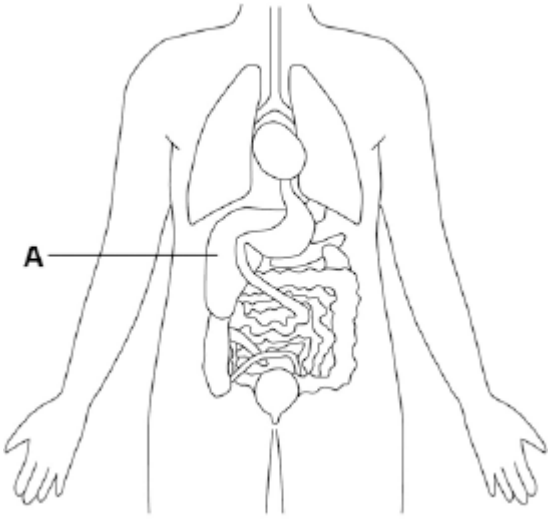
Q1. Humans control their internal environment in many ways.

Look at the diagram below.



(a) Name organ **A**.

.....

(1)

(b) Organ **A** stores glucose.

People with Type 1 diabetes cannot effectively control the levels of glucose in their blood.

Name the **hormone** people with **Type 1 diabetes** have to inject to decrease their blood glucose level.

.....

(1)

(c) Which organ produces urine?

Tick **one** box.

Brain ☐

Lungs ☐

Kidney ☐

Thyroid ☐

(1)

(d) Marathon runners often drink sports drinks during a race.

Explain why.

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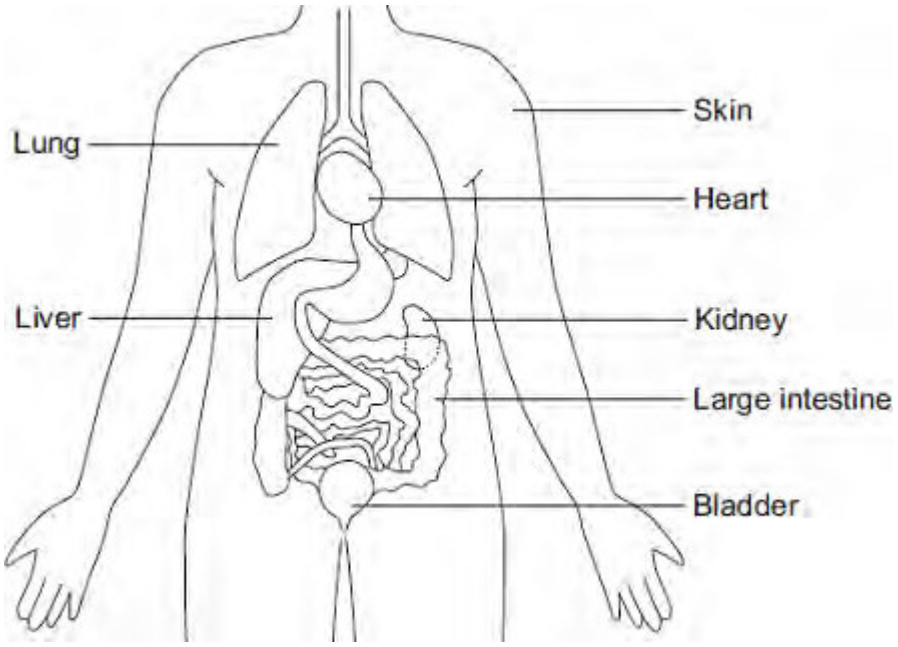
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.....

(2)
(Total 5 marks)

Q2. The diagram shows some of the organs of the human body.



(a) Which organ labelled on the diagram:

(i) produces urine .....
(1)

(ii) stores urine .....
(1)

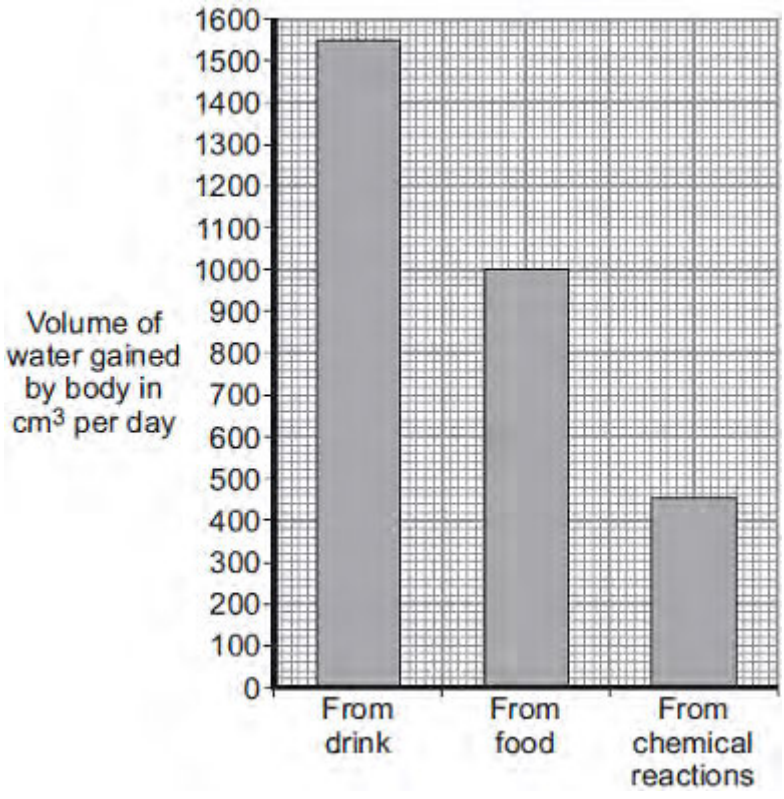
(iii) produces urea .....
(1)

(iv) gets rid of carbon dioxide .....
(1)

(v) helps to control body temperature? .....
(1)

(b) **Bar chart 1** shows the volume of water the human body gains each day.

Bar chart 1



Source of water gained by body

(i) Calculate the total volume of water the body gains each day.

.....

.....

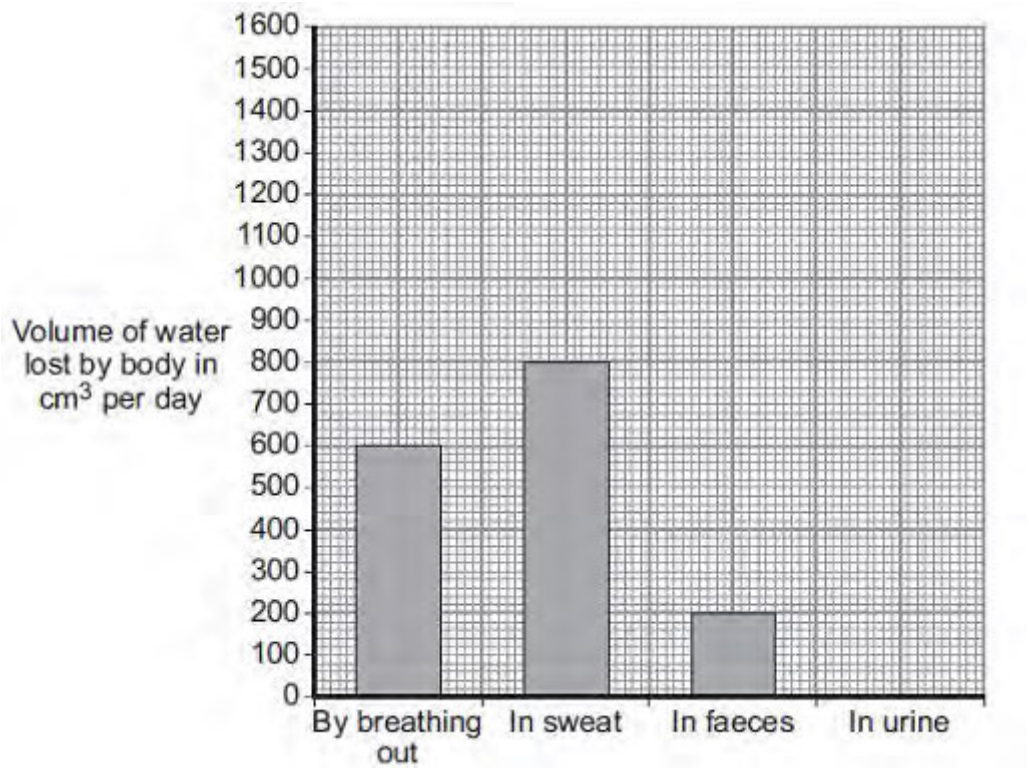
.....

Total volume of water gained = ... cm^3

(2)

Bar chart 2 shows the volume of water lost each day by breathing out, in sweat and in faeces.

Bar chart 2



Water lost by body

(ii) Calculate the total volume of water lost each day by breathing out, in sweat and in faeces.

.....

.....

Volume = ... cm^3

(1)

(iii) The volume of water the body loses must balance the volume of water the body gains.

Use your answers to part (b)(i) and part (b)(ii) to calculate the volume of water lost in urine.

.....

.....

Volume of water lost in urine = ... cm_3

(1)

(iv) Plot your answer to part (b)(iii) on **Bar chart 2**.

(1)

(v) After taking some types of recreational drugs, the kidneys produce very little urine.

What happens to the body cells if the kidneys produce very little urine?

.....

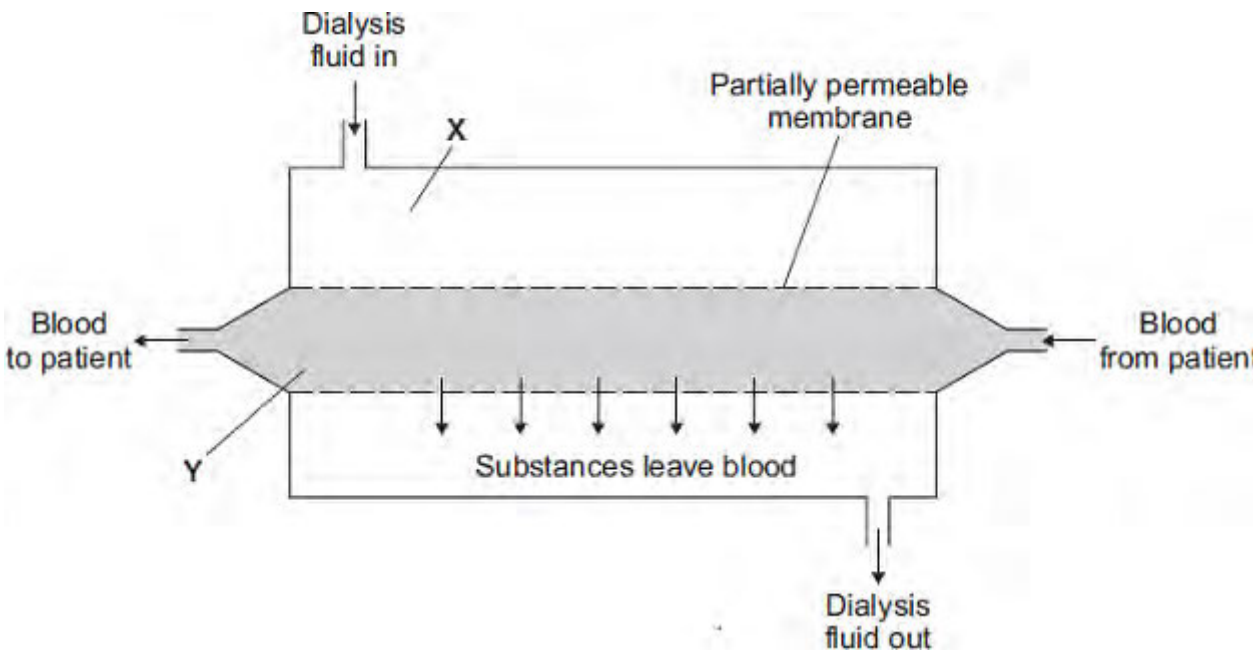
.....

(1)

(Total 11 marks)

Q3. People with kidney disease may be treated by dialysis.

The diagram shows a dialysis machine.



(a) Draw a ring around the correct answer to complete each sentence.

A person loses mass during dialysis. One patient lost 2.2 kilograms during a dialysis session.

(i) This person lost mass mainly because

salt
urea
water

was removed from the blood.

(1)

(ii) This substance was able to pass through the partially permeable membranes

because its molecules are

large.
round.
small.

(1)

(iii) The concentration of sodium ions at **X** is 3.15 grams per dm_3.

At the end of a dialysis session, the most likely concentration of sodium ions

at **Y** would be

0.00
3.15
6.30

grams per dm_3.

(1)

(b) The table shows the cost, in the UK, of treating one patient who has kidney disease.

Treatment		**Cost per year in pounds**
Dialysis		30 000
Kidney transplant:		
	operation + first year's medical care medical care in	51 000
	each further year	5 000

(i) During the first year, dialysis treatment is cheaper than a kidney transplant.

How much cheaper is the dialysis treatment? ..... pounds

(1)

(ii) After some time, the cost of treating a patient by a transplant operation would be cheaper than continual treatment by dialysis.

How many years would it take?

Draw a ring around **one** answer.

2 years **3 years** **4 years**

(1)

(iii) A transplant pa ient needs to take drugs for the rest of his life to suppress the immune system.

Why is it necessary to suppress the immune system ?

.....

.....

(1)

(Total 6 marks)

Q4. Diabetes is a disease in which the concentration of glucose in a person's blood may rise to fatally high levels.

Insulin controls the concentration of glucose in the blood.

(a) Where is insulin produced?

Draw a ring around **one** answer.

gall bladder **liver** **pancreas**

(1)

(b) People with diabetes may control their blood glucose by injecting insulin.

(i) If insulin is taken by mouth, it is digested in the stomach.

What type of substance is insulin?

Draw a ring around **one** answer.

carbohydrate **fat** **protein**

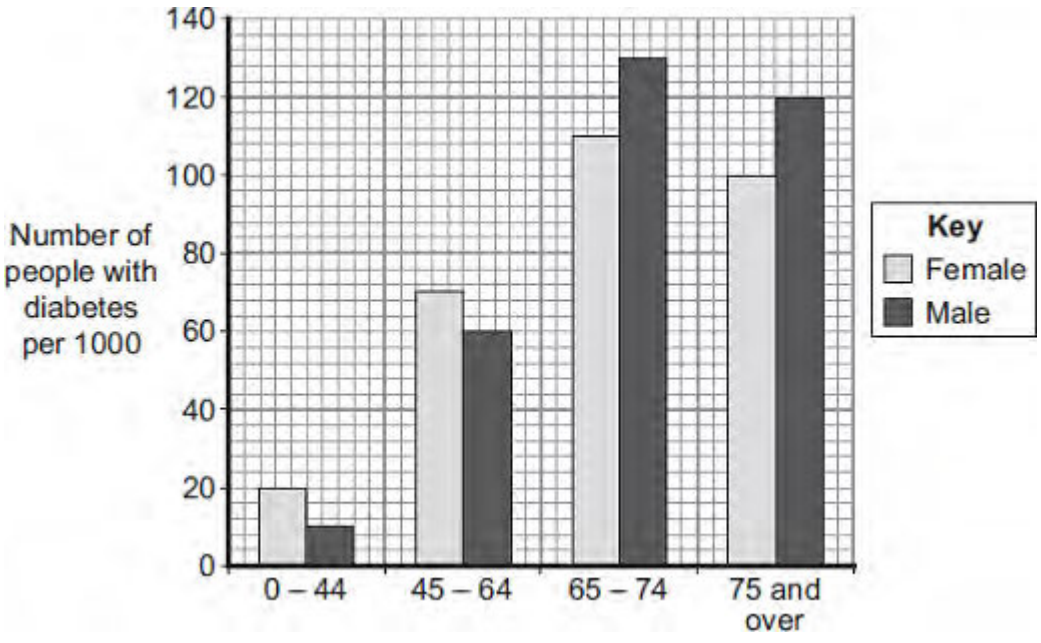
(1)

(ii) Apart from using insulin, give **one** other way people with diabetes may reduce their blood glucose.

.....

(1)

(c) The bar chart shows the number of people with diabetes in different age groups in the UK.



(i) Describe how the number of males with diabetes changes between the ages of 0 – 44 years and 75 years and over.

.....

.....

.....

.....

.....

.....

.....

.....

(3)

(ii) Compare the number of males and females with diabetes:

between the ages of 0 and 64 years

.....

.....

.....

over the age of 65 years.

.....

.....

.....

(2)

(Total 8 marks)

Q5. The body controls internal conditions.

(a) Use words from the box to complete he sentences about water loss from the body.

kidneys	**liver**	**lungs**	**skin**

(i) Water is lost in sweat via the .....

(1)

(ii) Water is lost in urine via the .....

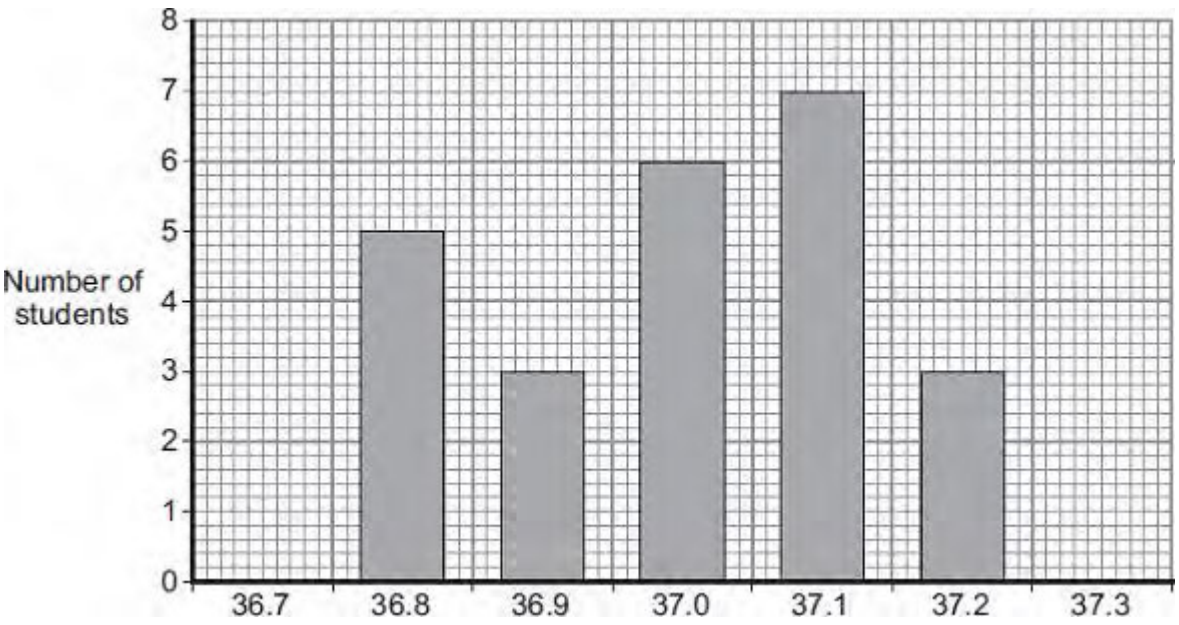
(1)

(iii) Water is lost in the breath via the .....

(1)

(b) Students investigated body temperature in the class.

The bar chart shows the results.



(i) One student used the bar chart to calculate the mean body temperature of the class.

The student calculated the mean body temperature as 37.0 °C.

How did the student use the bar chart to calculate the mean?

.....

.....

.....

.....

(2)

(ii) How many students had a body temperature higher than the mean of 37.0 °C

.....

(1)

(iii) Body temperature must be kept within a narrow range.

Why?

.....

.....

(1)

(Total 7 marks)

Q6. Human body temperature must be kept within narrow limits.

The image shows a cyclist in a race.



© Ljupco/iStock/Thinkstock

(a) Use the correct answer from the box to complete each sentence.

blood	**brain**	**kidney**	**sweat**	**urine**

The cyclist's body temperature is monitored by a centre in the ..... .

This centre is sensitive to the temperature of the cyclist's ..... .

If the cyclist's body temperature increases, his body increases

the production of ..... .

(3)

(b) (i) Cyclists drink sports drinks after a race.

The table below shows the ratio of glucose to ions in three sports drinks, **A**, **B** and **C**.

	Sports drink		
	A	**B**	**C**
Ratio of glucose (g per dm3) to ions (mg per dm_3)	15:14	12:1	2:7

The closer this ra io of glucose to ions is to 1:1 in a sports drink, the faster the body replaces water.

Which sports drink, **A**, **B** or **C**, would replace water fastest in an athlete? ☐

(1)

(ii) Why should sports drinks contain ions?

.....

.....

(1)

(iii) Why should a person with diabetes **not** drink too much sports drink?

.....

.....

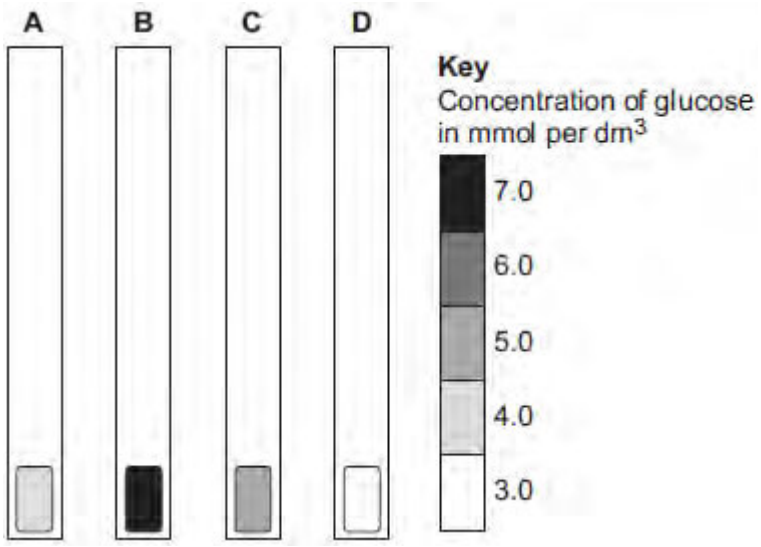
(1)

(Total 6 marks)

Q7. Blood glucose concentration in humans must be kept between 4.4 and 6.1 mmol per dm_3.

Four students, **A**, **B**, **C** and **D**, tested their blood glucose concentration with glucose testing strips.

The diagram shows the results of their tests and the key from the test strip bottle.



(a) (i) Which student, **A**, **B**, **C** or **D**, has diabetes and has eaten a large piece of cake?

(1)

(ii) Which student, **A**, **B**, **C** or **D**, is in most need of eating carbohydrates?

(1)

(iii) Which student, **A**, **B**, **C** or **D**, has a healthy blood glucose concentration?

(1)

(b) (i) Name the hormone that people with diabetes inject to prevent their blood glucose concentration from becoming too high.

.....

(1)

(ii) Blood glucose concentra ion is monitored in the body.

Which organ monitors blood glucose concentration?

Draw a ring around the correct answer.

brain **liver** **pancreas**

(1)

(Total 5 marks)