1 People with diabetes insipidus are unable to produce enough of the hormone ADH.

In a medical study, the ADH levels in the blood of eight people were measured.

Four of the people, A, B, C and D, do not have diabetes insipidus.

The other four people, E, F, G and H, have diabetes insipidus.

The results are shown in the tables.

people without diabetes insipidus	ADH level in blood / µg per dm^3
A	5.2
B	2.8
C	4.9
D	3.5
Mean ADH level:	

people with diabetes insipidus	ADH level in blood / µg per dm^3
E	0.1
F	0.2
G	0.1
H	0.0
Mean ADH level:	0.1

(a) (i) Calculate the mean ADH level in the people without diabetes insipidus.

(2)

..... µg per dm^3

(ii) Suggest why there is a wide range of ADH levels in the people without diabetes insipidus.

(2)

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

ADH is a hormone released into the blood by the

(1)

☒ **A** corpus luteum

☒ **B** collecting duct

☒ **C** pituitary gland

☒ **D** glomerulus

(iv) Suggest a symptom of diabetes insipidus.

(1)

*(b) Explain the role of ADH in regulating the water content of the blood.

(6)

(Total for Question 1 = 12 marks)

2 The temperature of Rebecca's brain and of one of her fingers was recorded at six different external temperatures.

temperature / °C		
external	**brain**	**fin**
20	36.9	37.0
15	37.0	36.8
10	36.7	36.5
5	36.9	36.2
0	36.8	35.6
-5	37.0	34.3

(a) (i) Calculate the maximum temperature range for Rebecca's finger.

(1)

answer ..... °C

(ii) Compare the temperature of Rebecca's brain and her finger as the external temperature decreased.

(2)

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(iii) Explain why the temperature of Rebecca's finger showed this response to the decrease in the external temperature.

(3)

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*(b) Explain how the human body responds to an external temperature of 40 °C.

(6)

(Total for Question 2 = 12 marks)

3 (a) (i) Conditions in the human body must be regulated to maintain a stable internal environment.

Name the process that maintains a stable internal environment.

(1)

.....

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

The temperature that enzymes work most effectively in the human body is

(1)

☒ **A** 31 °C

☒ **B** 33 °C

☒ **C** 35 °C

☒ **D** 37 °C

(b) Receptor cells in the skin detect temperature changes in the external environment.

Explain how this information is transmitted to the brain.

(4)

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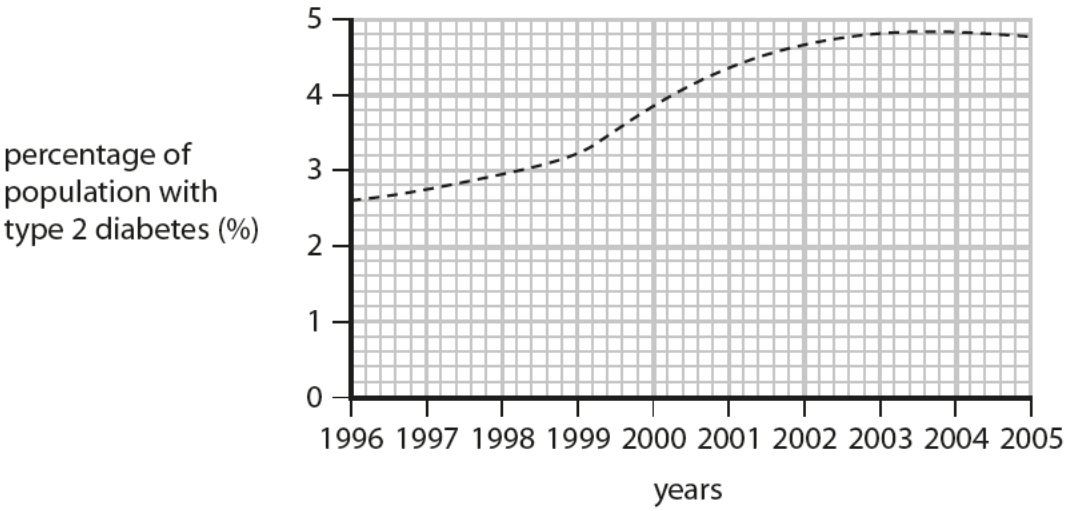
*(c) In the UK, the external temperature can drop below 0 °C.

Explain how the human body maintains a stable internal temperature when the external temperature is 0 °C.

(6)

(Total for Question 3 = 12 marks)

4 (a) In the UK, there has been an increase in the percentage of the population with type 2 diabetes.



(i) The population of the UK between 1996 and 2005 was 60 million.

Calculate the increase in the number of people with type 2 diabetes between 1996 to 2005.

(2)

answer = ...people

(ii) Suggest **two** reasons for this increase in the number of people with type 2 diabetes.

(2)

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(b) Explain how type 2 diabetes can be controlled without the use of drugs.

(2)

*(c) Explain how blood glucose levels are controlled in people who do **not** have diabetes.

(6)

(Total for Question 4 = 12 marks)