



Please write clearly in block capitals.

Centre number

Candidate number

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

Level 3 Certificate/Extended Certificate APPLIED SCIENCE

Unit 3 Science in the Modern World

Friday 24 January 2020

Afternoon

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	
3	
4	
5	
6	
7	
8	
9	
10	
11	
TOTAL	



J A N 2 0 A S C 3 0 1

IB/M/Jan20/E6

ASC3

Section A

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

Answer **all** questions in this section.

0	1
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Source A describes how corals and algae live together in a relationship known as mutualistic symbiosis.

The coral receives a benefit from the relationship with the algae.

What is the benefit that the coral receives from the algae?

Tick (✓) **one** box.

[1 mark]

Oxygen

Shelter

Sugar

Warmth

1



0 2

Source A states that coral bleaching damages the coral. The coral dies if the bleaching lasts for longer than a few weeks.

0 2 . 1

Explain the colour change that takes place during coral bleaching.

[3 marks]

0 2 . 2

Give **two** reasons why the coral dies if the bleaching lasts for longer than a few weeks.

[2 marks]

1 _____

2 _____

5

Turn over for the next question

Turn over ►



0	3
---	---

Explain the 'fundamental contradiction' referred to by the author of **Source A**.

[3 marks]

3



0 4**Source B** describes a possible ban on certain sunscreens in Hawaii.**0 4 . 1**

Why does the government in Hawaii want to ban certain sunscreens?

[1 mark]

0 4 . 2Suggest **two** reasons why people in Hawaii might want this ban more than people in other parts of the world.**[2 marks]**1

2

0 4 . 3

New sunscreens may be developed to replace the banned sunscreens.

What type of scientist will study the reactions of chemicals in order to make a new sunscreen?

Tick (✓) **one** box.**[1 mark]**

Environmental scientist

Laboratory technician

Pharmacologist

Research scientist

4**Turn over ►**

0 5

Source B refers to a 'lack of peer-reviewed evidence suggesting that sunscreen caused coral bleaching'.

0 5 . 1

Who is responsible for making amendments to scientific articles during the process of peer review?

Tick (✓) **one** box.

[1 mark]

Author

Editor

Journalist

0 5 . 2

Why might 'a lack of peer-reviewed evidence' lead to some people not wanting a ban on sunscreens?

[1 mark]

0 5 . 3

Suggest **two** other reasons why there might be opposition to the ban.

[2 marks]

1 _____

2 _____

4



0 6

The diagram in **Source C** shows a new machine designed to help reduce coral bleaching.

0 6 . 1

Suggest the purpose of the:

- pontoon
- solar panels
- electric motor.

[3 marks]

Pontoon _____

Solar panels _____

Electric motor _____

0 6 . 2

A material scientist tests the materials used to make the pontoon.

Suggest **two** properties that the materials used to make the pontoon would need to be tested for.

[2 marks]

Property 1 _____

Property 2 _____

0 6 . 3

Give **one** role of a marine biologist in evaluating the success of this machine.

[1 mark]

6

Turn over ►

07

Coral bleaching could lead to the global extinction of coral ecosystems.

Source D describes how scientists in Florida are trying to prevent global extinction of coral ecosystems.

07.1

A rise in seawater temperature causes coral damage in Florida.

Give **two** other causes of coral damage in Florida.

[2 marks]

1 _____

2 _____

07.2

Describe how scientists in Florida are growing new coral.

[2 marks]

07.3

Give **one** advantage of growing coral in the way you described in Question **07.2** rather than allowing it to grow naturally.

[1 mark]

07.4

One role of the Coral Restoration Foundation is to grow new coral.

Give **one** other role of the Coral Restoration Foundation that may contribute to preventing global extinction of coral ecosystems.

[1 mark]



0 7 . 5 Only some of the corals that were planted in 2018 survived.

Calculate the approximate number of corals planted in 2018 that survived at least 1 year.

[2 marks]

Number of corals = _____

8

Turn over for the next question

Turn over ►



0 8

You are an environmental scientist.

Your role involves visiting schools and colleges to provide information for students about:

- what coral bleaching is
- what causes coral bleaching
- how scientists are addressing the problem of coral bleaching.

You are searching for valid articles from the media to engage sixth form students with the topic of coral bleaching.

Describe the validity of each source, **A, B, C and D**, and its effectiveness at engaging and providing information to the students.

[9 marks]



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outside the
box

Lined writing area with horizontal lines. Includes the text "Extra space" followed by a line.

9

Turn over ►



Section B

Answer **all** questions in this section.

0 9

A survey conducted in the UK every year since 2012 asked members of the public for their opinion on climate change.

People were asked to select **one** of the following four responses about the causes of climate change:

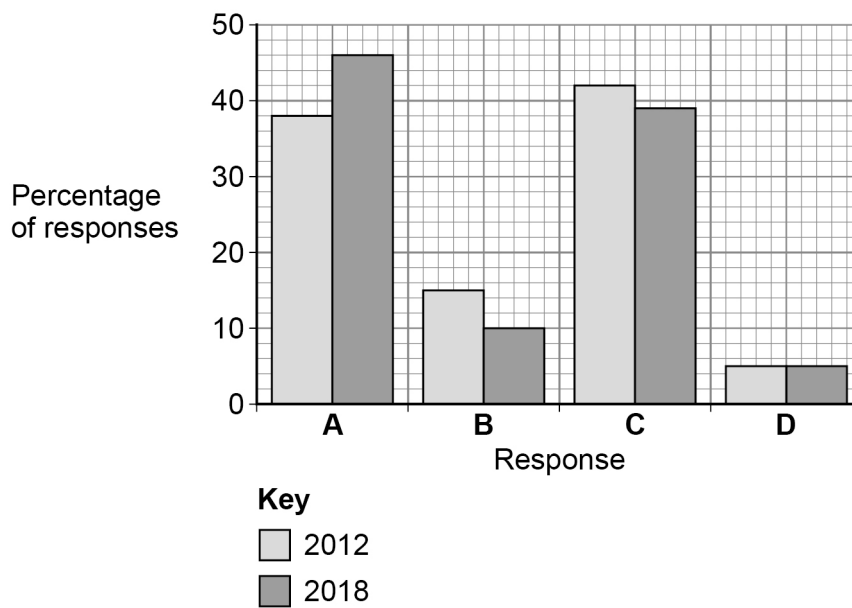
Response A: Climate change is mainly due to human activities

Response B: Climate change is mainly due to natural processes

Response C: Climate change is due to a mixture of both human activities and natural processes

Response D: Don't know anything about climate change

Figure 1 shows the data collected from this survey in 2012 and 2018.

Figure 1**0 9 . 1**

What does this survey show about the changes in attitudes towards climate change between 2012 and 2018?

[2 marks]



0 9 . 2 Give **one** reason why a bar chart is used in **Figure 1** to show the results of the survey. **[1 mark]**

0 9 . 3 Suggest **two** ways that the media may have contributed to a change in attitude to climate change. **[2 marks]**

1

2

0 9 . 4 Suggest **two** pieces of additional information that would be needed in order to assess the validity of the data from the survey. **[2 marks]**

1

2

7

Turn over for the next question

Turn over ►



1 0

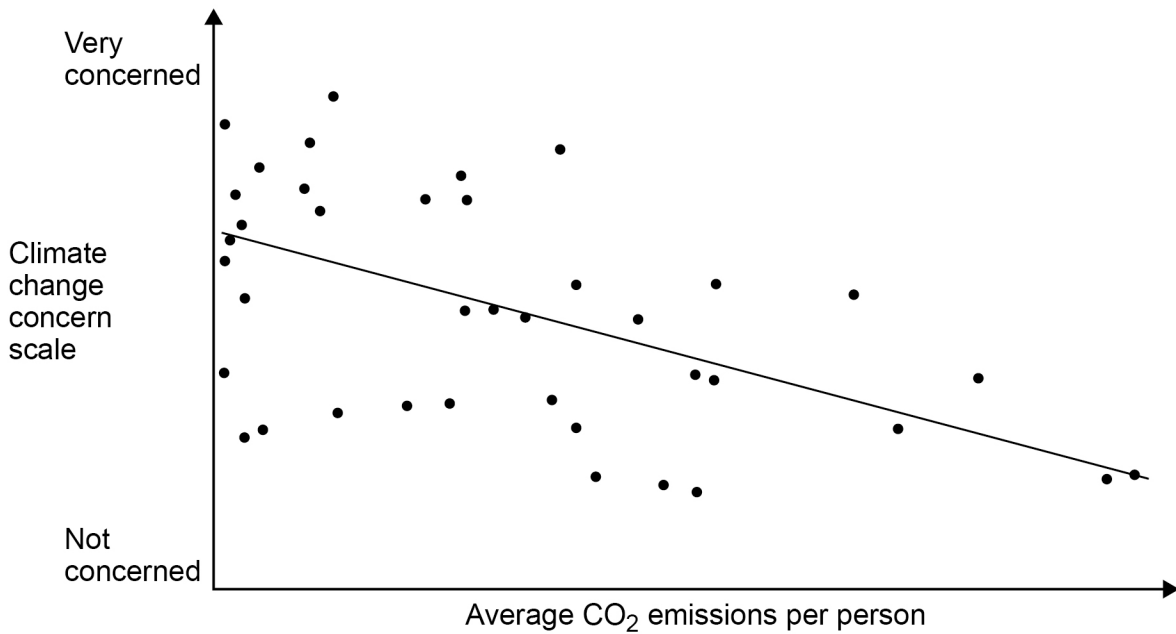
Environmental groups and governments around the world collect and analyse data about climate change.

Figure 2 shows a trend for global attitudes to climate change.

'Climate change concern scale' is a measure of a population's concern about climate change in each country.

Each point on the graph represents a country.

Figure 2



Explain why the trend shown in the graph is a global problem for the future.

[3 marks]

3



1 1

There is evidence that greenhouse gases contribute to climate change.

Carbon dioxide is a greenhouse gas.

Table 1 shows data for greenhouse gas emissions in the UK in 1990 and 2016.

Table 1

Sector	Greenhouse gas emissions / million tonnes	
	1990	2016
Energy supply	277.9	120.2
Business	114.7	81.5
Transport	128.1	125.8
Public	13.5	8.2
Industrial processes	59.9	10.5
Land use and forestry	-2.1	-14.6
Waste management	66.7	19.9
Total	658.7	351.5

1 1 . 1

Calculate the percentage decrease in total greenhouse gas emissions between 1990 and 2016.

[2 marks]

Percentage decrease = _____ %

Question 11 continues on the next page

Turn over ►



Greenhouse gas emissions from the energy supply sector have decreased by more than 50% between 1990 and 2016.

1 1 . 2 Explain why there has been a decrease in greenhouse gas emissions from the energy supply sector.

[2 marks]

1 1 . 3 Which **two** sectors had greater percentage decreases than the energy supply sector between 1990 and 2016?

Do **not** include land use and forestry in your answer.

[2 marks]

1 _____

2 _____



Greenhouse gas emissions from the land use and forestry sector are recorded as negative numbers.

1 1 . 4

Explain why emissions from the land use and forestry sector are recorded as negative numbers.

[2 marks]

1 1 . 5

Suggest **two** reasons why the greenhouse gas emissions for the land use and forestry sector have become more negative between 1990 and 2016.

[2 marks]

1 _____

2 _____

10

END OF QUESTIONS



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ANSWER IN THE SPACES PROVIDED**



