Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4461/01

S15-4461-01

SCIENCE A/BIOLOGY

BIOLOGY 1
FOUNDATION TIER

P.M. TUESDAY, 9 June 2015

1 hour

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.	**6**	
3.	**5**	
4.	**10**	
5.	**5**	
6.	**6**	
7.	**7**	
8.	**6**	
9.	**5**	
10.	**6**	
Total	**60**	

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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 **10**.

Examiner only

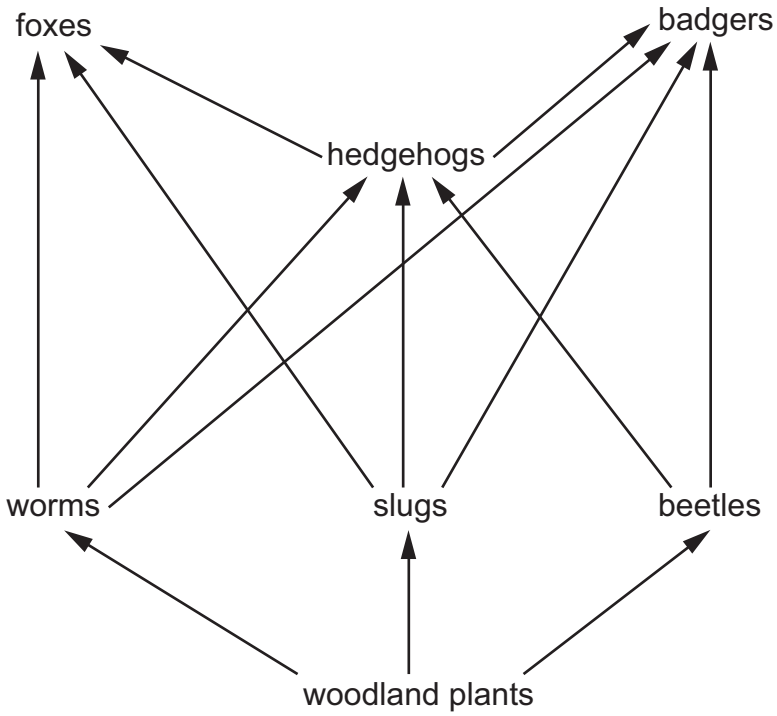
Answer **all** *questions.*

1. The photograph shows a hedgehog.

(a) Hedgehogs are carnivores. What does the term *carnivore* mean? [1]

.....

(b) The diagram below shows a woodland food web that includes hedgehogs.



Examiner only

Use information in the food web opposite **and** your own knowledge to answer the following question.

In recent years, the number of hedgehogs in the UK has decreased.
Tick (✓) the **three** factors in the following table that could cause hedgehog numbers to decrease. [3]

factor	causes hedgehog numbers to decrease
a disease harming the badgers	
an increase in the number of foxes	
the arrival of a new second stage consumer species	
an increase in the number of beetles	
a decrease in the area of woodland	

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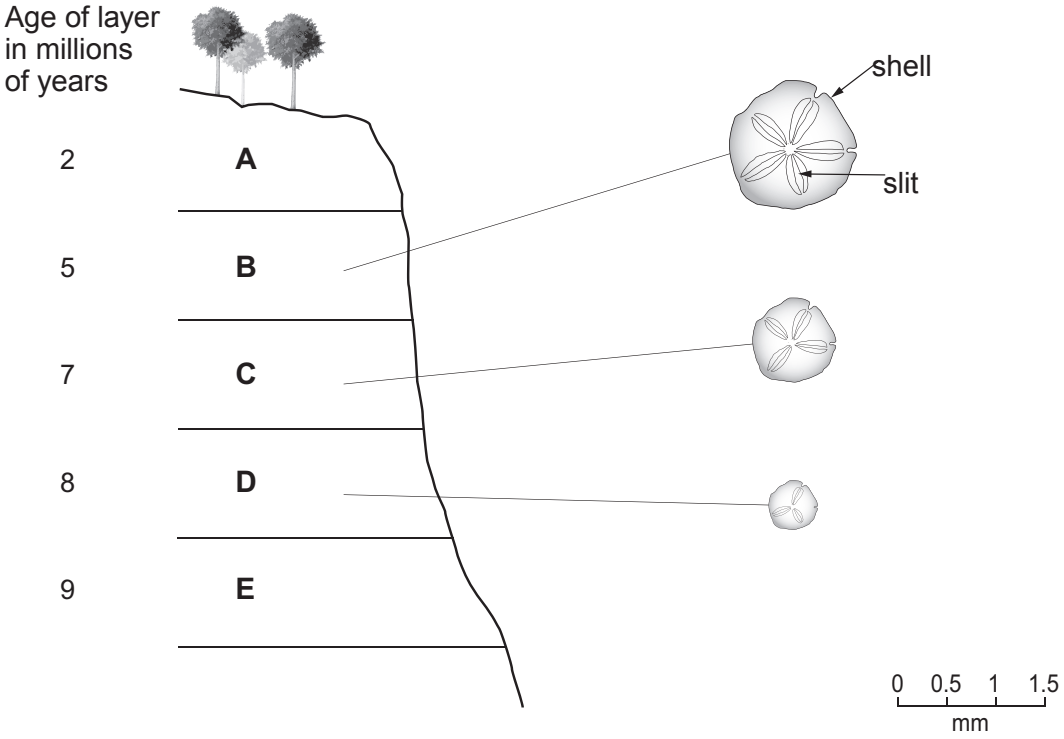
2. *(a)* Scientists found fossilised shells of one species of animal in the rock layers of a cliff. The age of each layer (**A**-**E**) is shown.



(i) Use the scale bar to give the diameter of the oldest shell. [1]

Diameter = ... mm

(ii) Describe **two** ways that the shell evolved (changed) over time. [2]

.....

.....

(iii) Species that fail to evolve may become extinct. What is the meaning of the term extinct? [1]

.....

(iv) Scientists think that this species became extinct about 2 million years ago. Give the evidence in the diagram that supports this idea. [1]

.....

(b) Species evolve by natural selection.
Give the name of the scientist who first described evolution by natural selection. [1]

.....

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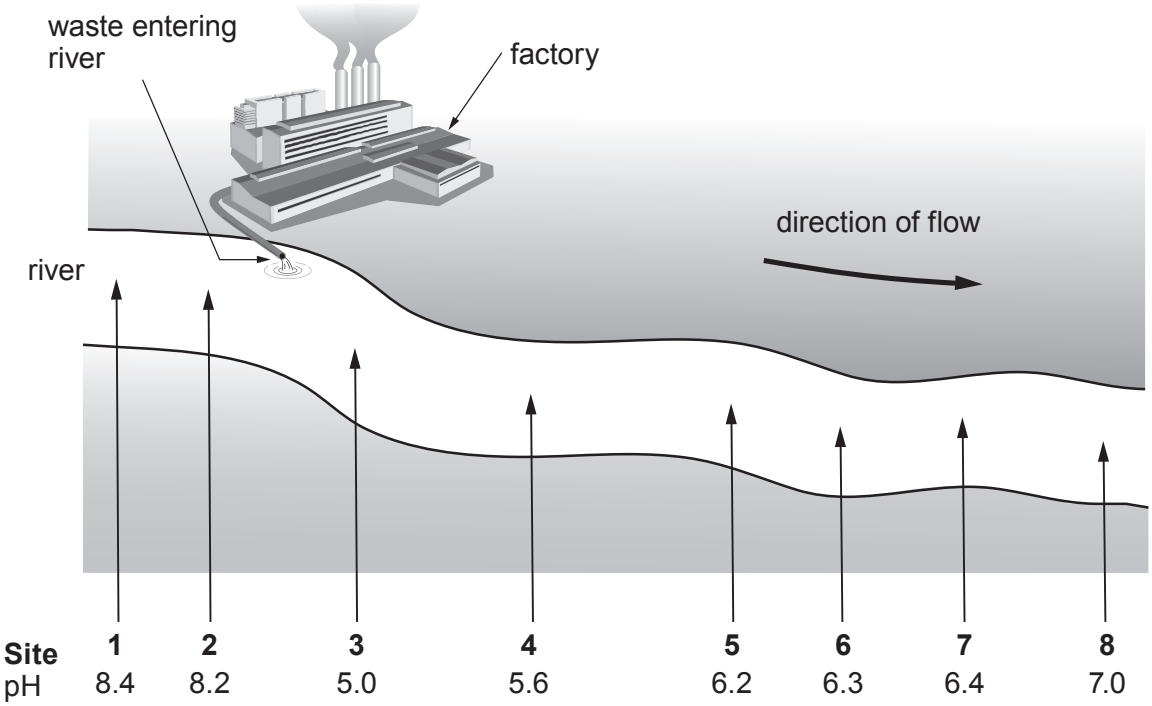
Examiner only

3. A factory discharged waste into a river. Gaynor tested the pH of the water in the river at 8 sites. She recorded her results on a map of the river, as shown below.



(a) (i) At how many of the 8 sites is the water alkaline? ..... [1]

(ii) What is the evidence that factory waste entering the river is acidic? [1]

.....

(b) Gaynor recorded the presence (✓) or absence (***x***) of three species of invertebrates at each of the sites in the river as shown in the table.

	site	1	2	3	4	5	6	7	8
	pH	8.4	8.2	5.0	5.6	6.2	6.3	6.4	7.0
Species	mayfly nymph	✓	✓	***x***	***x***	***x***	***x***	***x***	✓
	bloodworm	✓	***x***	✓	***x***	***x***	✓	✓	✓
	rat tailed maggot	***x***	✓	✓	✓	✓	✓	***x***	✓

(i) Use the table to state the name of the invertebrate which is a useful indicator species in this investigation. [1]

.....

(ii) Explain your answer to part (i). [2]

.....

.....

.....

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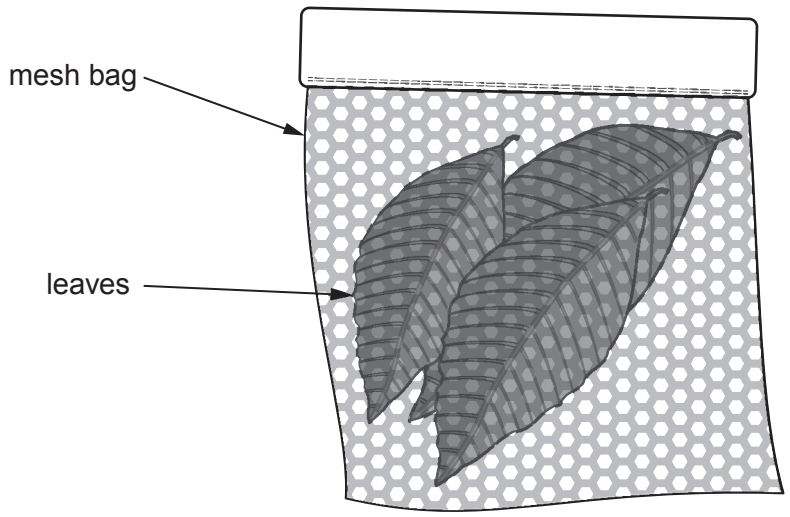
4. Students investigated the decay of leaves in woodland soil. The students put the leaves in bags of two different mesh sizes. The bags were buried in soil for four months. One of the bags is shown below.



The bags were dug up at the end of each month and the percentage (%) decay was measured. The results are shown in the table.

mesh size (mm)	percentage (%) decay			
	month 1	month 2	month 3	month 4
1.0	20	30	35	55
0.1	13	23	26	42

(a) (i) Complete a line graph of these results on the grid opposite.
The results for one mesh size have been plotted for you.

I. plot the points for the other mesh size, [2]

II. join the points with a ruler, [1]

III. label the **two** lines. [1]

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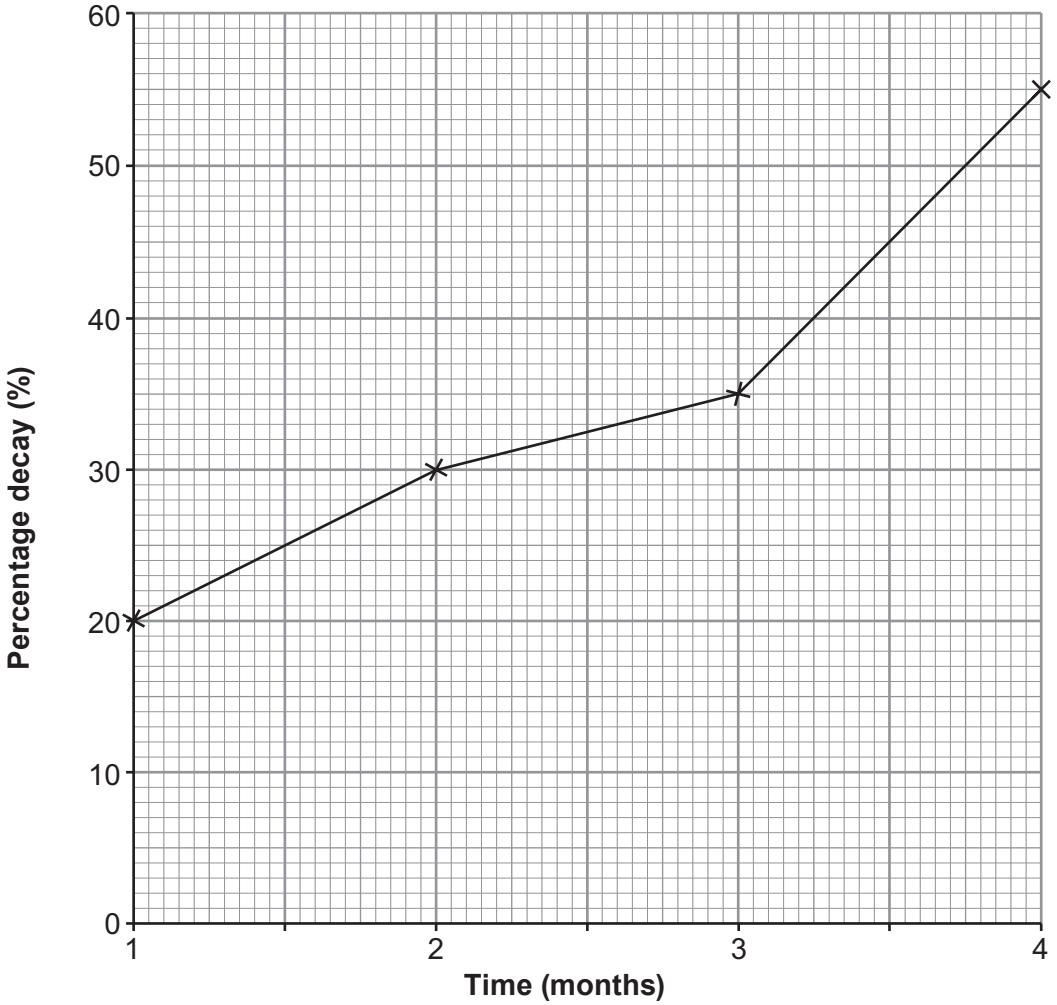


(ii) Describe the effect of **mesh size** on the percentage decay of the leaves. [1]

.....

.....

(iii) Give **two** features of **the leaves** that should be controlled at the start of the investigation. [2]

I. .....

II. .....

(iv) The decay is caused by microorganisms. Give the name of **one** type of decay causing microorganism. [1]

.....

(v) Suggest **one** reason why the leaves decayed more slowly between months **2** and **3**. [1]

.....

(b) State the importance of decay for plant growth. [1]

.....

Examiner only

5. Gareth takes a penalty kick.

He **watches** the moving ball speed towards the goal.

The list below describes how the nervous system takes part in some of the above events, but not in the correct order.

1 The impulses pass along neurones.

2 The receptor cells respond to this stimulus.

3 Light from the moving ball strikes receptor cells in his eye.

4 The central nervous system processes the information.

5 Electrical impulses are produced.

(a) Place the five statements above in the correct order. [3]

..... → ..... → ..... → ..... → .....

(b) The eye is a sense organ.
State the name of **one** *other* sense organ and the stimulus it detects. [2]

Sense organ .....

Stimulus it detects .....

5

Examiner only

6. Insulin has an important role in the control of blood glucose.

(a) What type of substance is insulin? [1]

Underline the correct answer:

fat

hormone

nutrient

(b) Use your knowledge to complete the following sentences about the control of blood glucose. [3]

As blood glucose level rises, insulin is released from the

.....

The insulin travels in the blood to the liver.

The liver then converts the excess ..... into an insoluble form

called .....**.**

(c) Some people have a medical condition in which they cannot control their blood glucose. State the name of the condition and describe **one** method of treating it. [2]

.....

.....

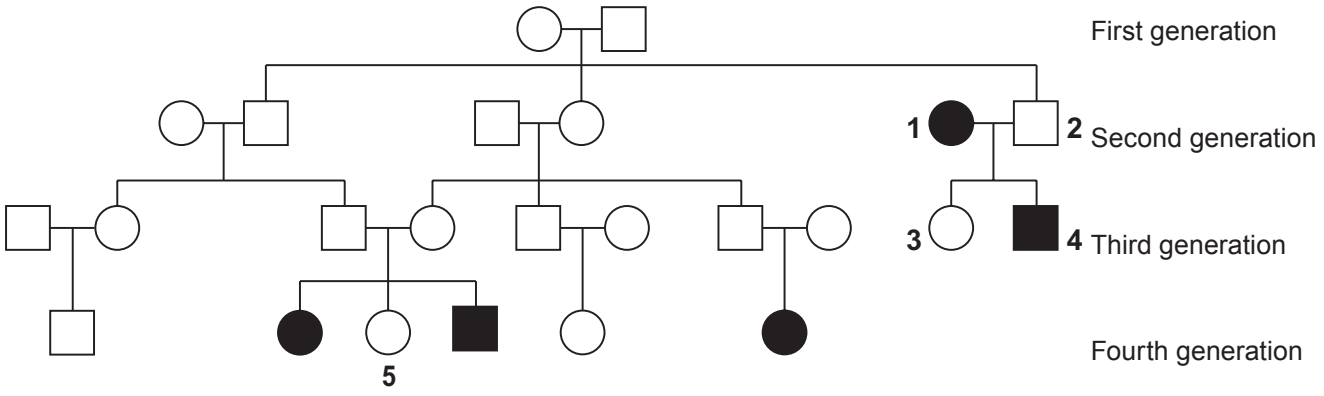
.....

6

Examiner only

7. Cystic fibrosis is a hereditary disease that affects around 1 in every 2 500 babies born in the UK. It affects several organs in the body including the lungs and pancreas. The disease is caused by a recessive allele (**n**).

The family tree below shows the history of the inheritance of cystic fibrosis.



Female

Male

Female with cystic fibrosis

Male with cystic fibrosis

(a) (i) State the genotype of person number **2**. ..... [1]

(ii) Explain your answer. [2]

.....

.....

.....

(b) (i) State the genotype of person number **3**. ..... [1]

(ii) Explain your answer. [2]

.....

.....

.....

(c) What is the probability of person number **5** being homozygous dominant? [1]
Place a circle around the correct answer.

25% 50% 75% 100%

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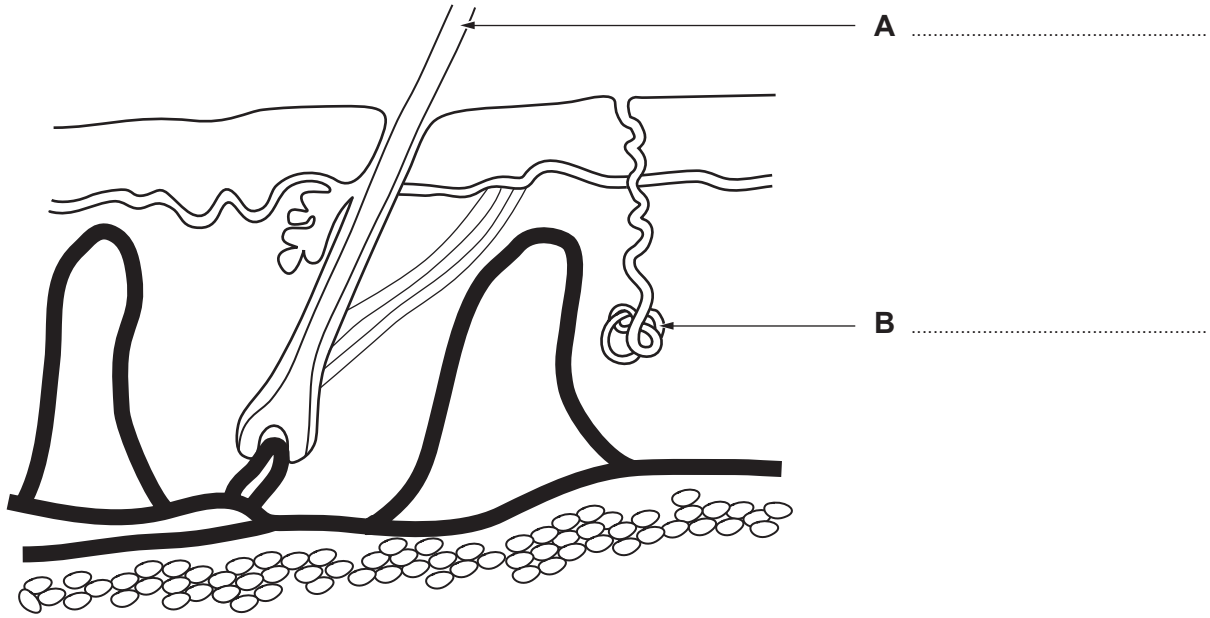
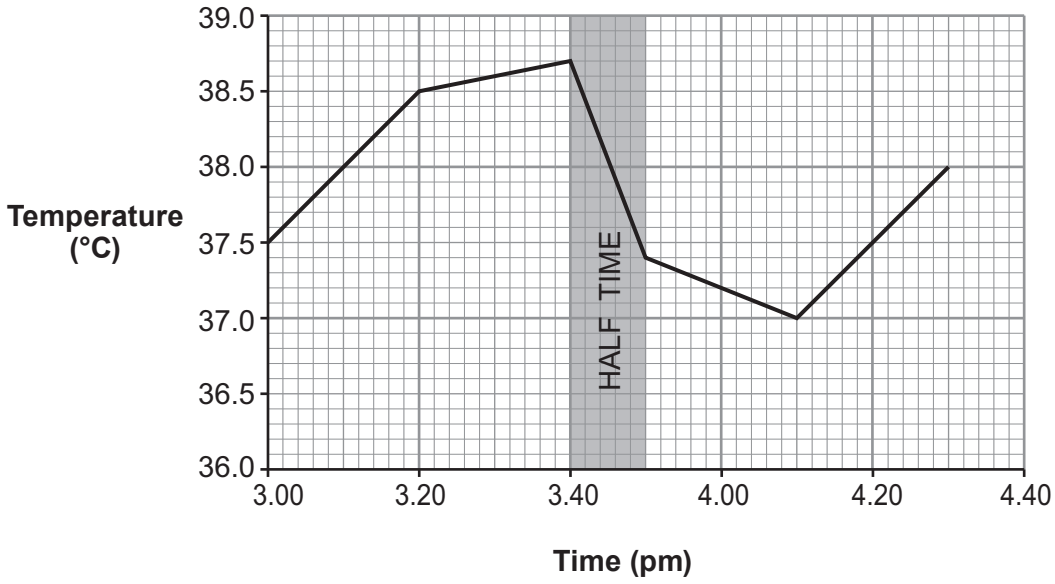
8. The diagram shows a section through the skin.



(a) Label parts **A** and **B** on the diagram. [2]

(b) The graph shows the body temperature of a player during the course of a rugby match.



Examiner only

(i) State **two** responses made by the skin to cause the change in body temperature observed between 3.40pm and 4.10pm. [2]

I. .....

II. .....

(ii) Explain how the narrowing of blood vessels in the skin helps maintain body temperature in cold conditions. [2]

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6

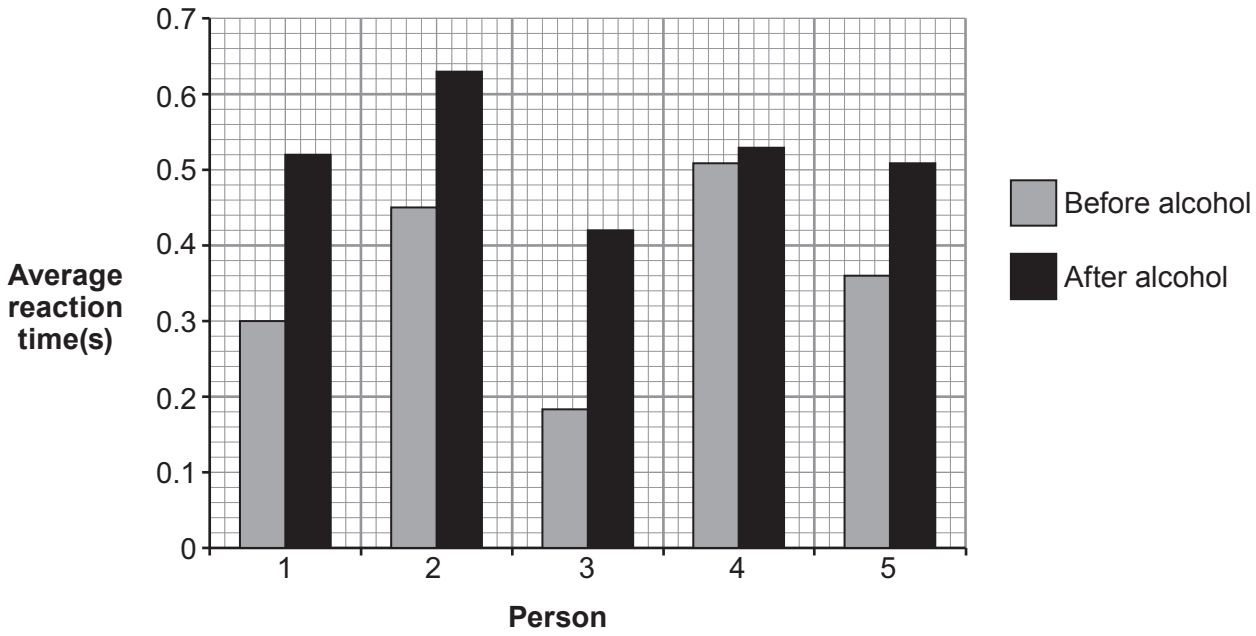
Examiner only

9. *(a)* State **two** ways in which excessive alcohol consumption can cause long-term physical damage to the body. [2]

(i) .....

(ii) .....

(b) An investigation was carried out into the effect of alcohol on reaction times. Five people were asked to drink some alcohol and the time taken to respond to a stimulus was recorded. Reaction times before drinking the alcohol were also recorded. The results are shown in the graph below.



(i) What conclusion can be drawn from the results shown in the graph? [1]

.....

.....

(ii) Which person has the longest reaction time after drinking alcohol? [1]

.....

(iii) How does drinking alcohol before driving a car increase the risk of having a road traffic accident? [1]

.....

.....

5

Examiner only

10. John is a severely obese 27 year old man. He weighs 31 stone and takes no exercise. For his height John should weigh about 14 stone. A typical lunch for John would include:

- 2 double cheeseburgers
- 2 litre bottle of cola.

The table below shows the nutrition facts for **one** double cheeseburger and **one** litre of cola. It also shows the Guideline Daily Amount (GDA) for an adult man.

Nutrition Facts

	Guideline Daily Amount (GDA)	double cheeseburger (220g serving)	cola (per litre)
energy (kcal)	2500.0	1120.0	400.0
carbohydrate (g)	300.0	47.0	108.0
of which sugars (g)	70.0	8.0	108.0
fat (g)	95.0	105.6	0.0
protein (g)	55.0	25.0	0.4
sodium – from salt (g)	2.4	2.0	0.12

Using the information and data above, and your own knowledge, describe the ways in which John's lifestyle and diet could lead to health problems. [6 QWC]

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END OF PAPER

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