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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 13 June 2019

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.
- Fill in the boxes at the top of this page.
- 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.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- 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 questions are shown 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	
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TOTAL	



JUN19ASC301

IB/M/Jun19/E6

ASC3

Section A

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

Answer **all** questions in this section.

0 1

Source A describes the historical landmarks in the development of electric cars.

Use information from **Source A** to answer Question **01**.

0 1 . 1

Electric cars first became popular in the late 1800s.

Why did electric cars first become popular with people living in cities?

Tick (✓) **one** box.

[1 mark]

Distance travelled was not an important factor

Electric cars could travel faster

Electric cars were cheap to make

Electric cars were more environmentally friendly

0 1 . 2

Give **three** reasons why the popularity of electric cars decreased in the early 1900s.

[3 marks]

1 _____

2 _____

3 _____



0 1 . 3

Give **two** reasons why car manufacturers began to make more electric cars in the 1990s.

[2 marks]1 _____
_____2 _____

6

Turn over for the next question

Turn over ►

0 2

Source B suggests that electric vehicles will replace petrol and diesel vehicles.

Source B states 'it is no longer a question of whether this will happen – but how quickly'.

0 2 . 1

Give **one** piece of evidence from **Source B** that shows the automotive industry is taking electric vehicles more seriously.

Do **not** refer to making more electric vehicles in your answer.

[1 mark]

0 2 . 2

There were some problems with early electric vehicles which have recently been solved.

Give **two** problems with early electric vehicles.

Describe how each problem has recently been solved.

Use information from **Source B**.

[4 marks]

1 _____

2 _____



0 2 . 3

There has been an increase in electric vehicle sales in China.

Suggest **two** reasons why this increase has encouraged the automotive industry in Europe to make more electric vehicles.

Use information from **Source B**.

[2 marks]

1 _____

2 _____

7

0 3

Source B refers to the Paris climate talks that took place in 2016. During the talks, 195 countries discussed and agreed action plans to reduce global warming.

Explain how the Paris climate talks might have encouraged the automotive industry to increase production of electric cars.

[3 marks]

3

Turn over for the next question

Turn over ►



0 4

Source B suggests that the increased use of electric cars might have environmental and social benefits.

Give **one** example of an environmental benefit and **one** example of a social benefit in the increased use of electric cars.

[2 marks]

Environmental benefit _____

Social benefit _____

2

0 5

Electric vehicles made by the car manufacturer *Tesla* are mentioned in **Sources A, B** and **C**.

Use information from **Sources A, B** or **C** to answer Question 05.

0 5 . 1

Electric vehicles are becoming more popular with the public.

Give **one** piece of information about the sales of *Tesla* electric vehicles that shows this popularity.

[1 mark]

0 5 . 2

Suggest why the *Tesla 3* sold well in the US in 2017.

[1 mark]

0 5 . 3

Give **one** reason why it was surprising that the *Tesla 3* sold well in 2017.

[1 mark]

3



0 6

Source C was written in 2017. The author believes that there are still potential problems with the safety of electric vehicles.

0 6 . 1

Explain **one** problem with the safety of electric vehicles, according to **Source C**.

[2 marks]

0 6 . 2

Explain how **Source C** suggests that the safety problem you described in Question **06.1** could be solved.

[2 marks]

4

Turn over for the next question

Turn over ►

0 7**Source D** refers to the Committee on Climate Change.

The committee advises the UK government on ways to reduce carbon dioxide emissions.

One suggestion is to ban the sale of new petrol and diesel vehicles by either 2030 or 2040.

Use information from **Source D** to answer Question **07**.

0 7 . 1

Calculate the percentage of total carbon dioxide emissions in the UK that came from tailpipe emissions from petrol and diesel cars in 2017.

[2 marks]

Percentage of total carbon dioxide emissions = _____ %

0 7 . 2

Calculate the percentage decrease in tailpipe emissions from petrol and diesel cars if the proposed ban on the sale of new petrol and diesel cars began in 2040.

[2 marks]

Percentage decrease in tailpipe emissions = _____ %

0 7 . 3

Suggest **two** reasons why a ban introduced in 2040 might be better than an earlier ban in 2030.

[2 marks]

1 _____

2 _____



0 7 . 4

Describe what is meant by 'full lifecycle emissions'.

[1 mark]

0 7 . 5

Why is 'full lifecycle emissions' a useful measure when discussing electric vehicles?

[1 mark]

8**Turn over for the next question****Turn over ►**

0 8

You are considering whether to buy an electric car or a diesel car.

You read **Sources A, B, C** and **D** to see if they provide you with information to help you make your decision.

For each source:

- evaluate its validity
- describe its effectiveness at providing useful information.

[9 marks]



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Section B

Answer **all** questions in this section.

0 9

Greenhouse gas (GHG) emissions contribute to climate change.

Greenhouse gases include:

- carbon dioxide (CO₂)
- methane (CH₄)
- nitrous oxide (NO₂)
- hydrofluorocarbons (HFCs).

Table 1 shows greenhouse gas emissions from different industry sectors in the UK.

Table 1

Industry sector	Greenhouse gas emissions / million tonnes of carbon dioxide equivalent (MtCO ₂ e)					
	1990	1995	2000	2005	2010	2015
Agriculture	60.2	59.7	56.3	52.6	50.7	51.5
Mining and quarrying	42.5	39.9	34.8	28.4	24.6	20.5
Manufacturing	181.1	168.9	139.6	125.9	96.9	88.5
Household services	285.5	250.3	237.6	242.5	207.7	149.5
Transport	64.8	70.7	83.7	100.4	85.0	85.7
Other industries	198.0	201.8	216.8	219.4	222.5	199.5
Total	832.1	791.3	768.8	769.2	687.4	595.2

The largest source of GHG emissions is the combustion of fossil fuels.

Reducing the use of fossil fuels is the main reason why GHG emissions have decreased since 1990.

0 9 . 1

Suggest how the UK has reduced the use of fossil fuels across most industry sectors since 1990.

[1 mark]



0 9 . 2 Suggest when the UK began to sell more electric cars.

Give a reason for your answer.

Use data from **Table 1**.

[1 mark]

Household services include:

- the supply and use of electricity and gas
- the management of waste.

The demand for these services has increased significantly since 1990. However, the GHG emissions from this sector have decreased.

0 9 . 3 Calculate the mean annual decrease in GHG emissions from the household services sector between 1990 and 2015.

Use data in **Table 1**.

[2 marks]

Mean annual decrease = _____ MtCO₂e

0 9 . 4 Suggest **two** reasons which may have contributed to a decrease in GHG emissions in the UK from the household services sector.

Do **not** refer to the reduction in the use of fossil fuels in your answer.

[2 marks]

1 _____

2 _____

Question 9 continues on the next page

Turn over ►



0 9 . 5

Suggest **one** reason that may have contributed to a decrease in GHG emissions in the UK since 1990 in **each** of the following industry sectors:

- agriculture
- mining and quarrying
- manufacturing.

Do **not** refer to the reduction in the use of fossil fuels in your answer.

[3 marks]

Agriculture _____

Mining and quarrying _____

Manufacturing _____

9



1 0

Carbon dioxide emissions are the largest contributor to global warming.
Reduction of carbon dioxide emissions is the focus of most climate change initiatives.

Table 2 shows data for total GHG and carbon dioxide emissions in 1990 and 2015.

Table 2

Year	Emissions / million tonnes of carbon dioxide equivalent (MtCO ₂ e)		Carbon dioxide emissions as percentage of total GHG emissions
	Total GHGs	Carbon dioxide	
1990	832.1	630.7	75.8
2015	595.2	504.3	84.7

Evaluate the success of climate change initiatives between 1990 and 2015.

Use data from **Table 2**.

[3 marks]

3

Turn over for the next question

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1	1
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Many scientists in different industry sectors are working to reduce climate change.

1	1	.	1
---	---	---	---

Explain how an **environmental scientist** could contribute to reducing climate change.

[2 marks]

1	1	.	2
---	---	---	---

Explain how a **research scientist** could contribute to reducing climate change.

[2 marks]

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

Explain how a **product developer** could contribute to reducing climate change.

[2 marks]

6

END OF QUESTIONS



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