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# Level 3 Certificate and Extended Certificate in Applied Science

## SCIENCE IN THE MODERN WORLD

Unit Number: ASC3

Friday 26 January 2018

Afternoon

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.
- The maximum mark for this paper is 60.

### Advice

Read each question carefully.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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11	
<b>TOTAL</b>	



J A N 1 8 A S C 3 0 1

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**ASC3**

**Section A**

**0 1**

Microplastics are defined as pieces of plastic smaller than 5 mm in size. Microbeads are one example of microplastics that can cause marine pollution. Use **Sources A** and **B** to answer the following questions.

**0 1 . 1**

Give **two** other examples of where microplastics come from.

**[2 marks]**

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**0 1 . 2**

Explain why microbeads have been chosen as the starting point for tackling the problems caused by microplastics.

**[2 marks]**

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0 1 . 3

Give **four** reasons why the small size of microbeads and the materials they are made of cause problems.

[4 marks]

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3 \_\_\_\_\_

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4 \_\_\_\_\_

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0 1 . 4

Why is microplastic pollution considered to be a global problem?

[2 marks]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

10

Turn over ►



0 2

**Source A** suggests that microplastics might be a potential health risk for humans.

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

0 2 . 1

What evidence is used to demonstrate the potential health risk for humans?

[1 mark]

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0 2 . 2

Suggest why Chinese people might be more at risk than people of other nationalities.

[1 mark]

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0 2 . 3

Microplastics erode into nanoplastics.

Why might this be a greater health risk to humans?

[1 mark]

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0 3

It is possible that all the microbeads used in cosmetic products in the UK each year could end up in the sea.

Use the summary in **Source B** to calculate the percentage of microplastics entering the sea from Europe each year that could come from microbeads in the UK.

Give your answer as a range.

[4 marks]

Range = \_\_\_\_\_ % to \_\_\_\_\_ %

3

4



0 4

One of the conclusions in **Source B** is that it is important that products containing microbeads are labelled clearly.

0 4 . 1

Give **one** reason why labelling is important for consumers.

[1 mark]

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0 4 . 2

Give **one** reason why cosmetics manufacturers might be reluctant to label products containing microbeads.

[1 mark]

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2

0 5

**Source B** concludes that a ban on microbeads is only the first part of the solution to microplastic pollution.

0 5 . 1

What statistical evidence supports this?

[1 mark]

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0 5 . 2

Other than a ban on microbeads, give **four** measures that would reduce microplastic pollution.

Use **Sources A** and **B** to support your answer.

[4 marks]

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

3 \_\_\_\_\_

\_\_\_\_\_

4 \_\_\_\_\_

\_\_\_\_\_

5

Turn over ►



0	6
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In **Source C**, Dr John Ugelstad was hailed as a hero in the 1980s but might now be compared to the inventors of asbestos and leaded petrol.

Explain why.

**[3 marks]**

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0 7

In **Source D**, Dr Friedman disagrees with a ban on microbeads.

0 7 . 1

In Dr Friedman's opinion, a ban on microbeads 'could potentially do more harm than good'. Explain why.

[2 marks]

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0 7 . 2

Dr Friedman refers to a 'non-peer-reviewed editorial in support of a microbead ban'.

Suggest why he has made a point of referring to it as 'non-peer-reviewed'.

[2 marks]

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0 7 . 3

Explain what Dr Friedman believes could have been an alternative to a ban on microbeads.

[2 marks]

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6

Turn over ►









**Section B****0 9**

**Table 1** shows the amount of money spent in the UK on environmental protection. It is measured in millions of pounds per year. **Table 1** shows figures for alternate years from 2000 to 2014.

**Table 1**

Environmental protection activity	Environmental expenditure (£ millions / year)							
	2000	2002	2004	2006	2008	2010	2012	2014
Household waste management	4 870	5 814	6 860	9 713	10 663	11 433	11 260	12 083
Waste water management	0	14	27	47	23	17	14	0
Protection of ambient air and climate	244	255	220	173	214	505	165	492
Protection of biodiversity and landscape	234	346	334	430	519	575	434	494
Research and development, education and administration	237	367	458	540	518	779	667	599
Other costs	835	1 065	1 079	1 458	1 563	1 983	1 826	1 748
<b>Total environmental expenditure</b>	<b>6 420</b>	<b>7 861</b>	<b>8 978</b>	<b>12 361</b>	<b>13 500</b>	<b>15 292</b>	<b>14 366</b>	<b>15 416</b>



0 9 . 1

Compare the amount of money spent on household waste management and waste water management between 2000 and 2014.

Use data from **Table 1** in your answer.

[4 marks]

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0 9 . 2

Calculate the percentage of the total environmental expenditure spent on household waste management in 2014.

[1 mark]

Total environmental expenditure = \_\_\_\_\_ %

0 9 . 3

In 2014 household waste in the UK amounted to 28.6 million tonnes.

Use information from **Table 1** to calculate the cost per tonne of managing household waste in 2014.

[2 marks]

Cost per tonne = £ \_\_\_\_\_

7

Turn over ►



1 0

**Table 2** shows figures for recycling of waste packaging materials in the UK in 2014.

**Table 2**

Packaging material	Amount of waste produced (thousand tonnes)	Amount of waste recycled (thousand tonnes)	Percentage of waste recycled	EU target for percentage of waste recycled
Total Metal : • Aluminium • Steel	736	429	58.3	50.0
	177	73	41.2	n/a
	559	356	63.7	n/a
Paper and cardboard	4 749	3 470	73.1	60.0
Glass	2 399	1 613	67.2	60.0
Plastic	2 220	842	37.9	22.5
Wood	1 310	412	31.5	15.0
<b>Total</b>	<b>11 414</b>	<b>6 766</b>	<b>59.3</b>	<b>55.0</b>

1 0 . 1

Which packaging material is the UK the **best** at recycling and which packaging material is the UK the **worst** at recycling?

Use the information in **Table 2**.

[2 marks]

Best: \_\_\_\_\_

Worst: \_\_\_\_\_

1 0 . 2

Discuss what the information in **Table 2** tells you about metal waste packaging and its recycling.

[4 marks]

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1 0 . 3

Some waste packaging materials are processed and used as an energy source.

Suggest **two** packaging materials in **Table 2** that are most likely to be used as an energy source.

[2 marks]

Material 1: \_\_\_\_\_

Material 2: \_\_\_\_\_

8

1 1

The Environment Agency (EA) is a government organisation that was established in 1996 to improve the environment for the benefit of people and wildlife. One responsibility of the EA is to monitor waste from industry which may be discharged into rivers.

Describe **one** role that each of these scientists, working for the EA, might play in the monitoring of this waste.

[3 marks]

Ecologist: \_\_\_\_\_

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

Analytical chemist: \_\_\_\_\_

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

Laboratory technician: \_\_\_\_\_

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

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END OF QUESTIONS



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