

Surname	Centre Number	Candidate Number
Other Names		0



LEVEL 1/LEVEL 2 AWARD

9846/01

APPLIED SCIENCE (IVQ)

P.M. MONDAY, 9 June 2014

1 hour

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	10	
2.	13	
3.	15	
4.	12	
5.	10	
Total	60	

ADDITIONAL MATERIALS

In addition to this paper you will require a calculator, pencil and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

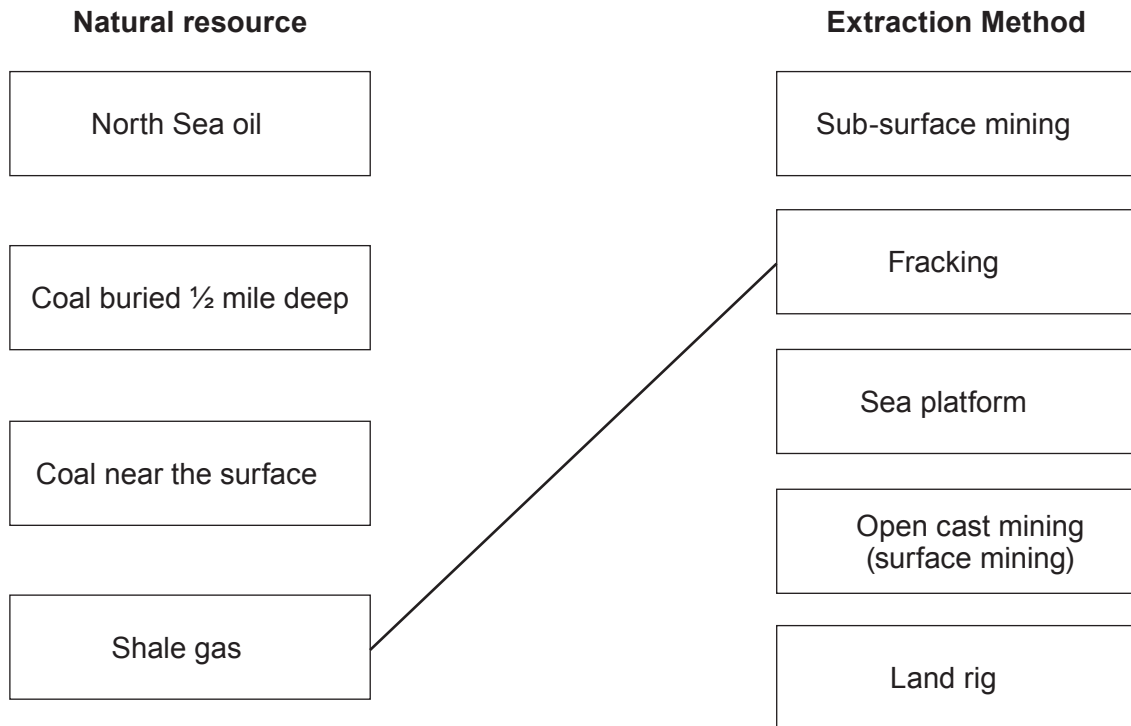
The number of marks is given in brackets at the end of each question or part-question.

You are reminded to show all your working. Credit is given for correct working even when the final answer given is incorrect.

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

1. This question deals with extraction of natural resources.

(a) Draw a line between the natural resource and the best method to extract it from the earth.
One has been done for you. [3]



(b) Oil has been discovered under the Arctic.

(i) Give **one** reason in favour of extracting oil from this region. [1]

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(ii) Give **one** reason against extracting oil from this region. [1]

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- (c) Use the letters (**A**, **B**, **C**, **D**) to put the following statements in the correct order to describe how oil was formed. [2]

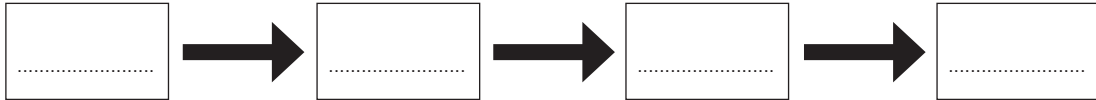
A. High pressure turns mud into rock.

C. High pressure and temperature turns remains into crude oil.

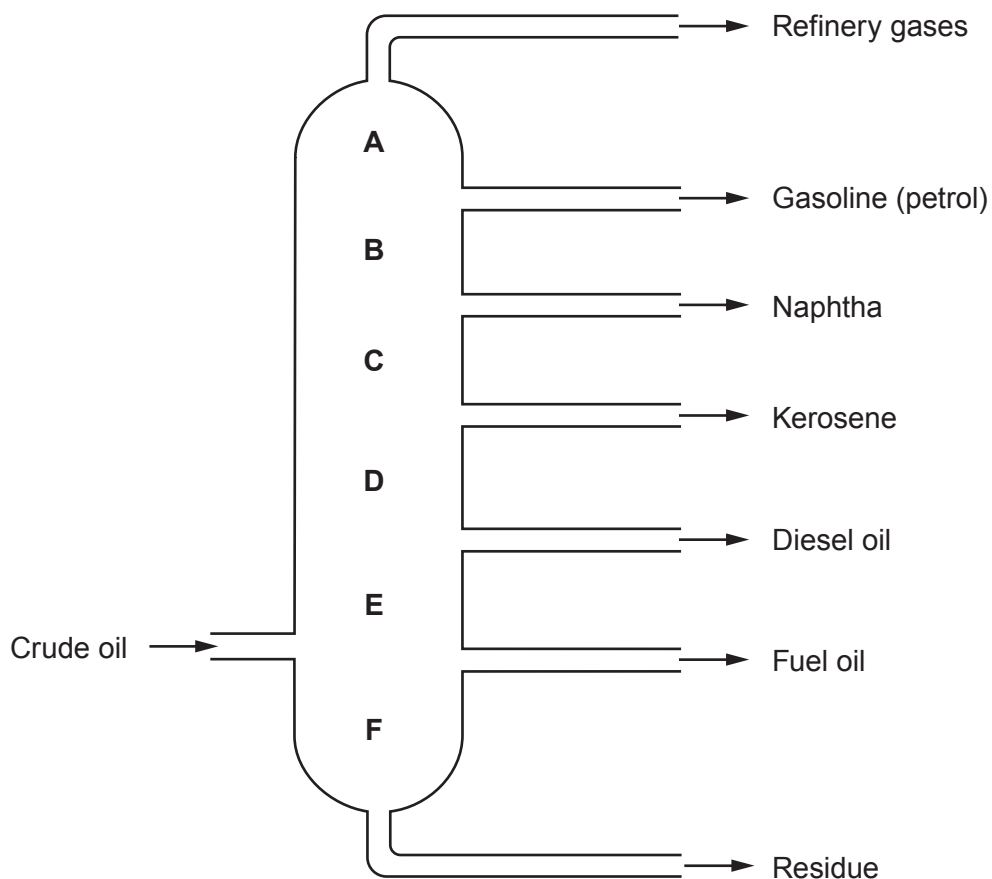
B. Animals and plants die.

D. Mud covers the dead plants and animals.

Correct order:



- (d) The diagram below shows how fractional distillation is used to separate crude oil extracted from the North Sea.



Answer the following questions using **only** the letters on the diagram above.

- (i) 1. The temperature of the column is at its **lowest** at
2. The temperature of the column is at its **highest** at [2]
- (ii) Complete the following sentence by **underlining** the correct words in brackets. [1]
- The **fractions** collected at the top of the column contain (*smaller molecules/larger molecules/molecules of the same size*) compared to those lower down the column.

2. This question is about how acids react with carbonates.

- (a) There are many different dangers when handling chemicals such as acids and carbonates. Hazard symbols are used to warn us about these dangers.



Identify the hazard symbol shown on the bottle above. [1]

Hazard symbol:

- (b) The general equation for the reaction between a carbonate and acid is given by:



In an experiment to produce calcium chloride a technician used hydrochloric acid and calcium carbonate.

Complete and balance the chemical symbol equation for the word equation below. [3]

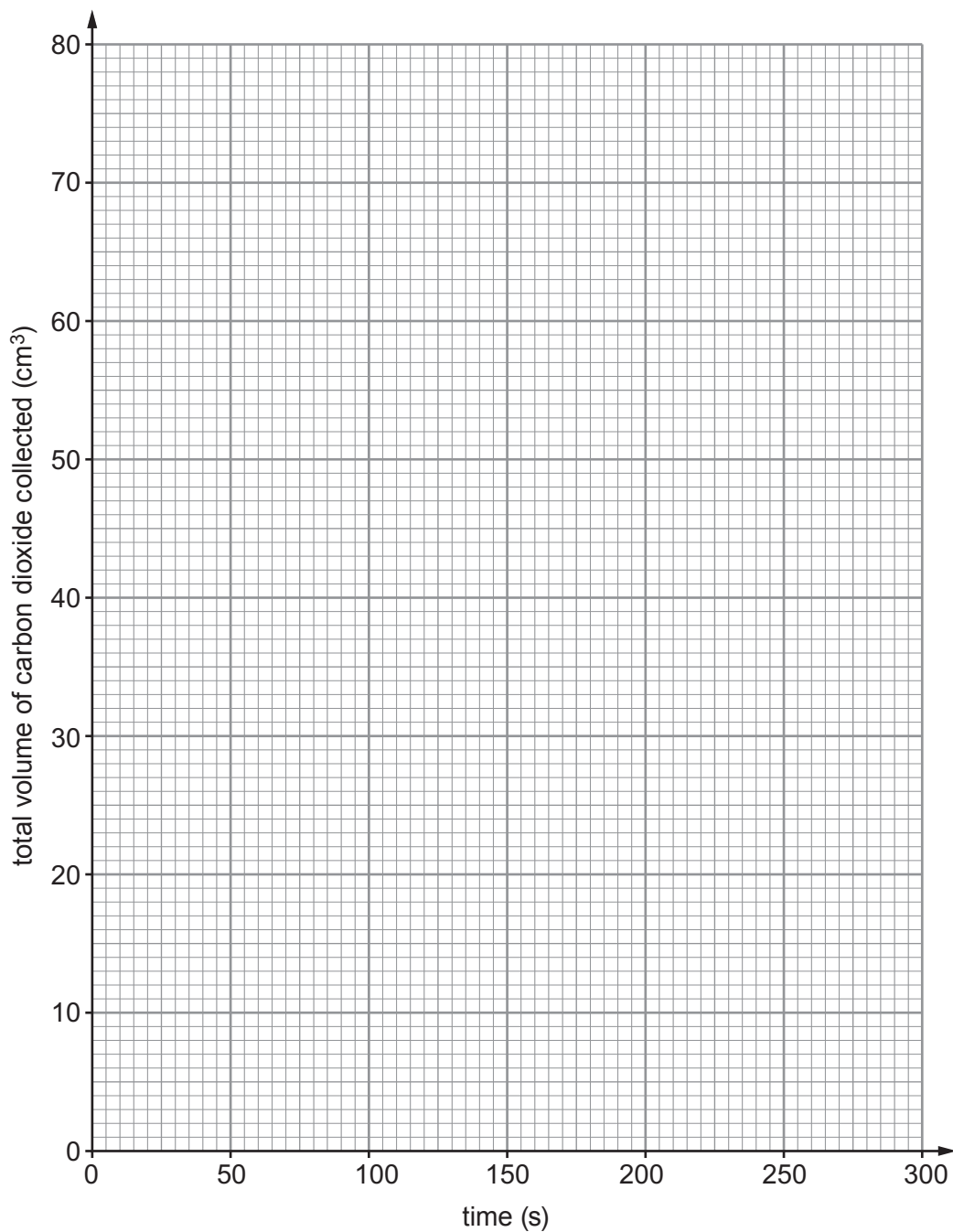
hydrochloric acid + calcium carbonate \longrightarrow calcium chloride + carbon dioxide + water



(c) In a repeat of the experiment, the technician also collected the volume of carbon dioxide given off using a burette. The total volume of carbon dioxide was measured after every 40 seconds. The results are given in the table below.

(i) Plot a graph of the total volume of carbon dioxide collected against time. [3]

Time (s)	0	40	80	120	160	200	240
Total volume of carbon dioxide (cm ³)	0	34	58	69	72	73.5	74



(ii) Use your graph to estimate the total volume of carbon dioxide produced after 1 minute.

..... cm³ [1]

(iii) The rate of reaction changes in this experiment.

1. Describe how the rate of the reaction changes as shown by the graph. [2]

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2. Give **one** reason for this change in the rate of reaction. [1]

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(iv) The technician used small chips of calcium carbonate. Suggest **two other** different ways in which the technician could speed up the reaction. [2]

1.

2.

3. The picture below shows a kingfisher (*Alcedo atthis*) on the river Avon.



(a) In the kingfisher's eye there are two areas on the retina where the concentration of light sensitive cones is high. These areas help the kingfisher while diving for fish because of the refraction of light by the water.

(i) Predators like the kingfisher tend to have their eyes at the front of their head. Give **one** reason why this adaptation is an advantage to the kingfisher. [1]

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(ii) The prey of the kingfisher tend to have eyes that are on the sides of their head. Give **one** reason why this adaptation is an advantage to prey species. [1]

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(iii) State the role of the cones in the retina of the eye. [1]

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(b) **Diagram 1** shows the general structure of the eye. **Diagram 2** shows how the eye is able to form a clear image of far and near objects.

Diagram 1

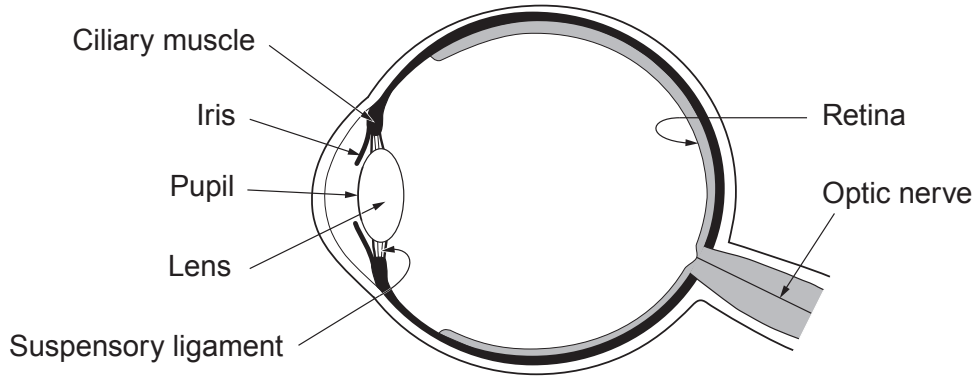
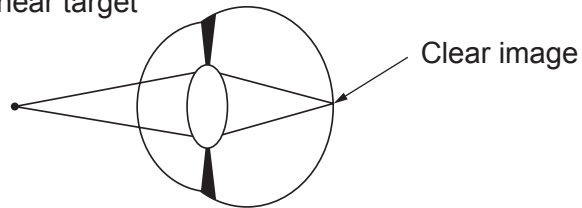
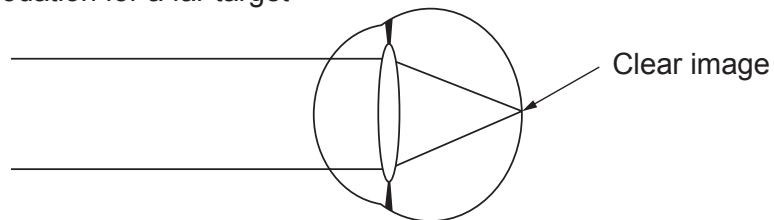


Diagram 2

Accommodation for a near target



Accommodation for a far target



Describe how the lens in the eye is able to form a clear image on a distant object using named structures in **Diagram 1**. [4]

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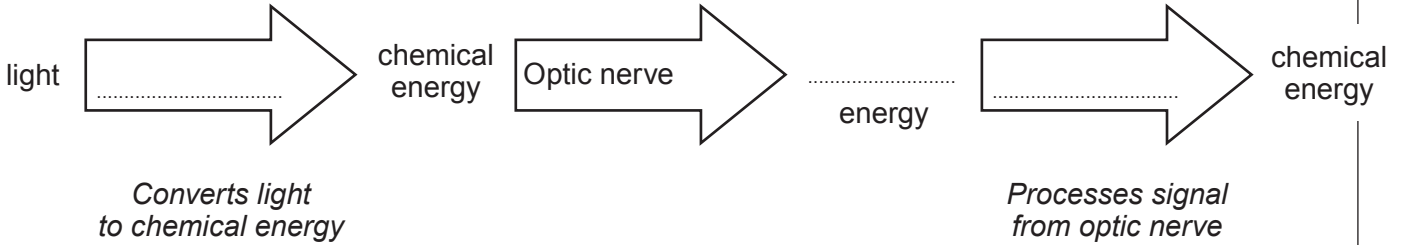
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- (c) (i) Complete the energy flow diagram showing how an image is formed in the brain. [3]



- (ii) Explain what is meant by the term 'refraction of light'. [2]

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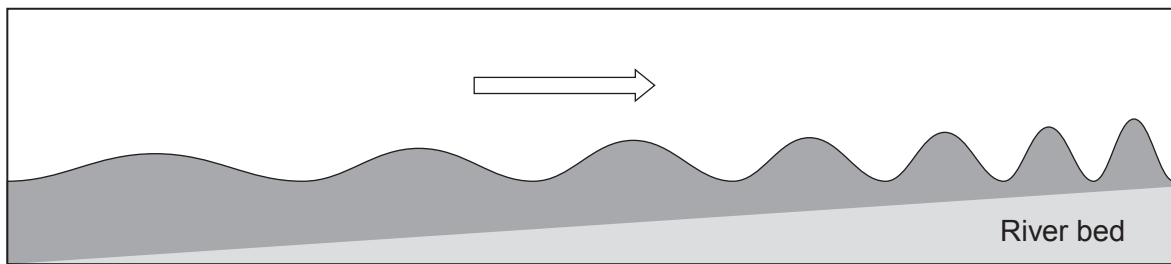
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- (d) The kingfisher also hunts for fish in shallow water. The diagram shows waves/ripples in a river travelling from deep to shallow water.



- (i) Label **one** wavelength on the diagram. [1]
- (ii) State **two** changes to the wave pattern as it passes from deep to shallow water. [2]

1.

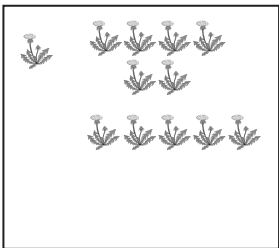
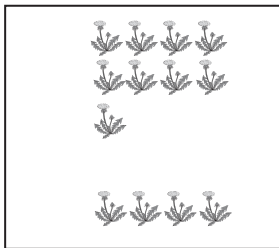
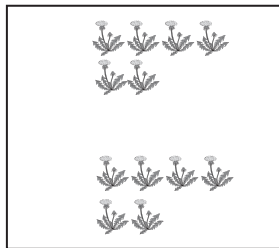
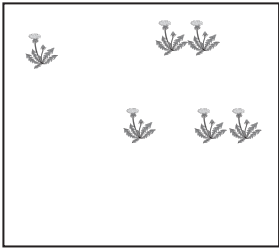
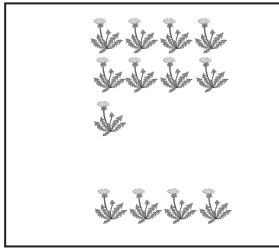
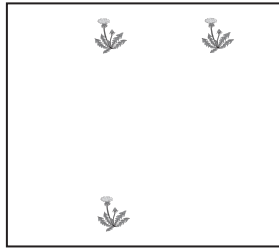
2.

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4. A green-keeper at the Black-Church golf course was concerned with the number of weeds growing on the putting greens. The green-keeper wanted to test which herbicide worked best. He used the first three putting greens to investigate which herbicide is best.

In his study he used a 1 m² quadrat. He marked on an outline of the quadrat the position of each weed before and after the experiment. The results are shown below.

Key: weed = 

	Quadrat on putting green 1	Quadrat on putting green 2	Quadrat on putting green 3
Before adding herbicide			
	herbicide A added	herbicide B added	herbicide C added
Two weeks after adding herbicide			

- (a) (i) Complete the table below.

[3]

Quadrat on putting green	1	2	3
Number of weeds before adding herbicide	13	12
Number of weeds two weeks after adding herbicide	13	3
Percentage change (%)	50%	0%

(ii) I. Use the information in the table to state which herbicide the green-keeper should use. [2]

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II. Give **one** reason why.

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(iii) The putting greens each have an area of 50 m². Calculate how many weeds you would expect to find on putting green **3** before adding herbicide. [2]

Number of weeds

(b) The weeds found in putting green **2** are not affected by the herbicide treatment. Explain how the weeds on putting green **2** may have evolved a resistance to the herbicide **B** as a result of natural selection. [5]

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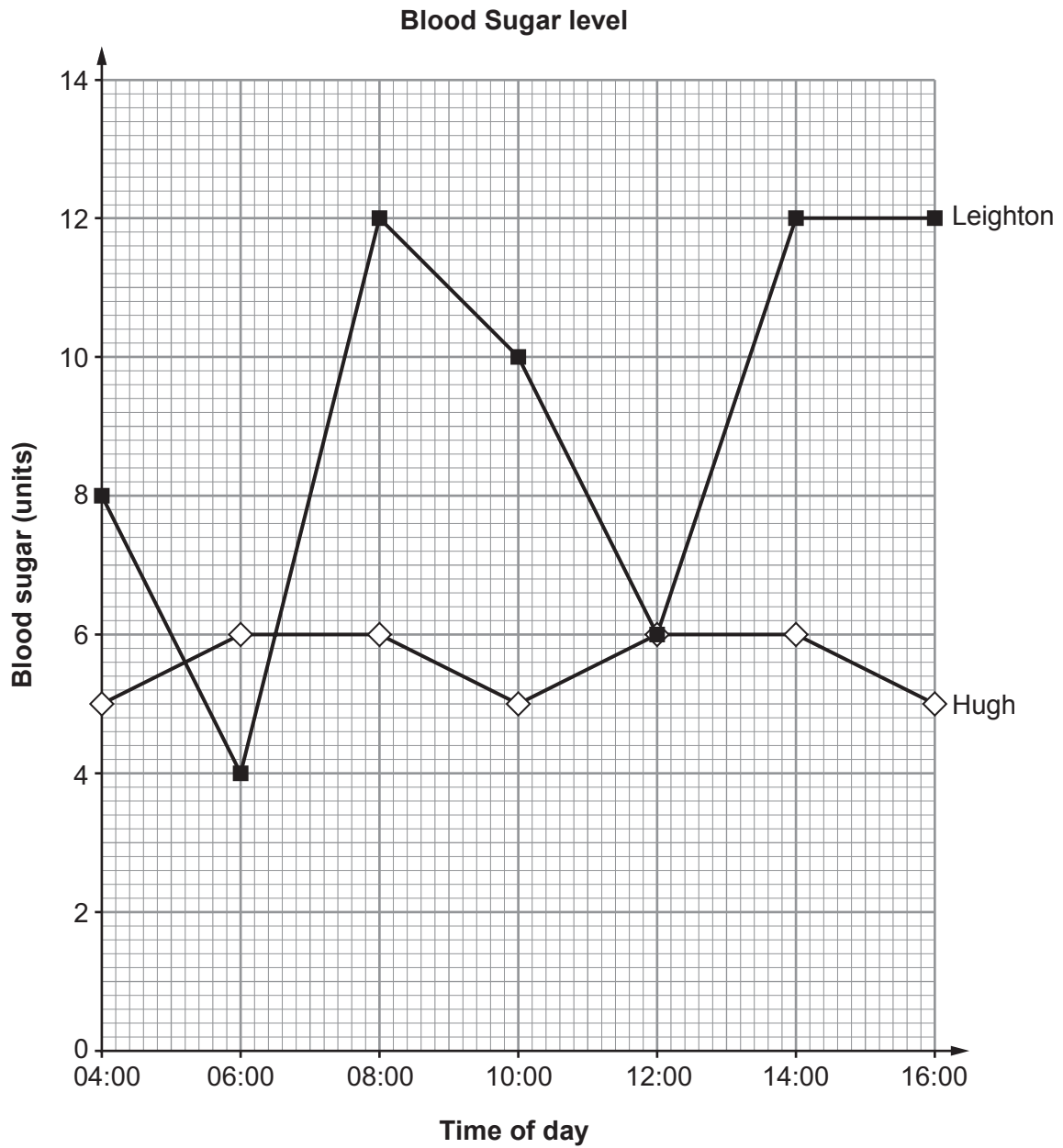
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5. A doctor suspects that Hugh and Leighton may be suffering from diabetes. They have their blood sugar measured at 2 hourly intervals. The data has been plotted for you below.



(a) Use the graph above to answer the following questions:

- (i) Explain which person is diabetic.

[2]

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(ii) Suggest why there is such a large change in Leighton’s blood sugar level between 06:00 to 08:00. [1]

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(b) Describe how the body would normally react if there is too much sugar in the bloodstream. [3]

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(c) Diabetes is a common disease. State the differences between type 1 and type 2 diabetes. [2]

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(d) An insulin dependent diabetic is planning to go on an expedition. State **two** things she needs to take to maintain a controlled blood sugar level. [2]

- 1.
- 2.

END OF PAPER

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