Careers with STEM
Game-changing jobs of tomorrow

TERM 2 2017

Teacher Notes

For Digital Technologies, PDHPE, Science and Maths Years 7-10

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About Careers with STEM

The *Careers with STEM* series includes four quarterly magazines, along with website articles, teacher resources and videos across four STEM areas: science, technology, engineering and mathematics. The focus is on independent inquiry and constructivist learning.

Each magazine issue provides inspiring stories, statistics and up-to-date information on the careers of the future, and is based on the premise of discovering new areas of innovation through STEM + X – where X is another field of study, a personal passion, or a world changing goal.

To order additional copies for events, clubs or classrooms, or for annual subscriptions and additional resources, career stories and videos go to: CareerswithSTEM.com

Who are these notes for?

The *Careers with STEM* Teacher Notes are for teachers, careers counsellors, parents, STEM-based institutions, or mentors that could use the guides to expose and inspire students towards STEM careers. For teachers, they are ideally suited to the Years 7–10 high school classroom.

How to use the STEM + X activities grid

The STEM + X activities grid aims to provide a variety of student activities across a wide range of 'X' categories, while developing different skill-sets required for flexible career options. This term, the focus is on Maths.

STEM + X rows – and what they mean

S	T	E	M
Science, and everything experimental and inquiry-based	Includes computational thinking and digital technologies	Maker space and design thinking tasks; building or making something to solve a problem	Anything related to numeracy that is accessible and/or applied

STEM Integrated

– a combination of two or more STEM skills

STEM + X columns – and what they mean

DOING AND USING MATHS
Students are given an actual activity to do.

CREATING AND MAKING WITH MATHS
Students are given an idea for an activity, but they must design and carry it out themselves in a constructivist manner.

	DOING AND USING MATHS	CREATING AND MAKING WITH MATHS
S	**MATHS + BIOLOGY** Studying nature numerically through the gathering and application of data is a growing trend in biology (*Careers with Maths*, pp 10, 29, 30 and 31). Two famous biology/maths examples include the use of the Hardy-Weinberg Law to calculate allele (version of a gene) frequencies in populations and the Fibonacci numbers found in the seed spirals of sunflowers. Explore these two mathematical principals and then choose one of your own to add to your research. Present your learning in a fun way that can be shared with your peers. **To read more, visit bit.ly/207cBVF** **The [healthy] way forward,** *Careers with Maths* p29 **Healthy humans,** *Careers with Maths* p30 **Doctor, doctor,** *Careers with Maths* p31	**MATHS + DATA COLLECTION + DATA ANALYSIS** Monica Wulff designed a survey to gather data related to startup companies. Using Monica's company, Startup Muster, as a guide, design a broad overarching central question that requires the collection of a range of data to answer. Create a scientific survey of subsidiary questions to gather information around that central question. Use a topic related to your favourite sport or hobby, or a question that could be used for a project at school or to settle an argument. Use the following information to help you complete your survey. **Visit bit.ly/2nzwBS4 to help you plan your survey.** When you have completed the survey, display the results visually as Monica has done to help answer your original question. **Why do maths?** *Careers with Maths* p8 **www.startupmuster.com** **Extension:** Were there any interesting or unexpected trends in the survey? Write further questions that are raised by the data gathered in this survey.
T	**MATHS + MAPS** Many of the jobs mentioned in the magazine require maps. List the maths skills needed to create maps such as those available in Google maps. **www.google.com.au/maps** What maths skills would be needed to set up games such as GeoGuessr or Earth-Picker.com? Suggest any ideas you can think of for games using maps. **Visit geoguessr.com and www.earth-picker.com** **Get techie, get the job,** *Careers with Maths* p18 **Global Google[r],** *Careers with Maths* p25	**MATHS + FINANCIAL PLANNING** Start your career towards being a financial maths whiz by creating a new digital tool, such as a spreadsheet, database or app, that helps yourself or someone you know. Then monitor some aspect of their/your finances so they can understand how much money they have left over at the end of each month. Include the following features: basic salary, overtime rates, holiday and sick pay rates, loan repayments, including simple and compound interest, and the ability to search or filter the data. **Smart mover,** *Careers with Maths* p16-17
E	**MATHS + ENGINEERING + DESIGN** Collect images of famous buildings and artworks, or take your own photos near where you live to collate examples of applied geometry. Analyse the images for: the type and number of shapes (i.e. how many different and repeated quadrilaterals and/or triangles), as well as their reflection, translation, rotation, similarity and congruence. Present your findings visually. **Puzzle solver,** *Careers with Maths* p21 **High flyer,** *Careers with Maths* p23	**MATHS + ARCHITECTURE + CIVIL ENGINEERING** Use appropriate software to design a futuristic skyscraper that pushes mathematical boundaries by including features such as curves, cantilevers, extreme height above ground, and novel design of supporting structures by extrapolating on current designs such as the buttressed core. **Visit bit.ly/2p3lVLp** Or use bridge-building software to design a bridge that meets the requirements stipulated by the software program with regard to load and cost. **Visit bit.ly/2p3iXq5**
M	**MATHS + GAMING + ENTERTAINMENT** To kickstart some ideas about maths and gaming, choose a number puzzle (such as the Magic Square) and present it to the class as an entertaining magic trick. Now share your analysis of how the puzzle works mathematically. Include some interesting history of the puzzle, such as who developed or designed it and the theory behind it. **For starters visit bit.ly/20VUG5x** **You do the maths,** *Careers with Maths* p12 **We've got your number,** *Careers with Maths* p24	**MATHS + MAPPING** With geometry in mapmaking and student engagement as the focus, create a treasure map that includes the use of the following maths skills to solve: use of a compass to measure angles (acute, obtuse, right, straight, reflex, and full rotation), Pythagorean theorem, and trigonometry (for example to direct participants to clues off-ground). **Creative classrooms,** *Careers with Maths* p15
STEM Integrated	**MATHS + RETAIL** Next time you go shopping make note of all the possible places maths could be used. An ideas category template sheet is provided for you on page 4 of these notes. **Show me the money,** *Careers with Maths* p6-7	**MATHS + SOFTWARE/CONSUMER ANALYSIS** Is your current computer and related computer services value for money? Demonstrate to the public how useful maths can be in everyday life by producing a blog about how to assess the capabilities of computer technology. Include information on value for money related to upload and download speeds, total capacity of mass storage systems compared to advertised capacity (i.e. include loss related to formatting and data protection and recovery). **Get techie, get the job,** *Careers with Maths* p18 **Destiny's calling,** *Careers with Maths* p19

Maths in the shopping mall ideas template

Name: _____ **Date:** _____

For each of the jobs below, list as many ways that maths could be used on a daily basis that you can think of.
Some categories have been provided for you and space has been left for any other categories you may want to use.

SHOPPING MALL JOB	SPECIFIC WORK CARRIED OUT	MATHS USED
Supplying the goods to the shops:		
Check out/cashier:		
Quality control:		
Stacking the shelves:		
Constructing the building:		
Pay office:		
Other:		
Other:		

Reflection

What I have learnt about maths careers	What I found interesting/inspiring about maths careers	What I still want to know about maths careers – where to go to find out

S

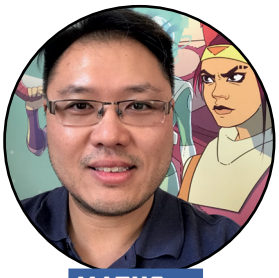
MATHS + SCIENCE

P22

What science career mixes maths with a passion for conservation to save jaguars in Peru?

Sam Clifford

T



MATHS + TECHNOLOGY

P12

What tech career manipulates numbers to create exciting new gaming experiences?

Kevin Chan

E

MATHS + ENGINEERING

P23

What airline careers use maths to ensure the safety of every passenger?

Rachael Barnes

M

MATHS + SPORT

P20

How could maths and a love of football be used to discover the AFL superstars of tomorrow?

Daniel Pelchen

For more career profiles, information and quizzes go to CareerswithSTEM.com

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