GCSE

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4461/01

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S16-4461-01-R1

SCIENCE A/BIOLOGY

BIOLOGY 1
FOUNDATION TIER

P.M. WEDNESDAY, 15 June 2016

1 hour

4461
010001

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator 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
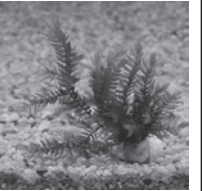
The number of marks is given in brackets at the end of each question or part-question.
You are reminded that assessment will take into account the quality of written communication (QWC) used in your answer to question **9**.

VP*(S16-4461-01-R1)

*Answer **all** questions.*

1. The photographs show five organisms (**A** to **E**) and the group to which each one belongs.

Organism	A	B	C	D	E
Photograph					
Group	fungi	insects	bacteria	mosses	mammals
Magnifications of photograph	× 0.50	× 1.0	× 2000	× 0.40	× 0.25

(a) Use the magnifications below each photograph to place the organisms in order of size. Start with the **smallest**. One has been done for you. [3]

smallest organism: 1   ....

2   ....

3   ....**A**........

4   ....

largest organism: 5   ....

(b) Give the names of the two groups that cause decay.

1.   ....

2.   ....   [1]

(c) Two of the groups belong to the same Kingdom.

Give the names of the two groups and the Kingdom to which they belong.   [2]

Name of group: .... and ....

Kingdom: ....

6

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(4461-01-R1) **Turn over.**

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010003

2. The heights of 100 boys were measured on their 15th birthday.

The results are shown in the table below.

Height (cm)	Number of boys
150-159	5
160-169	16
170-179	19
180-189	25
190-199	30
200-209	5

(a) (i) Draw a bar chart of the results on the grid below. [2]

number of boys

35
30
25
20
15
10
5
0

150-159   160-169   170-179   180-189   190-199   200-209
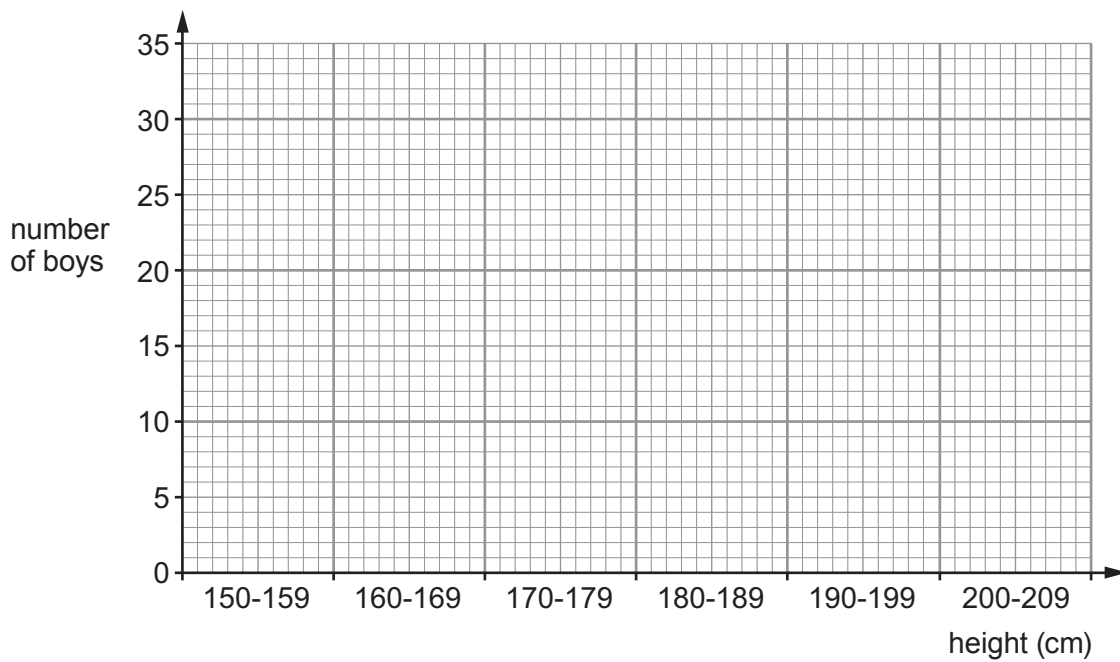
height (cm)

(ii) The mean height of the boys was 180 cm.
Calculate the number of boys who were less than the mean height. [1]

number of boys ....

(b) <u>Underline</u> the correct word in the following sentence. [1]

The method used shows that the variation in heights **cannot** be due to differences in **age / diet / genes**.

4

3. The photograph shows a farmer spraying crops with a pesticide.

(a) Explain why spraying crops with pesticides may increase crop yield on farms. [2]

....

....

....

....

(b) Some pesticides have harmful side effects.

Choose words from the list below to complete the following sentence. [4]

nitrates   DDT   toxic   consumers   producers   disease   fertility

Pesticides such as .... may build up in food chains to

.... levels causing reduced .... or

death to third stage ....

4. In a Year 11 investigation, Dafydd and Megan compared the energy content of two sweets.

The diagrams below show one stage in Dafydd's method and in Megan's method.

X

Y

mounted needle

burning sweet

heat-proof mat

Dafydd's method

Megan's method
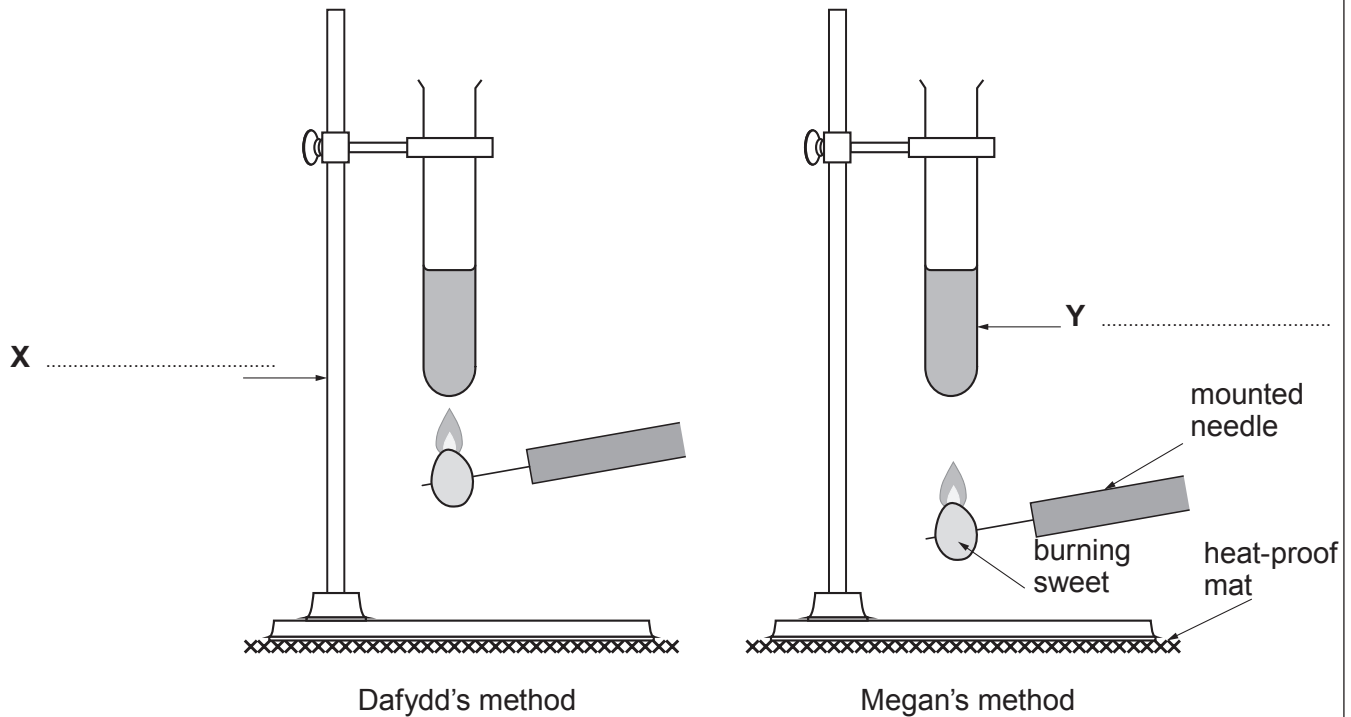
(a) (i) Label the apparatus **X** and **Y** on the diagram. [2]

(ii) State **three** other pieces of apparatus needed for this investigation, which are **not** shown in the diagram. [3]

1. ....

2. ....

3. ....

(b) The results of their investigation are shown in the table below.

Student	Mass of sweet (g)	Temperature of water (°C)			
		Start	End	Increase	Increase per gram of sweet
Dafydd	10	20	44	24	2.4
Megan	12	20	38	18	....

(i) Calculate the increase in temperature per gram of Megan's sweet.
Write your answer in the table. [1]

(ii) Why did Dafydd and Megan need to calculate the increase in temperature of water per gram of sweet in this investigation? [1]

....

(iii) Using the information in the diagram, explain why Dafydd and Megan got different results per gram of sweet. [2]

....

....

....

....

(c) We get energy from the sugar we eat.
The table below shows the sugar content of Megan's breakfast.

Item	Sugar content (g)
slice of toast	5.0
butter	0.0
teaspoon of honey	12.5
no fat yoghurt	5.4
glass of orange juice	20.0
total	....

(i) Calculate the total sugar content of Megan's breakfast.
Write your answer in the table. [1]

(ii) A recent report stated that sugar intake should be limited to 20 g a day.
Calculate the mass of sugar in excess of the stated daily limit in Megan's breakfast. [1]

mass of excess sugar .... g

(d) In what form is excess energy stored in the body? [1]

....

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5. *(a)* The diagram below shows a section of skin with the position of a hair on a hot day.

skin surface

hair

X ....
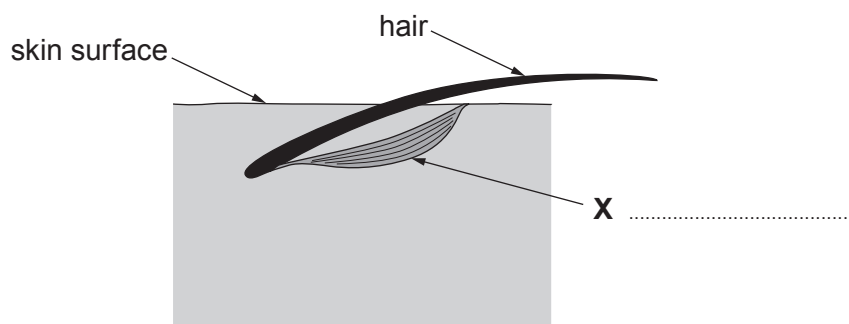
(i) Label structure **X** on the diagram. [1]

(ii) Complete the diagram below by drawing in the position of the hair on a **cold** day. [1]
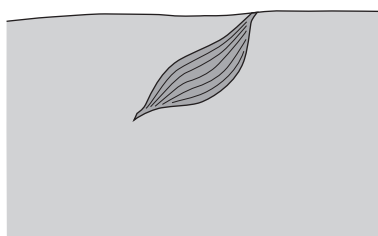
(iii) State how structure **X** causes the change in the position of the hair on a cold day. [1]

....

(iv) Describe how hair reduces heat loss from the surface of the skin. [2]

....

....

(b) The diagram shows a section through the skin on a cold day and on a hot day.

skin surface

sweat gland

cold day
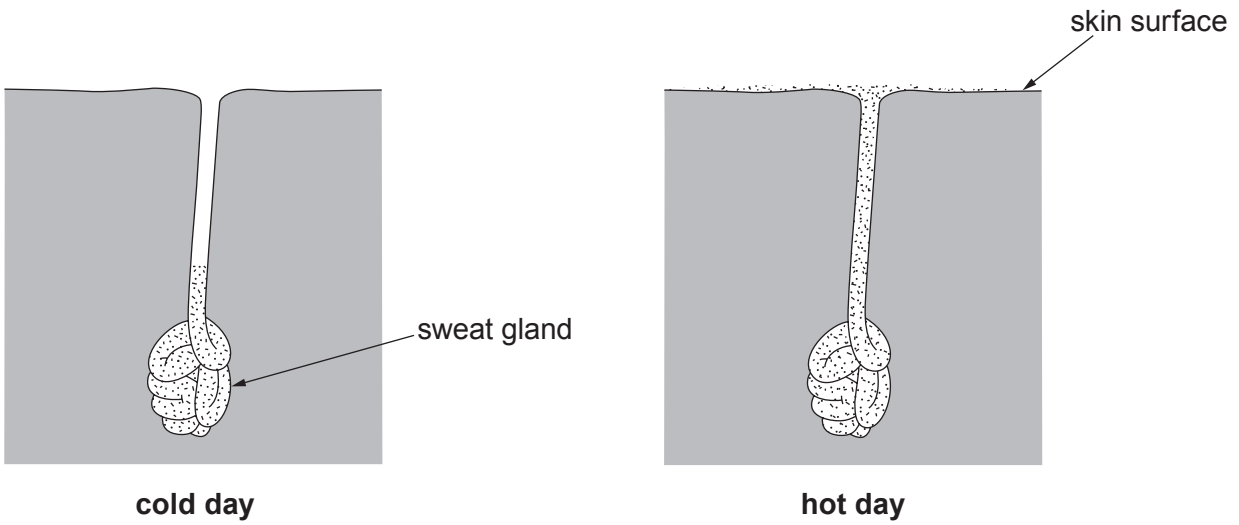
hot day

Use the diagram to describe and explain how the processes taking place in the sweat gland **and on the skin surface** help to cool the body on a **hot** day. [3]

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....

8

6. *(a)* (i) Gregor Mendel crossed purple flowered pea plants with white flowered pea plants. All the **F1** generation were purple flowered. Show this cross by completing the Punnett square below.
Use the letter **D** to represent the purple allele and the letter **d** to represent the white allele. [2]

Gametes		

F1

(ii) When Mendel selfed the **F1** generation he obtained a ratio of 3 purple : 1 white flowered pea plants in the **F2** generation. In the space below construct and complete a Punnett square to show this cross. [2]

(b) Mendel's experiments on genetics were carried out with garden peas *(Pisum sativum)*. In each of his experiments he used thousands of pea plants.
State the importance of the use of such a large number of plants. [1]

....

(c) Mendel published his work on the genetics of pea plants in 1866. The significance of his work was not recognised until it was replicated in the early 1900s. Why is it important for scientists to replicate the work of other scientists? [1]

....

6

7. There is an increasing demand for food to feed the growing human population. This has both worldwide and local effects on wildlife and on the environment.

Cockles *(Cerastoderma edule)*

In 1984 a survey found that there was a small cockle fishery in the Three Rivers area of Carmarthenshire, South Wales with a few people harvesting the cockles. By 2014 the Three Rivers Cockle Fishery had become an important industry in South Wales with many fishermen harvesting the cockles for human consumption. The cockles are harvested from sandy mudflats at low tide.

Map showing the Three Rivers Cockle Fishery
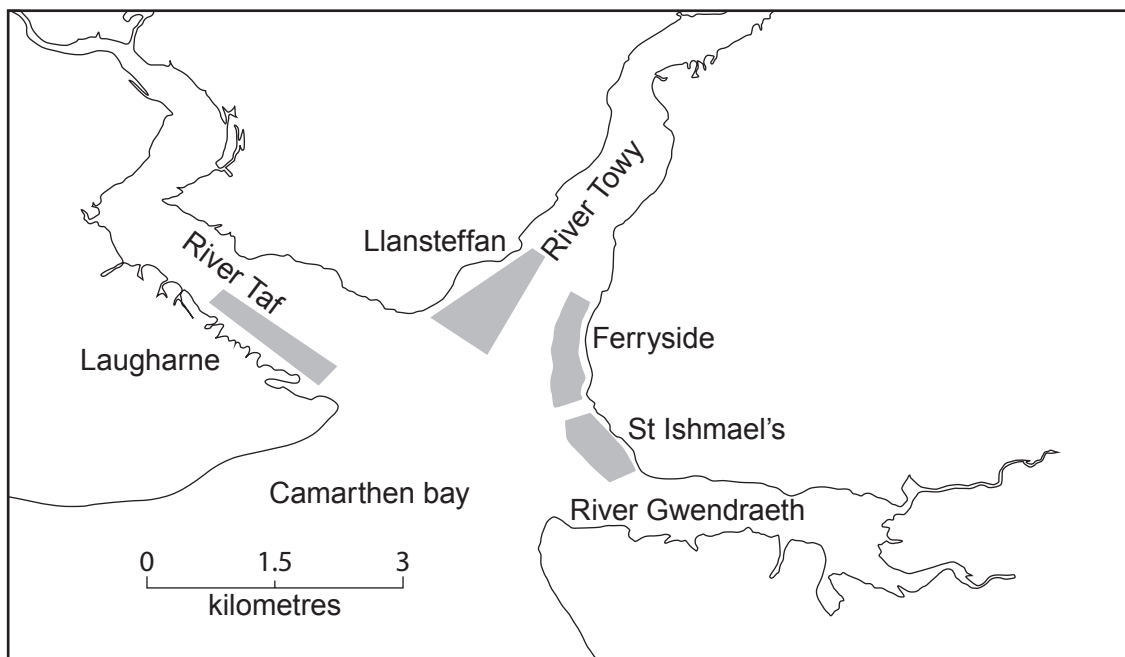
cockle beds

The table shows the number of fishermen that harvested cockles from the Llansteffan cockle bed on 4 days in the summer of 2007.

Date	Number of fishermen	Mass of cockles harvested (tonnes)
Tuesday 26 June	292	129
Tuesday 3 July	257	102
Tuesday 10 July	330	142
Tuesday 17 July	100*	37

*Tide not suitable for harvesting cockles

(a) Calculate the mean mass of cockles harvested per fisherman on Tuesday 26 June. Use the space below for your calculation. [2]

mean mass = ... tonnes

(b) (i) Cockles can only be harvested if there is a minimum of 50 cockles per m^2 of mud flats. If the number falls below this level then the Welsh Government closes the fishery. Suggest a reason why the fishery is closed if the number of cockles is less than 50 cockles per m^2. [1]

....

(ii) Suggest a way in which the mass of cockles harvested could be managed effectively. [1]

....

(c) The graph below shows the mass of cockles harvested in the Three Rivers Fishery between 1990 – 2004.
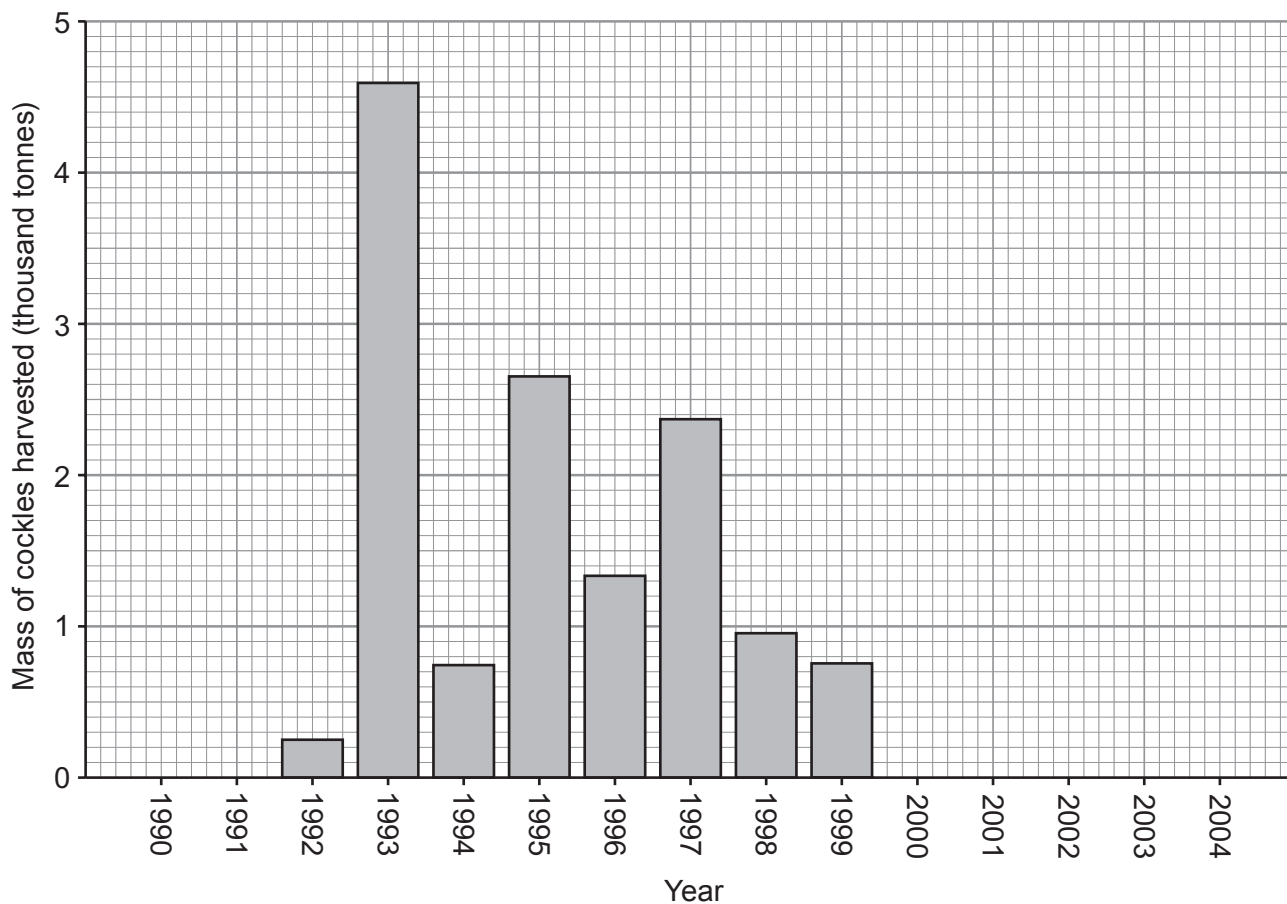
Adapted from South Wales Sea Fisheries Committee

Suggest **two** possible reasons why no cockles were harvested from 2000 to 2004. [2]

I. ....

II. ....

(d) Oystercatchers *(Haematopus ostralegus)* are birds which often feed on cockles.

In recent years there has been an increase in the number of oystercatchers *(Haematopus ostralegus)* moving into the Three Rivers area. Cockles are a major source of food for oystercatchers.

Suggest **one** possible reason for this increase. [1]

....

7

8. The graph below shows the blood glucose levels of Kate and Peter, after eating the same mass of sugary cereal at breakfast time. The normal blood glucose range before meals is 4.0 – 5.9 mmol/l.
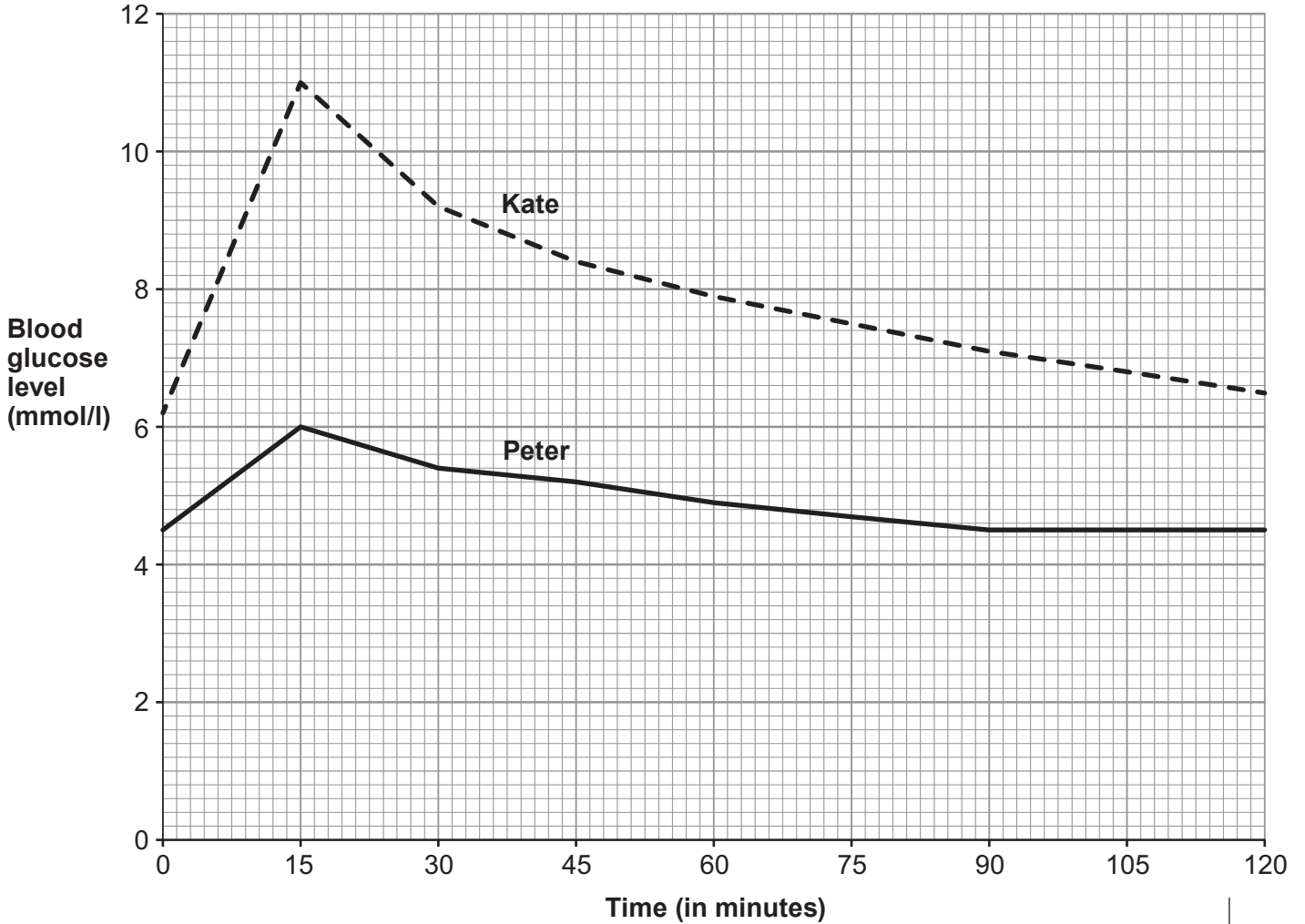
(a) Explain why Peter's blood glucose level rises then falls. [3]

....

....

....

....

....

(b) State **two** pieces of evidence, shown in the graph, which indicate that Kate has diabetes. [2]

I. ....

II. ....

5

9. Explain how the leakage of untreated sewage into an unpolluted pond can result in the death of fish living in the pond. [6 QWC]

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6

END OF PAPER