Teacher Resource

Solar Car Challenge

Focus Questions

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

1. Where does the World Solar Challenge start and finish? Find on a map.
2. What is the distance of the race?
3. What is used to power the cars?
4. How did the World Solar Challenge begin?
5. What do solar cars look like? Describe their features.

Activity: Class Discussion

Discuss the BTN Solar Car Challenge story as a class and record the main points on a mind map with SOLAR CARS in the centre.

Students will respond to the following:

- What do you know about solar energy?
- What did you learn from this story?
- What does this story make you wonder?
- Think of three questions you would like to ask about the story.
- Make a list of words related to this story. Use this list of words to help form a class glossary.

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KEY LEARNING
Students will learn more about solar powered cars. Students will guide their own scientific investigation to learn more about solar energy.

CURRICULUM
Science – Years 5 & 6
Scientific knowledge is used to solve problems and inform personal and community decisions.

Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions.

Science – Year 7
Solutions to contemporary issues that are found using science and technology, may impact on other areas of society and may involve ethical considerations.

Design and Technologies – Years 3 & 4
Recognise the role of people in design and technologies occupations and explore factors, including sustainability that impact on the design of products, services and environments to meet community needs.

Design and Technologies – Years 5 & 6
Examine how people in design and technologies occupations address competing considerations, including sustainability in the design of products, services, and environments for current and future use.

Activity: Glossary

Students will brainstorm a list of key words that relate to the BTN Solar Car Challenge story. Here are some words to get them started.

SOLAR POWERED CAR	CARBON EMISSIONS	SUSTAINABLE
INNOVATION	SOLAR ENERGY	RENEWABLE

Ask students to write what they think is the meaning of each word (including unfamiliar words). They will swap definitions with a partner and ask them to add to or change the definition. Check these against the dictionary definition.

Further activities for students:

- Students will add to their glossary by downloading the transcript for the BTN Solar Car Challenge story and highlight all the words that relate to the topic.
- What is the difference between renewable and non-renewable energy? Give examples and write a short explanation for each type. Make comparisons.

Activity: Solar Car Research

Discuss the information raised in the BTN Solar Car Challenge story. What questions were raised in the discussion and what are the gaps in students' knowledge? The following KWLH organiser provides students with a framework to explore their knowledge on this topic.

What do I **know**?	What do I **want** to know?	What have I **learnt**?	**How** will I find out?

Students will develop their own question/s to research or choose one or more of the questions below. Encourage students to collect and record information from a wide variety of sources and present the information they find in an interesting way.

- What are the pros and cons of solar powered cars? Create a T-chart to record your findings.
- How are solar powered cars different to petrol fuelled cars?
- How have cars changed since their invention? Explore the history of cars in more detail and create a timeline of significant events.
- What is solar energy? List the different ways we use solar energy.
- Make a prediction about how transport will change in the future. Illustrate your predictions.
- How much energy (in kilowatts) does the sun output each day? Watch this video on ABC Education to learn more about the sun's power.

Activity: Science Experiment

Provide students with the opportunity to think like scientists. In pairs or small groups, students will guide their own scientific investigation to learn more about solar energy. Students will design and produce a solar car, solar oven, or mini greenhouse to explore how the effects of light and heat energy can be used to perform a function.

Class Discussion

Before students begin their investigation, facilitate a class discussion to find out what your students already know about solar energy, where it comes from and how it is used to generate power. Use one or more of these questions to get the discussion started:

- Where does solar energy come from?
- Is solar energy renewable or non-renewable?
- How do we use solar energy? Give examples.
- What else do you know about solar energy? Share your ideas as a class and record ideas on a whiteboard.
- What keywords relate to solar energy? Make a list as a class and create a kid-friendly glossary.
- Have you used or seen solar panels or solar powered devices? Describe.
- What do you think are the benefits of using solar energy?

Investigation

Working individually or in small groups, students can choose to design and make a solar oven or plant greenhouse to learn more about solar energy. Students will use the investigation framework to guide them during their investigation.

Investigation Framework

Below is an investigation framework to guide students when planning and conducting their experiments.

- What am I going to investigate?
- What do I think will happen (prediction)?
- Why do I think this will happen?
- What steps do I need to follow to investigate my prediction?
- What materials and equipment will I need? Make list or draw and label each item.
- How will I make it a fair test? What variables am I going to keep the same?
- Write down as much information as you can about what happened during your investigation.
- Write a report which summarises the discoveries you made during the investigation. Include the following in your report: photos, a labelled diagram, a table of your results and observations to demonstrate what happened.
- Was this what I expected? Explain in more detail.

Students will choose one of the following for their scientific investigation.

Solar-powered oven

Students will experiment with a solar powered oven to explore the mathematical and scientific relationship among reflection, transmission, and absorption. Students will build and test a solar oven of their own invention.

Students will respond to the following questions:

- What shape will your oven be? What shape best captures the sun's energy.
- Will your oven have insulation? How does insulation increase the temperature?
- What direction will it face?
- What colour will the surface of the oven be (white, black or reflective)? Consider that some colours reflect heat while others absorb it.

Questacon instructional video – Solar-powered oven

Mini greenhouse

Students will experiment with a mini greenhouse to explore how solar energy is absorbed and retained. Students will build and test a mini greenhouse of their own invention.

Students will respond to the following questions:

- What shape will your greenhouse be?
- Where will you position your greenhouse to capture the sun's energy?
- What direction will it face?
- What type of material will you use to cover your greenhouse? Compare the effect of different materials.
- Will you use insulation? What will it be made from?

Questacon instructional video – Mini greenhouse

Solar-powered rover

Students will build and test their own solar powered car to explore the power of the sun. Students will learn the physics of how a solar panel converts sunlight into electrical energy.

Students will respond to the following questions:

- Did the angle of the solar panel affect the performance of your rover? Why?
- How does the weather affect the performance of the rover?
- How could you improve your rover's performance? Think about your rover's shape, size and other features.

Questacon kit – Solar-powered rover

Useful Websites

- Solar Car Challenge 2019 – BTN
- World Solar Challenge 2023
- Exploring the Sun – BTN
- How Do Solar Panels Work? – TEDEd