



Surname \_\_\_\_\_

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Candidate Number \_\_\_\_\_

Candidate Signature \_\_\_\_\_

## **Level 3 Certificate / Extended Certificate APPLIED SCIENCE**

**Unit 3 Science in the Modern World**

**ASC3**

**Thursday 14 June 2018      Morning**

**Time allowed: 1 hour 30 minutes**

**For this paper you must have:**

- a clean copy of pre-release Sources A, B, C and D
- a calculator.

**At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.**

**[Turn over]**



BLANK PAGE



## INSTRUCTIONS

- Use black ink or black ball-point pen.
- Answer ALL questions.
- You must answer the questions in the spaces provided. Do not write 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.

**DO NOT TURN OVER UNTIL TOLD TO DO SO**



**SECTION A**

**Answer ALL questions in this section**

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

**01.1** **State the TWO main reasons for the accident according to SOURCE A. [2 marks]**

**1** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**2** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**01.2** 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 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[Turn over]

4



**02**

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.

**02.1**

Calculate the percentage increase in the size of the exclusion zone after it had been extended.  
[1 mark]

Percentage increase = \_\_\_\_\_



**02.2** Extending the exclusion zone helped to protect people.

Give ONE reason why the exclusion zone helped to protect people. [1 mark]

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

Give ONE reason why. [1 mark]

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[Turn over]

3



**03**

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

**03.1**

**One of the experts may have been a toxicologist.**

**Suggest ONE role of a toxicologist in studies of the Chernobyl accident. [1 mark]**

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**03.2**

**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]**

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**03.3** How did the experts assess the effects of the accident on the health of the local people?  
[1 mark]

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3

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

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

Give ONE reason why. [1 mark]

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[Turn over]



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

**Use information from SOURCE A. [3 marks]**

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**04.3** 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]

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[Turn over]

5



**05**

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

**05.1**

Suggest who the target audience for **SOURCE C** might be. [1 mark]

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**05.2**

Discuss how effectively **SOURCE C** engages its target audience. [2 marks]

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**05.3** Give ONE reason why the information in SOURCE C might NOT be valid. [1 mark]

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4

**06** SOURCE C reports that biologists have found animals thriving in the exclusion zone around Chernobyl.

**06.1** Suggest why animals are thriving in the exclusion zone. [1 mark]

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**[Turn over]**



**06.2** Suggest TWO roles of a biologist in the University of Georgia study referred to in SOURCE C. [2 marks]

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

<b>3</b>

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

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2

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**[Turn over]**



**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** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_





**08**

Some of the sources may have been peer reviewed.

Describe the process of peer review. [3 marks]

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[Turn over]

**3**



09

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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**SECTION B**

**Answer ALL questions in this section**

**10**

**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.**

**10.1**

**Suggest TWO reasons why nuclear power is becoming increasingly important as an energy source. [2 marks]**

**1**

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**2**

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- 10.2** 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 = \_\_\_\_\_ %

[Turn over]

5



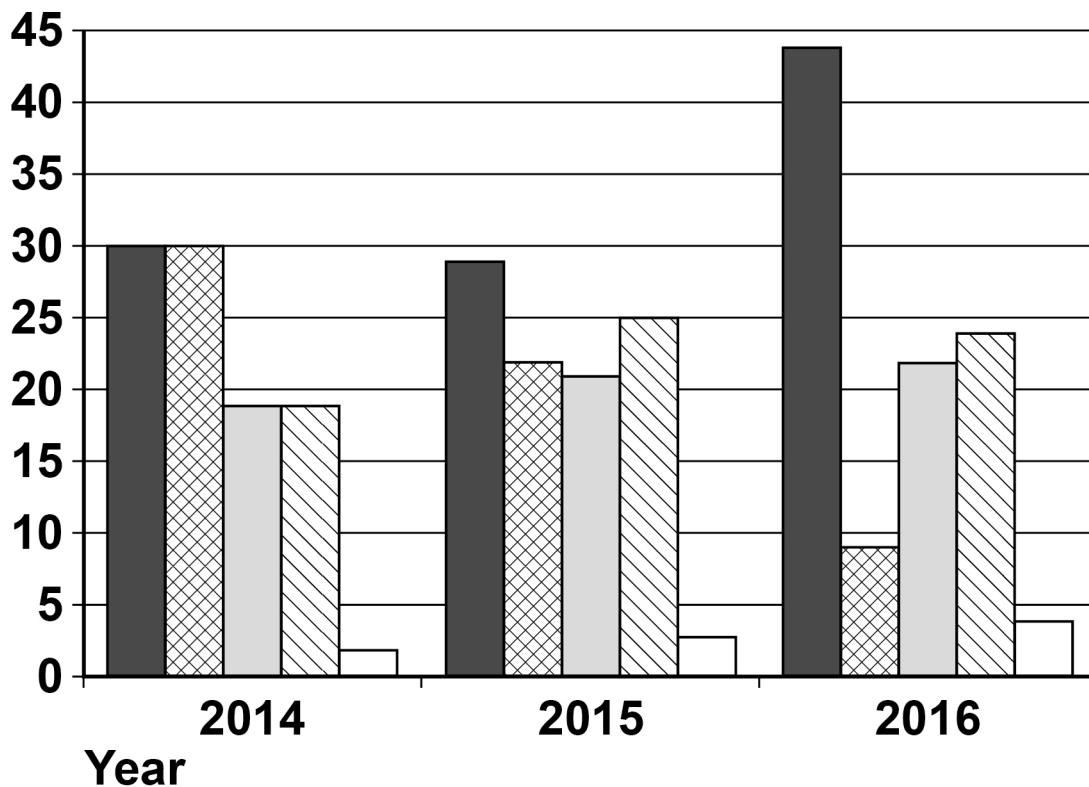
11

**FIGURE 1** represents data for electricity generation in the UK.

## FIGURE 1

### Electricity generation in UK between 2014 and 2016

Percentage of total energy generated



#### KEY

- Gas
- Coal
- Nuclear
- Renewable sources
- Other fuels



**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 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

[Turn over]



**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** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**[Turn over]**

<b>8</b>



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 <sup>2</sup>
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]

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**12.2** Give ONE piece of evidence from TABLE 1 to support your answer to Question 12.1.  
[1 mark]

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**12.3** The USA and China have approximately the same area in millions of km<sup>2</sup>.

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

Use data from TABLE 1. [3 marks]

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[Turn over]



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**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**

**END OF QUESTIONS**

7





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For Examiner's Use	
Question	Mark
1	
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<b>TOTAL</b>	

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