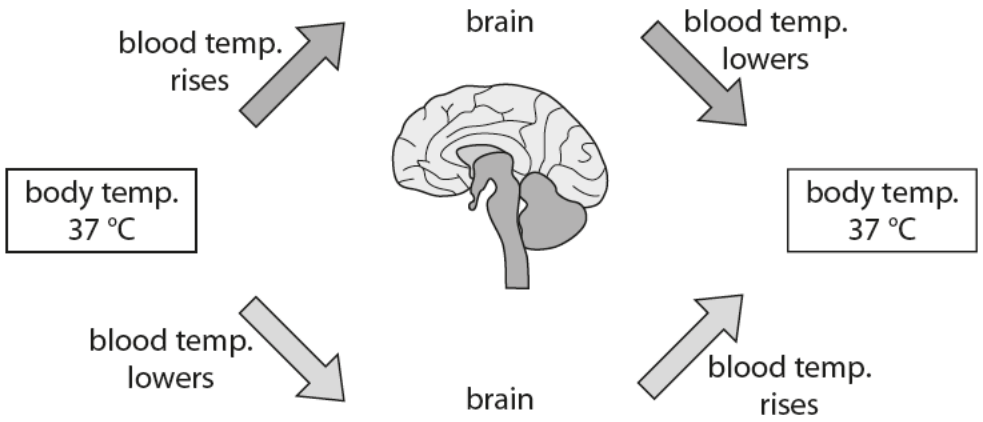
1 (a) The diagram shows the regulation of body temperature.



(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.

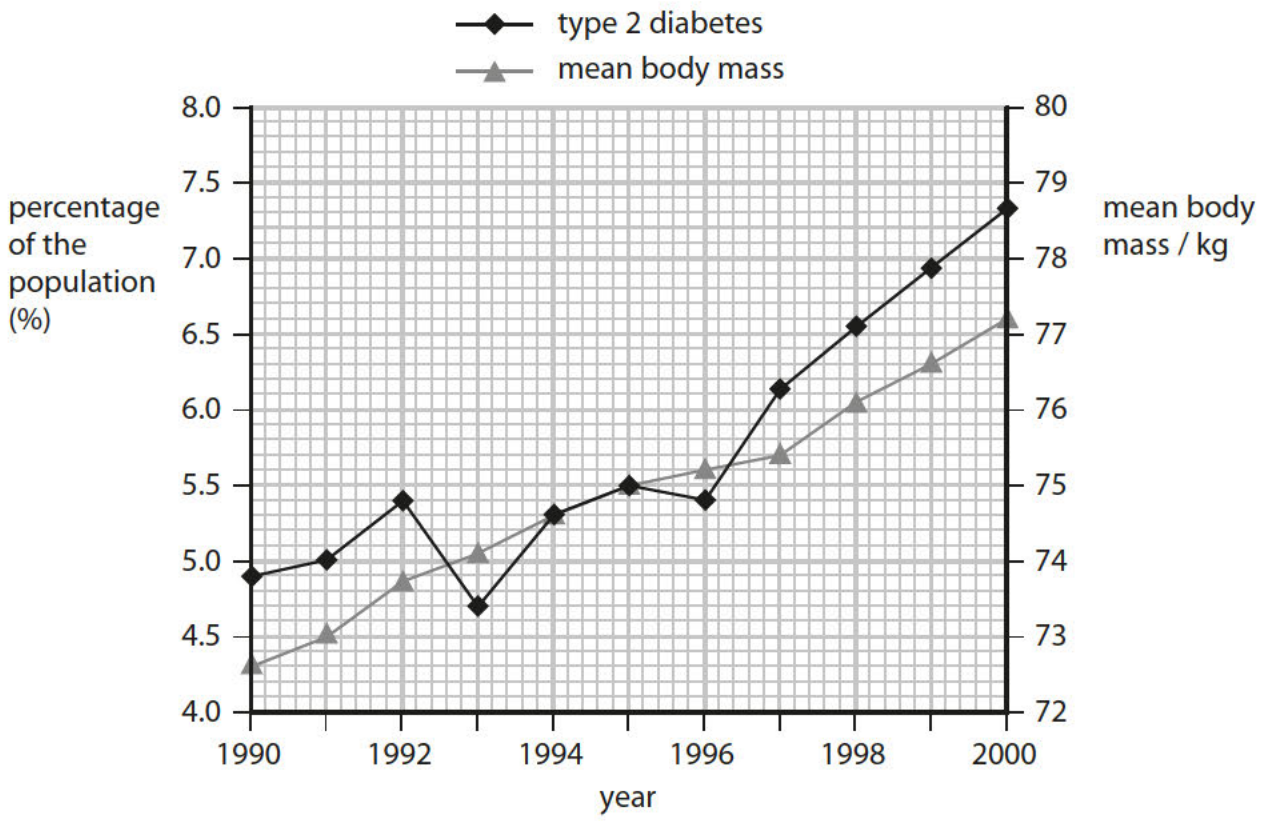
(2)

*(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)

.....

.....

.....

.....

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

(2)

.....

.....

.....

.....

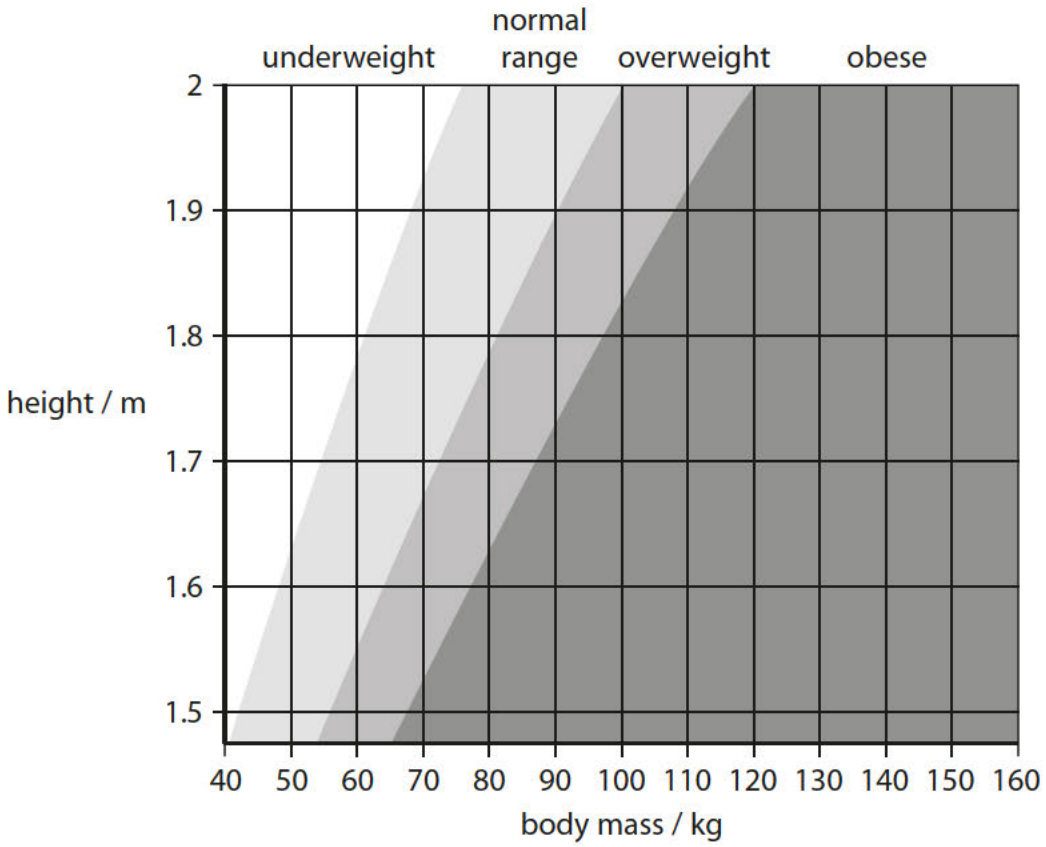
(b) (i) Use the equation to calculate the body mass index (BMI) for a person with a body mass of 78 kg and a height of 1.7 m.

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

(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.

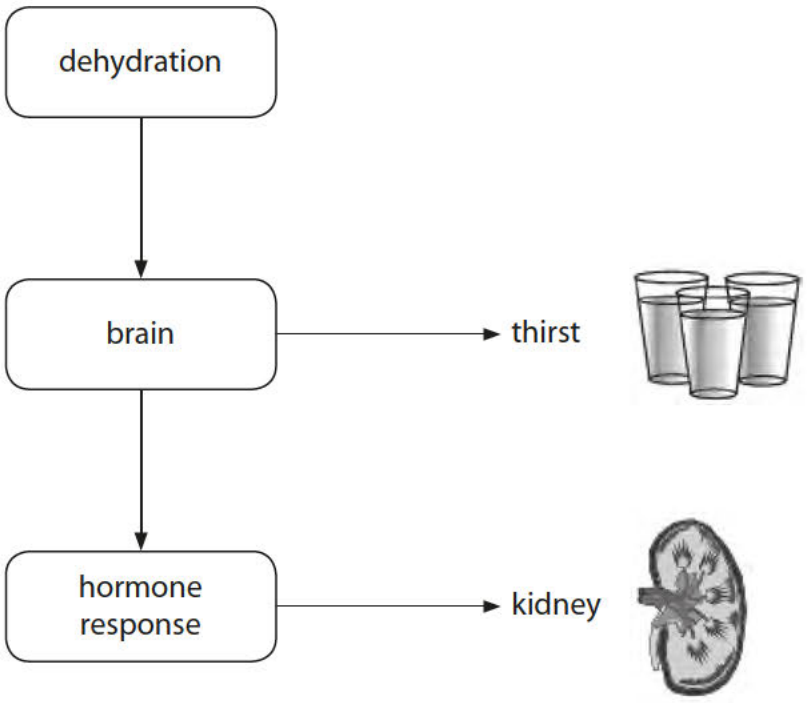
(2)

(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)

(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)