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# Level 3 Certificate and Extended Certificate in Applied Science

## SCIENCE IN THE MODERN WORLD

Unit number: ASC3

### SPECIMEN QUESTION PAPER

Time allowed: 1 hour 30 minutes

#### Materials

For this paper you must have:

- A clean copy of pre-released sources A, B, C and D
- a calculator.

#### Instructions

- Use black ink or black ball-point pen.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

#### Information

- You will be provided with copies of pre-released sources A, B, C and D
- There are two sections in this paper – **Section A** and **Section B**
- You should answer all questions in each section
- You should spend approximately 1 hour on **Section A** and 30 minutes on **Section B**
- The marks for questions are in brackets

#### Advice

Read each question carefully.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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7	
8	
TOTAL	



J U N 1 7 A S C 3 0 1

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ASC3

**Section A**

This section is based on Sources A, B, C and D

Answer **all** questions in this section

0 1

Hydraulic fracturing (fracking) is a method of extracting oil and gas from underground deposits.

0 1 . 1

Use **Source A** to give **one** reason why energy companies want to use fracking to extract oil and gas.

**[1 mark]**

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0 1 . 2

Describe how fracking is used to extract oil and gas. Use the diagram in **Source A** to help you.

**[3 marks]**

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0 1 . 3

The author of **Source A** identifies concerns relating to the use of fracking. One of the problems is the potential increased risk of earthquakes during fracking.

Describe two other concerns about fracking given in **Source A**.

[2 marks]

Concern 1 \_\_\_\_\_

\_\_\_\_\_

Concern 2 \_\_\_\_\_

\_\_\_\_\_

0 1 . 4

Fracking already takes place in the US. **Source A** suggest that fracking is more acceptable to the public in the US that it would be to the UK public.

Give one reason for this difference in public attitude towards fracking.

[1 mark]

\_\_\_\_\_

\_\_\_\_\_

0 2

**Source B** gives some different estimates of shale gas reserves in the UK.

0 2 . 1

Suggest why it is important to have reliable estimates of UK shale gas reserves.

[1 mark]

\_\_\_\_\_

\_\_\_\_\_

Turn over ►



0 2 . 2

In **Source B**, the section ‘Resource and Reserve terminology’ defines four terms used to describe the volume of shale gas available. **Reserves** of shale gas are smaller than the **Total Resources** of shale gas.

Explain why the reserves are smaller than the total resources.

[2 marks]

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0 2 . 3

**Source B** gives the British Geological Survey’s estimate of the recoverable shale gas from the Bowland Shale.

Calculate the minimum number of years the estimated amount of shale gas would last the UK at current gas consumption.

[2 marks]

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0 2 . 4

POSTbox articles (**Source B**) are written for UK Members of Parliament. The articles explain scientific or technical topics for a non-science audience. The articles are written by science advisors employed by parliament.

Explain why it is important that members of parliament understand scientific and technical topics.

[3 marks]

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0 3

**Source C** states that ‘commercial extraction of shale gas in the UK might improve our fuel security...’

0 3 . 1

Suggest **one** way in which fracking might improve ‘fuel security’ in the UK.

[1 mark]

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0 3 . 2

The author of **Source C** asks if the Government should set up an independent body to evaluate the costs and benefits of fracking.

Identify **two** groups of people who would need to be consulted, and give a reason why each group should be consulted.

[4 marks]

Group 1: \_\_\_\_\_

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Reason: \_\_\_\_\_

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Group 2: \_\_\_\_\_

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Reason: \_\_\_\_\_

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0 3 . 3

**Source C** states that ‘the carbon footprint of shale gas is lower than that of coal-fired power generators’.

What does this mean and why is it important to the global issue of climate change?”

[2 marks]

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Turn over ►



0 4

The government may give households in fracking areas a direct payment from the tax paid by the fracking companies. **Source D** describe this direct payment in two different ways:

- An incentive
- A bribe

0 4 . 1

Discuss why the UK Government and Friends of the Earth use different phrases to describe the same direct payments.

[4 marks]

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0 4 . 2

Friends of the Earth is an environmental campaigning group. The group produced a press release about the YouGov poll mentioned in **Source D**.

Give **two** reasons for producing a press release.

[2 marks]

Reason 1: \_\_\_\_\_

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Reason 2: \_\_\_\_\_

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0 4 . 3

Give **two** benefits for Friends the Earth of producing a press release about the YouGov poll findings.

[2 marks]

Benefit 1: \_\_\_\_\_

Benefit 2: \_\_\_\_\_



0 4 . 4

**Source D** describes opposition to the building of Hinkley Point C nuclear plant. Some of this opposition is due to environmental disadvantages. List **A – D** gives environmental disadvantages of different energy generation methods.

- A Long term waste disposal issues
- B Increase in heavy goods vehicles around the production site
- C Greenhouse gas emissions produced during construction or use
- D Increase in number of birds killed when in use

Tick the correct box to show possible environmental disadvantages of Nuclear Power.

[1 mark]

A only	<input type="checkbox"/>
A and C	<input type="checkbox"/>
B and D	<input type="checkbox"/>
C only	<input type="checkbox"/>

0 5

Do you think that fracking should be used to contribute to the energy supply in the UK?

Use **Sources A – D** to evaluate the use of fracking in the contribution of the energy supply in the UK.

[9 marks]

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Turn over ►







**Turn over for Section B**

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**Section B**

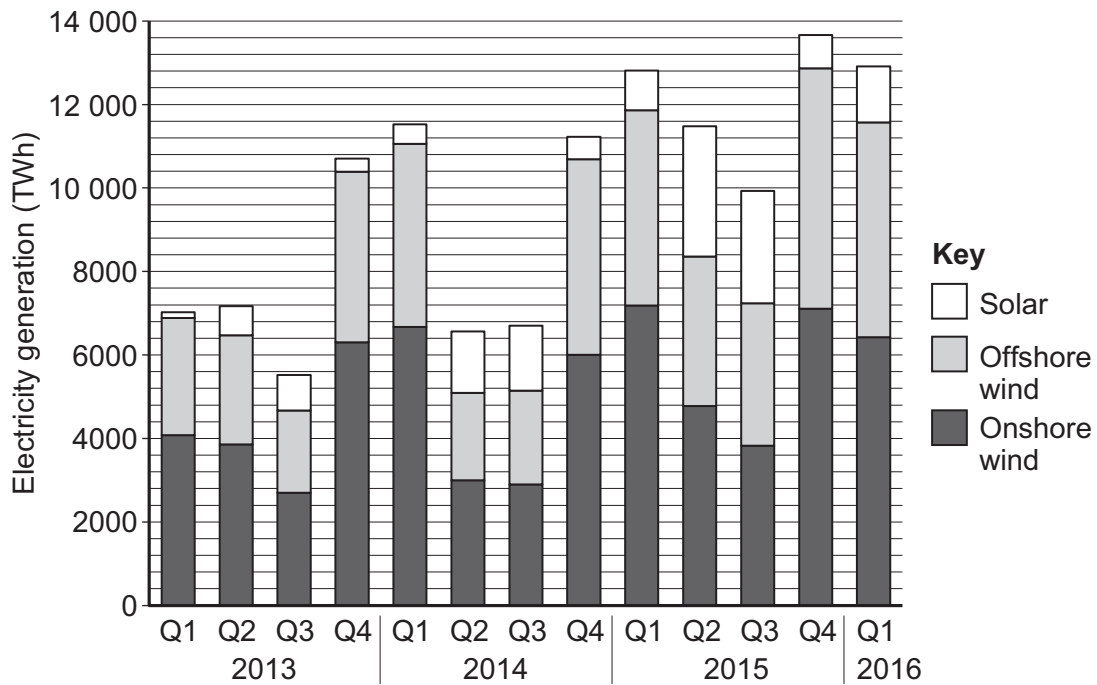
Answer **all** questions in this section

**0 6**

Electricity is generated using different sources.

**Figure 1** shows the amount of electricity (in terawatt hours) generated by two renewable resources: solar photovoltaics and wind (onshore and offshore). Each bar represents 3 months where Q1 is January to March, Q2 is April – June, Q3 is July – September and Q4 is October to December.

**Figure 1**



**0 6 . 1**

Terawatt hours (TWh) is a unit of energy used in electricity generation.

Give the standard unit for energy.

**[1 mark]**



- 0 6** . **2** Describe and explain the changes in electricity generation due to the season (quarter) for solar and wind energy. **[4 marks]**

Solar:

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Wind:

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- 0 6** . **3** Biomass can be in the form of wood pellets which can be burnt in existing coal power stations. State **two** advantages of using wood pellet biomass. **[2 marks]**

Advantage 1: \_\_\_\_\_

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Advantage 2: \_\_\_\_\_

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- 0 6** . **4** **Figure 2** shows the amount of electricity generated annually from biomass in the UK between 2010 and 2015.

**Figure 2**

	2010	2011	2012	2013	2014	2015
Electricity Generation from biomass (TWh)	2083	3085	3159	4019	4548	5219

One news article reported these data using the following headline:

‘Biomass soars to new heights for green electricity’

Discuss the accuracy of this headline using data from **Figure 1** and **Figure 2** to support your answer.

**[3 marks]**

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The news article also included the data in the form of a bar chart.

Give **two** advantages for readers of the article of presenting the data in a bar chart.

**[2 marks]**

Advantage 1: \_\_\_\_\_

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Advantage 2: \_\_\_\_\_

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0 7

Figure 3 shows an extract from a job advert for a wind turbine technician.

Figure 3

**Wind Turbine Technician**

Reporting to your regional Area Manager, you will be expected to maintain wind turbine projects in 26 wind farms.

Daily activities will include:

- Reporting and planning daily maintenance activity
- Fault-finding, troubleshooting, maintenance and repair on all turbine systems.
- Provide safety induction to visitors
- Ensuring the highest level of turbine availability

Skills and Qualifications

- Qualification in electric disciplines to NVQ3 level (or equivalent experience)
- High level of computer literacy
- UK driving licence

Personal Attributes

- Strong safety minded person
- High level of physical fitness and ability to work at heights
- Excellent analytical thinking.
- Ability to communicate and pass on technical knowledge

0 7 . 1

Suggest how each of the following attributes would be important for a wind turbine technician:

ability to work at heights \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

analytical thinking \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

ability to pass on technical knowledge \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[3 marks]

Turn over ►



0 7 . 2

Suggest why the wind turbine technician might need a driving licence.

[1 mark]

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0 8

Friends of the Earth is a charity and pressure group. It would like to see a significant increase in the amount of renewable energy used in the UK. Discuss how pressure groups, such as Friends of the Earth, can influence government policy about renewable energy.

[4 marks]

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END OF QUESTIONS



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