

# national science week



## SCIENCE IN THE CENTRES

13-21 AUG 2022



An Australian Government Initiative



# WELCOME TO NATIONAL SCIENCE WEEK 2022

National Science Week is one of Australia's largest festivals, with an annual audience of over a million across more than 1000 events. It is a celebration of science, engineering, mathematics, technology, and innovation — and the people behind them!

National Science Week was first run in 1997 and offers an opportunity to acknowledge the contributions of Australian scientists to the world of knowledge. The festival also aims to encourage an interest in science pursuits among the general public and to encourage younger people to be fascinated by the world we live in.

## ACKNOWLEDGEMENT OF COUNTRY

ACT National Science Week takes place on the unceded lands of the Ngunnawal and Ngambri peoples. We would like to acknowledge and celebrate the traditional custodians of these unceded lands as the first scientists, technologists, engineers, and mathematicians.

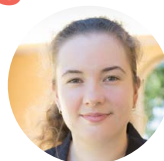
Ngunnawal and Ngambri peoples have cared for and nurtured these lands from time immemorial and we must recognise the immense value of Indigenous knowledges to science, to our lives, and to the world. We would like to pay our respects to Ngunnawal and Ngambri peoples and Elders, past and present. Always was, always will be Aboriginal land.

## A WORD FROM THE CHAIRS

Welcome to National Science Week! We're delighted about the range of science on offer this year and hope you find something that excites you, interests you, and inspires you. While many events are back in person, there's still lots that can be done remotely — check out the back page to find more great activities that you can do at home.

Stay safe and have fun!

Brittany Carter & Michelle Kothe  
Co-Chairs, ACT National Science Week Coordinating Committee



## SCIENCE IN THE CENTRES

This year National Science Week will be bringing science to you while you shop! Come past Westfield Belconnen, Westfield Woden, South.Point Tuggeranong, Cooleman Court, or the Canberra Centre to discover the exciting science behind growing mushrooms, engineering with Lego, parasites, geology, space, robotics, and much more!

A variety of hands-on science activities will be on display across the different locations during National Science Week (13<sup>th</sup>, 14<sup>th</sup>, 18<sup>th</sup>, 20<sup>th</sup>, and 21<sup>st</sup> of August). There is something for everyone so make sure you check out the schedule on the next page to find something exciting and learn something new!

## ABOUT THIS BOOKLET

This booklet features themed days for National Science Week. Each day will guide you through an activity, introduce a real-life scientist from the ACT, ask some thought-provoking questions, and suggest places to visit across the ACT.

Monday is about exploring the wonders of the human body, Tuesday is for celebrating the technology in our lives, Wednesday is for learning about the weather, Thursday is about understanding the science of taste, Friday is for getting out there and doing some fieldwork, Saturday is all about what things are made of and why, and Sunday is for appreciating the maths that is all around us!

Share your Science Week experiments, creations, and answers with us on Facebook (@ScienceWeekACT), Instagram (@ACTScienceWeek), or Twitter (@NSWk\_ACT) — or use the hashtag #ScienceWeek!



# SCIENCE IN



**Saturday 13  
August**

**Sunday 14  
August**

**Westfield  
Belconnen**

**Tesla Owners Club of  
Australia & Jerliz**

**Young Engineers  
Canberra**

**Canberra  
Centre**

**Geoscience Australia**

**Geoscience Australia**

**Australian Geospatial  
Intelligence  
Organisation**

**Geological Society of  
Australia**

**Westfield  
Woden**

**Australian  
National University  
Parasitology**

**Coolman  
Court**

**Royal Australian  
Chemical Institute**



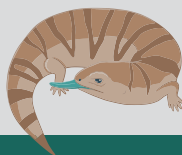
**South.Point  
Tuggeranong**

**Giggly Wiggly  
Balloons**

**ASTRO 3D**

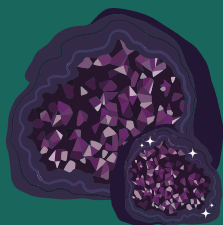
**Australian Science  
Innovations**

**GIO Stadium  
(Raiders vs  
Dragons)**



**Australian National  
University Earth  
Sciences**

# THE CENTRES



**Thursday 18  
August**

**Coolleman  
Court**

**Fungi Co**



**Saturday 20  
August**

**Sunday 21  
August**

**Canberra  
Centre**

**Academy of  
Interactive  
Entertainment**

**Canberra Daleks and  
Robots**

**Young Engineers  
Canberra**

**Westfield  
Woden**

**Australian Science  
Innovations**

**ASTRO 3D**

**Coolleman  
Court**

**Mount Stromlo  
Observatory**

**Tesla Owners Club of  
Australia & Jerliz**

See [inspiringtheact.org.au/science-in-the-centres](http://inspiringtheact.org.au/science-in-the-centres) for the most up-to-date schedule



**ScienceWeekACT**



**ACTScienceWeek**



**NSWk\_ACT**

# MUSCULAR MONDAY

Monday is about exploring the wonders of the human body!

Our bodies are incredibly complicated and capable of extraordinary feats. Scientists are always trying to understand more about how our bodies work!

## HANDS-ON: REACTION TIMER

Reaction time refers to the time taken for our bodies to react to a stimulus, for example, the starting gun of a race. It takes approximately 0.2 seconds for the visual information from our eyes to be processed by our brain, but our reaction time to sounds is much faster. Having a quick reaction time is important in many sports and it helps in everyday life. This activity is a simple way to measure your reaction.

### MATERIALS:

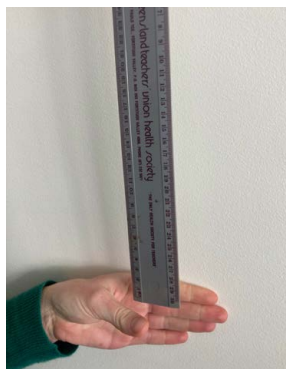
- Ruler
- Friend or family member

### METHOD:

1. Ask your friend or family member to hold the ruler vertically.
2. Place your hands at the 0 cm mark of the ruler without touching it.
3. Get your partner to drop the ruler without warning.
4. Catch the ruler as quickly as you can and use the table on the next page to find your reaction time.
5. Repeat steps 1-4 and test out other family members' or friends' reaction times.

### QUESTION:

- How do you think you could improve your reaction time?



## HARRY BROWN (HE/HIM)

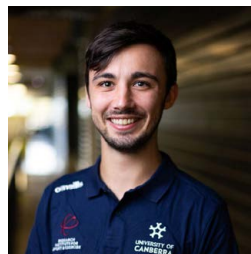
**JOB:** PhD Candidate at the University of Canberra Research Institute for Sport and Exercise Science

**WHAT THEY DO:** I research how humans adapt to hot conditions like during the summer months.

**HOBBIES:** Sport, being outside in the Sun, and drinking enough caffeine to fuel an army.

**SOMETHING INTERESTING THAT PEOPLE MIGHT NOT KNOW:**

Sweating is really good for us. Without it our bodies would overheat.



## QUESTION TIME: REACTION TIMER

*Match your distance in centimetres to your reaction time in seconds using the table below.*

cm on ruler	time (sec)	cm on ruler	time (sec)	cm on ruler	time (sec)	cm on ruler	time (sec)	cm on ruler	time (sec)
1	0.05	7	0.12	13	0.16	19	0.20	25	0.23
2	0.06	8	0.13	14	0.17	20	0.21	26	0.23
3	0.08	9	0.14	15	0.18	21	0.21	27	0.23
4	0.09	10	0.14	16	0.18	22	0.22	28	0.24
5	0.10	11	0.15	17	0.19	23	0.22	29	0.24
6	0.11	12	0.16	18	0.19	24	0.22	30	0.25

*Research which sports require athletes to have a fast reaction time. List them below.*



## ALL ABOUT THE ACT: SPORT AND SCIENCE

Head out to your local parkrun on a Saturday morning to test out your reaction time, warm up your muscles, and hopefully make some new friends!

There are eight parkruns across the ACT for you to participate in. Scan the QR code to find your local parkrun.



ScienceWeekACT




ACTScienceWeek



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# TECHNOLOGY TUESDAY

Tuesday is for celebrating the technology in our lives!

Technology has always been an important part of our lives, from our work to our home. All of the technology that you rely on was created by scientists and engineers. 

## HANDS-ON: BINARY JEWELLERY



Binary is a type of coding that is used by computers to make them simpler to build and to help them make fewer mistakes. It turns letters and numbers into a series of ones and zeroes. In this activity you will use the binary code to make a bracelet or necklace that says your name.

### MATERIALS:

- Beads (two different colours)
- Elastic
- Scissors
- Coloured pencils
- Paper

A	00001	N	01110
B	00010	O	01111
C	00011	P	10000
D	00100	Q	10001
E	00101	R	10010
F	00110	S	10011
G	00111	T	10100
H	01000	U	10101
I	01001	V	10110
J	01010	W	10111
K	01011	X	11000
L	01100	Y	11001
M	01101	Z	11010

### METHOD:

1. Write out your name in binary using the chart pictured. For example, 'ACT' in binary would be '00001 00011 10100'.
2. Pick which bead colour will represent '1' and which will be '0'.
3. Cut a long section of elastic and stick one end on to a surface.
4. Using the code you wrote out, thread the beads onto the elastic in the correct order.
5. Once complete, tie the ends of the elastic together — your jewellery is now ready to be worn!



### QUESTIONS:

- Why is the code called 'binary'?
- What other words can you write?





## DR BIANCA CAPRA (SHE/HER)

**JOB:** Senior Lecturer in Aeronautical Engineering at UNSW Canberra

**WHAT THEY DO:** I research how to make sure that flight vehicles stay intact while flying really fast.

**HOBBIES:** I enjoy running, cycling, and building Lego.

**COOLEST THING ABOUT YOUR JOB:** I get to use high speed wind tunnels where the air travels faster than 9000 km/h!

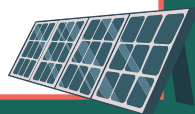


## QUESTION TIME: UNCOVERING TECH

*Technology has come a long way in your lifetime and is constantly evolving. Ask your family what technology was like when they were your age and list some examples below.*

*There are many great technological innovations and some were even created here in Australia, such as WiFi. What organisation created WiFi?*

*All new technology advancements come from someone's great idea. If you could create a new technology, what would it do?*



CSIRO created WiFi!

## ALL ABOUT THE ACT: TECHNOLOGY

To see some great new technology, take a trip to Questacon, discover the amazing radio telescopes at the Tidbinbilla Tracking Station, or why not check out the Mt Majura Solar Farm?

There are also some great National Science Week tech events you can check out:

- Game Plus Fest
- Canberra Kids SecuriDay
- Experiment in STEM with Robogals Canberra

# WEATHER WEDNESDAY

Wednesday is for learning about the weather!

To understand the weather, scientists need to observe, measure, and predict the natural world. Here in the ACT, we experience many different types of weather.

## HANDS-ON: MAKE IT RAIN IN A JAR

When clouds become too saturated with water, the water falls down as rain. In this experiment, the shaving cream is the cloud and the coloured water is the rain. As you drop the coloured water onto the cloud, the weight of the water forces itself through the cloud to 'rain' down into the jar.

### MATERIALS:

- 1 large clear jar or glass
- Shaving cream
- Liquid food colouring mixed in water
- Dropper
- Water

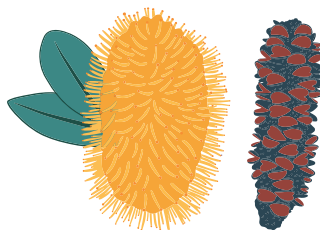
### METHOD:

1. Fill the jar halfway with water.
2. Cover the top with shaving cream.
3. Drop the food colouring onto the shaving cream and watch the 'rain' make its way through the 'cloud' and into the water!



## UP CLOSE AND PERSONAL: BANKSIA MARGINATA

*Banksia marginata* is a native plant that is commonly found in bushfire-prone areas throughout Australia, including the ACT. When a bushfire occurs, many of these plants are wiped out. However, they have adapted to be able to quickly regenerate from seeds after bushfires. The fire actually stimulates the opening of the seeds so that more plants can grow!



## BRADLEY MOGGRIDGE

**JOB:** Associate Professor in Indigenous Water Science, University of Canberra

**WHAT THEY DO:** I am a full-time researcher, finding opportunities to use Indigenous Traditional Knowledge to influence Western water management.

**HOBBIES:** My family, culture, golf, and building old-school BMX.

**COOLEST THING ABOUT YOUR JOB:** I have the opportunity to listen to some of the oldest water stories on the planet.



## QUESTION TIME: CLIMATE

*Weather is how hot or rainy it is on a given day, whereas climate is what the weather does over years or decades. Australia is prone to drought, which happens when the climate is very dry — can you think of some ways for Australia to conserve water in a drought?*

*Indigenous peoples have an expert understanding of weather and climate (scan the QR code for weather information from different Indigenous Countries). What are the differences between the four seasons you are familiar with and an Indigenous understanding of seasons in Australia?*



## ALL ABOUT THE ACT: WEATHER

Places to visit:

- Questacon has an exhibition that generates lightning!
- There are many weather-related sculptures in the ACT that use wind to move! For example, the 'Wind Sculpture' in Civic, 'Journeys' at the airport, 'Droplet' at Woden, and 'Dinornis Maximus' on Adelaide Avenue.
- Check out the Fog Sculpture at the National Gallery.



# TASTY THURSDAY

Thursday is all about understanding the science of taste.

There is an array of different materials in foods which give them their varying tastes, and scientists are always working to make food tastier, healthier, and more sustainable!

## HANDS-ON: MAKE YOUR OWN SHERBET

Sherbet is a fizzy treat enjoyed by many generations. It contains citric acid and bicarbonate of soda which dissolve in the saliva on your tongue and react to produce carbon dioxide gas, which creates the fizzing sensation. Follow this simple recipe to make and enjoy your own sherbet.

### MATERIALS:

- 2 tablespoons of icing sugar
- 1 teaspoon of citric acid
- 1 teaspoon of bicarbonate of soda
- 3 tablespoons of jelly crystals

### METHOD:

1. Combine the ingredients together in a bowl and mix.
2. Taste it!

### QUESTIONS:

- Try adding slightly more citric acid and then bicarbonate of soda to your sherbet mixture. How do they each affect the taste of your sherbet?



## UP CLOSE AND PERSONAL: MICROSCOPE

Microscopes are tools that let us see things too small to see with just our eyes alone. They work by precisely bending and focusing light using specially made glass lenses, similar to the glass in eyeglasses, binoculars, or even telescopes. Microscopes are useful to scientists studying the natural world, including food science, as they let us investigate the cells inside plants and animals and check for bad bacteria to make sure our food is safe to eat.



## PETER WENZEL (HE/HIM)

**JOB:** Mycologist (mushroom scientist) and Director of Fungi Co

**WHAT THEY DO:** We provide education and outreach to schools and groups interested in fungi, foraging, and growing mushrooms. We also grow fungi for food, dyes, textiles, and other bio-materials.

**HOBBIES:** Tai chi, gardening, and growing mushrooms!

**FAVOURITE SCHOOL SUBJECTS:** I enjoyed science and fine art — both were relevant as I've made paper and ink out of mushrooms!



## QUESTION TIME: FOOD SCIENCE

*What is your favourite flavour of food? Ask your friends and family for their favourite flavours of food and record them below.*

*Flavour is created from a combination of molecules in the food. Research what molecules are in your favourite flavour of food and list them below.*

*Unfortunately, a lot of food is not eaten and goes to waste. What are some ways you could reduce the amount of food going to waste?*



## ALL ABOUT THE ACT: SUSTAINABLE FOOD

- Head to your local community garden to check out the foods your community is growing.
- Research Canberra Seed Savers for some local events near you.
- Check out GoTerra, an organisation that is coming up with innovative solutions to the food waste problem.

# FIELDWORK FRIDAY

Friday is for getting out there and doing some fieldwork!

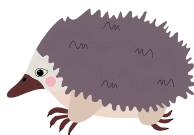
Different types of scientists do their work in different places. Some work in laboratories, some work in offices, and some work outside in nature!

## HANDS-ON: DISCOVERING ECHIDNAS

Did you know that during National Science Week is one of the best times to spot echidnas? Echidnas only breed from July to September each year, so this is the best time to spot them as they are most active!

You can help scientists learn more about echidnas by downloading the Echidna CSI app, taking photos of echidnas, and collecting echidna pool!

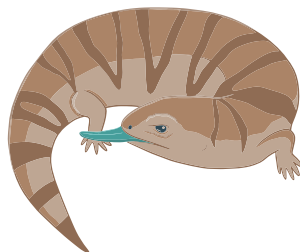
Scan the QR code to download the Echidna CSI app.



## UP CLOSE AND PERSONAL: BLUE-TONGUES

Blue-tongued lizards are native to Australia and can be recognised by their characteristic blue tongue! Like all lizards, blue-tongues can't make their own body heat, so they use the warmth of their environment to warm themselves up. This is why you might see lizards (and snakes!) sun-baking on rocks.

When they get scared, blue-tongues stick out their tongues to scare off the predator. If you see a blue-tongue you should watch it from a distance and make sure you don't pick it up — it might bite!



## MEENA SIVAGOWRE SRITHARAN (SHE/HER)

JOB: Plant Ecologist

WHAT THEY DO: I try to understand why plants can be rare across different ecosystems, in the hope of helping conserve threatened species.

HOBBIES: I love to read, crochet, and go on slow bushwalks, trying to identify and photograph all sorts of things I see from orchids to giant trees and fungi!

WHAT DID YOU WANT TO BE WHEN YOU GREW UP: A scientist, an environmental scientist, and a researcher.



## QUESTION TIME: PLANTS AND ANIMALS

*Native plants are those that occur naturally in an area where they have evolved over many thousands of years. Can you think of some examples of plants native to the ACT?*



*If you could be any animal, what would you be and why?*

*Bees are important as they help pollinate plants. Over one third of all crops rely on bees to grow! How many species of native bees are there in Australia?*

A. Five

B. 13

C. 120

D. Over 1650

The correct answer is D. Over 1650!

## ALL ABOUT THE ACT: FIELDWORK

There are lots of places where you can do your own fieldwork in Canberra! Try the Australian National Botanic Gardens, National Arboretum Canberra, Tidbinbilla Nature Reserve, Mulligans Flat Nature Reserve, Jerrabomberra Wetlands, Goorooyarroo Nature Reserve, or scan the QR code to find your local nature park!



ScienceWeekACT



ACTScienceWeek



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# SHATTERING SATURDAY

Saturday is all about what things are made of and why!

Some materials are strong, while others are flexible or maybe even reflective. Scientists use all kinds of materials and even make new ones!

## HANDS-ON: MAKE SOME OOBLECK

One really weird kind of material is called 'oobleck' and it's sort of halfway between a solid and a liquid. The best part is that you can easily make it at home!

### MATERIALS:

- 1 cup of water
- 2 cups of cornflour
- A few drops of food colouring

### METHOD:

1. Mix the ingredients together (add more cornflour if it's a bit too runny).
2. Play with it! Poke it, tear it, and let it run through your fingers. Be creative — but watch the mess!



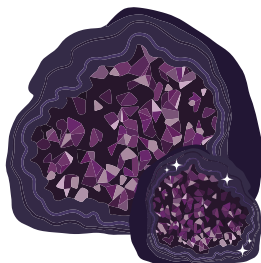
### QUESTIONS:

- In what ways is oobleck like a liquid? In what ways is it like a solid?
- Can you think of a use for oobleck?



## UP CLOSE AND PERSONAL: GEODE

Have you ever seen a geode? They look like ordinary rocks on the outside, but when cut open they reveal beautiful crystals such as quartz, amethyst, or agate. Geodes are formed over thousands or even millions of years as layers of crystal grow inside bubbles trapped in volcanic rock (rock that used to be lava!). Crystals are very interesting and useful materials in science, and scientists can still learn a lot from using or studying crystals made by nature.





## DR ROSE AHLEFELDT (SHE/HER)

**JOB:** Senior Research Fellow at the ANU Research School of Physics

**WHAT THEY DO:** I study the properties and interactions of atoms in crystals using lasers.

**HOBBIES:** I've always liked making things. At the moment, I'm spending time doing DIY work around the house, sewing, and building up a garden.

**WHAT MADE YOU WANT TO BE A SCIENTIST:** I've always had a bit of a research bent — I loved projects at school where I got to learn things for myself. I also really enjoy teaching and supervising students, so an academic job was a natural fit.



## QUESTION TIME: THINKING ABOUT MATERIALS

*Plants and animals use materials too! Wood in trees is both strong and flexible, fur keeps animals warm in the cold, and birds coat their feathers in a special oil to keep dust and water out. Think of some other natural materials and list their properties below.*

*Scientists can learn a lot from nature! Think about a material in nature like feathers, wood, or crystal and think about a problem that we could solve using that material. Be creative!*

## ALL ABOUT THE ACT: MATERIALS

Materials are everywhere! Go for a walk through your street or in the city, as well as out in nature. What kinds of different materials do humans and nature use? Do any of these materials do the same thing? Visit the Canberra Glassworks for an up-close look at glass-making. The Glassworks is in Kingston, ACT, and there they use the *science* of making different kinds of glass with different properties to make art.



# SUBTRACTION SUNDAY

Sunday is for appreciating the maths that is all around us!

Did you realise that we have been studying maths all week? We used rulers and timers, counted numbers and created codes, observed and predicted patterns, and measured ingredients and material properties.



## HANDS-ON: FUN WITH ORIGAMI



Origami is the art of folding paper to create two- and three-dimensional shapes.

Origami involves symmetry, geometry, and asking yourself mathematical questions about how to fold the paper in the right way to get the shape you want and how big or small your starting paper should be.

There are so many different types of origami ideas you can find by searching on Google or YouTube. Below are some pictures for you to follow to create a nine-pointed star — just repeat steps 1-7 with nine pieces of paper and join them together to make the star.

STEP 1



STEP 2



STEP 3



STEP 4



STEP 5



STEP 6



STEP 7



STEP 8



STEP 9



## DR JOAN LICATA (SHE/HER)

**JOB:** Associate Professor at the ANU Mathematical Sciences Institute

**WHAT THEY DO:** My research is in pure mathematics, so a lot of the time I'm working with pen and paper rather than in a lab or on a computer.

**HOBBIES:** I enjoy making things, reading, food, word games, and spending time with friends and family.

**SOMETHING PEOPLE MIGHT NOT KNOW:** Coloured pens are one of my chief technical tools, since my field of mathematics (topology) requires drawing a lot of pictures.



## QUESTION TIME: MATHS IS ALL AROUND YOU

*Have you ever noticed the difference between natural shapes and human-made shapes? How many squares do you see driving through the city compared to how many you see going on a bushwalk? Where are squares more common?*

*A fractal is a never-ending pattern. Fractals can be found in nature, for example, lightning, leaves on a fern, or a snowflake (see the graphic below!). Can you think of any others that you have seen in your garden or neighbourhood?*

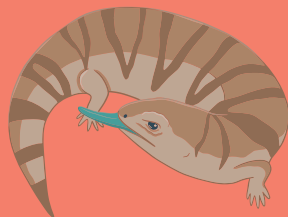
## ALL ABOUT THE ACT: MATHS

Mathematics is all around us! It includes concepts such as geometry, symmetry, patterns, trends, and making sense of data and information we observe.

Think about the places you have visited this week. Can you think of how maths is used in all different types of science?



# national science week



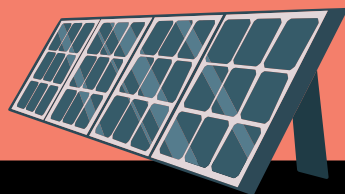
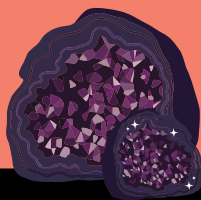
Scan the QR code for  
more fun activities  
and resources!



Or find an event  
near you by visiting  
[scienceweek.net.au](http://scienceweek.net.au)



#ScienceWeek  
#ScienceWeekACT



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