatedness between people. Using an algorithm I developed, I have created a software tool to determine if two individuals are related to each other. It has a number of applications, including verifying the identity of people's relatives. Most importantly, we are able to find regions of the genome inherited from the same ancestor that might contain disease-causing mutations that run in families. For example by finding relatedness between four Italian families with epilepsy, we have narrowed where to look for the epilepsy-causing mutation in their genomes. I'm hoping one day my work may help scientists develop a cure or stop the genome in its tracks for future generations.

I was never the best maths student or the quickest to get the answer, but I enjoyed it and pushed myself. My advice would be to work hard! If you really want something, you'll surprise yourself with how far a bit of hard work and passion can get you.

HAVING COMPLETED A BACHELOR OF SCIENCE (HONOURS) MAJORING IN MATHEMATICS AND STATISTICS AT MASSEY UNIVERSITY, NEW ZEALAND, LYNDAL IS CURRENTLY RESEARCHING HER PhD AT THE WALTER AND ELIZA HALL INSTITUTE OF MEDICAL RESEARCH. ■

Future Jobs

CHOOSE**MATHS**.ORG.AU

PRICEWATERHOUSECOOPERS
A SMART MOVE: *FUTURE-PROOFING AUSTRALIA'S WORKFORCE BY GROWING SKILLS IN STEM* - APRIL 2015

75

PER CENT

OF THE WORLD'S - FASTEST - GROWING JOBS WILL REQUIRE

STEM SKILLS

KYLIE HOLLINS

Being born and raised in Fremantle, the beach and outdoors were a big part of my childhood. One day I saw a careers poster on the wall of a classroom that had a photo of a marine scientist. I couldn't believe a job existed that would combine my passion for maths and science with my love of the ocean. That was the moment I knew exactly what I wanted to do.

After high school I studied marine science, zoology and mathematics. After several years as a marine scientist, I wanted to learn even more about mathematics. Working part-time, I completed a PhD in advanced analytics and modelling. My PhD is one of my biggest achievements. It was equally about deep learning in maths and science and working hard, having passion and digging deep to really show what I could do. It taught me how to apply data to solve environmental problems. Using advanced analytics, my research aimed to understand if marine protected areas were big enough to help protect fish from overfishing, and to detect significant environmental impacts on coral resulting from dredging for oil and gas development.

Currently, I work at BHP Billiton for the Remote Operations Centre. New technologies allow us the flexibility to operate some mine site activities via remote control systems from our control centre in the Perth CBD. Our on-site operators mine the iron ore and my team digitally mines the data to analyse and report on how our company can improve.

Every day brings a new challenge, the road has never been easy, but that's because the most rewarding things are often at the end of the most challenging paths.

DR KYLIE HOLLINS HAS A PhD IN ADVANCED ANALYTICS AND MODELLING. SHE IS THE SUPERINTENDENT, INTEGRATED PRODUCTION AND REMOTE OPERATIONS AT BHP BILLITON AND WORKS IN THE REMOTE OPERATIONS CENTRE IN PERTH. ■

SASKIA FREYTAG

Growing up in Germany I spent many weekends conducting experiments with my dad who is a physicist. My brother and I would look on as he demonstrated home creations such as self-made rockets powered by pressure and pendulums attached to the kitchen ceiling. We would then investigate the theories. I guess it was because of these experiences that I always enjoyed maths at school.

Weirdly it was at a conference in the Netherlands that I found my way to Australia. I gave my first scientific presentation in front of an international audience and afterwards Professor Terry Speed, a leading Australian statistician and winner of the 2013 Prime Minister's Prize for Science, based at the Walter and Eliza Hall Institute (WEHI), approached me with a job offer. Which is how I ended up where I am today.

My work at WEHI explores how genes are expressed in the human brain throughout development – from foetus to old age. The brain is an organ that undergoes a tremendous amount of change throughout a person's lifetime and using gene expression we can start to understand why and how these changes happen. This is important because many diseases originating in the brain, such as mental illness and neurological disorders, manifest because of misregulation of genes during brain development.

The human brain is one of the final scientific frontiers and is incredibly complex and hard to study. I use data, mathematical models and new technologies to explore areas we never thought possible. These advances are transforming the future of medical research, which is really exciting.

Ten years ago some of the things that we are able to do today would have seemed impossible; the next decade will be so exciting and data science, mathematics and statistics will be at the heart of it all.

DR SASKIA FREYTAG IS A RESEARCHER AT THE WALTER AND ELIZA HALL INSTITUTE OF MEDICAL RESEARCH. SASKIA HAS A PhD IN STATISTICS AND CURRENTLY WORKS ON HIGH DIMENSIONAL DATA ANALYSIS, EXPLORING HOW GENES ARE EXPRESSED IN THE HUMAN BRAIN. ■

Careers in Mathematics
More than just numbers

« Level 1 »

ACCESSIBLE THROUGH YEAR 12 COMPLETION OR CERTIFICATE I / II

BANK TELLER *BARTENDER* **DEBT COLLECTOR** *HOSPITALITY WORKER* **INSURANCE AGENT** *PAYROLL OFFICER* **RETAIL BUYER** *SALES ASSISTANT* **TRADES ASSISTANT**

« Level 2 »

ACCESSIBLE THROUGH DIPLOMA OR CERTIFICATE III / IV

AIRCRAFT MAINTENANCE ENGINEER *DRAFTSPERSON* **BIOMEDICAL TECHNICIAN** *CONSTRUCTION MANAGER* **CARTOGRAPHER** *CIVIL ENGINEERING TECHNICIAN* **COMPUTER TECHNICIAN** *DATA PROCESSOR* **ELECTRICIAN** *INSURANCE CLERK* **LABORATORY WORKER** *LINE MECHANIC* **MECHANICAL TECHNICIAN** *PERSONAL TRAINER* **PROCUREMENT MANAGER** *PRODUCTION MANAGER* **TELCO ENGINEER**

« Level 3 »

ACCESSIBLE THROUGH BACHELOR DEGREE

ACCOUNTANT *AIR TRAFFIC CONTROL ANALYST* **BIOTECHNICIAN** *BUSINESS ANALYST* **COMPUTER SYSTEMS ANALYST** *COMMERCIAL UNDERWRITER* **CRYPTOLOGIST** *DATA ANALYST* **ECOLOGIST** *GAME DESIGNER* **INDUSTRIAL DESIGNER** *INSIGHTS ANALYST* **MARINE SURVEYOR** *MARKET RESEARCH ANALYST* **NURSE** *OPTOMETRIST* **PHARMACIST** *PHARMACOLOGIST* **PILOT** *QUANTITY SURVEYOR* **SOFTWARE ENGINEER** *SYSTEMS ANALYST* **TEACHER** *VETERINARIAN* **WEB ANALYST** *WEB DEVELOPER*

« Level 4 »

ACCESSIBLE THROUGH BACHELOR DEGREE & POSTGRADUATE

ACTUARY *AERONAUTICAL ENGINEER* **ARCHITECT** *AUDITOR* **ASTROPHYSICIST** *BIOINFORMATICIAN* **BIOMEDICAL ENGINEER** *BIOSTATISTICIAN* **CHEMICAL ENGINEER** *CIVIL ENGINEER* **DATA SCIENTIST** *ECONOMIST* **ELECTRICAL ENGINEER** *ENVIRONMENTAL ENGINEER* **FINANCIAL ANALYST** *GEOLOGIST* **GEOMATICS ENGINEER** *GEOPHYSICIST* **GEOSPATIAL SPECIALIST** *MECHANICAL ENGINEER* **MARINE ENGINEER** *MATHEMATICIAN* **METEOROLOGIST** *MINING ENGINEER* **NAVAL ARCHITECT** *OPERATIONS RESEARCH ANALYST* **PHYSICIST** *QUANTITATIVE ANALYST* **RESEARCH SCIENTIST** *RISK ANALYST* **ROBOTICS ENGINEER** *STATISTICIAN* **UNIVERSITY LECTURER**

MATHS**ADDS** CAREERS GUIDE

COME AND SEE WHAT MATHEMATICS CAN DO FOR YOU

MATHS**ADDS**.AMSI.ORG.AU

Lily Serna

One of my earliest maths memories is counting in the car with Grandad when I was about five. When we reached 100 I was overwhelmed about what could possibly come next. I couldn't fathom anything bigger. I remember being told that no matter what number I could think of there would always be something bigger. I didn't know it at the time, but that was when I first grasped the concept of infinity.

When I was at school I didn't really know what I wanted to do. Maths was something I was really interested in, so when it came time to choose I thought I would see where it would lead (unexpected places evidently).

I certainly didn't expect to be on television; it isn't a natural progression for a maths graduate. I feel very lucky to have landed the resident Numbers Expert role on SBS's Letters and Numbers. It has been an incredible platform to both share the wonderful world of maths with the wider public and challenge the stereotype of what it means to study the subject.

I am always seeking new challenges. One of my current roles is as a Data Analyst at Software Company Atlassian specialising in building mathematical and statistical models. At the moment my focus is design and analysis of experiments. We change the experience of a product slightly and test if people appreciated the change or preferred the original mode.

I believe you should pursue what genuinely interests you not what you think you should be doing. Whatever your passion, chances are it will lead to something you never expected. Don't worry if you haven't worked out what it is yet, my advice is to try everything until you do.

LILY SERNA GRADUATED FROM THE UNIVERSITY OF TECHNOLOGY SYDNEY WITH A DOUBLE DEGREE IN MATHEMATICS AND FINANCE AND A BACHELOR OF INTERNATIONAL STUDIES. A MATHEMATICIAN AND DATA ANALYST AT ENTERPRISE SOFTWARE COMPANY, ATLASSIAN, SHE IS BEST KNOWN FOR HER LONG-RUNNING ROLE AS RESIDENT NUMBERS EXPERT ON SBS'S LETTERS AND NUMBERS. ■

Janine Stewart

With parents who were strong advocates for girls' education, I grew up believing "girls could do anything". I was really lucky to have that kind of influence in my life.

At the end of Year 12, I was awarded a bonded teacher education scholarship by the NSW Department of Education. This scholarship paid a stipend for my tertiary education and guaranteed a three-year teaching appointment in the NSW public school system. As a regional student, I accepted essentially to help pay the bills. After my initial training, I continued postgraduate studies in mathematics while I was teaching full-time. At the time, I thought that I would eventually move into the tertiary sector but I just loved teaching. The connections you make with students, parents and colleagues is, in my opinion, something that can't be replicated elsewhere. Teaching has also opened up new worlds through travel. I worked in New York for over a decade and have met and worked with many fantastic people, some of whom remain my closest friends.

Mathematics is humanity's tool for making sense of an uncertain universe. It's a universal language that empowers us to find solutions in a world fraught with problems. It is so important to mentor young people to continue with mathematics. Particularly with so many carrying the misguided belief that knowledge isn't necessary, either you can "Google it" or Wolfram Alpha will solve it for you. But maths fosters deep critical thinking and it's crucial now more than ever.

I have had so many highlights in my career, but I would like to think that my greatest achievement is still to come, as there is always room for growth and improvement. This is what continues to drive me to learn and improve as an educator.

Teaching gives you a sense of pride that's hard to explain. It is those moments when a student who has been grappling with a problem or concept finally makes the connections that make it all worthwhile. When you witness their sense of achievement and pride.

DR JANINE STEWART IS A SENIOR MATHEMATICS TEACHER AND YEAR 12 PATRON AT ST COLUMBA ANGLICAN SCHOOL, PORT MACQUARIE. IN 2016 SHE RECEIVED A CHOOSE**MATHS TEACHING AWARD FOR EXCELLENCE. JANINE HAS A PhD IN THE AREA OF NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS.** ■

Saving the planet

DR GENEVERA ALLEN
ASSISTANT PROFESSOR - STATISTICS, ELECTRICAL & COMPUTER ENGINEERING - RICE UNIVERSITY - USA

DISCOVERING CURES FOR DISEASES SUCH AS CANCER & ALZHEIMER'S DISEASE, **FINDING CLEAN ENERGY SOLUTIONS** & TACKLING CLIMATE CHANGE — **ALL OF THESE CHALLENGES REQUIRE MATHS SKILLS.**

CHOOSE**MATHS**.ORG.AU

KARLIE NOON

The area I grew up in carried the stigma of being ‘the worst place to live’. This left me with an ingrained sense of being different and the only place I felt I belonged was home. Unsurprisingly my school attendance was very poor and I struggled to stay engaged. I ended up leaving school all together in Year 8.

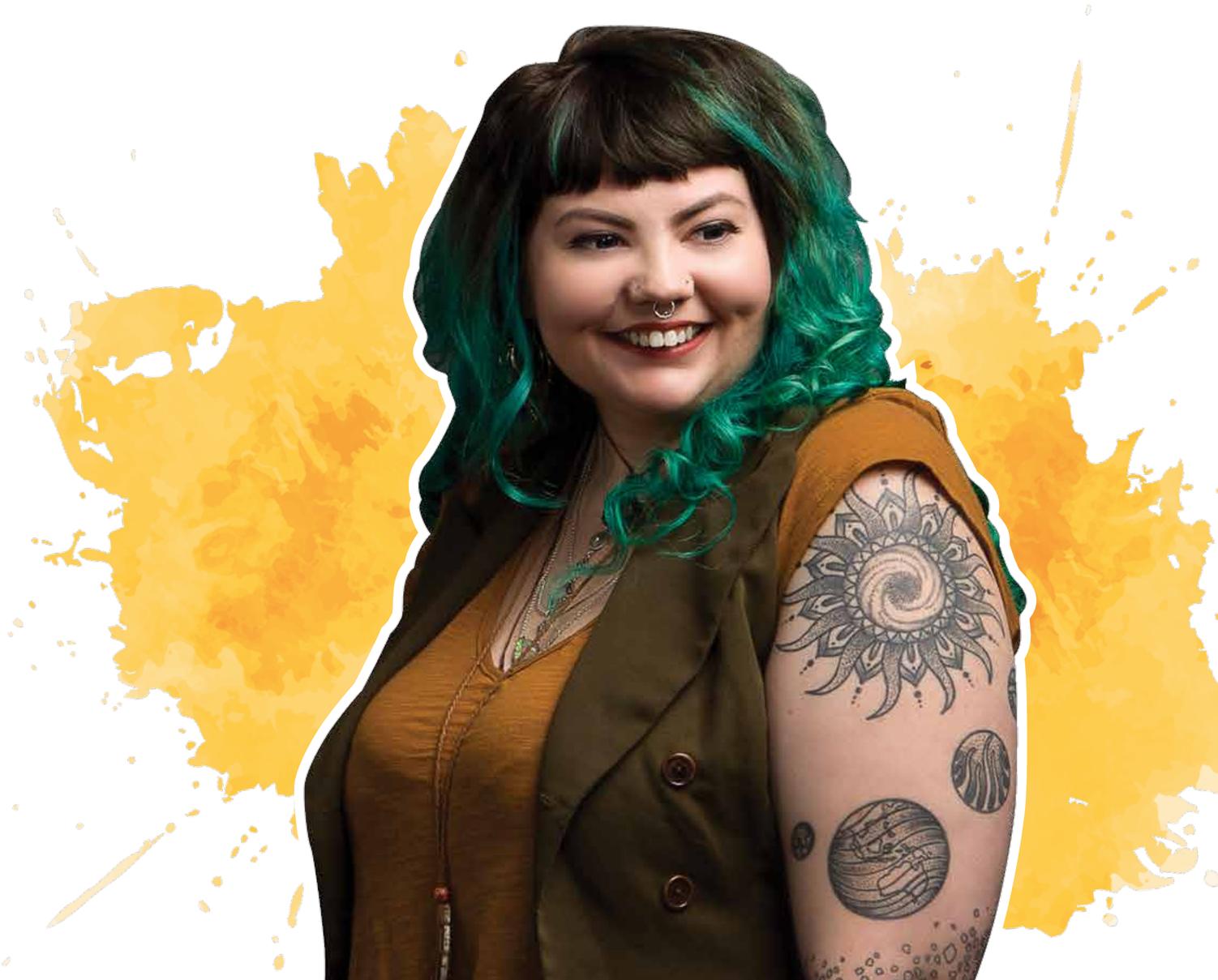
After two years at TAFE, I returned to school in Year 10. This time I was there by choice rather than force. For the first time I saw school as a place of learning rather than torture and bullying.

The first in my family to attend university, I was also the first Indigenous Australian in New South Wales to complete a double degree in Maths and Physics. While many see this as a remarkable achievement for me it’s the reverse – I should be the 500th! I want to help lead the way for other Indigenous people and show they can achieve anything.

I am currently working on a theoretical astrophysics research project with ANU and CSIRO. This research aims to understand how stars are formed in our galaxy. Based on current knowledge, the Milky Way is producing more stars than we think it should. I’m trying to explain how by identifying a potential source of gas needed to produce so many stars. This research requires the use of high volumes of data, programming and lots of maths.

The key is to believe in yourself and block out the judgements. It took me a long time to move away from wanting to ‘stick it to’ some of the negative people from my past. Now I set goals for myself, and myself only, and I know I can achieve anything.

KARLIE NOON COMPLETED A DOUBLE DEGREE IN MATHS AND PHYSICS AT THE UNIVERSITY OF NEWCASTLE. CURRENTLY SHE IS RESEARCHING FOR A MASTER'S IN THE FIELD OF ASTROPHYSICS. ■



BEN WATERHOUSE

I was originally going to study a Bachelor of Commerce, but fate had other ideas by way of some unexpected advice. During maths our teacher asked each of us what we were planning to do next. On hearing my plan, she roared back that commerce was a terrible idea and I should study maths. A few months later, I started my maths degree! She was clearly very persuasive!

My first job after graduating from university was with a consulting company. I learnt an enormous amount from this experience, in particular how little I knew. Eventually I returned to uni to complete a maths PhD. Not something I had ever really planned, it turned out to be the best few years of my life.

Following my PhD, I started Model Solutions. My company uses data every day to answer questions about pharmaceutical drug use. We work with clinicians, pharmaceutical companies and government agencies on a range of complex questions and problems within that sphere. Our work varies from helping launch a new treatment or ensuring a drug is being used in line with its approvals to writing an academic paper about how treatment of a particular disease is changing.

Business success requires a toolbox of different skills. As well as getting along with people, you need to be able to prioritise and execute different tasks and make decisions. Increasingly you also need the ability to both understand and critically interpret large volumes of data.

Study not only equips you with a body of knowledge but also exercises your intellectual muscle. Bodies of knowledge come and go, some are forgotten about over time, but a strong intellectual drive and love of learning will serve you well for many years to come. I think that mathematics is some of the heaviest intellectual weight going around.

DR BEN WATERHOUSE IS THE OWNER OF MODEL SOLUTIONS. AS WELL AS A COMBINED BACHELOR OF SCIENCE AND ARTS MAJORING IN MATHS AND GERMAN, HE ALSO HAS A PhD IN MATHEMATICS. ■

The Modern Workforce

A BASIC UNDERSTANDING OF **DATA ANALYTICS** IS **INCREDIBLY IMPORTANT** FOR THIS **NEXT GENERATION OF YOUNG PEOPLE.** THAT'S THE WORLD YOU'RE GOING INTO.

ERIC SCHMIDT

EXECUTIVE CHAIRMAN - ALPHABET INC.
(PARENT COMPANY - GOOGLE)

CHOOSE**MATHS**.ORG.AU

Lee Turnley

I have always loved reading and writing and for a time in high school thought I was going to be a journalist. I was so determined that I organised work experience at The Age newspaper. It was fantastic – shadowing reporters out in the field, researching fun facts – I even got a small article published in the Lifestyle section. More importantly, the experience revealed parts of the industry I didn't like...

I think my Year 11 Chemistry teacher helped grow my love of the sciences. She had previously worked in industry so had a lot of great stories about being a science graduate and work life. I found it so exciting and could see a lot of myself in her.

I ended up studying a double degree in Engineering and Science (Biotechnology) and am now a Composite Research Engineer for Boeing Research and Technology Australia. Maths is behind everything we do, from designing, analysing and building the next generation of carbon fibre aircraft parts and testing new materials to introducing automation (robotics) within the factory and building developmental test articles.

Our 2014 Aviation Weekly cover remains a career highlight. That photo represents four years of hard work by a team of very talented people. Working with Boeing US and Canada we designed, fabricated, assembled and tested a prototype panel which allowed a 20 per cent weight saving. A reduced aircraft weight means less fuel, resulting in a more efficient, greener and environmentally friendly form of transport. It is those moments in life where you realise exactly what you are capable of.

Aerospace and engineering is still very male dominated but it is improving as attitudes change. Every year I see more women around Boeing, and this year we have three female interns. It is great to see more girls sticking with science and maths and coming through university and into the workplace.

LEE TURNLEY HAS A DOUBLE DEGREE IN ENGINEERING AND SCIENCE (BIOTECHNOLOGY) FROM SWINBURNE UNIVERSITY AND IS A COMPOSITE RESEARCH ENGINEER AT BOEING RESEARCH AND TECHNOLOGY AUSTRALIA. SHE HAS ALSO BEEN SELECTED TO PARTICIPATE IN BOEING'S FAST-TRACK LEADERSHIP DEVELOPMENT PROGRAM. ■

Cassie Pennicuik

I come from a mixed background household, with a first generation Australian father and Indian mother. At school most subjects came to me fairly easily and I was also lucky enough to be reasonably musical and sporty too – but unfortunately this often meant I didn't easily fit into one peer group. I was also a bit younger than the rest of my cohort which sometimes presented its challenges in the complex world of school society. I eventually found my place in Year 9, when I found a group of similarly minded peers, many of whom also pursued diverse interests, were incredibly social, but still placed a lot of value on school and achievement.

In my role as Program Manager at the Country Fire Authority (CFA) I manage both the Project Management Office and one of the largest projects at CFA. This project has a large and complex budget dedicated to improving the CFA's service delivery to the community through the introduction of more fire-fighters, emergency appliances and new and modified stations. The role requires careful and robust planning.

Maths has equipped me to drive process-focussed problem solving while using my planning skills to break down complex problems and support organisational management of timely and cost-effective solutions. As well as research skills, my studies provided the scientific knowledge to communicate complex technical concepts and issues to broad audiences. These skills are critical when facilitating stakeholder brainstorming sessions or helping teams meet deadlines or goals through logic and organisation, rather than chaos. Maths is a fantastic base for so many careers, with the transferrable skills it provides.

Being younger and female in leadership roles has at times had its challenges, but I work hard to be recognised on my merit, and believe that my work will speak for itself. I don't hesitate to put myself forward for something I am interested in – on the soccer field or in my career – I don't mind what was done before me or what stereotypes I might challenge. I believe in trying to make everything I work on better than how I found it.

CASSIE PENNICUIK IS A PROGRAM MANAGER AT THE COUNTRY FIRE AUTHORITY, SHE RUNS THE PROJECT MANAGEMENT OFFICE FOR THEIR SERVICE DELIVERY DIRECTORATE (FIRE & EMERGENCY MANAGEMENT) AND THE MAJOR PROJECT PORTFOLIO OF THE GROWTH PROGRAMS. ■

bhpbilliton Foundation

The BHP BILLITON FOUNDATION'S ambition is to make a meaningful contribution to some of the unprecedented sustainability challenges facing our generation.

In a rapidly changing and complex world, Australia's future success will rely on a highly educated and diverse workforce founded on a strong pipeline of science and technology skills. We need young people who are innovative, resilient, problem solvers and critical thinkers.

Science, technology, engineering and mathematics (STEM) education will be critical to building the skills that will secure the prosperity of future generations. Providing access to quality education and training will unlock opportunities for individuals, enable communities to prosper, and businesses and economies to compete.

In Australia, research indicates that girls are under-represented in STEM. To support a national effort to address this gap, BHP Billiton Foundation and the Australian Mathematical Sciences Institute (AMSI) have formed a partnership to design and deliver the Choose Maths program. This AUD$22.2M investment aims to promote greater interest and academic achievement of girls in mathematics, leading to an increased participation in STEM subjects and contributing to a more sustainable and competitive economy.

BHPBILLITON.COM/COMMUNITY/BHP-BILLITON-FOUNDATION

AMSI AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

The AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE (AMSI) is a national not-for-profit, collaborative organisation based at the University of Melbourne. The central voice for Australia's mathematical sciences, AMSI plays an active role in the development of national research policy and frameworks to help shape Australian innovation for the future. We continue to drive a policy and advocacy agenda to achieve critical reform at all key stages of the mathematics pipeline from school-based and higher education, research training and funding to industry collaboration and innovation.

Our membership includes Australian universities, professional societies and government agencies with a shared objective to integrate research, education and industry involvement. A leading provider of services, we are working to radically improve mathematical sciences capacity and capability in the Australian community through:

- The support of high quality mathematics education for all young Australians
- Improving the supply of mathematically well-prepared students entering tertiary education by direct involvement with schools
- The support of mathematical sciences research and its applications including cross-disciplinary areas and public and private sectors
- The enhancement of the undergraduate and postgraduate experience of students in the mathematical sciences and related disciplines

AMSI.ORG.AU

CHOOSE MATHS

AN **AMSI** SCHOOLS PROJECT

DELIVERED BY

AMSI
AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

SUPPORTED BY

bhpbilliton Foundation

CHOOSE**MATHS** is a joint initiative of the Australian Mathematical Sciences Institute (AMSI) and the BHP Billiton Foundation