Q1. A man hurt his head in an accident.
Doctors found that he could not remember anything that had happened on the day of the accident.

(a) (i) Name the part of the brain concerned with memory.

.....

(1)

(ii) Name **one** method the doctors could use to find out how much the brain was damaged.

.....

(1)

(b) The doctors were worried that the man might also have injured his spine.
They touched different areas of his skin with a sharp point.
They asked him to tell them each time if he could feel the sharp point.

(i) Explain how the information about the sharp point touching the skin reaches the man's brain.

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(6)

(ii) The doctors found that the man could feel the sharp point when the point touched his arms but not when the point touched his legs.

Suggest what this information could tell the doctors about the damage to the man's spinal cord. Explain your answer.

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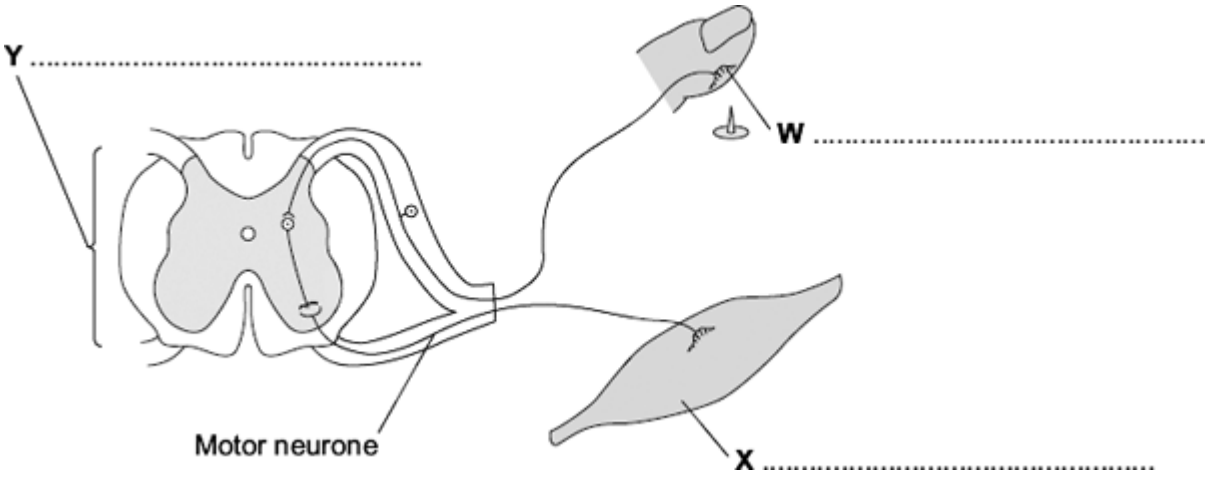
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(2)
(Total 10 marks)

Q2. The diagram shows the structures involved in a reflex action.



(a) On the diagram, name the structures labelled **W**, **X** and **Y**.

(3)

(b) The control of blood sugar level is an example of an action controlled by hormones.

Give **two** ways in which a reflex action is different from an action controlled by hormones.

1 .....

.....

.....

2 .....

.....

.....

(2)
(Total 5 marks)

Q3. Penguins live mainly in the Antarctic. Penguins eat mainly fish.
Photograph 1 shows a penguin swimming underwater.

Photograph 1



© raywoo/iStock

(a) Use information from **Photograph 1** to suggest **three** ways the penguin is adapted for catching fish.

1 .....

.....

2 .....

.....

3 .....

.....

(3)

(b) The Antarctic winter is very cold. In the winter some species of penguin huddle together as shown in **Photograph 2**.

Photograph 2



© Fuse

Suggest how the behaviour shown in **Photograph 2** helps the penguins to survive the Antarctic winter.

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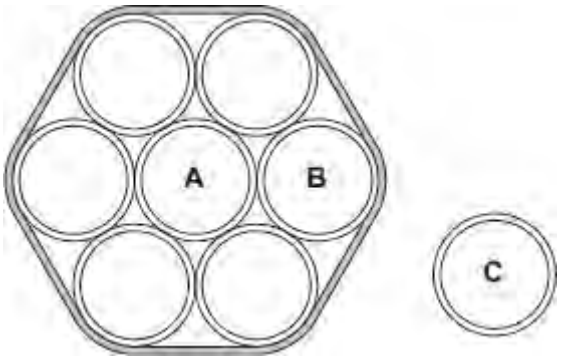
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(3)

(c) A student did an investigation to model the behaviour of the penguins shown in **Photograph 2**.

The diagram shows the apparatus the student used.



The student:

- held seven similar test tubes together with elastic bands as shown in the diagram
- stood a similar eighth tube in a test tube rack
- filled each of the eight tubes with hot water to the same level
- measured the temperature of the water in tubes **A**, **B** and **C** every 2 minutes for 20 minutes.

The table shows the student's results.

Time in Minutes	**Temperature in °C**		
	Tube A	**Tube B**	**Tube C**
0	65	65	65
2	65	65	64
4	65	64	63
6	64	64	62
8	64	63	61
10	64	63	60
12	63	62	59
14	63	62	58
16	63	61	57
18	62	61	56
20	62	60	55

(i) Give **two** variables that were controlled in the investigation.

1 .....

2 .....

(2)

(ii) Describe the patterns the data shows.

.....

.....

.....

.....

(2)

(iii) How far does the data from the model support the suggestion you made in part **(b)**?

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(2)

(d) Describe how blood vessels help control human body temperature.

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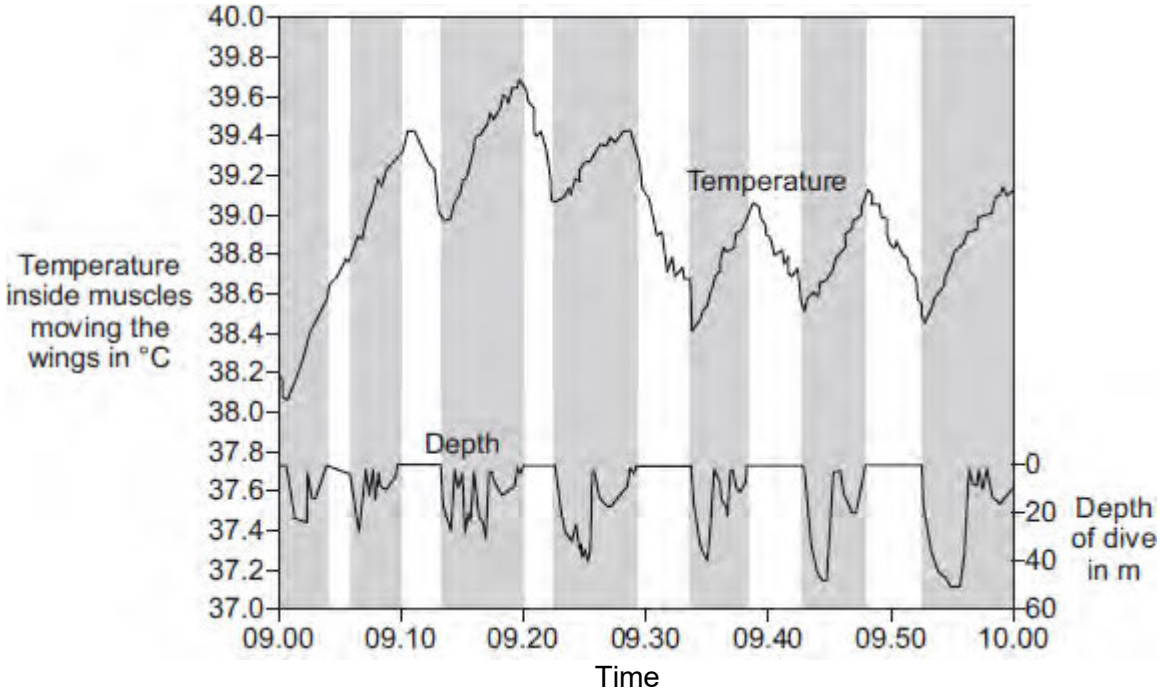
(4)

(e) Penguins control their body temperature in similar ways to humans.
Scientists investigated changes in body temperature of penguins when the penguins were diving to catch fish.

(i) **Graph 1** shows the relationship between the temperature of the muscles moving a penguin's wings and diving.

The shaded areas show when the penguin was diving.

Graph 1



© Reprinted from Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology, Volume 135, P.J. Ponganis,R.P. Van Dam,D.H. Levenson,T. Knower,K.V. Ponganis,G. Marshall, Regional heterothermy and conservation of core temperature in emperor penguins diving under sea ice, pp 477-487, copyright 2003, with permission from Elsevier

Suggest an explanation for the changes in temperature inside the muscles moving the penguin's wings.

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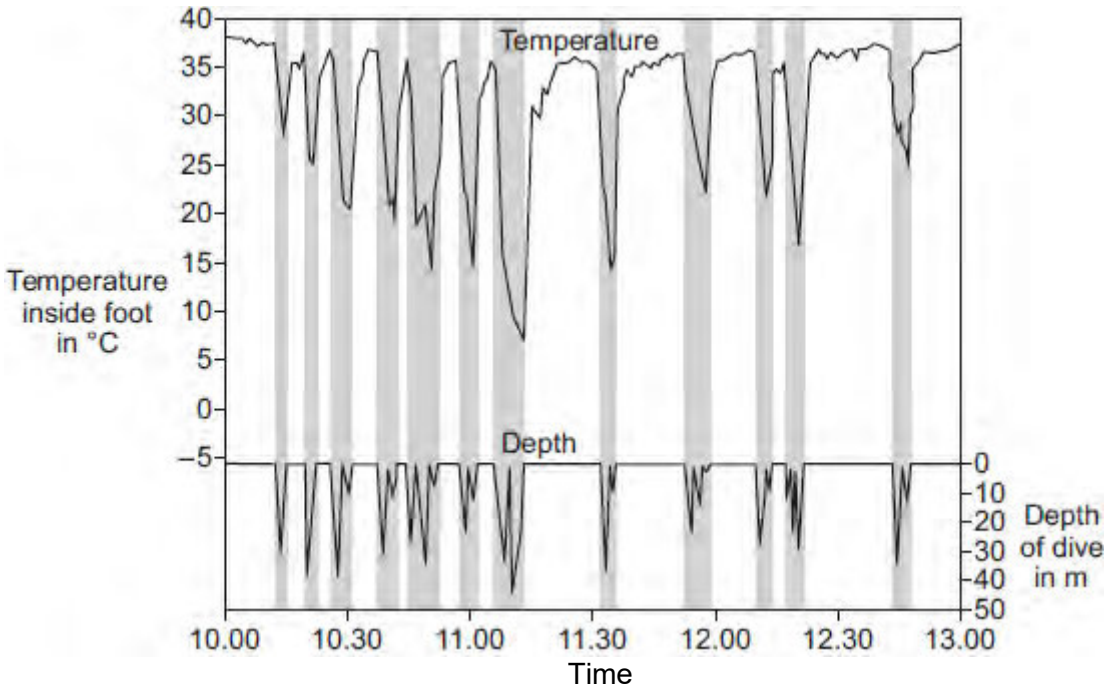
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(3)

(ii) **Graph 2** shows the relationship between the temperature inside a penguin's foot and diving.

The shaded areas show when the penguin was diving.

Graph 2



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Suggest an explanation for the changes in temperature inside the penguin's foot as it dives.

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(3)
(Total 22 marks)

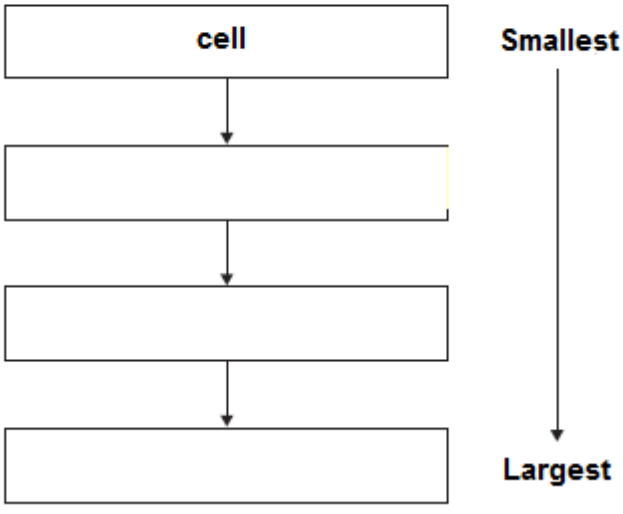
Q4. The human body is organised to carry out many different functions.

(a) Use words from the box to complete **Figure 1** by putting the parts of the body in order of size from smallest to largest.

The smallest one has been done for you.

cell	organ system	organ	tissue

Figure 1



(2)

(b) The stomach is made of different types of tissue.

Draw **one** line from each type of stomach tissue to the correct description.

Epithelial tissue	Allows food to be churned around the stomach
Glandular tissue	Covers the outside and the inside of the stomach
Muscular tissue	Produces digestive juices
	Coordinates nerve impulses

(3)

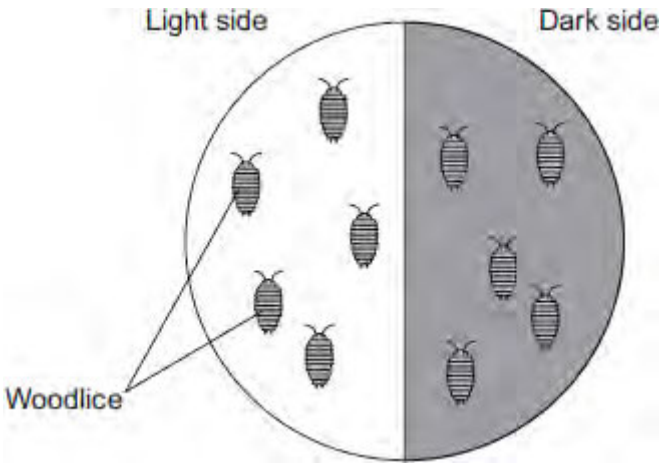
(c) Animals can react to their surroundings because they have nervous systems.

A student investigated the behaviour of small animals called woodlice.

The student set up the investigation as shown in **Figure 2.**

- The student covered one half of a Petri dish with black paper to make that side of the Petri dish dark.
- The other side had no cover.
- The student put five woodlice into each side of the dish and then put the clear Petri dish lid back on the dish.

Figure 2



After 30 minutes, all the woodlice had moved to the dark side of the Petri dish.

(i) In this investigation, what is the **stimulus** that the woodlice responded to?

.....

(1)

(ii) In this investigation, what is the **response** that the woodlice made?

.....

(1)

(iii) The student concluded that woodlice prefer dark conditions.

Give **two** ways in which the student could improve the investigation to be sure that his conclusion was correct.

1.....

.....

2.....

.....

(2)

(Total 9 marks)

Q5. This question is about the nervous system.

(a) Describe the function of receptors in the skin.

.....

.....

.....

.....

(2)

(b) A response is caused when information in the nervous system reaches an effector.

(i) There are two different types of effector.

Complete the table to show:

- the two different types of effector

- the response each type of effector makes.

Type of effector	Response the effector makes
1	....
2	....

(4)

(ii) Some effectors help to control body temperature.

Give **one** reason why it is important to control body temperature.

.....

.....

(1)
(Total 7 marks)

Q6.In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

The human body is kept at a constant internal temperature of about 37 °C.

Body temperature is monitored and controlled by the thermoregulatory centre in the brain.

Describe what happens in the body to keep the body temperature constant.

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Extra space .....

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(Total 6 marks)