

Name Class Date

Land Rover BAR is the British Challenger for the 35th America’s Cup – the oldest international sporting competition in the world. There are only six crew on the race boat, but dozens of experts are back at the team base working hard to help Land Rover BAR design the most technically advanced and innovative racing catamaran to win the America’s Cup. The Land Rover BAR team also aims to be as sustainable as possible. They monitor how they create carbon emissions that add to global warming, and find ways to reduce these emissions.



Dr Susie Tomson – Sustainability Manager

Since Susie has been Sustainability Manager, she has helped to ensure that 100% of electricity at the Land Rover BAR base is from renewable sources.

1 Dr Susie Tomson, the team’s Sustainability Manager, helps every team member understand the basics about how carbon emissions add to global warming. Draw lines to match each term with the correct description:

Atmosphere	A gas that keeps the atmosphere warm.
Carbon cycle	The gradual increase in the Earth’s average temperature.
Greenhouse gas	A natural fuel formed in the past from the remains of plants or animals.
Greenhouse effect	Changes to weather patterns around the world due to human influence.
Fossil fuel	How carbon constantly moves from one place to another in the environment.
Climate change	The trapping of the Sun’s warmth in the atmosphere.
Global warming	A place where carbon is absorbed from the atmosphere.
Carbon reservoir	The gases that surround the Earth.
Carbon sink	A place where carbon is stored for a very long time.

The Land Rover BAR team base is designed to be very sustainable. However, the team still uses a lot of electricity to power the offices and workshops.

2 Roughly what percentage of the atmosphere is carbon dioxide?

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3 Why does burning fossil fuels add to the greenhouse effect?
Use the **carbon cycle** in your answer.

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Did you know the Land Rover BAR base is powered by solar panels? The solar panels installed at Land Rover BAR have a capacity of 114 kW. Depending on the sunshine levels, that could be enough to power over 700 televisions!

4 Write numbers to put the statements in order and explain how a solar panel generates electricity.

.....	The Sun's light energy releases electrons in the solar panel.
.....	The electrons flow, creating a current.
.....	The Sun shines on the solar panel.
.....	The current is converted to 240V AC, like mains power.

5 Why does using solar panels help Land Rover BAR reduce its carbon emissions?

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6 Name two other renewable energy sources that are used to generate electricity.

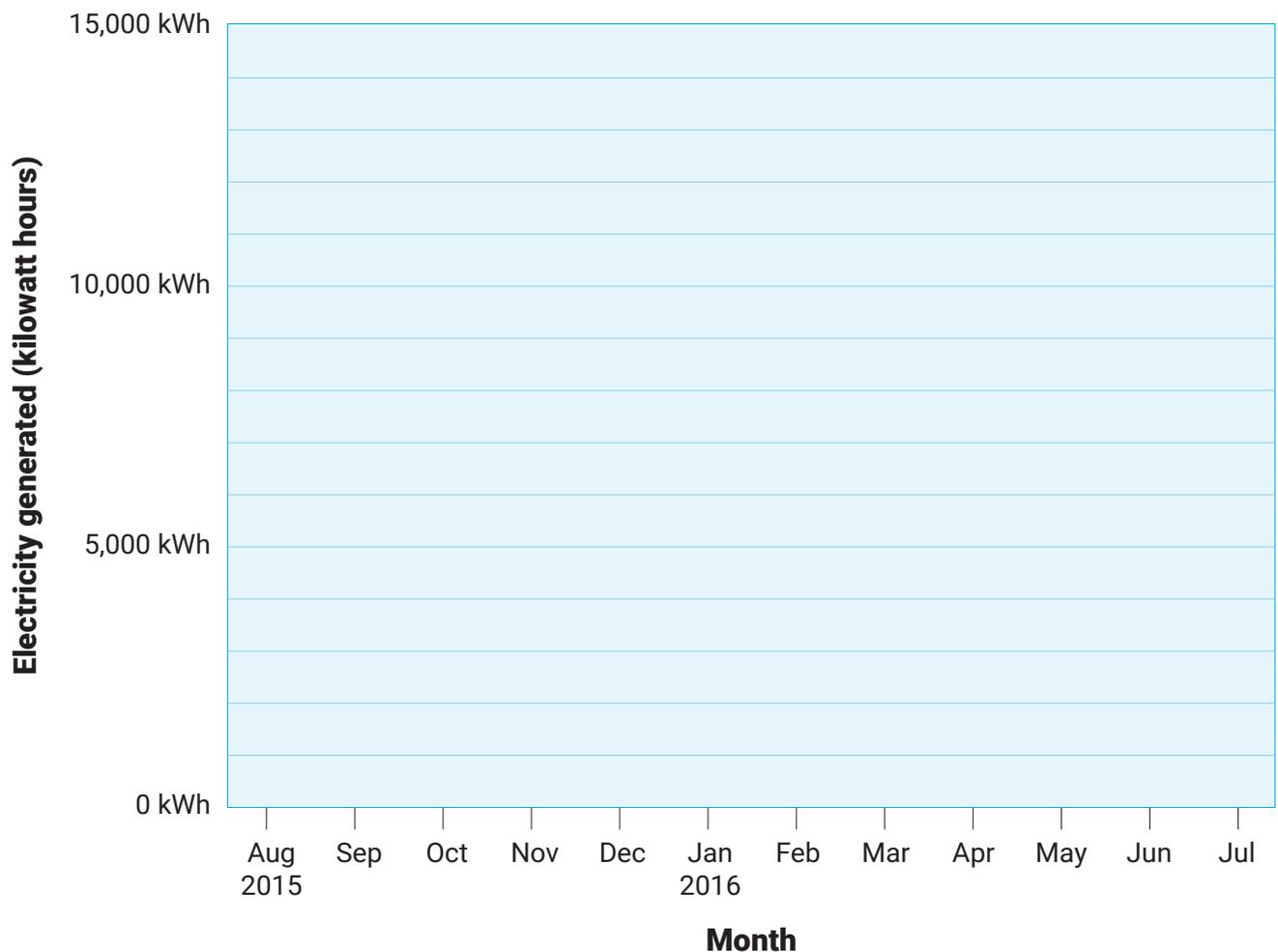
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7 Susie monitors the building's environmental performance, including how much electricity is generated and used. Draw a line graph on the chart to show the solar electricity generated each month.

Month	Aug 2015	Sep	Oct	Nov	Dec	Jan 2016	Feb	Mar	Apr	May	Jun	Jul	Total
Solar production (kWh)	10,400	9,800	5,000	2,000	1,500	2,100	4,000	8,400	10,800	15,000	12,600	14,600	



a How much solar electricity does the base generate between August 2015 and July 2016?

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b How much carbon emissions are saved in the year thanks to generating this solar electricity? Use 0.527 kg of carbon per kWh of solar electricity.

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c In which month did the base save the most carbon? Calculate how much carbon was saved in this month. Use 0.527 kg per kWh.

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ANSWERS

1

Atmosphere	A gas that keeps the atmosphere warm.
Carbon cycle	The gradual increase in the Earth's average temperature.
Greenhouse gas	A natural fuel formed in the past from the remains of plants or animals.
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Carbon sink	A place where carbon is stored for a very long time.

2 About 0.04%, or 400 parts per million.

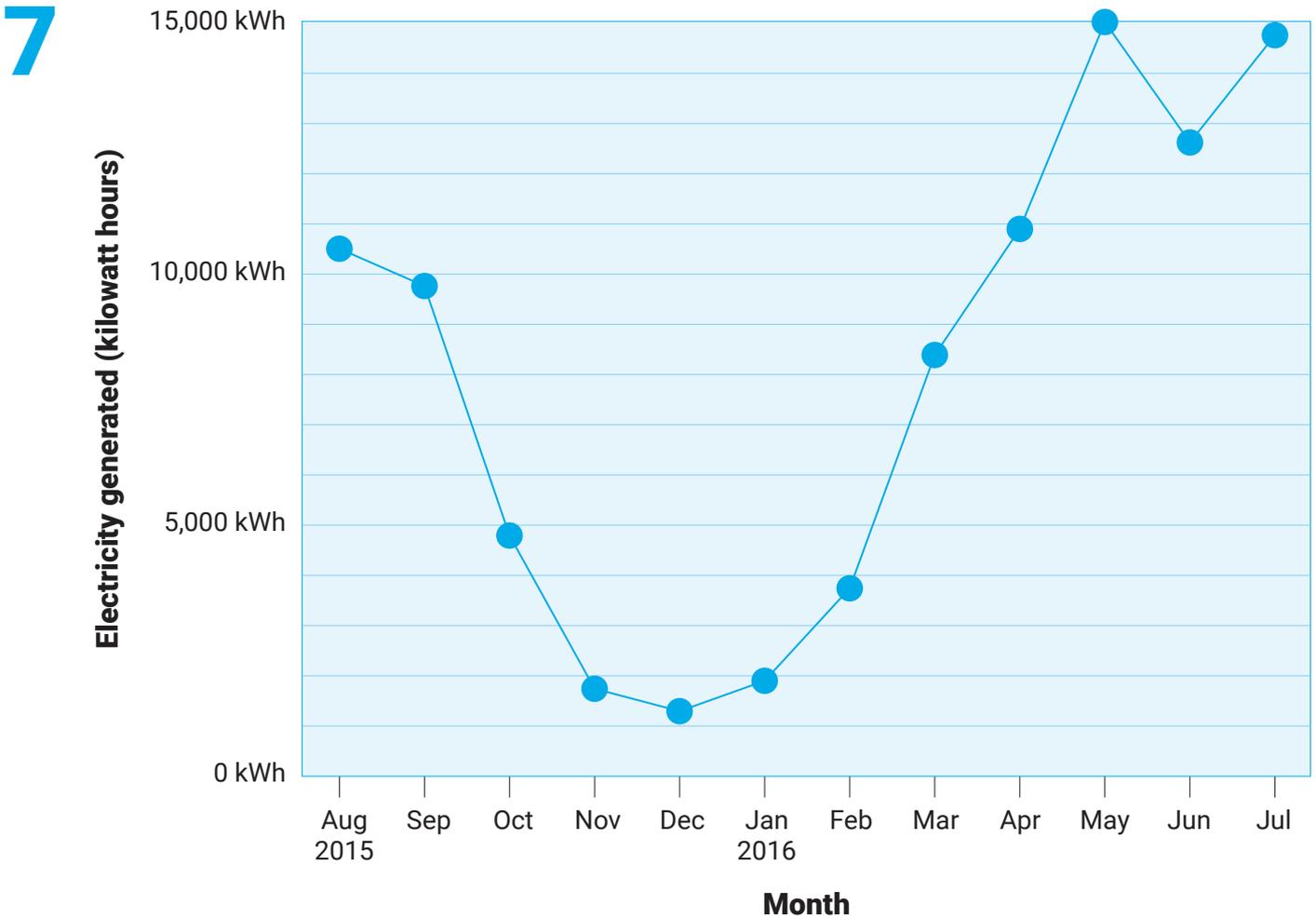
3 Combustion of fossil fuels releases carbon that was stored underground in fossil fuels for millions of years (a carbon reservoir), adding to the carbon stored in the atmosphere, which is a greenhouse gas.

4

2	The Sun's light energy releases electrons in the solar panel.
3	The electrons flow, creating a current.
1	The Sun shines on the solar panel.
4	The current is converted to 240V AC, like mains power.

5 Solar panels generate electricity directly without the need for combustion of fossil fuels, so no carbon is released into the atmosphere.

6 Wind, hydro or tidal are other renewable sources.



- a** 96,200 kWh
- b** 50,697.4 kg carbon are saved (96,200 kWh x 0.527 kg).
- c** May, when 15,000 kWh were produced, saving 7,905 kg carbon (15,000 kWh x 0.527 kg).