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ISSUE 02

HEADJAM

THE STEM MAGAZINE FOR INQUISITIVE YOUNG MINDS

MEET THE
SURFING
SCIENTIST

WE HAVE A
CHAT WITH THE

Australian
Defence
Force

Find an Australian
VOLCANO NEAR YOU

ACTIVITIES

FUN FACTS

INTERVIEWS

SCIENCE NEWS

Hi STEMies



Headjam magazine is for primary and secondary school students who have a keen interest in all things science, technology, engineering and maths (STEM). We love our teachers so we've created content that can be used to start conversations in the classroom.

The Headjam team is always changing, and we say that with pride, because each semester we get amazing interns from Melbourne universities.

So, who's writing these articles you ask? A bunch of geeks of course: A physicist/chemist, environmental engineer, medical scientist, a bunch of amazing science internship students from Monash University, and an RMIT University journalism student. The final review is conducted by a human I'm sure is an imposter who's really a hawk; nothing gets past her - yes, you know who I'm talking about - Emily!

If you've enjoyed this edition let us know by shooting us an email at headjam@stemhub.com.au or reaching out via social media.

Cheers

Jo

Editor-in-Chief



All experiments have been tested. Activities should be done under parental supervision and are done at your own risk. STEM Hub Pty Ltd does not accept liability for any damages.

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MEET TEAM HEADJAM



HEADJAM

THE STEM MAGAZINE FOR INQUISITIVE YOUNG MINDS

Cover photo: Aurora Borealis, also known as the polar lights, is a natural light display in the sky, mostly seen in high-latitude regions (around the Arctic and Antarctic). Auroras display dynamic patterns of brilliant lights that appear as curtains, rays, spirals, or dynamic flickers covering the entire sky. **Credit:** Pobytov

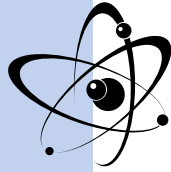


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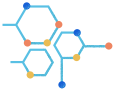


We've added QR codes on some pages to make it easy to access links. You'll need a phone or tablet with a camera.

WANT TO CONTRIBUTE?

If you'd like to contribute to our next edition get in touch with us at headjam@stemhub.com.au.





SCI BUZZ >

TURN UP THE BEAT! MUSIC IMPROVES COGNITIVE PERFORMANCE

Researchers from Japan's University of Tsukuba have found that dancing doesn't just feel good, it also enhances brain function. But it has to be music with a groove, called groove music. This music can significantly increase measures of executive function and associated brain activity in participants who are familiar with the music. So next time your parents tell you to turn down the music, just tell them it's good for your brain. :-)



GEOLOGICAL SCIENCE >

RESEARCHERS DISCOVER A NEW, YOUNG VOLCANO IN THE PACIFIC

Researchers from Tohoku University have discovered a new petit-spot volcano at the oldest section of the Pacific Plate. These volcanoes are a new phenomenon on Earth. They are young, small volcanoes that are formed along fissures from the base of tectonic plates.

As the tectonic plates sink deeper into the Earth's upper mantle, fissures occur where the plate begins to bend causing small volcanoes to erupt.

dense jungle. This discovery of vast pyramids and waterways demonstrates that the Amazon was home to societies long before Europeans arrived.

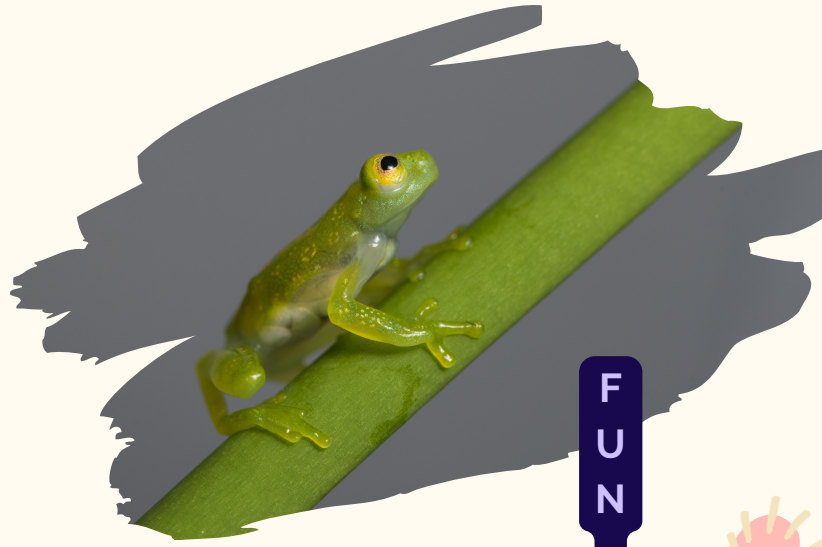
ARCHAEOLOGY >

11 'LOST' SETTLEMENTS DISCOVERED BENEATH THE AMAZON

Archaeologists have fired millions of lasers from a helicopter while flying over the Amazon jungle, discovering 11 previously unknown 'lost' settlements in the southwest corner of the

Archaeologists used laser technology called Light Detection and Ranging (LiDAR). This sensor technology uses lasers to produce a 3D map of the environment around it. Did you know that LiDAR is also used in autonomous vehicles?





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Transparent Treasures: Glass Frogs

By Amna Waseem

Many creatures use transparency as a type of camouflage, and those that live in water use it far more frequently than those that live on land. Terrestrial animals have red blood cells which react to light and give them colour.

Glass frogs are extremely unique since they can achieve transparency despite living on land. Their internal organs and bones can be seen because of the translucent skin on their tummies, this is also how they get their name!

According to a study by Duke University, glass frogs become transparent by hiding their red blood cells in their liver! Their distinctive liver is coated by guanine crystals, which makes it reflective like a mirror.

Even more intriguingly, unlike most vertebrates, their red blood cell aggregation does not cause blood clotting. Scientists are now eager to further explore these frogs' unique body systems and translate the research into blood clotting prevention in human health.



GLASS FROGS ARE ABOUT THE SIZE OF A MARSHMALLOW.

THEY LOVE TO EAT SMALL INSECTS.

THEY BECOME TRANSPARENT WHEN SLEEPING ON LEAVES, TO AVOID PREDATORS.

Interested in Animal Science?



Subjects like biology and chemistry can lead you to a degree in:

- Zoology: study animal biology and behaviour!
- Veterinary Medicine: to be a vet!
- Ecology: understand and reduce the impact humans have on animals!

The dangers of SLEEP Deprivation



Have you ever wondered how long you can go without sleep, and what would happen to you after days of not sleeping?

1 DAY

Staying awake for 24 hours can have the same affect as having alcohol intoxication. Your focus and performance are affected as much as having a Blood Alcohol Concentration (BAC) of 0.10%. In Australia, you're considered to be legally drunk when you have a BAC of 0.05% - although your legal BAC limit could be less, depending on what type of license you have, for example learner drivers must have a 0.00% BAC.

A BAC of 0.05% means that there is 0.05g of alcohol in 100mL of blood.





2 DAYS



When you go without sleep for 48 hours here's what happens:

- Feeling foggy or completely out of touch with what's happening.
- Difficulty remembering and concentrating.
- Increase in irritability or moodiness.
- Immune system is affected increasing your chances of getting sick.
- Microsleeps occur throughout the day where you lose consciousness briefly, for anywhere from a few seconds to half a minute.



3 DAYS

If you've gone without sleep for 3 days, life is about to get pretty tough, both emotionally and physically. Here's what happens to you:

- Difficulty focusing on conversations, and tasks.
- Inability to do simple activities, like getting up to look for something.
- Your heart beat will increase and beat more rapidly.
- Issues with regulating your emotions.
- Experiencing feelings of depression, and anxiety.
- **Illusions, paranoia, and hallucinations.**



>3 DAYS

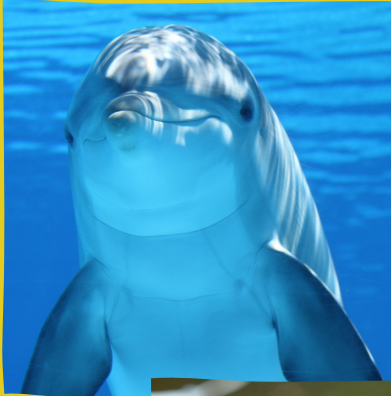
More than 3 days of not sleeping becomes dangerous. All the other side effects listed will now be even worse. You'll experience:

- More frequent hallucinations, and increased paranoia.
- You won't be able to drive or perform any potentially risky tasks, like driving a vehicle, riding a bike, or operate machinery.
- Your brain will begin to stop functioning properly, leading to **organ failure** and, in rare cases, **death.**



HOW DIFFERENT ANIMALS SLEEP

By Amy Ellis



A GROUP OF BUTTERFLIES IS CALLED A KALEIDOSCOPE.

DOLPHINS

When dolphins sleep, they must be super careful, as mammals in the water they not only need to get oxygen from the air but also need to protect themselves from predators. To overcome this, scientists think that dolphins sleep with half of their brain staying active, while the other half sleeps. This allows time to rest and recover but also keeps them mobile so they can move through the water.

BUTTERFLIES

Lots of insects do not sleep and instead enter a state called **torpor**. This is a state of rest which gives their body time to recover, but they can still remain semi-alert and aware of predators. During the night, some types of butterflies form a group and hang upside down in trees and enter torpor together allowing them to stay warm and protect each other in their resting state.

COWS

You may have heard the rumour that cows sleep standing up. **WRONG!** They sleep laying down just like us, and sometimes they doze off while they stand, but once they get into the REM part of their sleep, they have to lay down to fully rest, and recuperate.

BIRDS

Birds also sleep with half of their brain staying active. This is mainly as a precaution against predators. Having this type of sleep means that they must sleep for longer periods of time but are able to protect themselves. It also means they can balance in trees when they sleep.

BIOLOGICAL RHYTHMS



By Amy Ellis



Circadian

The circadian cycle (also known as rhythm) is a natural bodily process that regulates the sleep-wake cycle, and repeats every 24 hours. This rhythm is classified as a diurnal rhythm because it is dictated by the time of day and night.

Ultradian

The ultradian rhythm lasts for a 90 minute period multiple times throughout the day, which is why we have bursts of productivity throughout the day.

Diurnal



Infradian

This type of biological rhythm lasts for longer than a day. In humans an example is the menstrual cycle in females, but in other animals can include migration or hibernation patterns.

Careers in sleep

Want to make a career studying sleep? Sleep psychology is the study of sleep, but there are many more scientists from a range of different fields looking into how sleep affects the body, which includes immunology (study of the immune system), physiology (study of body systems) and many more! To find out where you can study the above courses go to **The Good Universities Guide** (use the QR code).





THE SURFING SCIENTIST



RUBEN MEERMAN

By Amy Ellis

I caught up with Ruben to find out just what makes him a scientist unlike any other. His passion lies in teaching people about the wide world of science. But it hasn't always been that way. In fact, a large proportion of his science research now involves chemistry, but up until 10 years ago, he had never studied chemistry ever!

Ruben is an Australian scientist, educator, author, and public speaker. He has appeared on Australian television shows to educate the public on science topics. Ruben performs science demonstrations for school children. He is currently working on research into weight loss and focusing on what happens to fat after weight loss.



Fun Fact!

RUBEN

HATED

CHEMISTRY

IN SCHOOL

How did he get here?

Ruben started his career by completing a degree in physics at Queensland University of Technology before getting a job at Laser Dyne, a company that focuses on laser engineering. He then worked at Questacon Science Circus while he did further study in science communication. Within this job he did lots of science shows where he grew his passion for teaching science. This is where his title of Australia's surfing scientist first came into play. Ruben is super busy, facilitating up to 120 science shows per year. Amazing effort!



FUN FACTS ABOUT THE SURFING SCIENTIST

1

Ruben studied physics but hated chemistry until he got older, realising that like physics, chemistry is everywhere, so he taught himself chemistry! That's pretty awesome.



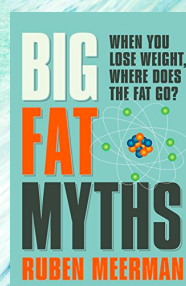
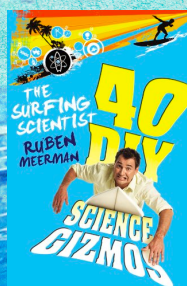
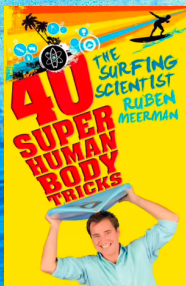
2

Ruben called himself the Surfing Scientist to entice more kids to get involved in science, and because science is in everything, even surfing!



BOOKS BY THE SURFING SCIENTIST

If you want to buy his books use the QR code



The Science of Fragrances

The History of Perfume

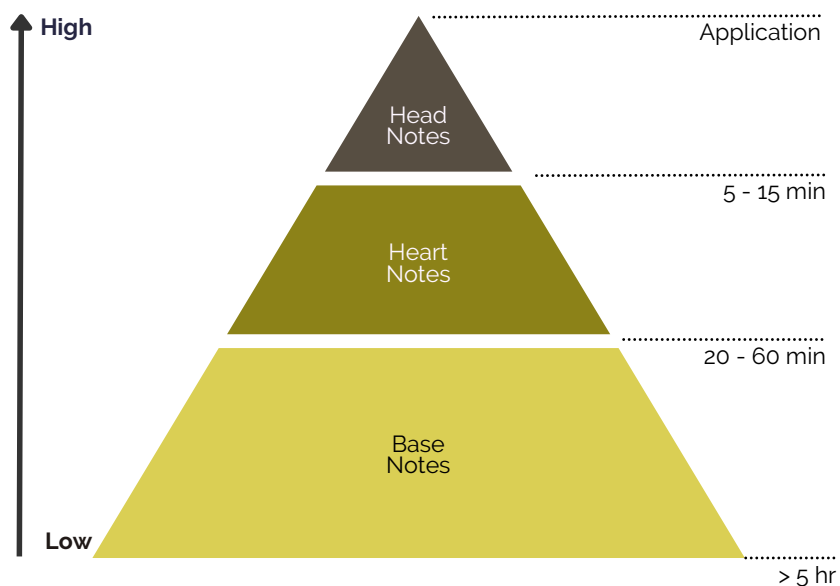
The ancient Egyptians used perfumes during their embalming process and religious rituals. These scented unguents were made by collecting herbs such as peppermint or rose and steeping them in oil until the essence was infused. Modern perfumery originated in the 19th Century as organic chemistry advanced.

Fragrance Pyramid

Have you noticed how a perfume smells differently throughout the day? This is because of the way perfumes are composed.

Most perfumes have a 3-part structure. The **head note** (also called a **top note**) is the first thing you smell when you put the perfume on. They consist of the most volatile compounds, which evaporate very quickly. The second is the **heart note**, which is the main fragrance that lasts for several hours. And the last is the **base note**, which is the fragrance that underpins the whole perfume, and is made up of the least volatile chemicals making the fragrance last all day.

Volatility



In chemistry, volatility is a measure of the tendency of how readily a substance vaporizes.

These notes are all stacked on top of each other in layers, which are referred to as a pyramid, and each layer supports the one above it. This pyramid structure serves as a concept for simplifying, and

visualising the character of a fragrance. Not all perfumes are built using this same structure. Here are some alternative structures: *Linear, Kaleidoscopic, Baseless / Headless, and Undulating.*

If you want to learn more about perfumes use the QR code.



Fragrance Chemistry

The different compounds used to devise the notes have different levels of volatility.

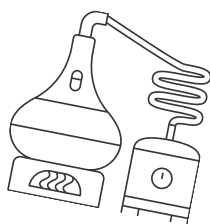
In perfumes, the varying rates of volatility are determined by the skin's heat, and the way a fragrance dries, and evaporates. The compounds in a fragrance evaporate at different speeds rather than all at the same time. As this happens, the fragrance reveals different notes to the wearer.

Perfumes consist of 78% to 95% **ethyl alcohol** (also known as **ethanol**) with the chemical formula C_2H_6O while essential oils comprise the remaining ingredients. A lot of perfumes contain many synthetic compounds to enhance the fragrance. Some common plant sources for scents are cardamom, jasmine, lavender, sandalwood and nutmeg.

In the Lab

Making the perfumes starts by extracting the oils from the natural ingredients. The extraction of these oils can be done several ways: solvent extraction, steam distillation, expression, enfleurage (a process that squeezes out the oils) or maceration.

The olfactory system is responsible for our sense of smell.



WORD SEARCH

*Perfume *Chemistry
*Science *Fragrance
*Oil *Floral

o i l b y i w k g r
b l v n n s d x a a
a e s c i e n c e o
f r a g r a n c e p
u b l b m p c v e e
c h e m i s t r y r
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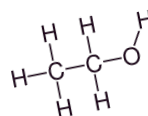
Basic Manufacturing Process

A variety of methods are employed in perfume manufacturing.

Distillation: involves heating materials containing fragrant chemicals and condensing them into a vapor that is then collected. **Maceration:** raw ingredients are soaked in water, oil or a solvent to draw out the fragrances. **Expression:** involves compressing materials and squeezing out the aromatic oils. **Enfleurage:** draws out a fragrance by using odourless fats to capture the fragrant compounds that are extracted using alcohol.

DID YOU KNOW?

Alcohols are a homologous series of organic compounds with the general formula $C_nH_{2n+1}OH$ and names ending **-ol**. the functional group in alcohols is the hydroxyl group **-OH**.



Becoming a Fragrance Chemist!

You'll need to do a Bachelor of Science majoring in Chemistry or a Pharmaceutical Science degree. Jobs that are similar include Cosmetic Chemists or Flavour Chemists. For more information have a look at Monash University's degree program.

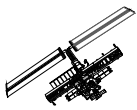


A full-page background image of an astronaut in a white spacesuit floating in space. The astronaut is wearing a helmet with a clear visor and has a NASA logo on the chest. The Earth's blue and white atmosphere is visible at the bottom of the frame.

SPACE

There are more stars in the universe than grains of sand on all the beaches on Earth. That's at least a billion trillion!

NASA:



Scientists see into the past



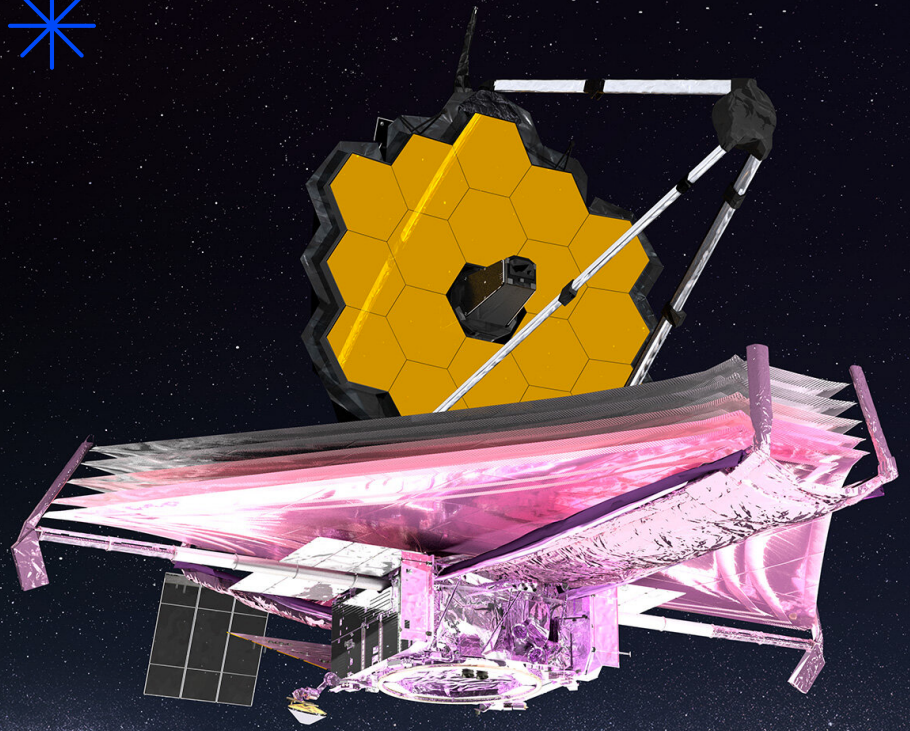
By Amna Waleeb

The James-Webb telescope is like a cosmic time machine, allowing scientists to see almost 13 billion years into the past! The telescope is the largest and most sensitive of its kind and has been created to see almost every phase of cosmic history.

Being the largest, the James-Webb telescope can collect lots of light and see very faint, far away objects- as distant as billions of years ago! The infra-red (IR) technology used by it also allows the telescope to see very far, as it can detect light at wavelengths that are blocked by the Earth's atmosphere and outside the visual range of conventional telescopes, and human eyes. This means that it can even see otherwise hidden regions of space.



The first set of images taken by the telescope revealed the oldest galaxies ever seen as well as details of star birth, and death! Scientists predict that the James-Webb telescope will be able to peer back in time to the formation of galaxies, and planets, ushering in a new era of astronomy.



The James-Webb telescope!

One of the first photos taken by the James-Webb telescope

DID YOU KNOW?

The James-Webb telescope is the size of a tennis court and must fold to fit inside a rocket before unfolding portion by portion in space.





BUILD YOUR OWN ROCKET

By Amy Ellis



what you'll need

Plastic bottle with lid
4x pencils
Sticky tape
1/4 to 1/2 cup of vinegar
1tbs baking soda

instructions

- 1 *Tape the 4 pencils to the top of the plastic bottle so that the plastic bottle can stand upside down*
- 2 *Into the bottle pour the vinegar and the baking soda*
- 3 *Quickly add the cork to the top of the bottle*
- 4 *Flip over your rocket and watch it fly!*

The chemistry involved

When baking soda and vinegar mix it creates a chemical reaction releasing gas called Carbon Dioxide (CO_2). This CO_2 gets trapped in the bottle and the pressure builds and builds so much, that the cork pops out and the bottle flies off. You can play with the ratios of vinegar and baking soda to see what gets the best result for your rocket.

Don't forget to tag us

Make it and race it with your friends!
Tag us **@stemhubaus** and show us your best rocket and races.



WE CAUGHT UP WITH THE

AUSTRALIAN DEFENCE FORCE



- * MEET A RAAF AERONAUTICAL ENGINEER
- * WE HAVE A CHAT WITH A NAVY MARINE TECHNICIAN
- * THE ARMY INTRODUCES US TO CASPER, THE ROBOT DOG



WHAT DO YOU LOVE ABOUT YOUR JOB?

Working with the technicians on the airplanes, and getting to be involved in the 5th generation Air Force and air capability. And also seeing the work that you lead to airplane taking off and doing something in the sky.

WHAT COOL STUFF DO YOU WORK ON?

In the past I worked on training aircraft, like what the Roulettes fly (PC-21), C-17 Globemaster, EA-18G Growler aircraft which is a fast jet that can jam electronic signals in the sky. At the moment I'm posted at the Defence Force Academy which means I get to work on a race car.

HOW DID YOU GET WHERE YOU ARE?

I did my engineering degree through the Australian Defence Force Academy (ADFA), and joined the RAAF. The great thing was that I got paid to do my degree.

HAVE YOU ALWAYS HAD AN INTEREST IN ENGINEERING?

As a kid I really liked Lego, and from my love of Lego came my love of building things and understanding how things work.



FLIGHT LIEUTENANT WAIGHT

WHAT WOULD BE YOUR ADVICE TO A BUDDING AIR FORCE ENGINEER LIKE YOU?

Stick to doing maths and science subjects at school, study hard and do everything possible to get good marks. Then apply to the ADF and join the Air Force. You'll have an amazing time!

WHAT DID YOU STUDY AT SCHOOL?

I studied physics and one of the lectures we had was about flight and I actually fell in love with it. That's when I decided to study aeronautical engineering and learn how planes worked.

RAAF AERONAUTICAL ENGINEER

Check out the RAAF careers site.

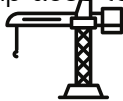




RAN MARINE TECHNICIAN

What does a Marine Technician do in the Navy?

We're maintainers and operators of engineering machinery and systems on ships. We make sure everything is fully operational and mission capable. I'm a Propulsion Rate which means I look after systems that the ship uses to make it propel forward.



What cool stuff do you work on?

We work on RHIBs, V12 engines, pumps, cranes, forklifts and anything that moves basically, and obviously the RHIB.

What's a RHIB?

It stands for Rigid-Hulled Inflatable Boat and it goes on a ship and is used for high speed boarding, and personnel and cargo transport, and man overboard rescue.



Tell us about the RHIB performance and propulsion?

The boat has a Yanmar marine 319 HP diesel engine driving through a Hamilton water jet. It can do up to 40 knots which is about 74 km/h.

What do you love about your job?

You're always learning something new and you're always learning from others. The mateship is awesome!

Where do you do your training and how does it work?

I'm currently down at HMAS Cerberus. We do all our theory upfront and we do a little bit of practical then we go to a ship and put all our classroom learning into practice.

What subjects did you study at school?

I studied maths and science (biology) but didn't do physics.

How do you become a Marine Technician?

Go to your nearest Defence Force Recruiting office and apply to get into the Navy. You'll do tests that let you see what you're suited to based on your scores. You'll do a basic maths and science test. Once you get into the Navy you'll have to do about 2.5 months of Navy basic training, and then you go and do your technical training, and then you get posted to a fleet.

RHIB



Check out the Navy careers site.





WE CAUGHT UP WITH THE AUSTRALIAN ARMY AND ASKED SOME QUESTIONS ABOUT CASPER THE BOT DOG & JOBS THAT USE THE DOG.

What is Casper used for in the field?

The Robot Dogs were procured for concept development and experimentation to explore challenges and benefits of small robots to inform future capability development within Army.



Is there a specific job in the Army that would be tasked with operating the bots?

The Robot Dogs have been extremely valuable in experimentation and gathering data on appropriate user needs for future modernisation but do not have a current operational role. Similar technology is widely used in many areas within Army such as UAVs, and Robots for the destruction of unexploded ordinance.

Does the Army see a need for more bots like these for the near future?

Robotics, autonomous vehicles, UAVs, are all examples of technologies that Army is either already using or continuing to exploit in the developing of future capability. Army will continue to work closely with the wider defence industry in the use and development of future technology and these systems will be a growth area in Army and the wider ADF.



What kind of skills do the operators need to have?

There is a high level of emphasis on ensuring maximum interoperation between the operator and the technology being employed however, due to the technical nature and complexity it is very advantageous to have studied or have background in **technology, science** and **maths** areas.

DKNOW

THE AUSTRALIAN ARMY HAS A DRONE RACING TEAM THAT COMPETES AGAINST OTHER MILITARY DRONE RACING TEAMS FROM ALL OVER THE WORLD LIKE NEW ZEALAND, SINGAPORE & BRITAIN.



MEET CASPER!



THE ARMY'S ROBOT DOG ✨

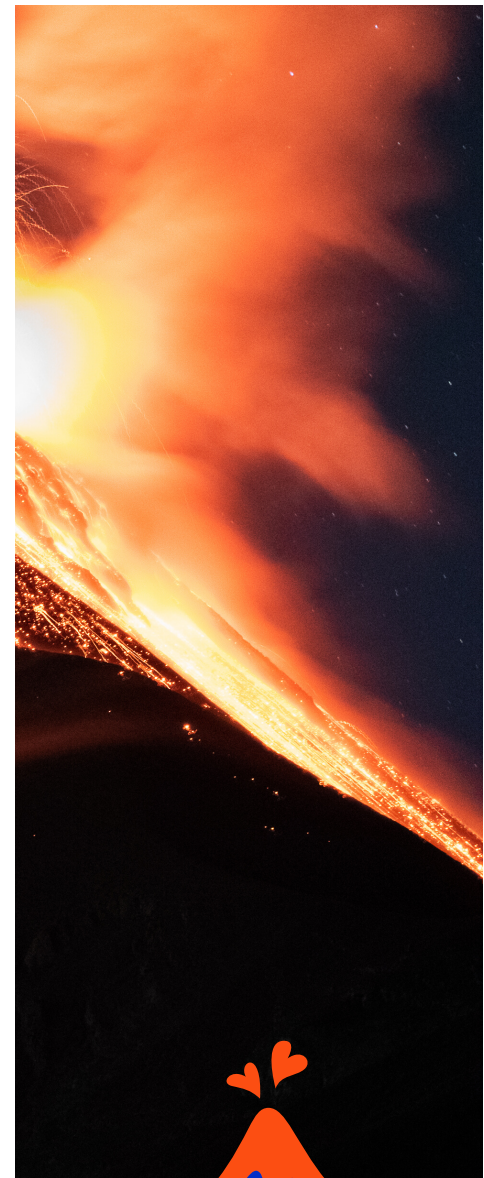


Check out the careers site for cool jobs in the Army.

A composite image of Earth from space. The top half shows a blue sky with white clouds and a bright sun in the upper right. The bottom half shows a starry space background. In the center, a globe of Earth is shown, with a volcano on the right side emitting a red plume of smoke. The text 'OUR EARTH' is written in a bold, black, hand-drawn font across the top of the globe, and 'THE WONDERS OF VOLCANOES' is written in a similar font along the bottom edge of the globe.

OUR EARTH

THE WONDERS OF VOLCANOES



VOLCANOES



A VOLCANO IS AN OPENING IN OUR PLANET WHERE MOLTEN ROCK AND GASES TRAPPED UNDER THE SURFACE ERUPT, OFTEN FORMING A HILL OR MOUNTAIN.

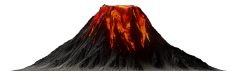
Volcanoes are classified **ACTIVE**, **DORMANT** or **EXTINCT**. Volcanoes are classed as active if they have erupted within the last 10 000 years, and are likely to erupt again. Dormant volcanoes have not erupted for a very long time but may erupt at a future time. Extinct volcanoes are not expected to erupt in the future.

WHAT'S INSIDE A VOLCANO?



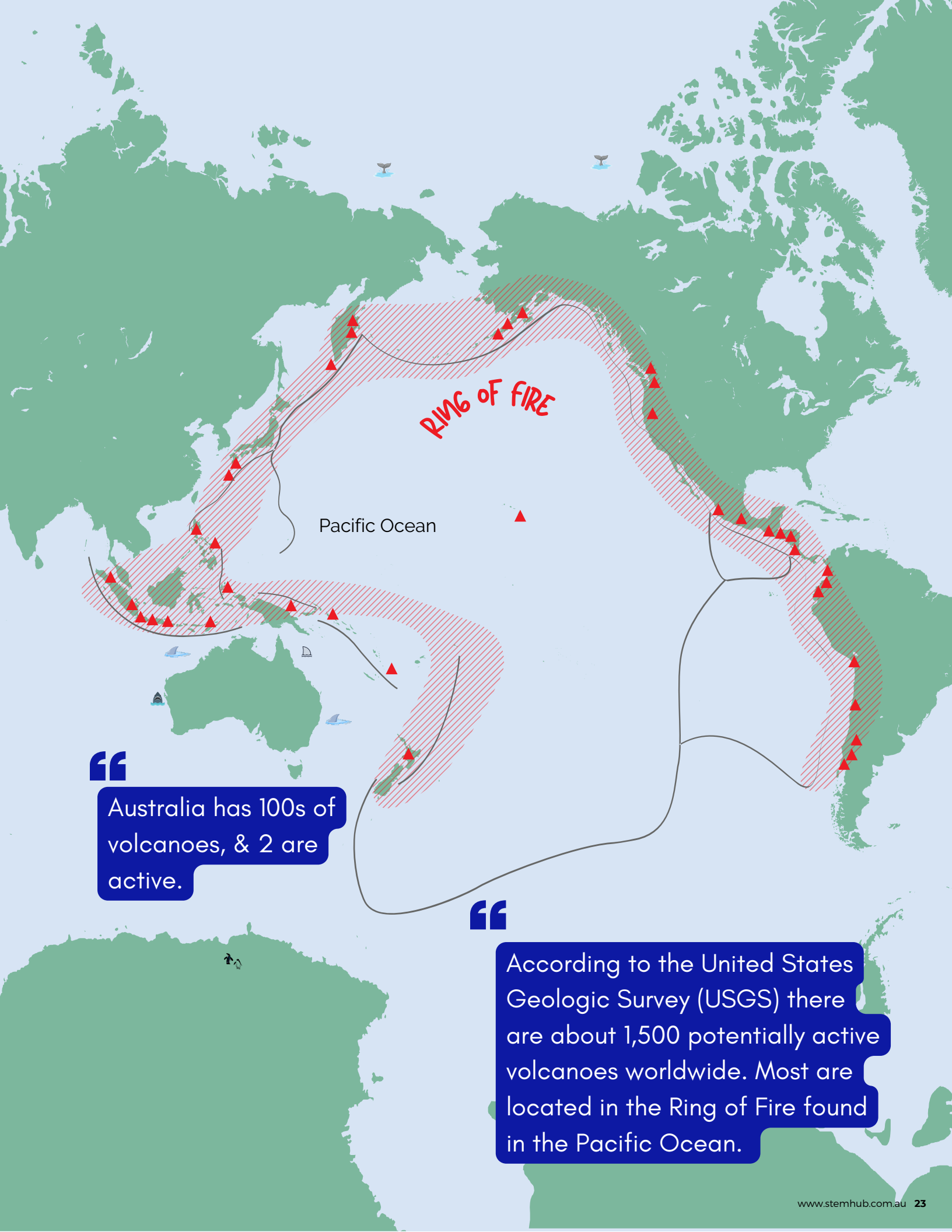
In an active volcano there's a chamber where **magma** (molten rock) collects. Under immense pressure the magma is forced through channels in the rock pushing its way out onto the surface. Once the magma flows on the surface it's called **lava**.

LAND & OCEAN VOLCANOES



Did you know that volcanoes are found on land and the ocean? Volcanoes that erupt on the ocean floor often create underwater mountains, but if the lava released is big enough these mountains become so large they actually create islands above the surface of the ocean. We here in Australia have examples of this really close by: New Zealand is one such island.





RING OF FIRE

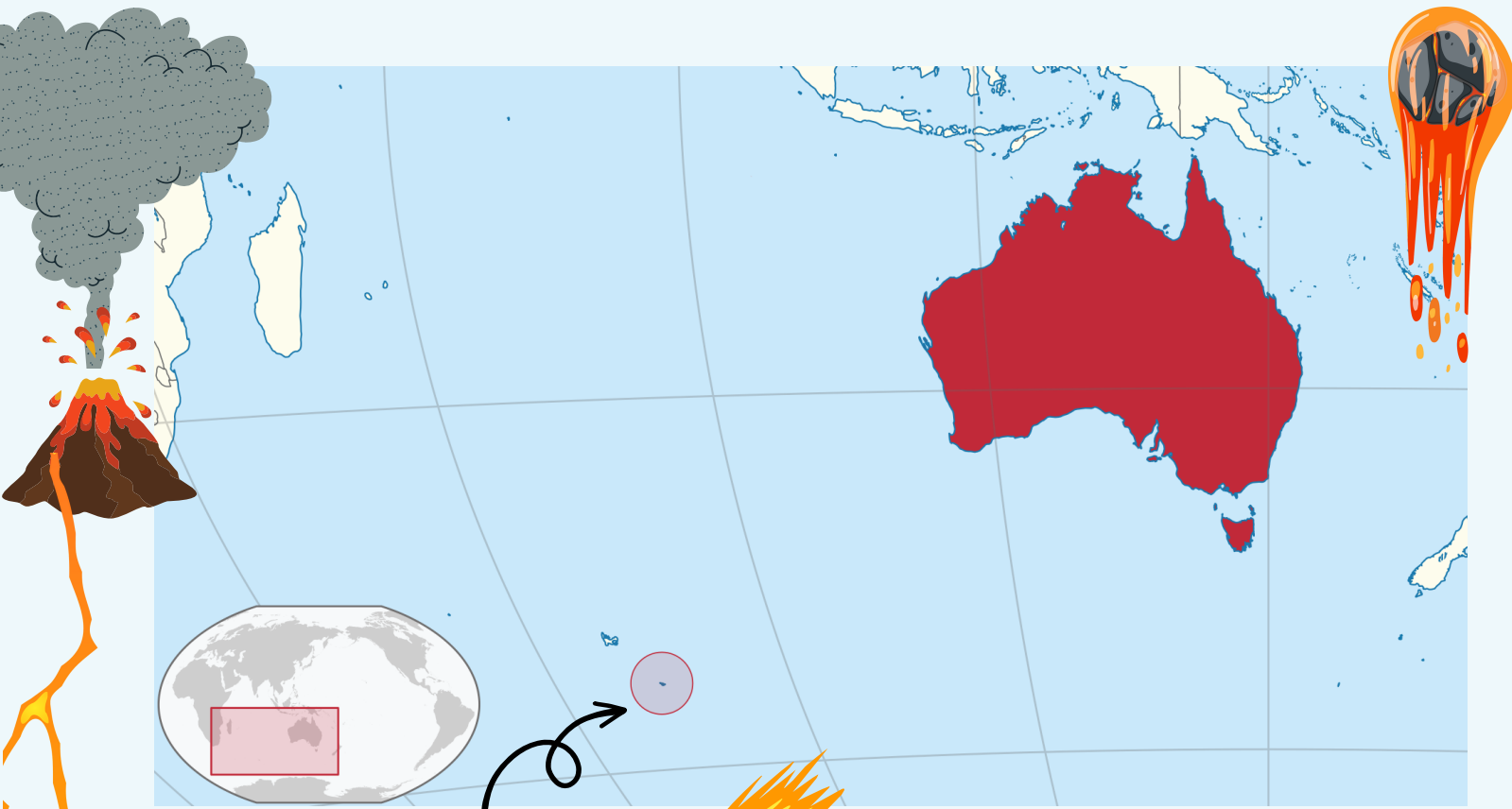
Pacific Ocean

“

Australia has 100s of volcanoes, & 2 are active.

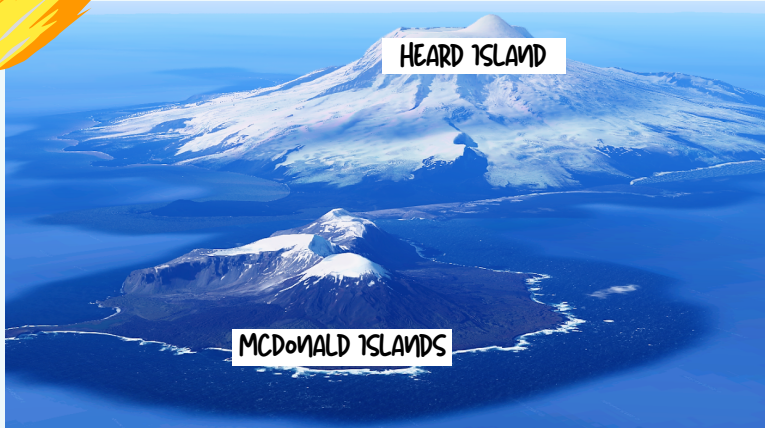
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According to the United States Geologic Survey (USGS) there are about 1,500 potentially active volcanoes worldwide. Most are located in the Ring of Fire found in the Pacific Ocean.



Australia's currently active volcanoes are **Heard Island**, and **McDonald Islands** (HIMI) which are a sub-Antarctic island group. These islands are located in the Southern Ocean, about 4,000 km south west of mainland Australia.

HIMI are managed by the Australian Antarctic Division which is based in Kingston, Tasmania. The Division leads, coordinates and delivers the Australian Antarctic Program. To find out more, go to www.antarctica.gov.au.



VICTORIAN VOLCANOES

THERE ARE HUNDREDS OF DORMANT VOLCANOES AND OTHER GEOLOGICAL FEATURES ACROSS VICTORIA'S WESTERN DISTRICT, ALL THE WAY TO THE BORDER OF SOUTH AUSTRALIA.



CHECK IT OUT



FIND AN AUSTRALIAN VOLCANO NEAR YOU

WANT TO BE A VOLCANOLOGIST?

The majority (44%) of volcanologists have a bachelors degree. You'll have to complete a degree in Geology or Earth Science. You can then go on to do post-graduate studies: 40% have a masters, and 15% a PhD.

WHERE TO STUDY?

The University of Queensland, Western Sydney University or Monash University.

MAKE & MAP YOUR VOLCANO ERUPTION



A COOL EXPERIMENT FROM NASA'S JET PROPULSION LABORATORY YOU CAN DO IN CLASS

WHAT YOU NEED:

1. White vinegar
2. Food dye
3. Baking soda
4. Paper towels
5. Paper cup
6. Piece of cardboard
7. 3 or more colours of playdough
8. Coloured pencils/crayons (that match the colours of the play dough)
9. 2 sheets of plain paper or graph paper
10. Tape, scissors
11. 1 to 3 drinking straws

Tag us
@stemhubaus
and show us your
experiment



INSTRUCTIONS:

- STEP 1** Cut off the top of the paper cup so it's only about 2 cm tall. Put the paper cut in the middle of the plain (or graph) paper and trace around the cup. This circle and cup represent the crater inside your volcano. Tape the cup to the cardboard. Mark north, east, south and west on both the paper and cardboard.
- STEP 2** Fill the cup with a spoonful of baking soda. Slowly pour in enough vinegar to make the mixture foam up and flow out of the cup (this is your lava). Using one of your coloured pencils, trace around the edge of where the lava flowed out. Wipe away the fluid with paper towel and cover the area with a thin layer of play dough (same colour as your pencil).

STEP 3

On your plain (or graph) paper, use a coloured pencil that matches the colour of your play dough you used in step 2, to draw the shape of your lava flow. NOTE: Make sure your cardinal directions match.

STEP 4

Repeat steps 2-3 three or four more times. Each time put down a new layer of play dough. Make sure you keep changing play dough colours so you can see different layers.

STEP 5

Trade your volcano with your class mate, or with a family member or friend. You'll now have to take core samples. Cut a plastic straw into thirds or fourths. Push an open end into the playdough lava flow until you reach the bottom, twist and pull out a core sample. Repeat this step several times in different places of the lava flow.

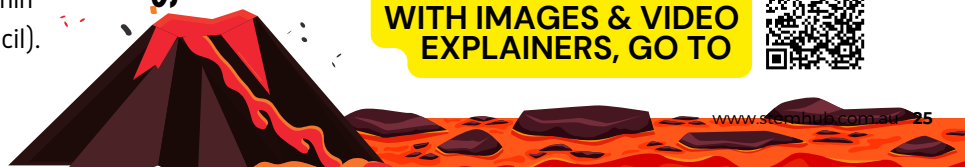
STEP 6

On a blank piece of paper draw a circle and cardinal directions like you did in step 1. Use your core samples to make predictions on where each layer of the volcano you're studying begins and ends. Now use coloured pencils that match the colours you find in the volcano to draw the layers on your graph paper.

STEP 7

Compare your map of your predictions with the map you created in steps 1 - 4.

FOR THE FULL GUIDE -
WITH IMAGES & VIDEO
EXPLAINERS, GO TO





Sea pink flower coral