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Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

Level 3 Certificate / Extended Certificate APPLIED SCIENCE

Unit 3 Science in the Modern World

Thursday 14 June 2018

Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a clean copy of pre-release **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-release **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 question are in brackets.
- The maximum mark for this paper is 60.

Advice

Read each question carefully.

For Examiner's Use

Question	Mark
1	
2	
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10	
11	
12	
TOTAL	



J U N 1 8 A S C 3 0 1

IB/M/Jun18/E11

ASC3

Section AAnswer **all** questions in this section**0 1**

Source A describes the Chernobyl accident. The Chernobyl accident occurred during tests on the Chernobyl 4 reactor in April 1986.

0 1 . 1

State the **two** main reasons for the accident according to **Source A**.

[2 marks]

1 _____

2 _____

0 1 . 2

Give **two** reasons why the information in **Source A** is likely to be more valid than information from a newspaper article.

[2 marks]

1 _____

2 _____



0 2

An exclusion zone was set up immediately following the accident. Thousands of local residents were relocated. In the years that followed, this exclusion zone was extended and more people relocated.

Use **Source A** to answer the following questions.

0 2 . 1

Calculate the percentage increase in the size of the exclusion zone after it had been extended.

[1 mark]

Percentage increase = _____

0 2 . 2

Extending the exclusion zone helped to protect people.

Give **one** reason why the exclusion zone helped to protect people.

[1 mark]

0 2 . 3

Source A implies that the extension of the exclusion zone might **not** have been necessary.

Give **one** reason why.

[1 mark]

3

Turn over ►



0 3

Experts carried out several studies to assess the effects of the Chernobyl accident on the contaminated areas.

0 3 . 1

One of the experts may have been a toxicologist.

Suggest **one** role of a toxicologist in studies of the Chernobyl accident.

[1 mark]

0 3 . 2

Why was it difficult to assess the effects of the accident on the health of the local people?

Use information from **Source A**.

[1 mark]

0 3 . 3

How did the experts assess the effects of the accident on the health of the local people?

[1 mark]

3



0 4

Source B states: ‘thousands of children, even those born 30 years after Chernobyl, still have to drink radioactively contaminated milk’.

0 4 . 1

Many people are reluctant to believe that this statement is true.

Give **one** reason why.

[1 mark]

0 4 . 2

Explain why thousands of children in the area around Chernobyl may still be drinking radioactive milk.

Use information from **Source A**.

[3 marks]

0 4 . 3

Give **one** way to reduce exposure to radioactivity for residents in the areas worst affected by the Chernobyl accident.

Use information from **Source B**.

[1 mark]

5

Turn over ►



0	5
---	---

Use **Source C** to answer the following questions.

0	5	.	1
---	---	---	---

Suggest who the target audience for **Source C** might be.

[1 mark]

0	5	.	2
---	---	---	---

Discuss how effectively **Source C** engages its target audience.

[2 marks]

0	5	.	3
---	---	---	---

Give **one** reason why the information in **Source C** might **not** be valid.

[1 mark]

4



0	6
---	---

Source C reports that biologists have found animals thriving in the exclusion zone around Chernobyl.

0	6	.	1
---	---	---	---

Suggest why animals are thriving in the exclusion zone.

[1 mark]

0	6	.	2
---	---	---	---

Suggest **two** roles of a biologist in the University of Georgia study referred to in **Source C**.

[2 marks]

1

2

3

Turn over for the next question

Turn over ►



07

Source D describes how a new steel shelter has been built to encase Chernobyl reactor 4. The steel shelter has replaced the original concrete sarcophagus.

07.1

Suggest **two** roles of a material scientist in the design and construction of the new steel shelter.

[2 marks]

1 _____

2 _____

07.2

One improvement of the new steel shelter is that it is more durable compared with the original sarcophagus. This means it will last longer.

Give **two** other improvements of the new steel shelter compared with the original sarcophagus.

For each improvement, give a reason why the improvement is better.

[4 marks]

Improvement 1 _____

Reason _____

Improvement 2 _____

Reason _____

6



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0 8

Some of the sources may have been peer reviewed.

Describe the process of peer review.

[3 marks]

3

Turn over for the next question

Turn over ►



0	9
---	---

The diagram in **Source A** shows the main environmental pathways of human radiation exposure.

Discuss how different groups of people affected by the Chernobyl accident were exposed to radiation **and** the consequences of exposure to radiation.

Use the diagram in **Source A** and evidence from **Sources A, B, C** and **D** in your answer.

The Quality of Written Communication will be assessed in your answer.

[9 marks]



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Extra space _____

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Section BAnswer **all** questions in this section**1 0**

Nuclear power plays an increasingly important role in providing energy for our modern world. In 2017, over 11% of the total electricity generated worldwide was from 449 nuclear reactors in 30 countries around the world. There were also 60 new nuclear reactors being built in 15 countries.

1 0 . 1

Suggest **two** reasons why nuclear power is becoming increasingly important as an energy source.

[2 marks]

1

2 _____

1 0 . 2

Calculate the percentage of total electricity generated worldwide which will be provided by nuclear power when all the new reactors are built.

For this question assume that all nuclear reactors provide an equal amount of electricity.

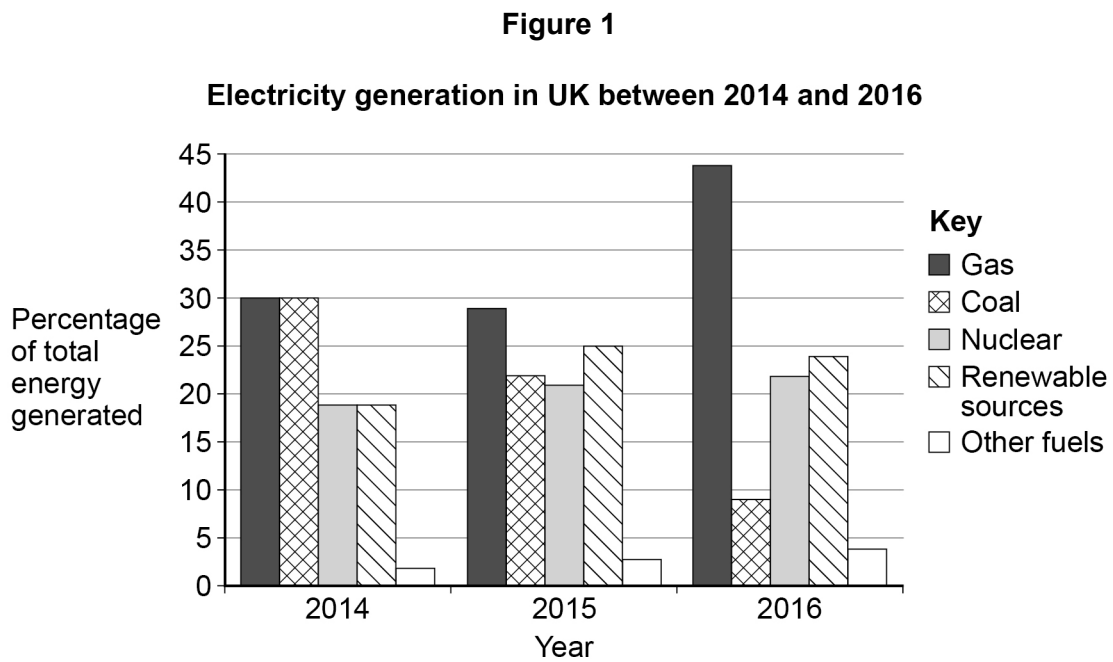
[3 marks]

Total electricity generated = _____ %

5**Turn over ►**

1 1

Figure 1 represents data for electricity generation in the UK.



1 1 . 1

Suggest **two** reasons why scientists might use a chart such as **Figure 1** to represent data for electricity generation.

[2 marks]

1 _____

2 _____

1 1 . 2

Give **three** examples of 'renewable sources'.

[3 marks]

1 _____

2 _____

3 _____



1	1	.	3
---	---	---	---

The use of energy from renewable sources in 2016 was lower in the UK than it was in 2015.

Suggest **three** reasons why the use of energy from renewable sources was lower in 2016.

[3 marks]

1 _____

2 _____

3 _____

8

Turn over for the next question

Turn over ►



1 2

Table 1 shows data for energy generated by nuclear power in different countries in 2016.

Table 1

Country	Energy from nuclear power / billion kWh	Percentage of total energy generated	Number of reactors	Approximate area of country / million km ²
USA	805.3	19.7	99	9.6
France	384.0	72.3	58	0.7
China	210.5	3.6	36	9.6
South Korea	154.3	30.3	25	0.1
Canada	97.4	15.6	19	10.0
Ukraine	81.0	52.3	15	0.6
UK	65.1	21.2	15	0.2

Use the data in **Table 1** to answer the following questions.

1 2 . 1

Which country relied more on nuclear power in 2016 than any other country?

[1 mark]

1 2 . 2

Give **one** piece of evidence from **Table 1** to support your answer to Question 12.1.

[1 mark]



1 **2** **3** The USA and China have approximately the same area in millions of km².

Compare the USA's and China's use of nuclear power to generate energy.

Use data from **Table 1**.

[3 marks]

1 **2** **4** Calculate the total electrical energy generated in the UK in 2016 to the nearest billion kWh.

[2 marks]

Total electrical energy generated = _____ billion kWh

7

END OF QUESTIONS



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