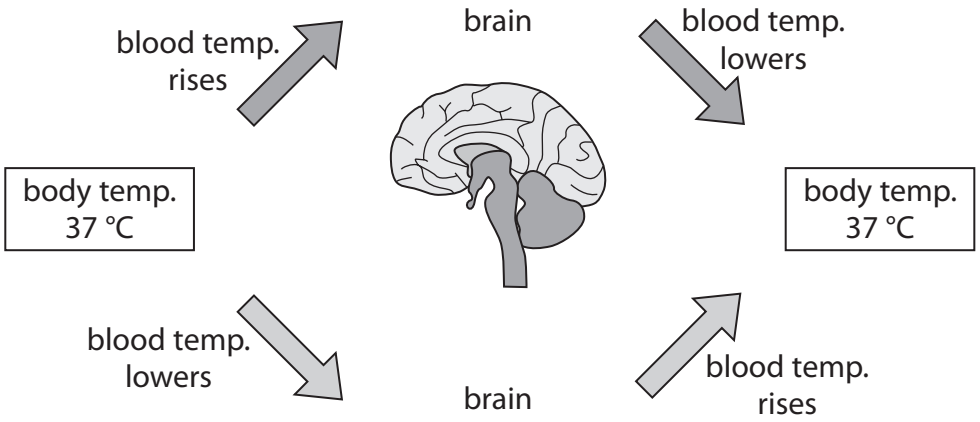
1 (a) The diagram shows the regulation of body temperature.



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

The type of control shown in the diagram is known as

(1)

☒ **A** negative feedback

☒ **B** osmoregulation

☒ **C** positive feedback

☒ **D** variation

(ii) State the part of the brain that controls body temperature.

(1)

.....

(b) Describe **one** way in which the skin helps in the control of body temperature.

(2)

.....

.....

.....

.....

(c) Explain why humans need to maintain their body temperature at 37 °C.

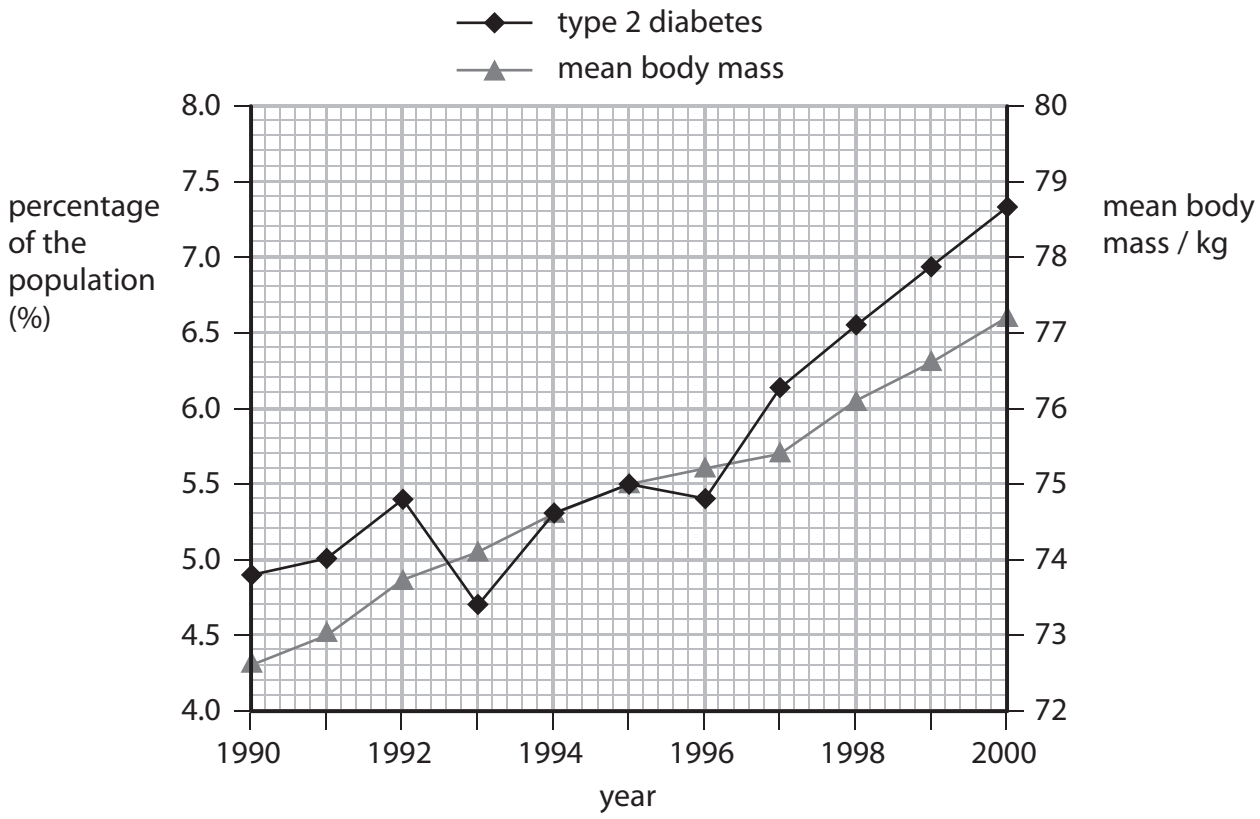
(2)

*(d) Explain how changes in the volume of blood going through the skin help to maintain body temperature.

(6)

(Total for Question 1 = 12 marks)

2 The graph shows the percentage of the population with type 2 diabetes and the mean body mass of the population, from 1990 to 2000.



(a) (i) Use information from the graph to describe the correlation between type 2 diabetes and body mass shown from 1993 to 2000.

(2)

.....

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.....

.....

(ii) Suggest how a change in body mass may cause a person to develop type 2 diabetes.

(2)

.....

.....

.....

.....

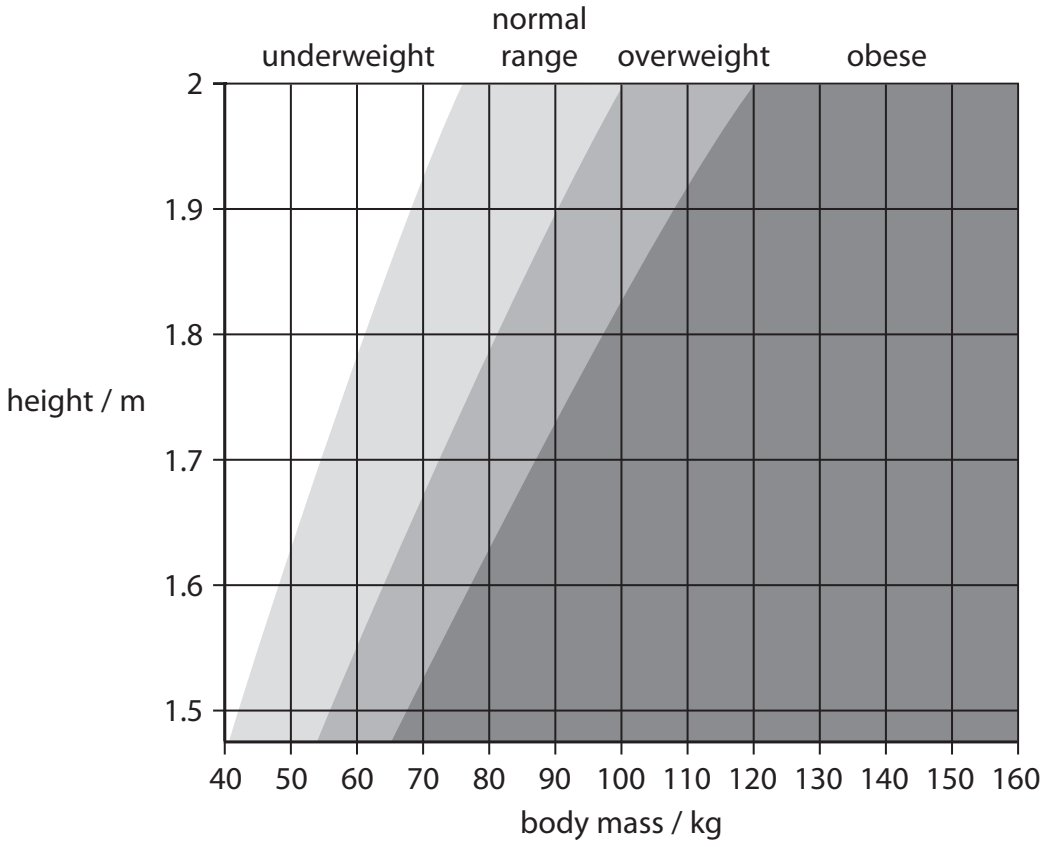
(b) (i) Use the equation to calculate the body mass index (BMI) for a person with a body mass of 78 kg and a height of 1.7 m.

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

(2)

BMI .....

(ii) Use the chart to find the BMI category for this person.



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

The BMI category for this person is

(1)

☒ **A** underweight

☒ **B** normal range

☒ **C** overweight

☒ **D** obese

(c) Describe how the human body acts in response to low glucose levels in the blood.

(3)

(Total for Question 2 = 10 marks)

3 Blood tests can be used to check a person's blood glucose and hormone levels.

Figure 4 shows the results of two blood tests carried out on three people to check their blood glucose levels. Person 1 is healthy.

	blood glucose level (mmols/l)	
	after fasting for 12 hours	**two hours after drinking 75 g glucose**
person 1	5.4	6.4
person 2	5.6	9.0
person 3	7.8	12.1

Figure 4

(a) (i) Compare the glucose levels of person 1 with the glucose levels of person 2 after fasting for 12 hours.

(1)

.....

.....

(ii) Compare the glucose levels of person 3 with the glucose levels of person 1, two hours after drinking 75 g glucose.

(1)

.....

.....

Person 3 cannot produce the hormone that controls blood glucose levels.

(iii) State the hormone that person 3 cannot produce.

(1)

.....

.....

(b) Figure 5 shows the level of progesterone for a female during five different stages of the menstrual cycle.

days in the menstrual cycle	progesterone level (nmol/l)
1–9	1.85
10–14	1.48
15–17	14.28
18–23	35.27
24–28	17.11

Figure 5

(i) Describe the changes in progesterone levels during the 28-day cycle.

(2)

(ii) Explain why progesterone levels changed following day 14.

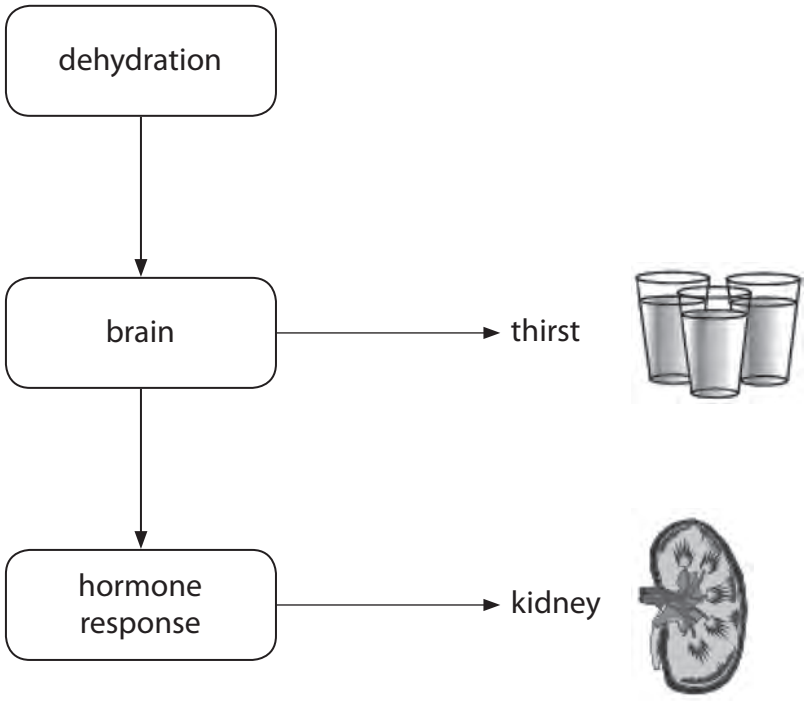
(2)

(iii) Use Figure 5 to explain if the female is pregnant.

(2)

(Total for Question 3 = 9 marks)

4 The diagram shows the body's response to dehydration.



(a) Use the diagram to help explain the body's hormonal response to dehydration.

(4)

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(b) The menstrual cycle is also controlled by hormones including progesterone.

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

Progesterone is produced by the

(1)

☒ **A** corpus luteum

☒ **B** glomerulus

☒ **C** hypothalamus

☒ **D** pituitary gland

(ii) Describe the effect of high levels of progesterone on the uterus lining during pregnancy.

(1)

.....

.....

*(b) (iii) Explain how the menstrual cycle is controlled by hormones and negative feedback.

(6)

(Total for Question 4 = 12 marks)