

# Specimen Paper

Centre Number						Candidate Number					
Surname											
Other Names											
Candidate Signature											



General Certificate of Secondary Education  
Higher Tier  
Specimen Paper

## Science B (Science in Context)

### Unit 1 My World

#### Higher Tier

**For this paper you must have:**

- a ruler.

You may use a calculator.

#### Time allowed

- 60 minutes

#### 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 space 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

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 4(b) should be answered in continuous prose. In this question you will be marked on your ability to:
  - use good English
  - organise information clearly
  - use specialist vocabulary where appropriate.

#### Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

# H

Answer **all** questions in the spaces provided.

**1** Crude oil contains many useful substances.

**1 (a)** What is the name of the process used to separate the useful substances from crude oil?

.....  
(2 marks)

**1 (b)** **Table 1** gives some information about some of the useful substances obtained from crude oil.

**Table 1**

Substance	Number of carbon atoms	Boiling point (°C)	Viscosity (cP)
Refinery gas	1–4	< 30	0.009
Petrol	4–10	50	0.5
Naptha	6–11	130	0.9
Kerosene	10–16	200	2.5
Diesel fuel	16–20	260	6.2
Lubricating oil	20–40	310	22.7

Describe the trends shown in the table.

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(3 marks)

1 (c) The relative amounts of substances obtained from crude oil are given in **Table 2**.

**Table 2**

<b>Substance</b>	<b>Relative % in crude oil</b>	<b>Relative % demand</b>
Petrol	10	20
Kerosene	15	23
Diesel	20	25
Fuel oil	45	12

Suggest why petrol costs more than fuel oil.

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(2 marks)

7

**Turn over for the next question**

**Turn over** ►

**2 (a)** Astronomers use telescopes to observe the movement of planets and stars.

Give **one** advantage of having a telescope at the top of a high mountain rather than at the bottom.

.....  
(1 mark)

**2 (b)** An astronomer noticed that the light coming from distant galaxies appeared to be different from the light coming from our own galaxy.

**2 (b) (i)** How does the light coming from distant galaxies appear different?

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.....  
(1 mark)

**2 (b) (ii)** Describe how the size of this effect on the light is related to the distance of a galaxy from the Earth. Give a conclusion from the evidence about what is happening to the universe.

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(2 marks)

**2 (b) (iii)** The size of this effect on light (*Z*) can be calculated using the equation

$$Z = \frac{\text{observed wavelength of light} - \text{original wavelength of light}}{\text{original wavelength of light}}$$

The value of *Z* for the light from a star is 0.15.

The original wavelength for the light is 600 units.

What was the observed wavelength for this light?

Show clearly how you work out your answer.

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Wavelength = ..... units  
(3 marks)

7
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**Turn over for the next question**

**Turn over** ▶

- 3 The table shows the biomass of types of organisms in a pond.

Organism	Biomass units
Plants	800
Herbivores	160
Carnivores	64
Top carnivores	16

- 3 (a) Use the data in the table to draw a pyramid of biomass on the grid below.

Use a scale of 16 biomass units to one small square.

Use the space above the grid to show how you calculate the values for each step.



(4 marks)

- 3 (b) Suggest **one** reason why the biomass of the top carnivores is much smaller than the biomass of plants in the pond.

.....

.....

(1 mark)

**4** We can get many important substances from the Earth’s crust. Sometimes we can use these substances straight from the ground.

**4 (a)** Which **one** substance in the list can be used straight from the ground?

Draw a ring around your answer.

**gold**      **iron**      **lead**      **calcium**      **aluminium**

(1 mark)

**4 (b)** *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Rock salt is a mixture containing salt (sodium chloride) that we get from the Earth’s crust.

To get pure salt from rock salt we need to separate the pure salt from the other substances in the mixture.

Describe how you would obtain pure salt from rock salt in the laboratory. You should include in your answer the apparatus that you would use.

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(6 marks)

4 (c) (i) Name the elements in pure salt.

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(1 mark)

4 (c) (ii) What is the chemical formula for pure salt?

.....

(1 mark)

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<b>9</b>



**5** Lithium has an electronic configuration of 2, 1. Fluorine has an electronic configuration of 2, 7.

Describe how both lithium and fluorine form ions to make lithium fluoride.

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(4 marks)

4
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**Turn over for the next question**

**Turn over** ▶

**6** Carbon is an important element in maintaining life.

**6 (a)** Draw and label a diagram of an atom of carbon. Include the correct names of the particles.

*(4 marks)*

**6 (b)** Use your diagram to give the atomic number and mass number of carbon.

Atomic number .....

Mass number .....

*(2 marks)*

**6 (c)** Describe the process in which carbon is cycled through the air, plants, animals and microbes.

You may use a flow diagram to help in your answer.

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(5 marks)

**Turn over for the next question**

7 Most metals are extracted from ores, which are mined from the Earth's crust.

In a blast furnace coke is heated in air to form carbon dioxide.

7 (a) (i) Give the symbol equation for this reaction.

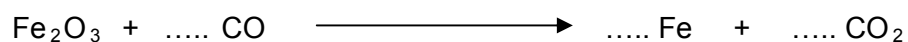
.....  
(1 mark)

7 (a) (ii) The carbon dioxide then reacts with more coke.

Write a balanced symbol equation for this reaction.

.....  
(2 marks)

7 (b) The chemical equation shows a reaction that occurs when iron is produced.



7 (b) (i) Balance the equation above by writing the correct numbers in the spaces in the equation.  
(2 marks)

7 (b) (ii) Complete the sentences about the reaction.

The name of the compound that is being reduced in this reaction is

.....

The name of the substance that is the reducing agent is

.....  
(2 marks)

7 (c) (i) Some metals can not be extracted from their ores by heating with carbon. These metals are extracted by electrolysis.

Name **one** metal that is extracted by electrolysis.

.....  
(1 mark)

**7 (c) (ii)** Suggest **two** reasons why metals extracted by electrolysis are often more expensive than iron.

1 .....

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2 .....

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(2 marks)

      
**10**

**Turn over for the next question**

**Turn over** ►

**8** Woodlice are small animals that prefer to live in cool, damp places.

Woodlice feed on decaying plant material.

It is very difficult to count all the woodlice in an area. One way of estimating the population is described below.

1. Catch all the woodlice you can in the area (first capture).
2. Count them.
3. Put a small spot of white paint on the back of each woodlouse.
4. Release them all back into the area.
5. A few days later collect all the woodlice you can from the same area (second capture). Count how many there are, and how many of them have a spot of white paint on the back.

The table shows the results for 1m<sup>2</sup> sections of three areas, **A**, **B**, and **C**.

	<b>Area A</b>	<b>Area B</b>	<b>Area C</b>
Number in first capture	10	60	30
Number in second capture	5	50	35
Number with white spots in second capture	4		25
Estimated number in the population	13	100	42

**8 (a)** Suggest why you have to estimate the population of woodlice.

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.....

(1 mark)

8 (b) Use the data in the table, and the equation below, to calculate the number of woodlice with white spots in the second capture for area **B**.

$$\text{Number in population} = \frac{\text{number in first capture} \times \text{number in second capture}}{\text{number with white spots in second capture}}$$

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(2 marks)

8 (c) The three areas sampled are described below.

- Description 1** A shady area with a dead tree lying across it.
- Description 2** A shady area on an old path covered with broken tiles.
- Description 3** A sunny area on a patio with some pot plants on it.

Match each area, **A**, **B** and **C**, with the descriptions. Give a reason for each choice.

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(3 marks)

8 (d) Suggest **one** reason why the recapture numbers of woodlice with white spots might be low.

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(1 mark)

**END OF QUESTIONS**

7
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**There are no questions printed on this page**

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ANSWER IN THE SPACES PROVIDED**

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