



# national science week

## National Science Week Trivia

### National Science Week

National Science Week is Australia's annual celebration of all things science and technology, with more than 1000 events in museums, science centres, universities, libraries, schools and a myriad other places. It's your chance to see science, talk science and do science.

### Register your event

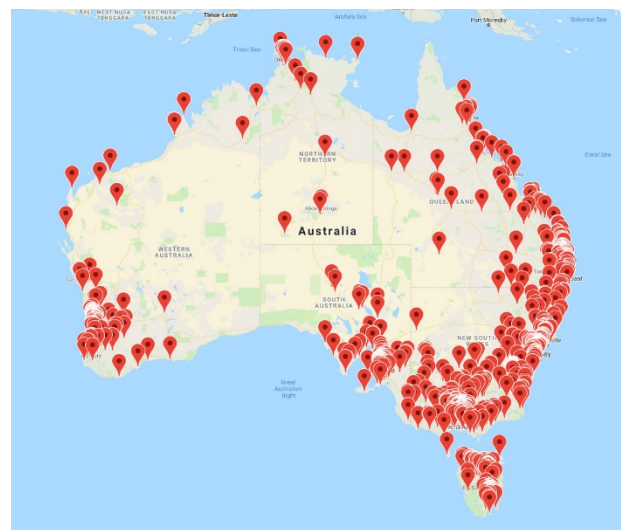
Be sure to register your National Science Week trivia event on our website – it's quick and you'll become part of our event map.

If you have an in-house booking system or use services like Eventbrite you can include the link or other contact information with the event listing.

<https://www.scienceweek.net.au/event-holder-registration/>

Register and publicise your event far enough in advance so that people have the chance to register to join in individually or as a team.

*You can mark the event as private if it isn't for other people to attend.*



### Tag us!

We'd love to hear from you when you are holding your event – tag social media photos with #scienceweek or include our account handles:

Twitter	aus_scienceweek
Instagram	nationalscienceweek
Facebook	nationalscienceweek

*Speaking of online - please don't publish these questions and answers online – they'll be able to be discovered by curious participants!*



## Round 1: Space Science

- Q1 Name the astronaut who hit a golf ball on the Moon.
- Q2 Which other planet in the Solar System has a surface gravity closest to that of the Earth?
- Q3 What type of animal was the first living thing to be launched into space by humans?  
*Bonus point: What was its name?*
- Q4 What is thought to be at the centre of most galaxies in the Universe?
- a. Supernova
  - b. Supermassive black hole
  - c. Pulsar
  - d. Planetary nebula
- Q5 Apart from the Sun, what is the closest star to the Earth?
- Q6 How long does it take light from the surface of the Sun to reach the Earth?
- Q7 Eris, Haumea, Makemake and Ceres are all examples of what?
- Q8 According to stories from many Indigenous Australian groups, what animal can be seen in the dark patches of the Milky Way, stretching across a large area of the sky?
- Q9 The International Space Station orbits the Earth at a speed of nearly:
- a. 30 kilometres per hour
  - b. 300 kilometres per hour
  - c. 3000 kilometres per hour
  - d. 30 000 kilometres per hour
- Q10 Who was the first person to observe a moon orbiting a planet other than the Earth?

## Answers

- A1 Alan Shepard, 1971, Apollo 14 commander
- A2 Saturn, with surface gravity of 10.4 metres per second squared compared to  $9.8\text{m/s}^2$  on Earth
- A3 It was a dog and her name was Laika. She was launched on a one-way journey on the Soviet satellite Sputnik 2. She died a few hours after launch due to overheating and stress.
- A4 b. Supermassive black hole
- A5 Proxima Centauri, or sometimes known as Alpha Centauri C. Alpha Centauri is made up of three stars (A, B and C) and is the brightest star in the constellation of Centaurus. It is one of the 'Two Pointers' that form a line pointing at the Southern Cross.
- A6 8 minutes. However, it can take 100 000 years for a photon of light to travel from the core of the Sun to the Sun's surface because the Sun is so dense.
- A7 Dwarf planets. Pluto is also a dwarf planet.
- A8 Emu
- A9 d. 30 000 kilometres per hour (27 724 kilometres per hour, or 16 orbits every 24 hours)
- A10 Galileo Galilei. In 1610, he saw the four largest moons of Jupiter using an early telescope and named them Io, Europa, Castillo and Ganymede.



## Round 2: Extreme Science

- Q1 Where is the coldest place on Earth?
- Q2 Which Australian state or territory has recorded the highest maximum daily temperature?
- Q3 What is the largest living organism on Earth?
- Q4 What racquet sport has the fastest recorded hit?
- Q5 Where is the smallest bone in the human body?
- Q6 Where is the largest muscle in the human body?
- Q7 What is the strongest known material?
- Q8 What is the hottest planet in the Solar System?
- Q9 What is the deadliest animal on Earth?
- Q10 What was the loudest reported sound on Earth?

## Answers

- A1 Antarctica. Coldest temperature recorded, East Antarctic Plateau, -93 degrees Celsius, on 10 August 2010.
- A2 Western Australia. Mardie Station, 50.5 degrees Celsius, on 19 February 1998.
- A3 A fungus, known as 'honey fungus', *Armillaria solidipes*, measuring 3.8 km across.
- A4 Badminton. The world record is 426 kilometres per hour.
- A5 Ear. It is the stapes bone, a stirrup-shaped bone in the middle ear which is about the size of a grain of rice.
- A6 Buttocks. *Gluteus maximus* is the largest of the three muscles in the gluteal group. The other two are *gluteus medius* and *gluteus minimus*.
- A7 Graphene – a form of carbon.
- A8 Venus. A thick atmosphere of carbon dioxide on Venus traps heat via the greenhouse effect.
- A9 Mosquito. 750 000 deaths per year.
- A10 The eruption of Mount Krakatoa in 1883, heard in Perth more than 3100 km away, with a loudness estimated at 180 decibels at the volcano.





## Round 3: Living Science

- Q1 Which of the following might you find communicating by doing a 'waggle dance'?
- a. Brolga
  - b. Bee
  - c. Brown bear
  - d. Beyoncé
- Q2 True or false? The male platypus is venomous.
- Q3 What does a female spider wasp usually do with a captured huntsman spider?
- Q4 What Australian national symbol could be described as featuring living things with the following scientific names: *Dromaius*, *Macropus* and *Acacia*?
- Q5 In Australia, what animal is most likely to kill you?
- Q6 Why was the cane toad introduced to Australia?
- Q7 What animal has the greatest recorded bite force?
- Q8 The world's largest species of earthworm, the giant Gippsland earthworm (*Megascolides australis*), is native to a small area of Victoria. To the nearest metre, how long can these worms grow?
- Q9 In addition to the senses of sight, smell, taste, touch and hearing, sharks have another sense. What can they detect?
- Q10 If a human's average heart rate is about 60-100 beats per minute, what is the heart rate of a hummingbird in flight?
- a. 500 beats per minute
  - b. 800 beats per minute
  - c. 1200 beats per minute
  - d. 2000 beats per minute

## Answers

- A1 Bee. They dance in a pattern to communicate information about the direction to food sources.
- A2 True. They have a venomous spur on each hind leg.
- A3 Lays an egg inside the spider's body. It paralyses the spider, lays a single egg in the spider's abdomen, and the growing wasp larva eats the spider from the inside out.
- A4 Australian Coat of Arms: Emu, kangaroo and wattle.
- A5 Horse, mostly from falls.
- A6 To control beetles that damaged cane crops: native grey-backed cane beetle (*Dermolepida albohirtum*) and Frenchi beetle (*Lepidiota frenchi*)
- A7 Saltwater crocodile (*Crocodylus porosus*)
- A8 3 metres. The species is listed as being vulnerable due to habitat loss.
- A9 Electricity, electrical potential, or electric fields. Electroreception has also been found in fish, dolphins and the platypus.
- A10 c. 1200 beats per minute



## Round 4: Medical Science

- Q1 Which of the following structures is NOT part of the human body?
- a. Islets of Langerhans
  - b. Canal of Schlemm
  - c. Ampullae of Lorenzini
  - d. Bowman's capsule
- Q2 What is the main organ of the body that would be treated by a nephrologist?
- Q3 Which of the following illnesses is not caused by a virus?
- a. Common cold
  - b. Whooping cough
  - c. Polio
  - d. Chicken pox
- Q4 Name the three chemical elements that make up most of the human body.
- Q5 If there are 270 bones in the body of a human at birth, how many bones are in the body of an adult human?
- a. 283
  - b. 274
  - c. 237
  - d. 206
- Q6 What is a metatarsal?
- Q7 Allergic reactions are a response by what body system?
- Q8 To the nearest metre, what is the length of the adult human digestive tract?
- Q9 How many weeks does a human taste bud typically live?
- Q10 What is the medical term for low blood sugar?

### Answers

- A1 c. Ampullae of Lorenzini – these are electroreceptors in fish. The Islets of Langerhans are in the pancreas, the Canals of Schlemm are in the eyes, and Bowman's capsules are in the kidneys.
- A2 Kidney
- A3 Whooping cough. It is caused by a bacterial infection of *Bordetella pertussis*.
- A4 Oxygen (65%), carbon (18.5%) and hydrogen (9.5%)
- A5 d. 206. Some bones fuse together between birth and adulthood.
- A6 Foot bone. They are the long bones that are connected to the toe bones (phalanges).
- A7 Immune system
- A8 About 9 metres. The digestive tract is made up of the mouth, oesophagus, stomach, small intestine, large intestine, and anus.
- A9 Two weeks. As a person ages, not all of their taste buds are replenished and an older person can have half as many taste buds as a child.
- A10 Hypoglycaemia



## Round 5: Tiny Science

- Q1 In molecular biology, what term is commonly used for the technology that utilises ‘clusters of regularly interspaced short palindromic repeats’?
- Q2 The scanning tunnelling microscope kick started which field of tiny science?
- Q3 When tiny particles of gold, less than 100 nanometres in size, are suspended in water, what colour do they appear?
- Q4 The morpho butterfly gets its blue colour from:
- a. Photonic crystals in the scales of its wings
  - b. Eating native blueberries
  - c. Pigmented hair fibres
  - d. Reflecting the colour of the sky
- Q5 Cells are said to be the building blocks of life. Are all cells microscopic?
- Q6 What type of tiny animal lives on human eyelashes, feeding on dead skin cells?
- Q7 What is smaller: a virus particle or a bacterial cell?
- Q8 Bubbles and oil slicks can have a rainbow of colours due to what nanoscale phenomenon?
- Q9 Bacteria have been discovered surviving on air, producing energy from hydrogen, carbon dioxide and carbon monoxide gases. On what continent was this discovered?
- Q10 What is the average total weight of bacteria living inside and on the surface of a 70 kg person?
- a. 50 grams
  - b. 200 grams
  - c. 1 kilogram
  - d. 5 kilograms

## Answers

- A1 CRISPR, also known as CRISPR-Cas9. It is technology for editing DNA and was developed from an immune defence process found in bacteria.
- A2 Nanoscience or nanotechnology. The scanning tunnelling microscope allows for imaging of individual atoms.
- A3 Red. This is called colloidal gold. Larger particle sizes can give a purple appearance and when the particles are big enough they appear gold in colour.
- A4 a. Photonic crystals in the scales of its wings. These nanoscale structures scatter different wavelengths of light in different ways, creating an iridescent effect.
- A5 No. Marine algae, pollen grains, and squid neurons can all be seen with the naked eye.
- A6 Eyelash mites. They are only about 0.4mm long and about 50% of people have them.
- A7 Virus particle, or virion. Most viruses are between 20 and 400 nanometres (billionths of a metre) in size. Bacteria range in size from 0.2 to 10 microns (millionths of a metre).
- A8 Thin film interference. Light is reflected off the front and back surfaces of the bubble film, resulting in different colours becoming brighter or darker depending on the thickness of the film. Bubble films go black just before they pop.
- A9 Antarctica. The discovery has raised the question of whether life on other planets could possibly be supported by atmospheric gases.
- A10 b. 200 grams



## Round 6: Earth Science

- Q1 Which of the following is NOT a renewable source of energy?
- a. Solar
  - b. Wind
  - c. Oil
  - d. Hamsters in wheels
- Q2 Per molecule of gas in the atmosphere, which contributes more to global warming: methane or carbon dioxide?
- Q3 To the nearest 10%, what percentage of the Earth's surface is covered with water?
- Q4 What is the only gem that is made up of atoms of a single element?
- Q5 Earthquakes are caused by the movement of what structures in the Earth's crust?
- Q6 What does the Japanese word "tsunami" mean when literally translated into English?
- Q7 The 2017 discovery of a rock shelter near Kakadu National Park provided evidence that humans reached Australia at least how long ago?
- a. 35 000 years
  - b. 65 000 years
  - c. 100 000 years
  - d. 1 million years
- Q8 True or false: Uluru was once at the bottom of the ocean.
- Q9 What type of rock is formed from molten rock that has cooled?
- Q10 Which gas makes up most of the Earth's atmosphere?

### Answers

- A1 c. Oil. It is a fossil fuel like coal and natural gas, formed over millions of years, and with a limited total supply on Earth.
- A2 Methane, but there is a lot more carbon dioxide in the atmosphere than there is methane.
- A3 71%, or 70% to the nearest 10%
- A4 Diamond. Diamonds are formed deep below the surface of the Earth under great temperature and pressure. Each carbon atom in a diamond is bound to four other carbon atoms via strong covalent bonds, making diamond a very hard material.
- A5 Tectonic plates. They move about as fast as a person's fingernails grow.
- A6 Harbour wave
- A7 b. 65 000 years (18 000 years earlier than previously thought)
- A8 True. Uluru began forming about 550 million years ago. Sand that eventually became Uluru was covered by sea for about 100 million years and the pressure of the water turned the sand into the hard sandstone of Uluru.
- A9 Igneous. The other main types of rock are sedimentary and metamorphic.
- A10 Nitrogen (N<sub>2</sub>) at 78%



## Round 7: Chemical Science

- Q1 True or false: A snowflake is a crystal
- Q2 If the chemical symbol for hydrogen is 'H', what are the chemical symbols for the following elements: tin, lead, gold and silver?
- Q3 A plutonium atom is 244 times the mass of a hydrogen atom. What is the diameter of a plutonium atom in multiples of hydrogen atoms?
- Q4 Which three metals are in an Australian one dollar coin?
- Q5 Compared to fresh water, the melting point of salt water is:
- Higher
  - Lower
  - About the same
- Q6 Which of the following is a chemical reaction?
- Sugar dissolving in water
  - Ice melting
  - Iron rusting
  - Prince Harry meeting Meghan Markle
- Q7 What shape is a buckminsterfullerene molecule?
- Q8 To make a popular type of slime, what toxic chemical is added to PVA glue to act as a cross-linking agent?
- Q9 What colour is liquid oxygen?
- Q10 What chemical is commonly used in both hair dyes and glow sticks?

## Answers

- A1 True. It is an ice crystal.
- A2 Sn (tin), Pb (lead), Au (gold), Ag (silver)
- A3 The size is only about 3 times the diameter of a hydrogen atom ( $3 \times 0.24$  nanometres) due to forces of attraction between positive charges in the nucleus and negatively charged electrons.
- A4 Copper (92%), Aluminium (6%), Nickel (2%)
- A5 b. Lower (for example, seawater freezes at  $-2\text{ }^{\circ}\text{C}$ )
- A6 c. Iron rusting – the formation of iron oxide from a reaction between iron and oxygen in the presence of water.
- A7 Ball, sphere, or soccer ball. It was named after Buckminster Fuller who designed geodesic domes that look like the molecule's structure.
- A8 Borax or boric acid. It is also a key ingredient in the manufacture of Silly Putty.
- A9 Blue
- A10 Hydrogen peroxide





## Round 8: Prehistoric Science

- Q1 What is a coprolite?
- Q2 When did humans and dinosaurs co-exist?
- Q3 The stegosaurus had a brain the size of a:
- a. Rockmelon
  - b. Lemon
  - c. Walnut
  - d. Peanut
- Q4 The word 'dinosaur' is made up of two Ancient Greek words that mean what?
- Q5 What modern day animals do many believe are direct descendants of dinosaurs?
- Q6 True or False: There is evidence that *Tyrannosaurus Rex* lived in South America and Europe.
- Q7 The oldest fossils of humans found in Africa were from people who lived how long ago?
- Q8 What appeared on Earth first: dinosaurs or flowering plants?
- Q9 In which states or territories of Australia have dinosaur fossils NOT been found?
- Q10 Which of the following is NOT a type of dinosaur?
- a. Muttaburrasaurus
  - b. Oviraptor
  - c. Pteranodon
  - d. Ankylosaurus

## Answers

- A1 A fossilised faeces (poo). Because they have been fossilised, they don't smell.
- A2 Never, except in books, movies and cartoons like the Flintstones.
- A3 Walnut. T. Rex on the other hand had a relatively big brain – it was larger than a human brain.
- A4 Terrible lizard
- A5 Birds. Fossil records suggest that birds evolved from a group of small meat-eating dinosaurs.
- A6 False: T. Rex fossils have been found in North America and Asia
- A7 200 000 years
- A8 Dinosaurs. Flowering plants were the last type of plants to evolve on Earth.
- A9 The Northern Territory and Tasmania
- A10 c. Pteranodon. This is a flying reptile that lived during the Cretaceous period.





## Round 9: Cutting Edge Science

- Q1 In what year were gravitational waves first detected?
- Q2 Scientists believe that less than 5% of the Universe is made up of atoms and about 27% is dark matter. What makes up the other 68%?
- Q3 Scientists are working on techniques for de-extinction to bring back what ancient beast that roamed the arctic?
- Q4 What type of computing relies on the science of superposition and entanglement?
- Q5 What is the term used for tiny machines being developed that are small enough to act on individual cells inside the human body?
- Q6 What unusual cargo did Elon Musk send into space on the Falcon Heavy rocket in 2018?
- Q7 True or False: The Microsoft artificial intelligence chat bot called Tay was shut down for making racist statements on Twitter.
- Q8 To colonise Mars, which of the following issues will people need to deal with:
  - a. Lower gravity on Mars than on Earth
  - b. Low oxygen levels in the Martian atmosphere
  - c. High levels of radiation from the Sun
  - d. Extremely cold temperatures
- Q9 The emerging field of pharmacogenomics seeks to match a patient's genetic profile with what?
- Q10 The first hamburger made from lab-grown meat was launched in 2013. The process has been refined to cost less than \$20 per burger, but how much did the burger cost to make in 2013?

## Answers

- A1 2015. They were first observed in September 2015 and announced in February 2016. The waves were detected by two Laser Interferometer Gravitational Wave Observatory (LIGO) detectors, with more than 1000 scientists around the world making up the LIGO group of researchers. The group includes Associate Professor Tara Murphy at the University of Sydney who leads a team that has confirmed gravitational wave events using Australian-based radio telescopes.
- A2 Dark energy, but scientists are still working out what dark energy actually is!
- A3 Woolly mammoth. They plan to make an elephant-mammoth hybrid.
- A4 Quantum computing
- A5 Nanobots. These are nanoscale machines, too small to be seen with the naked eye.
- A6 His car, a Tesla Roadster, with a mannequin strapped in and the stereo playing David Bowie's Space Oddity.
- A7 True: it learnt how to be racist from other Twitter users.
- A8 All of them
- A9 Medicine to treat disease. It uses a patient's genetic information to determine how well the patient is likely to respond to different types of therapeutic drugs.
- A10 A\$380 000



## Round 10: Adult Only Science

- Q1 In proportion to its body size, the male of which animal has the longest penis?
- Q2 In Tasmanian poppy fields, what animal has been found creating crop circles after getting high on opium?
- Q3 Which of the following foods has NOT been shown to enhance libido?
- a. Chocolate
  - b. Strawberries
  - c. Oysters
  - d. Spicy food
- Q4 Name one of the medical conditions that Viagra was originally developed to treat?
- Q5 For what part of its body does the 'sperm whale' get its name?
- Q6 How many nerve endings does the clitoris have?
- a. 25
  - b. 1500
  - c. 3700
  - d. 8000
- Q7 In wine making, 'noble rot' is an infection of grapes by what type of organism?
- Q8 The chemical quinine gives tonic water a bitter flavour and was originally added to water as a treatment for what disease?
- Q9 True or False: Drinking coffee is a quick way to sober up.
- Q10 Does swearing help to reduce pain?

## Answers

- A1 Barnacle. Charles Darwin was fascinated with barnacles and observed barnacle penile appendages up to 8 times the length of the barnacle's body.
- A2 Wallaby. They eat the opium poppies and then hop around in circles.
- A3 b. Strawberries. The other three foods elicit some physiological responses that are similar to those experienced during sexual arousal.
- A4 High blood pressure and angina.
- A5 A semi-liquid, waxy substance found in the 'spermaceti' organ in the whale's head
- A6 b. 8000. The penis has about the same number but spread over a larger area.
- A7 Fungus, *Botrytis cinerea*. The grapes are used to make sweet dessert wines.
- A8 Malaria. Quinine is no longer used as a preferred treatment for malaria.
- A9 False. It still takes about an hour for the body to process one standard drink.
- A10 Yes, and the stronger the swear words, the better they are as painkillers!



## Games

### Game 1: Who's the tallest scientist?

Place the following historically famous scientists in order from shortest to tallest:

Albert Einstein  
Nikola Tesla  
Marie Curie  
Charles Darwin  
Isaac Newton  
Thomas Edison

1. *Marie Curie 152cm*
2. *Isaac Newton 171cm*
3. *Albert Einstein 175cm*
4. *Thomas Edison 178cm*
5. *Charles Darwin 182cm*
6. *Nikola Tesla 188cm*

### Game 2: Who Am I?

1. I was born in 1833 into a family of engineers.
2. I had over 330 inventions.
3. I never married.
4. In 1884 I was elected a member of the Royal Swedish Academy of Sciences.
5. In 1888 my brother Ludvig died.
6. Following my brother's death, newspapers incorrectly reported my death instead of my brother's, with statements such as, "The merchant of death is dead". This inspired me to change my will and how my fortune would be used after my own death.
7. My inventions included Ballistite, a mixture of nitrocellulose and nitroglycerine, and Dynamite, a mix of nitroglycerin and an absorbent stabiliser.
8. After my death in 1896, the majority of my wealth was used to fund the world's best known science awards.
9. The awards are known as the Nobel Prize.
10. I am Alfred Nobel.



## Games

### Game 3: What's in your bag?

Teams are challenged to be the first to find objects with the following physical properties:

1. Ferromagnetism (attracted to a magnet)
2. Elasticity (stretches and returns to original shape)
3. Colour with a wavelength greater than 600 nanometres (red or orange)
4. Recycled
5. Polarizer (e.g. Polaroid sunglasses, LCD screen)

### Game 4: Whose quote is this?

The quotes are read out 1 to 3 words at a time and teams aim to be the first to raise a hand to answer. Each team is only allowed one guess.

1. My experiments proved that the radiation of uranium compounds can be measured with precision under determined conditions and that this radiation is an atomic property of the element of uranium. – *Marie Curie*
2. While the x-ray evidence cannot, at present, be taken as direct proof that the structure is helical, other considerations make the existence of a helical structure highly probable. – *Rosalind Franklin*
3. We want to build not just a quantum computer, but a quantum computing industry. It's nail-biting, it's exciting and it's happening here right now in Sydney. – *Michelle Simmons*
4. Mathematical science shows what is. It is the language of unseen relations between things. But to use and apply that language, we must be able fully to appreciate, to feel, to seize the unseen, the unconscious. – *Ada Lovelace*





## Answer Sheet

Team name: \_\_\_\_\_

### Round 1

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

### Round 2

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

### Round 3

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

### Round 4

- 1.
- 2.
- 3.
- 4.
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- 6.
- 7.
- 8.
- 9.
- 10.

### Round 5

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

### Round 6

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.



# national science week

## Answer Sheet

Team name: \_\_\_\_\_

### Round 7

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

### Round 8

- 1.
- 2.
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- 6.
- 7.
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- 9.
- 10.

### Round 9

- 1.
- 2.
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- 9.
- 10.

### Round 10

- 1.
- 2.
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- 7.
- 8.
- 9.
- 10.





## Answer Sheet

Team name: \_\_\_\_\_

Round \_\_\_\_

1.

2.

3.

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10.

