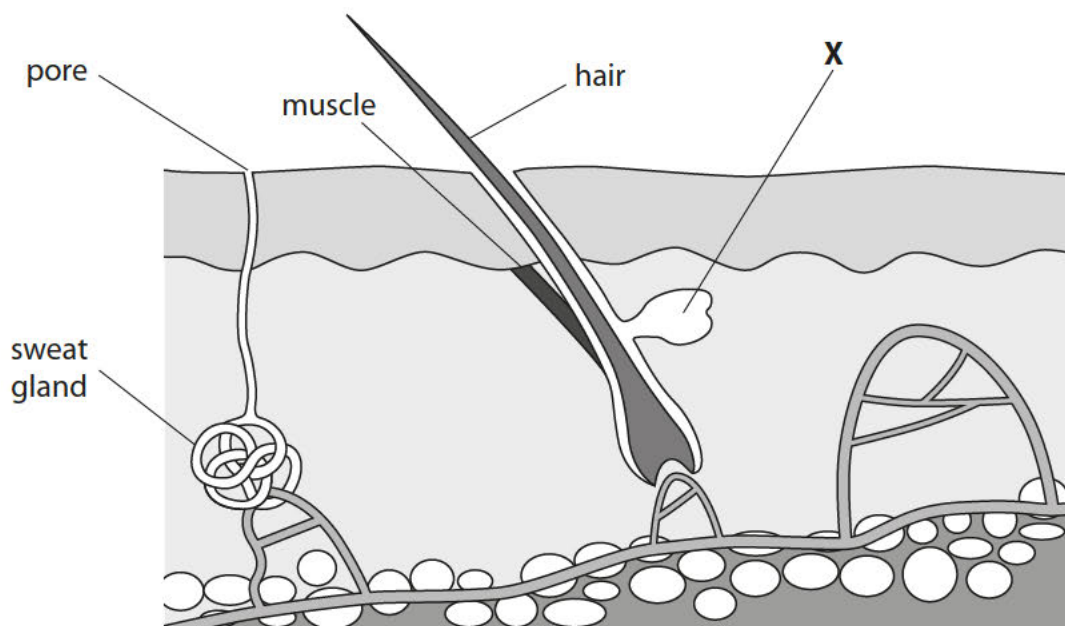


1 (a) The diagram shows a cross section through human skin.



(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Structure **X** is the

(1)

- A** blood capillary
- B** dermis
- C** nerve ending
- D** sebaceous gland

(ii) Describe the role of the sweat gland in thermoregulation.

(2)

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(iii) Explain why the muscle attached to the hair follicle is important when a person starts to feel cold.

(2)

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(b) Thermoregulation is one way in which a constant internal environment is maintained.

What is the name given to the maintenance of a constant internal environment?

Place a cross (☒) in the box next to your answer.

(1)

- A** homeostasis
- B** hypothalamus
- C** vasoconstriction
- D** vasodilation

(c) Explain why the temperature of the human body needs to be maintained at 37 °C.

(2)

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(d) The photograph shows a reptile lying in sunlight.



Explain why reptiles lie in sunlight for long periods of time.

(2)

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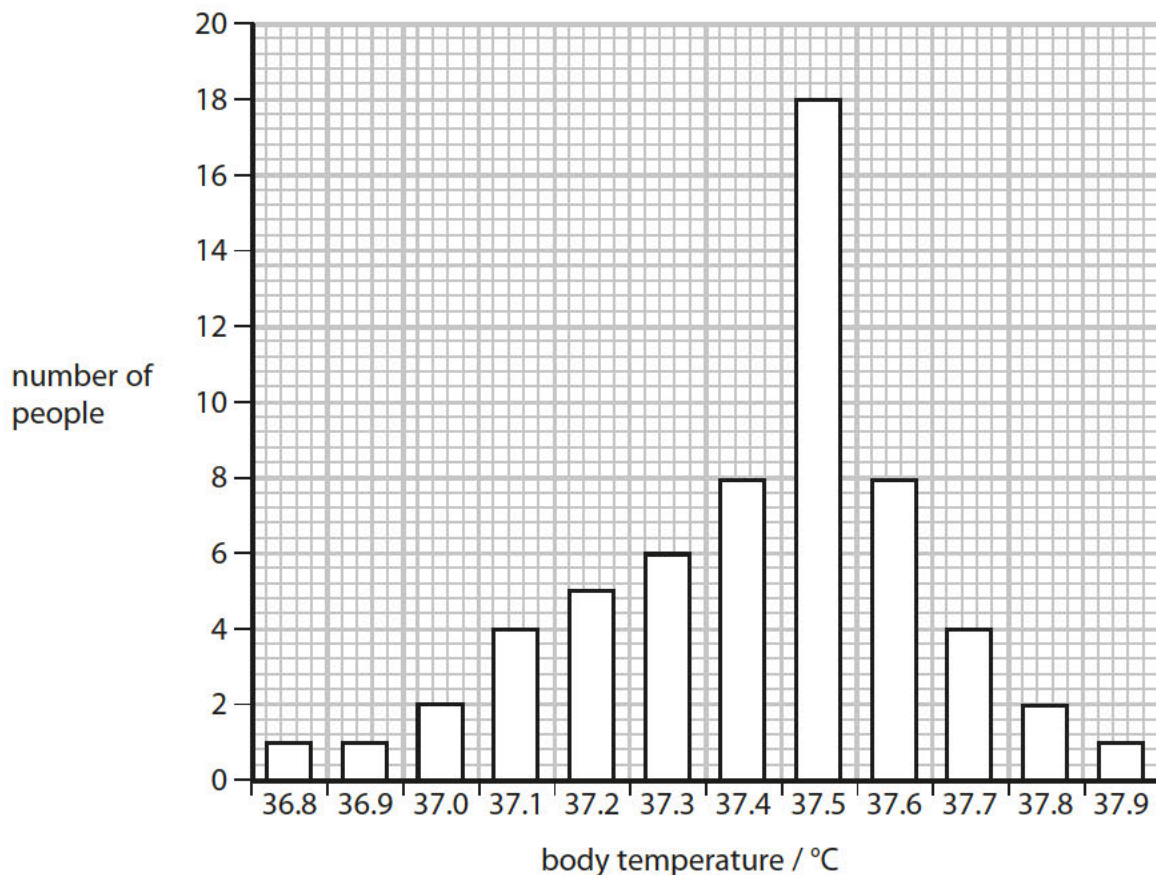
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**(Total for Question 1 = 10 marks)**

2 (a) The graph shows the body temperature of 60 people.



(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The range in body temperature is

(1)

- A** 0.1
- B** 1.1
- C** 11.0
- D** 11.1

(ii) State the type of variation, shown in the graph, that results in a normal distribution curve.

(1)

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(iii) Calculate the percentage of people with a body temperature of 37.5 °C. (2)

answer = ..... %

(b) A person with a body temperature of 37.9 °C had a body temperature of 37.5 °C one hour later.

(i) Explain how thermoregulation causes this reduction in body temperature. (4)

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(ii) Explain how exercise can cause body temperature to increase. (2)

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**(Total for Question 2 = 10 marks)**

**3** Humans regulate the glucose concentration of their blood.

A scientist recorded the blood glucose concentration of an individual over a seven-hour period.

The results are shown in the table.

<b>time of day</b>	<b>blood glucose concentration / mg per 100 cm<sup>3</sup></b>
06.00	76
07.00	77
08.00	124
09.00	91
10.00	83
11.00	81
12.00	79
13.00	130

(a) (i) Describe the trend in blood glucose concentration for this seven-hour period.

(2)

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(ii) Suggest reasons for the changes in blood glucose concentration.

(2)

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(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Excess blood glucose is converted into

(1)

- A** glucagon in the liver
- B** glucagon in the pancreas
- C** glycogen in the liver
- D** glycogen in the pancreas

(b) (i) Scientists have discovered that a high body mass index (BMI) is a risk factor that may cause Type 2 diabetes.

Calculate the BMI for a female who has a mass of 67.5 kg and a height of 1.50 m.

$$\text{BMI} = \frac{\text{mass in kg}}{(\text{height in metres})^2}$$

(2)

answer = .....

(ii) Explain how a Type 2 diabetic can regulate their blood glucose concentration.

(3)

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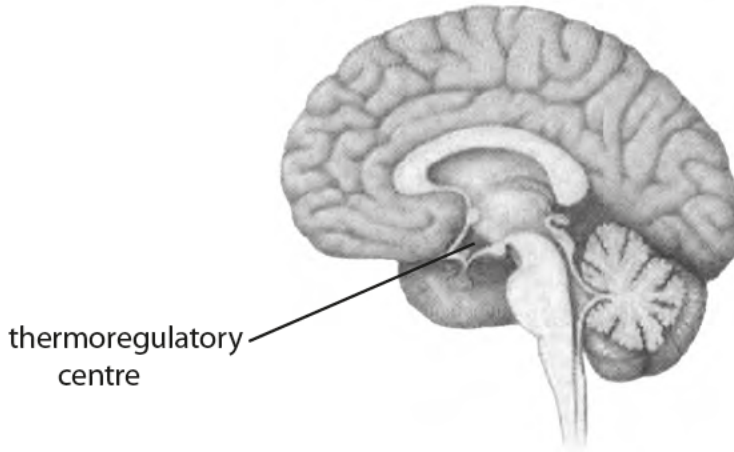
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**(Total for Question 3 = 10 marks)**

4 The diagram shows a brain with the thermoregulatory centre labelled.



(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The part of the brain that contains the thermoregulatory centre is the

(1)

- A** cerebrum
- B** cerebellum
- C** hypothalamus
- D** medulla

(ii) The thermoregulatory centre controls internal body temperature.

Explain how the blood vessels in the skin help to control internal body temperature.

(4)

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(b) Water content is also controlled within the human body.

State the name given to the control of water content in the body.

(1)

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\* (c) The human body prevents blood glucose levels from becoming too high or too low.

Explain how the human body maintains blood glucose levels within a narrow range.

(6)

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**(Total for Question 4 = 12 marks)**