



Teacher Resource

# Science Week

## Focus Questions

Discuss the stories in the BTN Science Special as a class and record the main points of the discussion. Students will then respond to the following:

### Epidemiology

1. What did the Epidemiology story explain?
2. What does an epidemiologist do?
3. How does Dr Emma Miller describe the type of work she does?
4. Why have we heard more about epidemiology over the past year?
5. The COVID pandemic isn't the first big disease outbreak the world has ever seen. True or false?
6. In which century were viruses first identified?
  - a. 18<sup>th</sup> century
  - b. 19<sup>th</sup> century
  - c. 20<sup>th</sup> century
7. Which outbreak did John Snow help to control?
8. Apart from helping to fight pandemics like COVID, epidemiologists also fight health problems like...
9. What did you learn watching this story?
10. What questions do you have about the BTN story?

Check out the [Science Week Special](#) resource on the Teachers page.

### Understanding Climate Change

1. Before you watch the BTN story, record what you know about climate change.
2. How does David Karoly explain what climate change is?
3. David is the Chief Research Scientist for which organisation?
4. What is the key greenhouse gas that is increasing in our atmosphere?
  - a. Carbon Dioxide
  - b. Water Vapour
  - c. Ozone
5. Give examples of human activity that are causing the increase in carbon dioxide in the atmosphere.
6. In Australia, the temperature has warmed up 50% more than the global average. True or false?

#### EPISODE 23

17th August 2021

#### KEY LEARNING

Students will explore the topics explained in the BTN Science Week Special including epidemiology, climate change, robotic and artificial intelligence and the future of food.

#### CURRICULUM

##### HASS – Year 4

Reflect on learning to propose actions in response to an issue or challenge and consider possible effects of proposed actions.

##### HASS – Years 5 & 6

Work in groups to generate responses to issues and challenges.

##### HASS – Year 7

Reflect on learning to propose personal and/or collective action in response to an issue or challenge, taking into account different perspectives, and describe the expected effects.

##### Science – Years 5 & 6

Scientific knowledge is used to solve problems and inform personal and community decisions.

##### Science – Year 7

Scientific knowledge has changed peoples' understanding of the world and is refined as new evidence becomes available

##### Science – Year 7

People use science understanding and skills in their occupations and these have influenced the development of practices in areas of human activity.

7. What impact can an increase of a few degrees make?
8. What is being done to cut carbon emissions?
9. Scientists say that we need to find ways to live with a changing climate. Give an example of something we will need to adapt to.
10. What do you understand more clearly since watching the BTN story?

## Robot Revolution

1. Discuss the Robot Revolution story in pairs. Record the main points of your discussion.
2. Describe the robot 'Shakey'.
3. How was Shakey different to other robots?
4. Which company had the first working industrial robot?
5. In which decade did the robot revolution really get going?
6. Humanoid robotic programs started building robots to be more \_\_\_\_\_ like.
7. What is artificial intelligence?
8. What impact has artificial intelligence had on robotics?
9. How will robots affect jobs in the future?
10. What are the advantages and disadvantages of robots and artificial intelligence?

## Future of Food

1. Retell the BTN Future of Food story.
2. Experts say that by 2050 we'll have to produce enough food for how many people?
  - a. 9 million
  - b. 9 billion
  - c. 90 billion
3. What percentage of land on Earth is currently used for food production?
4. What impact does food production have on the environment?
5. In the next 30 years we'll have to \_\_\_\_\_ our food production.
6. Name three foods that are alternative protein sources?
7. Why is eating insects good for the environment?
8. Would you try a new food like lab meat or insects? Why or why not?
9. What was surprising about this story?
10. Name three facts you learnt watching the BTN story.

## Activity: Class Discussion

The BTN Epidemiology story explained the work epidemiologists do to find out more about how viruses work and how to develop vaccines for diseases like COVID-19. Hold a class discussion about the information in the story using the following questions to help guide discussion.

- What is an epidemiologist? Describe the work they do.
- What are some ways we can prevent diseases from spreading?
- What is a virus?

- What are some examples of viruses?
- How do viruses spread?
- Why do they make us sick?
- What is a pandemic?



### Further investigation

- What is a vaccine?
- What vaccines do you know about?
- What impact have vaccines had on controlling disease?
- How do vaccines work?

## Activity: COVID Science - Glossary

Students will brainstorm a list of words that relate to the BTN Epidemiology story and then add to the glossary as they learn more about vaccines. Below are some words to get you started.

VIRUS	PANDEMIC	VACCINE
DISEASE	INFECTIOUS	EPIDEMIOLOGIST

## Activity: Become a Disease Detective

In this activity students will work in groups to learn more about diseases and how vaccines have helped prevent them spreading in the community. Each group will become experts and then share what they have learnt with other students. Please note: If students are learning from home, they can choose one vaccine to research.

Divide the class into groups. Each group will be assigned a different vaccine which has been developed to prevent one of these diseases (*Polio, MMR (measles, mumps, rubella), diphtheria, tetanus, whooping cough, hepatitis B or chicken pox*) and become an expert. Each group will need to decide how they will collect and communicate the information they find during their research.



**Research** Each group will respond to the following questions to become experts:

- What disease does the vaccine protect against? Describe the disease.
- What impact does the disease have on the community?
- How does it spread? (Direct or indirect contact, airborne transmission, food, water, or blood contamination.)
- When was the vaccine developed? Who developed it?
- How does the vaccine work?
- How often should a person be vaccinated?
- What impact has the vaccine had on controlling the disease worldwide?

## Share

One student from each of the expert groups will form a new group to share the information they have collected. Students will make sure there is one expert from each group at their table. Students will share the information they have collected and learn from one another.

## Reflect

Students will reflect on the activity by responding to one or more of the following questions:

- What did you enjoy about this investigation?
- What did you find surprising?
- What would you do differently next time?

## Activity: Who is Edward Jenner?

Students will watch this [Horrible Science](#) video to learn about Edward Jenner, a scientist who helped to develop the smallpox vaccine. After students have watched the video, they will respond to the following questions:

- Who is Edward Jenner?
- What animal did Edward Jenner use to help develop the smallpox vaccine?
- Who did Edward Jenner test his theory on?
- How did he test his theory?



[Who is Jenner Edward? – Horrible Science](#)

Pretend you are Edward Jenner and write a journal entry describing your experiments inoculating an eight-year-old boy with cowpox and then smallpox. Include in your journal entry what you think this might mean for protecting people from infectious diseases in the future.

## Further Learning

Students match the scientist to the disease they helped prevent by playing the [Pioneer Breakthroughs matching game](#). The History of Vaccines website also has an [interactive timeline](#) which highlights significant events in the history of diseases and vaccines.

## Activity: Quick Climate Change Quiz

Begin this part of the activity with a quick climate change quiz. Circle the correct answer.

1. The Earth's atmosphere is made up mostly of oxygen.	True False
2. CO <sub>2</sub> is the chemical symbol for Carbon Dioxide.	True False
3. The warming effect caused by gases that absorb the sun's radiation is the hothouse effect.	True False
4. Carbon dioxide, water vapour and methane are all greenhouse gases.	True False
5. The name of the layer in the atmosphere that absorbs most of the ultraviolet radiation from the sun is the hydrogen layer.	True False

Answers: 1. False, it's nitrogen, 2. True. 3. False, it's the greenhouse effect, 4. True, 5. False, it's the ozone layer

## Activity: Climate Change Glossary

Students will brainstorm a list of words that relate to the BTN Understanding Climate Change story and then add to the glossary as they learn more about the topic. Below are some words to get you started.

GREENHOUSE EFFECT	EMISSIONS	GLOBAL WARMING
CARBON DIOXIDE	FOSSIL FUELS	RENEWABLE ENERGY

## Activity: What is the Greenhouse Effect?

Working in pairs or small groups, ask students to discuss their understanding of the greenhouse effect. Use the following questions to guide discussion.

- What is the greenhouse effect?
- Why is it called the greenhouse effect?
- How is the earth a greenhouse? What are the similarities between earth's atmosphere and a greenhouse that you would find in a garden?

In their pairs or groups, students will create a diagram/illustration to explain the greenhouse effect, including the following elements in their image: sun, earth, atmosphere, ozone layer and greenhouse gases.

### What are the Consequences?

Ask the class to consider a range of consequences for not reducing greenhouse gas emissions. Rate the consequences on a scale of 1 to 10, where 1 is a low impact and 10 is severe impact.

Have students give their opinion on the likelihood of each consequence. Below are some suggested consequences:

- Rising temperatures

- Ice will melt
- Sea levels will rise
- Plants and animals at risk
- Ecosystems will be affected (e.g., the Great Barrier Reef ecosystem)
- Health will be affected
- Extreme weather (heat waves, flooding, bushfires, drought)

## Activity: Choose your Climate Future

Students investigate how their world could change as global temperatures rise through the [WWF's interactive](#). They will see the effects on their home, community, sports, farming, environment and beach.

Summarise what you noticed when global warming increased by:

- 1.5°C
- 2°C
- 3°C+



## Activity: Taking Action on Climate Change

Students will investigate ways that they can be part of the solution to reduce the effects of climate change. Discuss with the class ways to reduce the effects of climate change. What can be done on a global, national and local level? What changes can be made in our homes and schools to reduce emissions?

Reducing greenhouse gas emissions is the key to reducing the impact of climate change. This means getting most of our energy from a range of renewable energy sources instead of burning fossil fuels. Students can choose to research a clean energy technology in more detail and explain how it works and whether the technology is being used in Australia.

Ask your students ‘What can we do and why is it important to get involved in tackling pollution?’. Record students’ responses on a mind map. Ask students to think about ways their school and home can reduce energy demand, become more energy efficient and incorporate renewable energy sources.

Students can undertake one or more of the following activities:

- School energy audit – track your school’s energy usage and calculate your carbon emissions. How can your school reduce its carbon emissions? For example, turn off lights when not in use, turn off computers at the end of the day, find alternatives to driving to school, buy locally sourced seasonal food and reduce your waste. Share your results with the school community.
- Does your school have solar panels? If not, conduct a study and present it to your school.

Research the benefits of using solar energy at your school. Does your school have a plan to reduce its carbon footprint? If so, find out what your school's targets are in reducing its carbon emissions. Would installing solar panels reduce your school's carbon emissions? Explain.

- Write letters to local or federal politicians expressing your school's views on greenhouse gas emissions and its impact on communities, plants and animals in your local area.
- Contribute a class article to the school newsletter sharing your research.
- Invite a scientist to visit your school to talk about the effects of global emissions.
- Contact your local council and/or schools in your area to share ideas on how your community can reduce their greenhouse gas emissions.

### Young People Taking Action

Watch the BTN [Climate Change Court Battle](#) story to find out how a group of teenagers challenged the Federal Environment Minister over the expansion of a coal mine in New South Wales – saying she has a duty to protect kids from the future impacts of climate change. Below are some questions about the story students can respond to. Students can also find out whether there are any updates or resolutions to the court case.

1. Why have a group of teenagers taken the Federal government to court?
2. They are hoping the court action will restrict the environment minister from approving an extension to the \_\_\_\_\_ mine.
3. What does the government say are the benefits of the coal mine?
4. Why don't Izzy and Tom want the extension of the coal mine to go ahead?
5. What is a class action law suit?
6. Who are the group of teenagers representing?
7. Taking a government to court has become more common. True or false?
8. Why do Tom and Izzy say it's important for young people to take action?

## Activity: Design a robot

If you could build a robot, what kind would you build? What would you make it do? Would it help you do your homework or play your favourite sport? Students will brainstorm ideas in pairs and then share their ideas as a class. Students will design a robot that performs a specific task. When thinking about their design, ask students to consider:

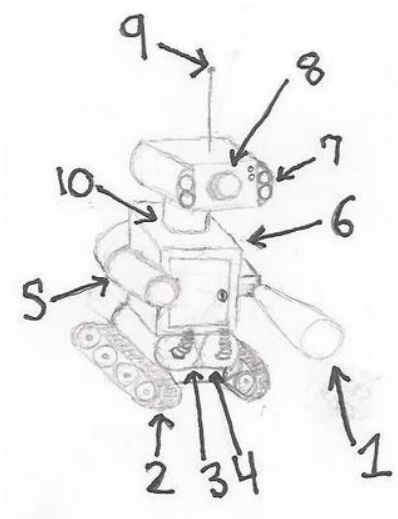
- What problem or challenge does the robot solve?
- What are some of the functions your program will carry out?
- Is it a function that a human could perform?
- How does your robot use artificial intelligence?
- Does the robot need any special features? If so, what are they?
- What would your robot look like?
- How will your robot function? Consider the following:



- How will it be controlled?
- How does it move?
- How will it detect the environment around it?
- How will it be powered?

Students will draw a design of their robot and present it to the class. Students will include a detailed diagram of each component and a description of how it works. Using recycled materials students will then try to make a 3D model of their robot.

If students have access to robot making products, they can design and build a robot that performs a specific task. How are the instructions for the robot written so that it will perform the task?



## Activity: Visual literacy - Robots

Students look at the photographs of various robots and respond to the following questions:

- Describe what the robot looks like. What do you see?
- How big is it? What are its main features?
- What do you think the robot does? What is its function?
- Who made the robot?
- What questions do you have about the image?



[Link to image](#)



[Link to image](#)



[Link to image](#)



[Link to image](#)



## Activity: Could a robot do your job?

Students will look at the ABC interactive [Could a robot do your job?](#) then respond to the following:

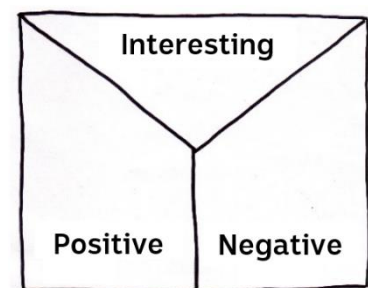
- Choose five jobs to search for and record what percentage of jobs is more likely to be automated. Record some of the tasks that could be automated. Which tasks will still need to be done by humans?
- Which jobs face the biggest risk of automation?
- Who faces the lowest risk of automation?
- What was the most surprising thing you learnt?



## Activity: PMI and Class discussion - Insects

Students will practise their note-taking skills while watching the BTN Future of Food story. After watching the story, ask students to reflect on and organise the information into three categories. What information in the story was...?

- Positive
- Negative or
- Interesting



As a class discuss the BTN Future of Food story, using the following questions as a guide. Record the main points of the discussion.

- What are the benefits of eating insects?
- Why is eating insects good for the environment?
- Would you eat insects? Why or why not?
- Why do we need insects?
- What are some examples of alternative food sources?
- Why do we need to look for alternative food sources?

## Activity: Persuasive text

Students will develop a persuasive text for the following statement: "We should be eating insects". Alternatively, students can write their persuasive text about another alternative food source. Encourage students to use as many of the following key words and terms in their persuasive text as they can.

FOOD SECURITY	SUSTAINABILITY	NUTRIENTS
FARMING	GREENHOUSE GAS EMISSIONS	FOOD PRODUCTION
ENTOMOPHAGY	PROTEIN	RESOURCES

### Tips for persuasive writing

- Who is your audience? For example, are you directing your argument at kids, teachers or politicians?
- Explore how language choices can have a big impact on persuading your audience.
- Which language devices give the report credibility and authority?
- Which are designed to create an emotional response in the listener?
- Provide facts and evidence to support your argument.
- Write in the present tense.
- Check your spelling and punctuation.

Students can use this [Read Write Think persuasion map](#) to organise the information they find.

## Activity: Insect investigation

Provide students with the opportunity to think and behave like scientists. In this activity students will be given the mission to explore a natural habitat in their local area, identify insects in their habitat and document what they find. Use the following as a guide. Students may work individually or in small groups.

**Plan** Students will plan a visit to a local nature reserve or their own school yard to explore and identify insects. Students will need to write a list of tools they may need for the investigation, for example: pen and paper for taking notes, camera and magnifying glass. Students will predict insects they might see and find. Students will think about what an entomologist would need on an investigation.

**Explore** Students will visit the habitat and carry out an exploration of the area. Students will choose a spot in the environment to investigate. Consider exploring the habitat from different angles, closeup or far away. Look and listen for evidence that insects live in the area.

**Collect** Students will choose their favourite insect to explore in detail. Students will collect as much data as they can about that insect and record what they find. Students may write notes and sketch what they see to help in their investigation. Students may want to record what they see with a stills or video camera.

**Share** Students will return to the classroom and share/compare their findings.

**Analyse** Students will analyse their findings and write a short summary of their investigation. Students will respond to the following questions:

- Did you find any insects during your investigation? If yes, identify and describe what you found. If you didn't see any insects, did you find any evidence that insects live in the area?
- How could you help protect this habitat?

**Research** Students will research an insect, and respond to the following:

- What does the insect look like? Describe its physical characteristics.
- What is its classification?
- What is the life cycle of the insect?
- What role does the insect play in the ecosystem?
- Why is this insect important?

## Reflect

Students will reflect on the investigation by responding to one or more of the following questions:

- What did you enjoy about this investigation?
- What did you find surprising?
- What would you do differently next time?

## Activity: Create a new insect species

Students will use their imagination and create a new insect species. Students will imagine they have discovered a new species of insect which has never been seen before. Use the following as a guide for this activity:

- Illustrate the new insect using only a black felt-tip pen on a piece of A4 art paper – include as much detail as you can.
- Give the insect a common and scientific name.
- Describe what the insect looks like – what are some of its physical characteristics?
- Describe its habitat and how it behaves in its habitat.
- Does it have any interesting or unique features? For example. any adaptations.

## Activity: Insects – Choose a project

Individually or in small groups, students will choose one of the following projects to work on and then present their findings to the class.

### Reporter for a day

Investigate why scientists are looking for alternative food sources. Write a newspaper article or online news report for kids.

### Poster

Create a poster to celebrate insects and their importance in the ecosystem, and the benefits of insects to people as a food source.

### Opinion Poll

Would you eat insects? Conduct a classroom opinion poll on the topic of eating insects. Compare your attitudes on the topic to that of your classmates.

### Recipes

Design your own recipe that includes edible insects. Include ingredients, measurements, a procedure, cooking time and equipment required. Make a class cookbook.

## Activity: Australian Scientist Biography

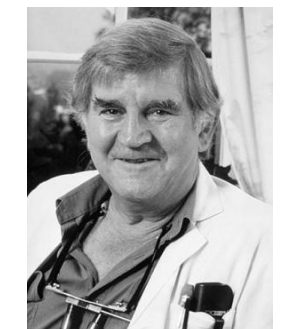
The BTN Science Week Special told us about some important Aussie scientists. Students will choose an Australian scientist that has made a significant contribution in the field of science and write a biography about them. They can research one of the four scientists featured in the BTN Science Week Special or choose another one.

- Douglas Mawson
- Elizabeth Blackburn
- Michelle Simmons
- Sir Mark Oliphant
- Howard Florey
- Ruby Payne-Scott
- John O'Sullivan
- Graeme Clark
- Fred Hollows



At the end of this activity there is a biography template to help students to record and organise information about the scientist they have chosen. Below are some possible areas to research for the biography:

- What did they do or discover?
- When were they born?
- What scientific discoveries made them famous?
- What were their challenges?
- How do we recognise their achievements?
- How did they change our understanding of the world?
- How would our world be different if their discovery had not been made?
- What do you admire about them?
- Imagine you could sit down and talk to them. What questions would you ask about their life and work as a scientist?



## Useful Websites

- [National Science Week 2021](#)
- [What is a virus?](#) – BTN
- [Curious Kids: What is an epidemiologist?](#) – The Conversation
- [Who is Edward Jenner](#) – Horrible Science
- [Timeline](#) – History of Vaccines
- [COVID-19: Everything you need to know](#) – BTN
- [Climate Change Court Battle](#) – BTN
- [Greenhouse Gases](#) – BTN
- [Greenhouse Effect](#) – Bureau of Meteorology
- [Greenhouse Effect](#) – Climate Kids: NASA
- [Robot Jobs](#) – BTN

- [Could a robot do your job? Find out now](#) – ABC News
- [Can robots be creative?](#) – Ted Ed
- [Artificial Intelligence](#) – BTN
- [Aussie Scientists](#) – BTN
- [Eating Insects](#) – BTN
- [Insects](#) – Australian Museum
- [Should we eat bugs?](#) – TedEx

# Biography – Famous Scientist

Full name

Born

My Family

Portrait of me

The important contributions I have to the world...

Interesting things about me...

My Achievements