



Surname _____

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For Examiner's Use

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Candidate Signature _____

Level 3 Certificate and Extended Certificate in
Applied Science

SCIENCE IN THE MODERN WORLD

ASC3

Friday 26 January 2018 Afternoon

Time allowed: 1 hour 30 minutes

For this paper you must have:

- a clean copy of pre-released 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]



J A N 1 8 A S C 3 0 1

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

- **The marks for questions are shown in brackets.**
- **The maximum mark for this paper is 60.**
- **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.**

ADVICE

- **You should spend approximately 1 hour on Section A and 30 minutes on Section B.**
- **Please read each question carefully before starting.**

DO NOT TURN OVER UNTIL TOLD TO DO SO



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]



0 1 . 2

**Explain why microbeads have been chosen as the starting point for tackling the problems caused by microplastics.
[2 marks]**

[Turn over]



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 _____



4 _____

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]

0 2

. 2

Suggest why Chinese people might be more at risk than people of other nationalities. [1 mark]

0 2

. 3

Microplastics erode into nanoplastics.

Why might this be a greater health risk to humans? [1 mark]



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 _____ %

4

[Turn over]



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]

0	4	.	2
---	---	---	---

Give ONE reason why cosmetics manufacturers might be reluctant to label products containing microbeads. [1 mark]

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]**

[Turn over]



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



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]

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]



0 7 . 3

Explain what Dr Friedman believes could have been an alternative to a ban on microbeads. [2 marks]

6

[Turn over]





20

SECTION B**09**

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
Total environmental expenditure	6 420	7 861	8 978	12 361	13 500	15 292	14 366	15 416

[Turn over]



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2 2



2 3

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]

[Turn over]



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]

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:	736	429	58.3	50.0
• Aluminium	177	73	41.2	n/a
• Steel	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
Total	11 414	6 766	59.3	55.0





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: _____

[Turn over]



28

10 . 2

Discuss what the information in TABLE 2 tells you about metal waste packaging and its recycling. [4 marks]



29

10 . 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

[Turn over]

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: _____

3

END OF QUESTIONS



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Examiner's Initials	
Question	Mark
1	
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TOTAL	

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