AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 6.1.3

National and global energy resources

Past-paper questions

Tier	**Higher**
Question groups	**6**
Available paper years	**2019–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

6.1.3 National and global energy resources

Question 01

June 2019 | 8464/P/1H | Original Q3

0 3 A hybrid car has an electric motor and a petrol engine.

0 3 . 1 Petrol is a non-renewable energy resource.

What is meant by a non-renewable energy resource?

[1 mark]

0 3 . 2 The electric motor in the car is powered by a battery.

To charge the battery, the car is plugged into the mains supply at 230 V

The power used to charge the battery is 6.9 kW

Calculate the current used to charge the battery.

[4 marks]

Current = _____ A

0 3 . 3 Mains electricity is an ac supply.

Explain the difference between direct and alternating potential difference.

[2 marks]

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Question 01 · continued

0 3 . 4 The cable used to connect the car to the mains electricity supply has a low resistance.

Explain why it is better to use a cable with a low resistance than to use a cable with a high resistance.

[2 marks]

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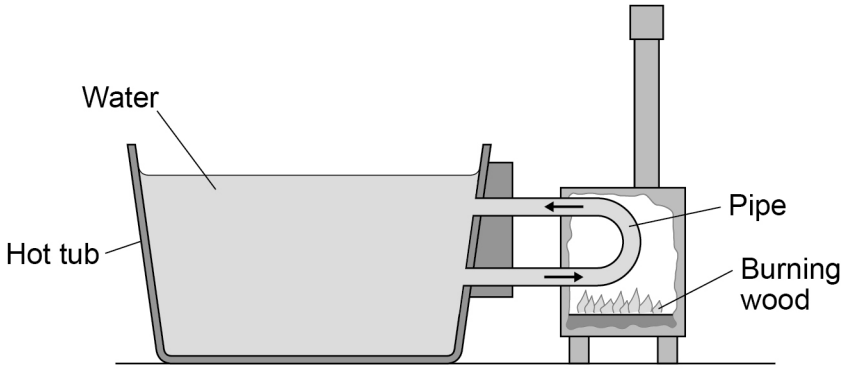
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Question 02

November 2020 | 8464/P/1H | Original Q4

0 4 **Figure 5** shows a wood-fired hot tub.

Figure 5



0 4 . 1 What type of fuel is wood?

[1 mark]

Tick (✓) **one** box.

A non-renewable biofuel ☐

A non-renewable fossil fuel ☐

A renewable biofuel ☐

A renewable fossil fuel ☐

0 4 . 2 Give **two** environmental effects of using wood as an energy resource.

[2 marks]

1 _____

_____

2 _____

_____

6.1.3 National and global energy resources

Question 02 · continued

0 4 . 3 Describe the change to the stores of energy of the wood, pipe and water as the water is heated.

[3 marks]

Wood _____

_____

Pipe _____

_____

Water _____

_____

0 4 . 4 The temperature of the water reaches 42 °C

The temperature then stays constant even though the fire continues to burn.

Explain why the temperature of the water stays constant.

[2 marks]

_____

_____

_____

_____

_____

8

6.1.3 National and global energy resources

Question 03

November 2021 | 8464/P/1H | Original Q3

0 3 **Figure 4** shows a sailing boat crossing an ocean.

Figure 4



There is a wind turbine on the boat.

0 3 . 1 The wind turbine generates electricity to charge a battery on the boat.

Name one **other** renewable energy resource that could be used on the boat to generate electricity.

[1 mark]

_____

0 3 . 2 The boat also has a generator that burns a fossil fuel.

The battery can be charged by either the wind turbine **or** the generator.

Give **two** reasons why this is useful.

[2 marks]

1 _____

_____

2 _____

_____

6.1.3 National and global energy resources

Question 03 · continued

0 3 . 3 Explain **one** environmental impact of using fossil fuels to generate electricity.

[2 marks]

0 3 . 4 The kinetic energy of the boat is 81 kJ.

mass of boat = 8000 kg

Calculate the speed of the boat.

[4 marks]

Speed = _____ m/s

Question 3 continues on the next page

6.1.3 National and global energy resources

Question 03 · continued

0 3 . 5 As the boat passes over a wave, the gravitational potential energy of the boat increases by 19 600 J.

mass of boat = 8000 kg

gravitational field strength = 9.8 N/kg

Calculate the change in height of the centre of mass of the boat as it passes over the wave.

[3 marks]

Change in height = _____ m

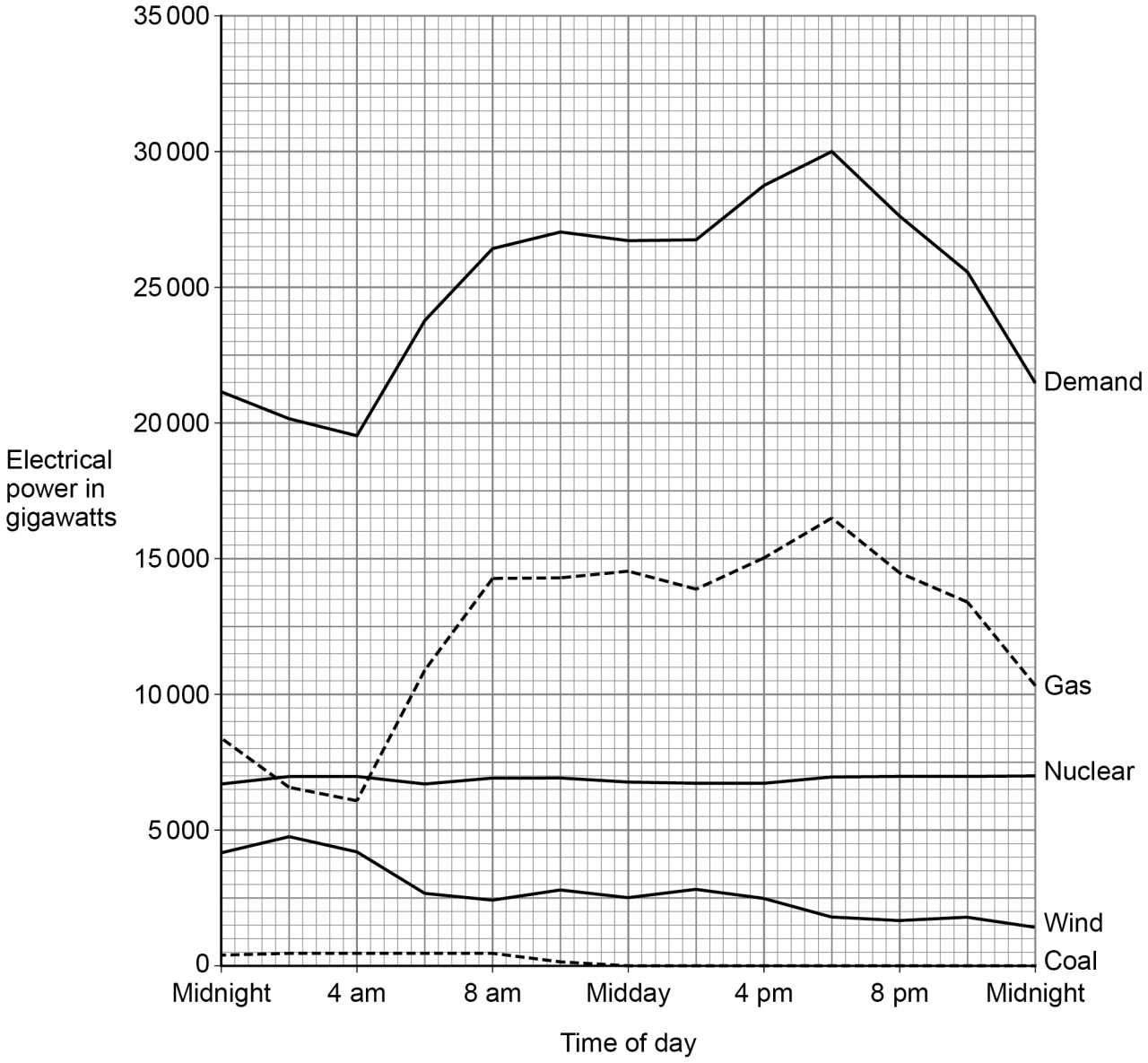
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6.1.3 National and global energy resources

Question 04

0 1 **Figure 1** shows some of the energy resources used to meet the demand for electrical power in the UK on one day in 2020.

Figure 1



6.1.3 National and global energy resources

Question 04 · continued

0 1 . 1 The maximum demand for electrical power on that day was at 6 pm.

Determine the percentage of the maximum demand for electrical power that was generated using gas.

[3 marks]

Percentage = _____ %

0 1 . 2 The UK government wants to reduce carbon emissions as much as possible.

Which energy resources need to be used less to achieve this?

[1 mark]

Tick (✓) **one** box.

- Coal and gas ☐
- Gas and nuclear ☐
- Wind and coal ☐
- Wind and nuclear ☐

Question 1 continues on the next page

6.1.3 National and global energy resources

Question 04 · continued

A network of transformers and transmission cables transfers electrical power from power stations to consumers.

0 1 . 3 What is this network called?

[1 mark]

0 1 . 4 Explain how using step-up transformers makes the network efficient.

[3 marks]

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6.1.3 National and global energy resources

Question 05

0 1 Wind power and solar power are both renewable energy resources used to generate electricity for the National Grid.

0 1 . 1 Which of the following is also a renewable energy resource?

[1 mark]

Tick (✓) **one** box.

- Geothermal ☐
- Natural gas ☐
- Nuclear fuel ☐

0 1 . 2 The energy transferred by the National Grid in one second was 36 gigajoules (GJ).

Which of the following is the same as 36 gigajoules?

[1 mark]

Tick (✓) **one** box.

- 36×10^3 J ☐
- 36×10^6 J ☐
- 36×10^9 J ☐
- 36×10^{12} J ☐

Question 1 continues on the next page

0 1 . 3 **Figure 1** shows how the mean power output from solar and wind energy resources in the UK varied between 2014 and 2019.

Figure 1

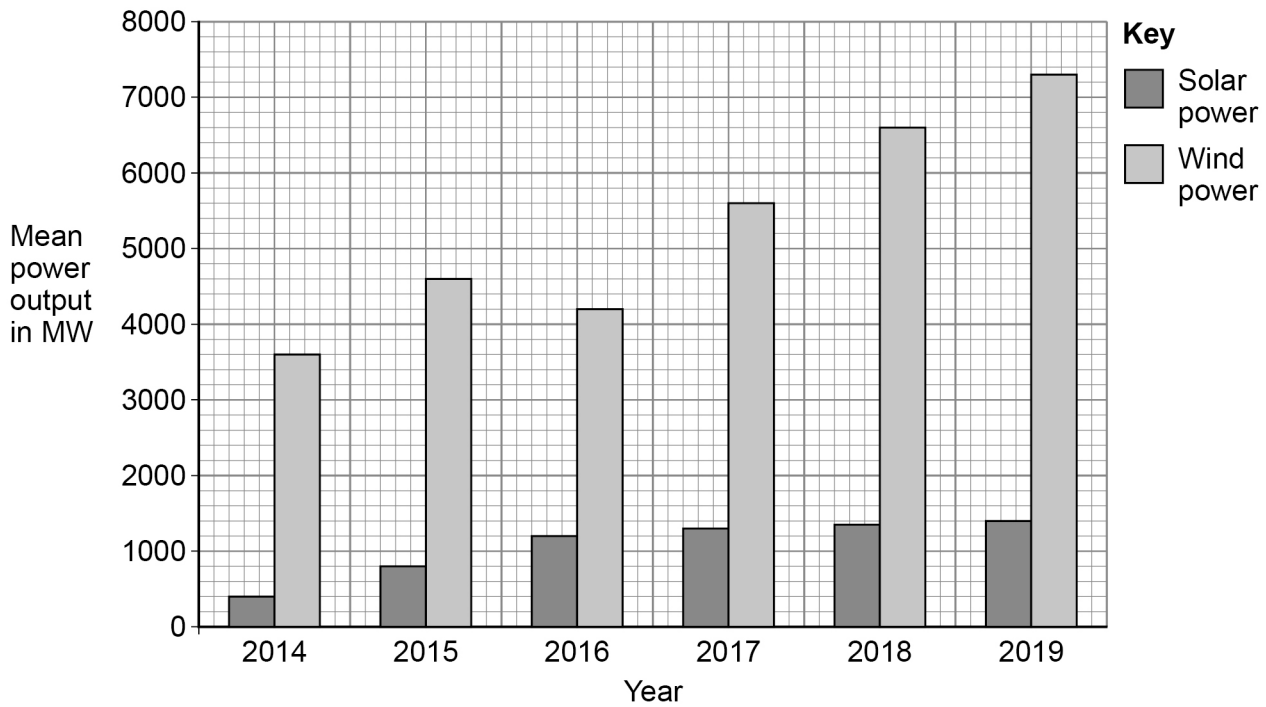
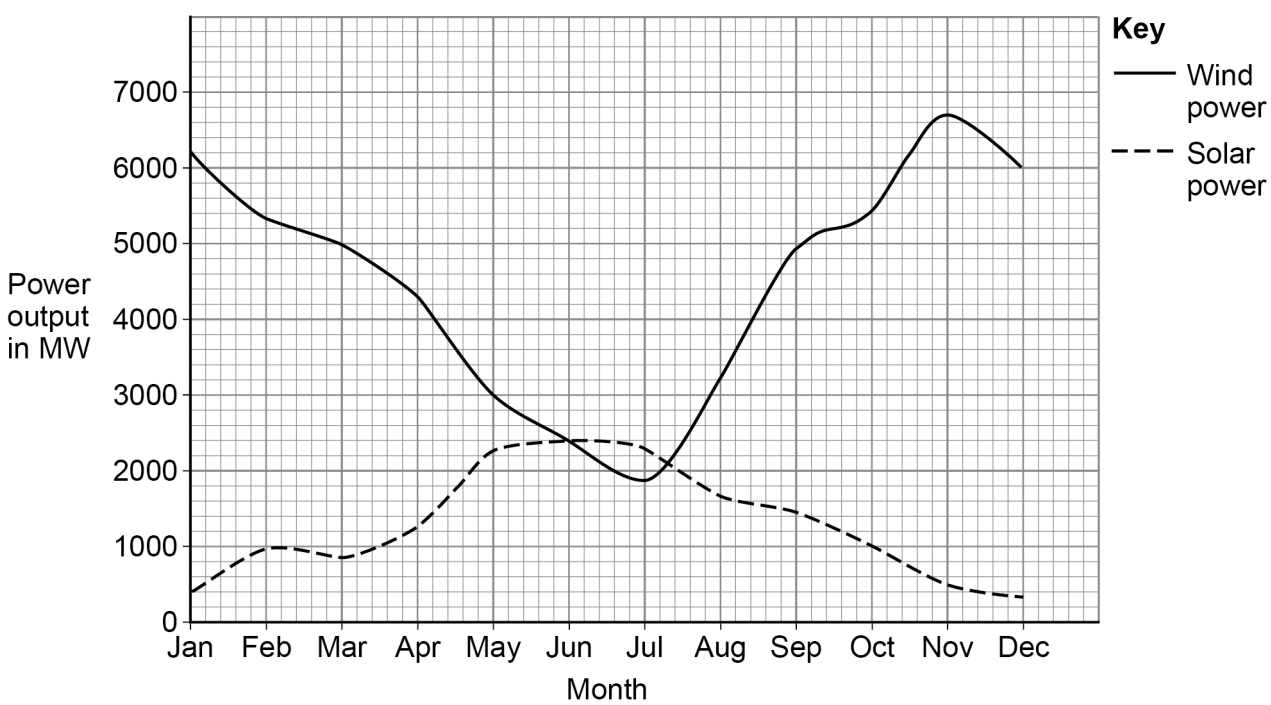


Figure 2 shows how the power output from solar and wind energy resources varies in a typical year.

Figure 2



6.1.3 National and global energy resources

Question 05 · continued

Explain the changes in power output from solar and wind energy resources between 2014 and 2019.

You should include an explanation of the change in power output during a typical year.

[6 marks]

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6.1.3 National and global energy resources

Question 06

June 2025 | 8464/P/1H | Original Q1

0 1 Fossil fuels are burned in car engines and in power stations.

0 1 . 1 Describe how different energy stores change in a car engine when a fossil fuel is burned.

[2 marks]

0 1 . 2 Some car engines burn a fuel that is produced using plants.

Name a fuel produced using plants.

[1 mark]

0 1 . 3 Some cars do **not** contain an engine that burns a fuel.

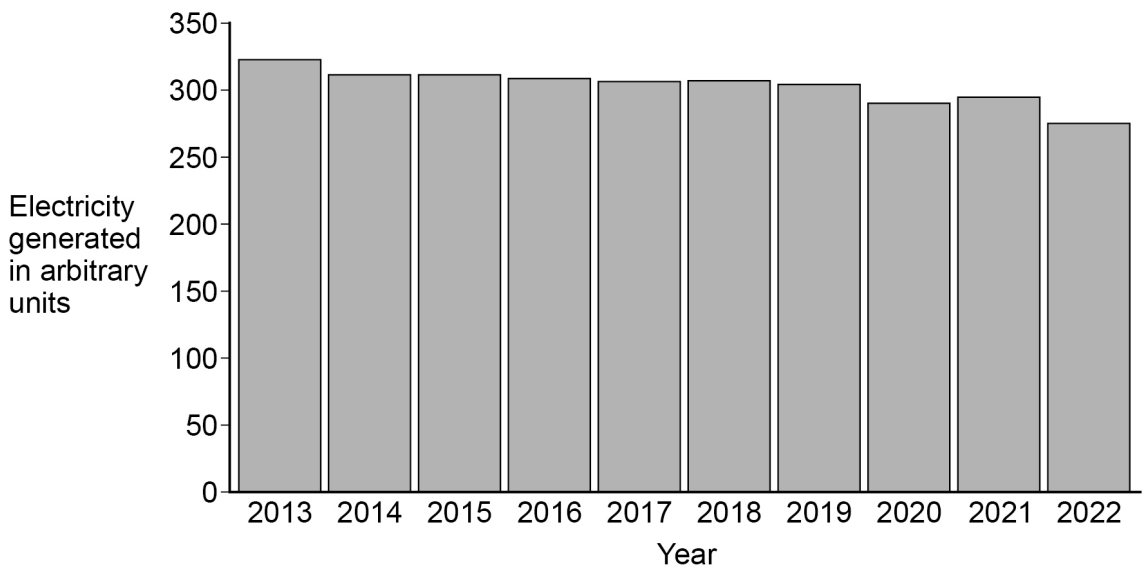
Suggest how cars that do **not** burn a fuel are powered.

[1 mark]

Question 1 continues on the next page

Figure 1 shows how the total amount of electricity generated in the UK has changed with time.

Figure 1



0 1 . 4 The proportion of electricity that is generated using renewable energy resources has increased since the year 2013.

Which conclusion is correct?

Use **Figure 1**.

[1 mark]

Tick (✓) **one** box.

The amount of fossil fuel that is burned to generate electricity each year has decreased. ☐

The concentration of carbon dioxide in the atmosphere has decreased. ☐

The rate of increase of the mean temperature of the atmosphere has decreased. ☐

6.1.3 National and global energy resources

Question 06 · continued

0 1 . 5 The UK plans to stop burning fossil fuels to generate electricity.

Explain **one** reason why it will take many years before all electricity is generated using renewable resources.

[2 marks]

0 1 . 6 Renewable energy resources can have a negative impact on the environment.

Give **one** negative environmental impact of hydro-electric power and of wind power.

[2 marks]

Hydro-electric power _____

Wind power _____

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