AQA B3.3 Homeostasis LEVEL 1

176 minutes

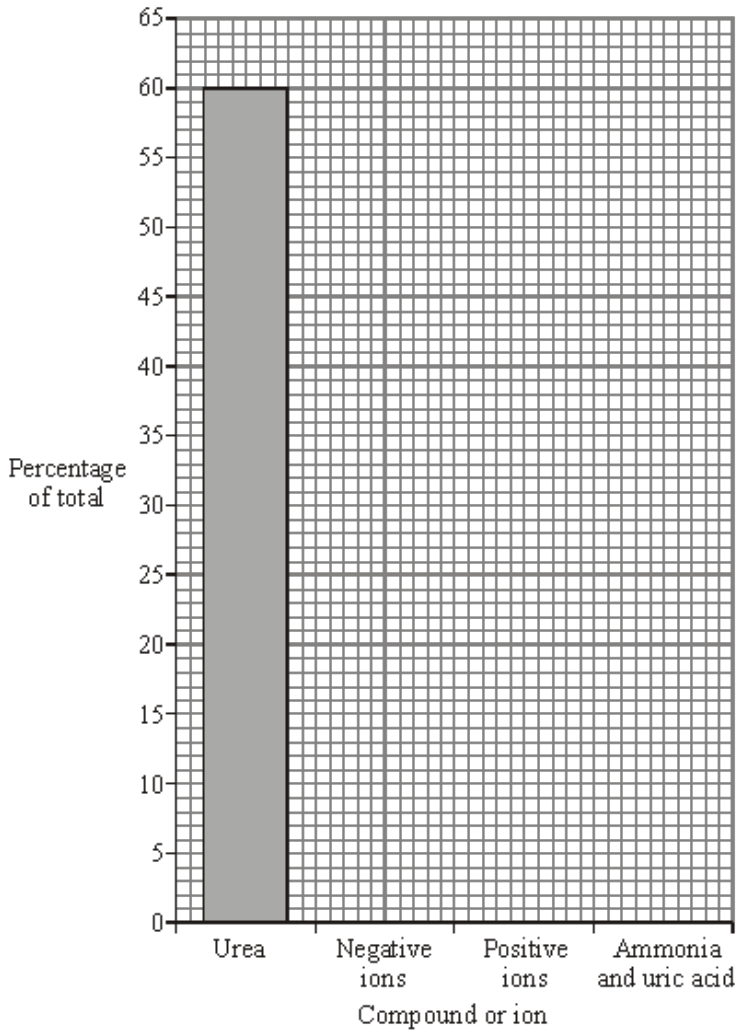
176 marks

##

(a) The table shows the compounds and ions dissolved in a student's urine.

Compound or ion	Percentage of total
urea	60
negative ions	25
positive ions	10
ammonia and uric acid	5

(i) Complete the bar chart. One bar has been drawn for you.



(2)

(ii) There is a total of 10 g of compounds and ions dissolved in a sample of this student's urine. Calculate the mass of urea in the sample. Show clearly how you work out your answer.

.....

.....

.....

Mass of urea ..... g

(2)

(b) Use words from the box to complete the sentences.

anus	bladder	kidneys	liver	lungs

Plasma transports carbon dioxide from the body to the ..... .

Plasma transports urea from the ..... to the ..... .

(3)

(Total 7 marks)

Q2. When people suffer from kidney failure, they may be treated with a dialysis machine. The patients' blood is passed through the machine where the composition of the blood is adjusted.

(a) Name a waste substance, carried in the blood, which is removed by the dialysis machine.

.....

(1)

(b) Doctors sometimes give these patients dialysis treatment, rather than a kidney transplant.

Suggest **four** reasons for this.

.....

.....

.....

.....

.....

.....

.....

.....

(4)
(Total 5 marks)

-

Q3. Kidney transplants were introduced in the twentieth century as one way of treating patients with kidney failure.

(i) Give **one** other way of treating kidney failure.

.....

(1)

(ii) The patient's body may reject a transplanted kidney unless doctors take precautions.

Some of these precautions are listed below.

- A donor kidney is specially chosen.
- The recipient's bone marrow is treated with radiation.
- The recipient is treated with drugs.
- The recipient is kept in sterile conditions.

Explain how **each** of these precautions may help the patient to survive.

.....

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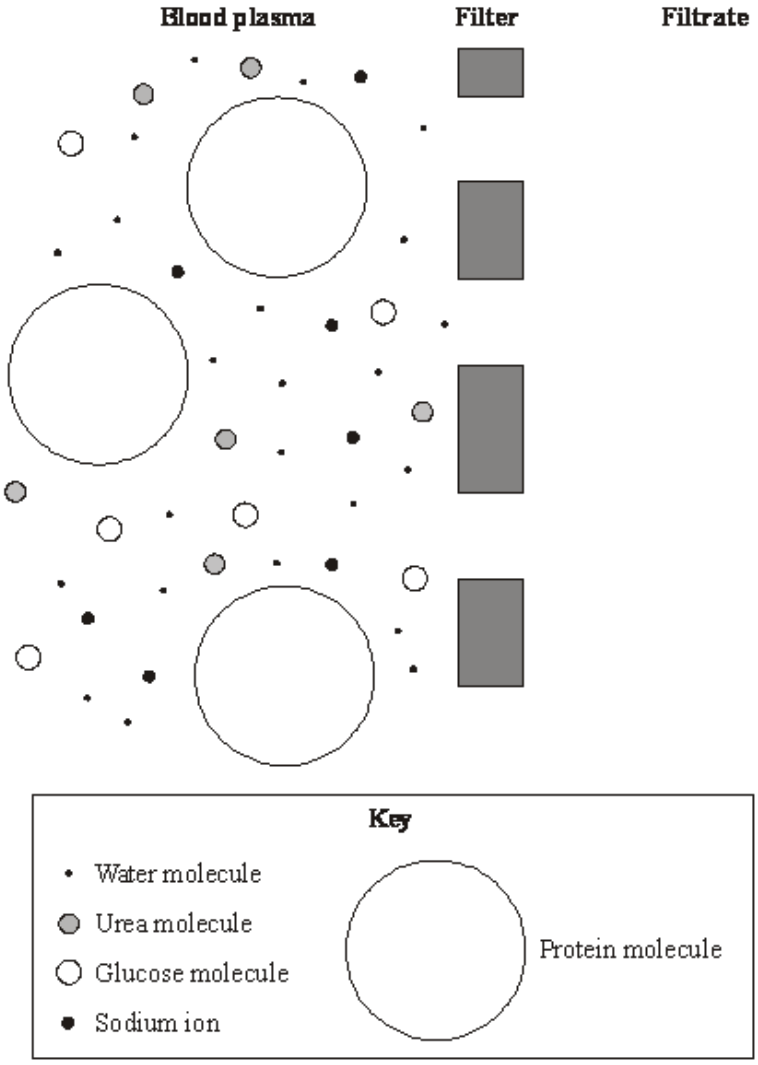
(4)
(Total 5 marks)

Q4. The kidneys filter the blood.

The diagram shows the site of filtration in the kidney.



(a) Use information from the diagram to answer this question.

Put a tick (✓) in the box next to every substance that will pass through the filter from the blood plasma into the filtrate.

One has been done for you.

glucose	✓
urea	
water	
sodium ions	
protein	

(2)

(b) Proteins and glucose are not present in the urine of a healthy person.

(i) Use information from the diagram to explain why protein is not found in the urine of a healthy person.

.....

.....

(1)

(ii) Complete the sentence by drawing a ring around the correct answer.

After filtration, all the glucose is

reabsorbed
released
respired

(1)

(c) An athlete trained on a hot day and on a cold day. On each day, he did the same amount of exercise and drank the same volume of water.

Complete the sentences by drawing a ring around the correct answer.

(i) On the hot day, the athlete would produce

less
more
the same amount of

urine.

(1)

(ii) This is because he would produce

less
more
the same amount of

sweat.

(1)
(Total 6 marks)

Q5. (a) (i) Urine is made in the kidneys and stored for a few hours before being released from the body.

In which organ of the body is urine stored? Draw a circle around **one** answer.

bladder **large intestine** **liver**

(1)

(ii) Which **two** of the following substances are **not** found in the urine of a healthy person?

Tick (✓) **two** boxes.

glucose ☐

mineral ions ☐

protein ☐

urea ☐

(2)

(b) A person with kidney disease may be treated by dialysis or by having a kidney transplant.

Read the information about dialysis and kidney transplants.

- A person needs 3 dialysis sessions a week, each lasting about 8 hours.
- Intake of protein and salt in the food is kept low between dialysis sessions.
- For each patient, dialysis costs £30 000 per year.
- The use of a general anaesthetic can sometimes cause brain damage.
- Drugs to suppress the immune system are given after a kidney transplant.
- A transplant costs £20 000 in the first year plus £6500 in each of the following years for drugs.

Use this information to answer the questions.

(i) Give **two** advantages of treatment by having a kidney transplant rather than treatment by dialysis.

1 .....

.....

2 .....

.....

(2)

(ii) Give **one** disadvantage of treatment by having a kidney transplant.

.....

.....

(1)

(c) The table shows the amounts of some substances in the blood of one patient before dialysis and after dialysis.

Substance	**Concentration in blood plasma in grams per dm^3**	
	Before dialysis	**After dialysis**
Sodium ions	2.88	3.00
Potassium ions	0.22	0.14
Urea	4.50	0.30

During dialysis, substances are removed from the blood.

(i) Which substance in the table decreased in concentration the most during dialysis?

.....

(1)

(ii) By how much did the concentration of this substance decrease?

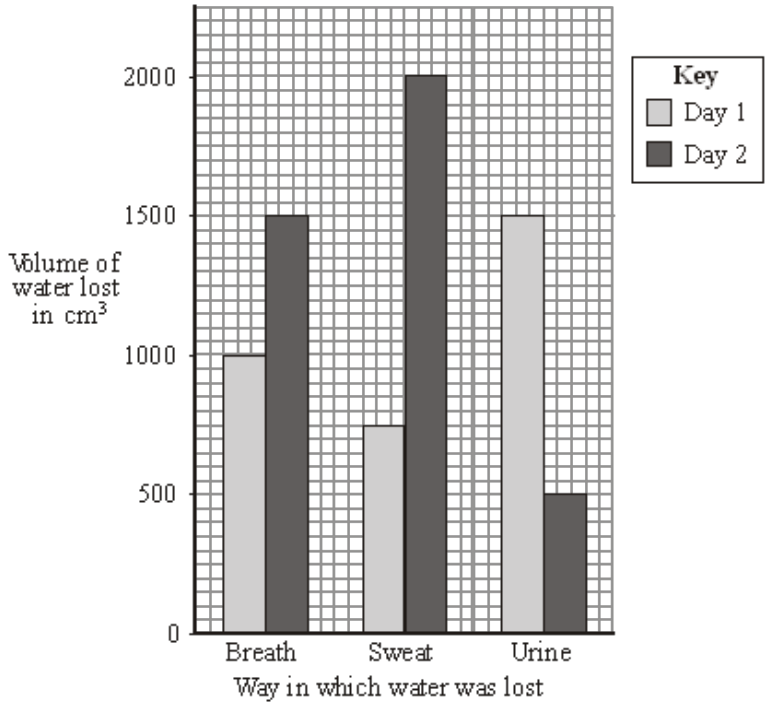
..... grams per dm^3

(1)

(Total 8 marks)

Q6. The bar chart shows the amount of water lost from the body of a student on two different days.

The student ate the same amount of food and drank the same amount of liquid on the two days. The temperature of the surroundings was similar on the two days.



(a) The total volume of water lost on day 1 was 3250 cm^3.

How much water was lost on day 2? Show all your working.

.....

..... cm^3

(2)

(b) The student did much more exercise on one of the days than on the other.

On which day did he do more exercise? Day .....

Give **two** reasons for your answer.

1 .....

.....

2 .....

.....

(2)

(c) (i) Which **one** of these is a chemical reaction that produces water in the body?

Put a tick (✓) in the box next to your choice.

Breathing	☐
Osmosis	☐
Respiration	☐
Sweating	☐

(1)

(ii) How does sweating help the body?

.....

.....

(1)

(iii) If the body loses more water than it gains, it becomes dehydrated.
The concentration of the solution surrounding the body cells increases.
This causes the cells to lose water.

By which process do cells lose water?

Put a tick (✓) in the box next to your choice.

Breathing ☐

Osmosis ☐

Respiration ☐

Sweating ☐

(1)
(Total 7 marks)

Q7. (a) Which **two** of the following substances are found in the urine of a healthy person?

Tick (✓) **two** boxes.

Glucose ☐

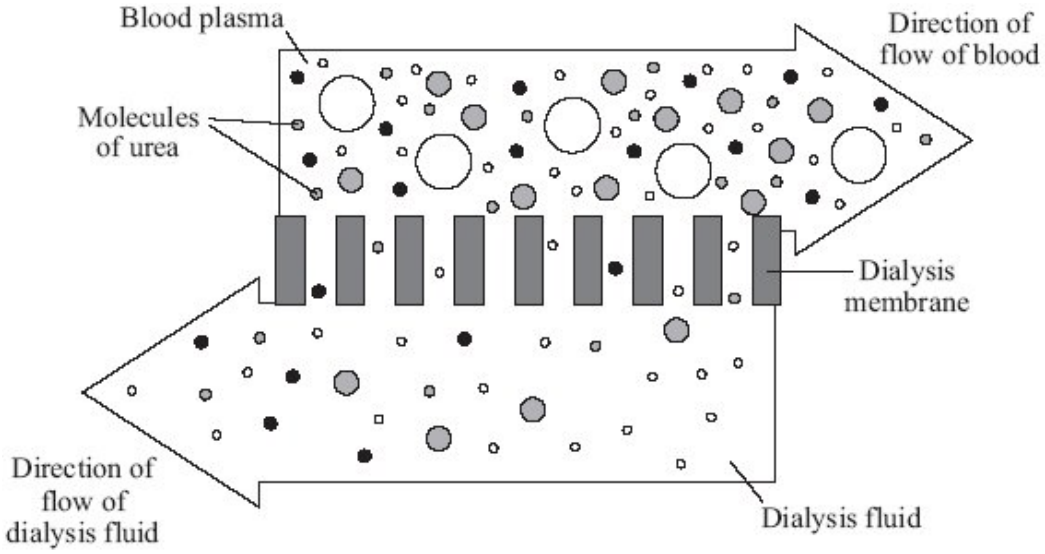
Mineral ions ☐

Proteins ☐

Water ☐

(2)

(b) A person with kidney disease can be treated by dialysis.
The diagram shows how dialysis works.
The circles represent molecules of different substances.



Draw a ring around the correct word or phrase to complete each sentence.

(i) During dialysis, urea moves out of the

blood cells
blood plasma
dialysis fluid

.

(1)

(ii) During dialysis, urea moves into the

blood cells
blood plasma
dialysis fluid

.

(1)

(iii) Urea moves by the process of

diffusion
digestion
transpiration

.

(1)

(iv) To allow the movement of urea, the dialysis membrane is

impermeable
partially permeable
thick

.

(1)

(v) The urea can pass through the membrane because

the urea molecules are

large
round
small

.

(1)

(c) For most patients a kidney transplant is better than continued dialysis treatment.

Tick (✓) **one** box to complete the sentence.

One major problem with a kidney transplant is that

drug treatment is needed to suppress the immune system. ☐

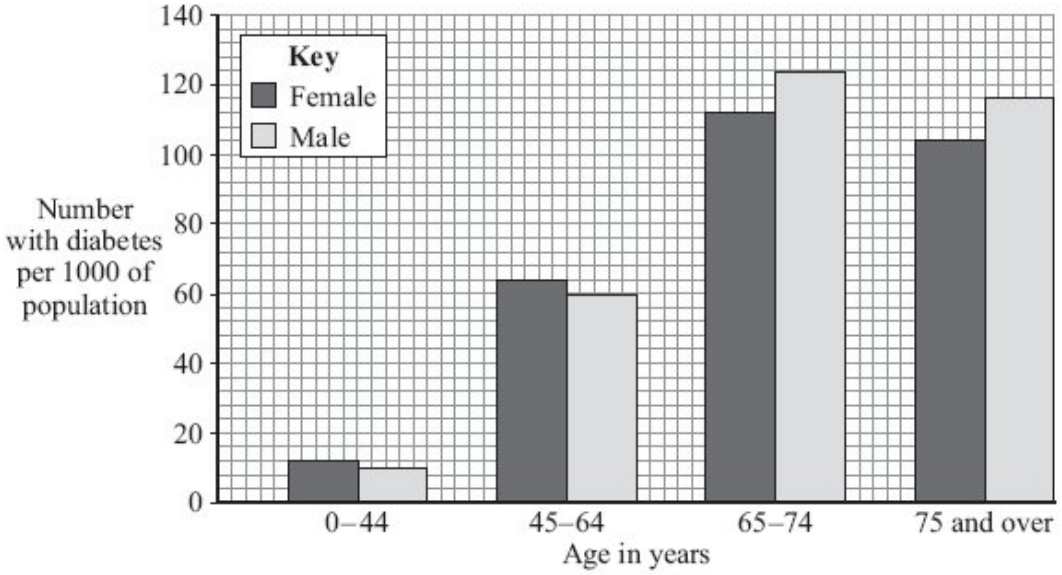
hospital visits are needed three times a week. ☐

yearly costs are higher than for dialysis. ☐

(1)
(Total 8 marks)

Q8. Diabetes is caused when the body does not produce enough insulin.

(a) The bar graph shows the number of people with diabetes per 1000 of population.



(i) How many more males aged between 45 and 64 years of age have diabetes than males under 45 years of age?

Show clearly how you work out your answer.

.....

.....

Answer ..... per 1000 of population

(2)

(ii) Describe the way in which the number of females with diabetes changes with age.

.....

.....

.....

.....

.....

(2)

(b) One way of treating diabetes is by injecting insulin.

Insulin is a protein.

(i) If insulin is taken by mouth, it is broken down in the digestive system.

Where in the digestive system would insulin be broken down?

Draw a ring around your answer.

liver **mouth** **stomach**

(1)

(ii) Give **one** way of treating diabetes instead of using insulin.

.....

.....

(1)

(Total 6 marks)

Q9. Water can be lost from the body in several ways.
The table shows the volume of water lost by a man on a cold day.

Way in which water is lost	Volume of water lost in cm^3
In urine	2000
Through skin	600
Breathed out	300
In faeces	100
Total	**3000**

(a) Calculate the proportion of water that the man lost through his skin.

Show clearly how you work out your answer.

.....

.....

Proportion = ...

(2)

(b) More water is lost through the skin on a hot day than on a cold day.

(i) Explain why.

.....

.....

(1)

(ii) To maintain water balance in the body, the total volume of water taken in must equal the total volume of water lost.

Give **two** ways this is achieved on a hot day, when compared to a cold day.

Tick (✓) **two** boxes.

The volume of water in the urine decreases. ☐

The volume of water in the faeces increases. ☐

The volume of water taken as food or drink increases. ☐

The volume of water breathed out decreases. ☐

(2)

(c) Use words from the box to complete the sentences.

bladder	kidney	liver	stomach

The body cannot store amino acids.

The body converts the amino acids it cannot use into urea.

(i) Urea is made in the .....

(1)

(ii) Urea is removed from the blood by the .....

(1)

(iii) Urine is stored in the .....

(1)

(Total 8 marks)

Q10. (a) The kidney controls the amount of water in the body.

The table shows the volume of water filtered from the blood and the volume of urine produced in one day.

	Volume in dm^3
Water filtered from blood	180
Urine	2

Calculate the volume of water reabsorbed into the blood.

Show clearly how you work out your answer.

.....

Volume of water reabsorbed = ...dm^3

(2)

(b) On a hot sunny afternoon, Man **A** sat in the shade, drinking beer. Man **B** went jogging in the desert.

Man **A**

Man **B**

As a result, the volume and concentration of the urine of the two men were different.

Complete the table by writing the word '**higher**' or '**lower**' in each box.

The first line has been completed for you.

	Man A	**Man B**
Volume of urine produced	higher	lower
Volume of water reabsorbed by the kidneys		
Concentration of urine		

(2)

(Total 4 marks)

Q11. Waste products, such as carbon dioxide and urea, have to be removed from the body.

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

(a) Carbon dioxide is produced by

breathing
diffusion
respiration

.

(1)

(b) Most carbon dioxide leaves the body through the

kidneys
lungs
skin

.

(1)

(c) Urea is produced in the

kidneys
liver
lungs

.

(1)

(d) Urea is produced from the breakdown of

amino acids
glucose
urine

.

(1)

(Total 4 marks)

Q12. A marathon runner loses a lot of sweat during a race.

(a) Complete the following sentence.

Sweat contains water and .....

(1)

(b) The table shows the concentration of glucose, ions and protein in four sports drinks, **A**, **B**, **C** and **D**.

Runners drink sports drinks to replace the water lost in sweating. Replacing water is called rehydration.

Scientists have shown that the ratio of the glucose concentration, in g per dm^3, to the ion concentration, in mg per dm^3, in a drink affects the rate of rehydration.

The nearer this ratio is to 1:1, the faster the body rehydrates.

Drink	Glucose in g per dm^3	Ions in mg per dm^3	Protein in g per dm^3	Glucose to ion ratio
A	110	22	1.2	5:1
B	64	96	0.0	2:3
C	72	80	0.0	.....
D	138	23	0.2	.....

(i) Which drink, **A**, **B**, **C** or **D**, would give the runner most energy? ☐

(1)

(ii) Calculate the glucose to ion ratios for drinks **C** and **D**.

Write your answers in the table.

(2)

(iii) Which drink, **A**, **B**, **C** or **D**, would rehydrate the runner the fastest? ☐

(1)

(c) The kidney controls the amount of water in the runner's body.

The table shows:

- the volume of water filtered from the blood
- the volume of urine produced in one day.

	Volume per day in dm^3
Water filtered from blood	180
Urine	2

Calculate the volume of water reabsorbed into the blood in one day.

.....

Volume of water that is reabsorbed ..... dm^3

(1)

(d) On a hot sunny afternoon:

- man **A** sat in the shade, drinking beer
- man **B** went jogging in the desert.

Man **A**

Man **B**

Complete the table to compare the volume and concentration of urine produced by the kidneys of the two men.

Tick (✓) **one** box on each row.

Compared with Man A	**The same**	**Higher**	**Lower**
the volume of urine produced by man **B** would be			
the concentration of urine produced by man **B**'s kidneys would be			

(2)

(Total 8 marks)

Q13. The table shows the concentrations of some substances in the blood plasma, kidney filtrate and urine of one person.

Substance	Concentration in grams per dm^3		
	Plasma	**Filtrate**	**Urine**
Protein	78.0	0.0	0.0
Glucose	0.8	0.8	0.0
Urea	0.3	0.3	20.0
Sodium ions	2.8	2.8	3.5

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

(i) Protein is **not** found in the filtrate.

This is because protein molecules are

- too large to pass through the filter.
- used up in respiration.
- reabsorbed into the blood.

(1)

(ii) Glucose is found in the filtrate but **not** in the urine.

This is because glucose is

- too large to pass through the filter.
- used up in respiration.
- passed through the filter, then reabsorbed into the blood.

(1)

(iii) The concentration of urea is much higher in the urine than in the filtrate.

This is because

- urea is made by the kidney.
- water is reabsorbed from the filtrate into the blood.
- glucose and salts are reabsorbed from the filtrate into the blood.

(1)

(iv) The fluid entering the bladder

will contain

- water, protein, glucose, urea and sodium ions.
- water, urea and sodium ions.
- water, glucose, urea and sodium ions.

(1)

(b) An athlete ran a 10-kilometre race on a cold day. He then ran the same race on a hot day. He ate and drank the same on each day.

Draw a ring round the correct answer to complete each sentence.

(i) On the **hot** day this athlete will produce

more urine.

less urine.

the same amount of urine.

(1)

(ii) On the **hot** day the athlete's urine will be

more concentrated.

less concentrated.

the same concentration.

(1)

(Total 6 marks)

Q14. 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)

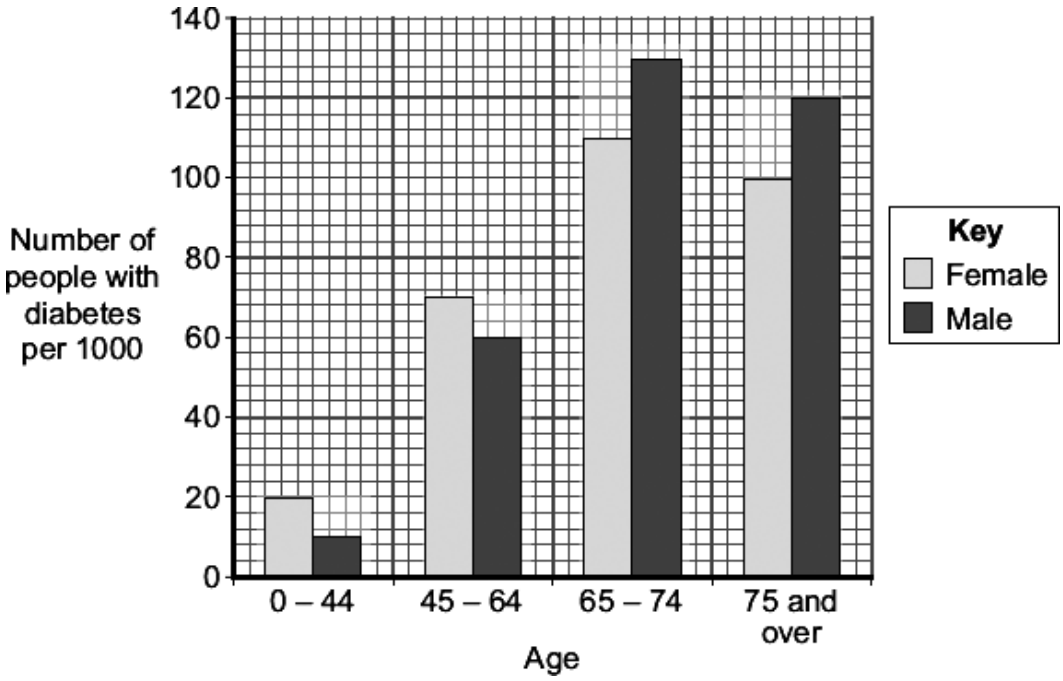
(b) Diabetics may control their blood glucose by injecting insulin.

Apart from using insulin, give **one** other way diabetics 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 and 75 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.

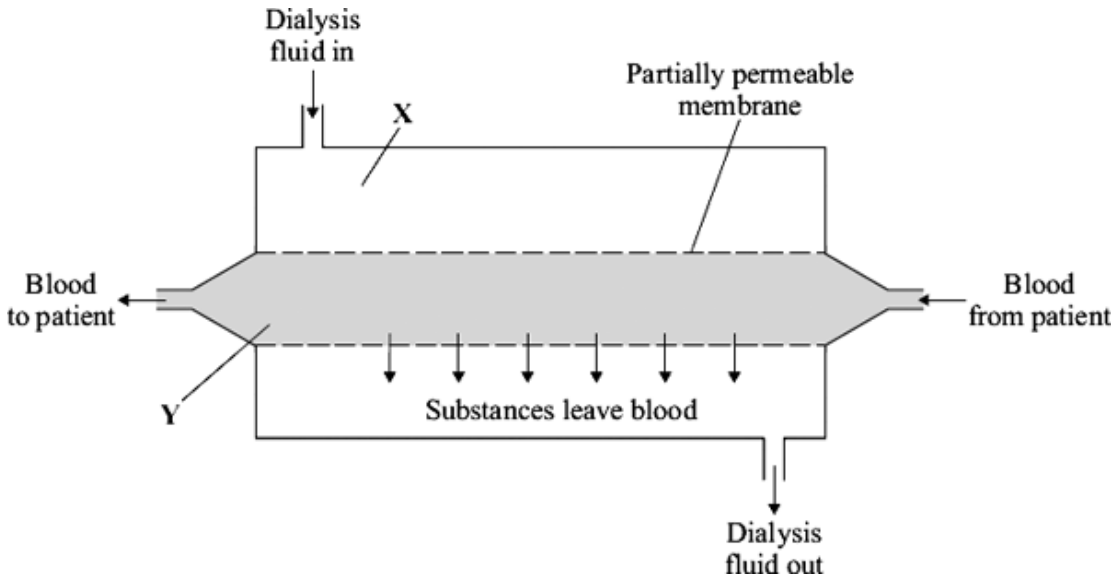
.....

.....

(2)

(Total 7 marks)

Q15. 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 the substance

salt
urea
water

was removed from the blood.

(1)

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

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
6.85

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 each further year	 51 000 5 000

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

How much cheaper is 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 patient needs to take drugs for the rest of his life to suppress the immune system.

Why is this necessary?

.....

.....

(1)

(Total 6 marks)

Q16. Diabetes is a disease in which blood glucose (sugar) concentration may rise more than normal.

(a) Which organ in the body monitors this rise in blood sugar?

Draw a ring around your answer.

liver **pancreas** **stomach**

(1)

(b) One way of treating diabetes is by careful attention to diet.

Chart 1 shows the recommended diet for a person with diabetes.

Chart 2 shows a diet for a person without diabetes.

Chart 1 Person with diabetes

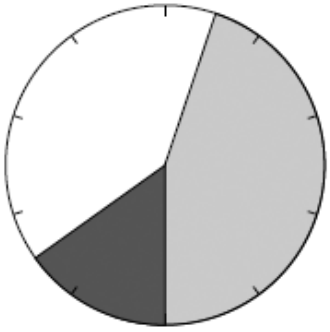
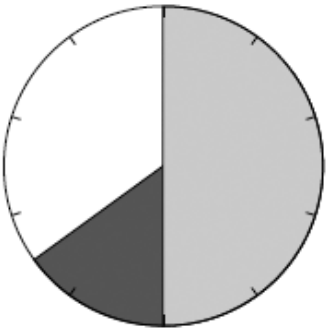
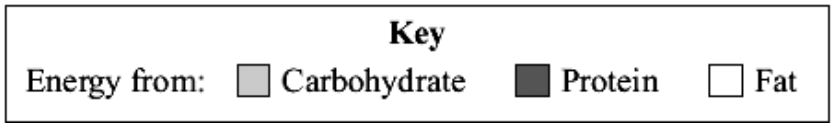


Chart 2 Person without diabetes





How is the recommended diet of a person with diabetes different from the diet of a person without diabetes?

Use information from the charts.

Tick (✓) **two** box.

The diabetic should get more energy from fat. ☐

The diabetic should get more energy from protein. ☐

The diabetic should get less energy from carbohydrate. ☐

The diabetic should get less energy from protein. ☐

(2)

(c) Other than diet, give **one** way in which diabetes may be treated.

.....

.....

(1)

(Total 4 marks)

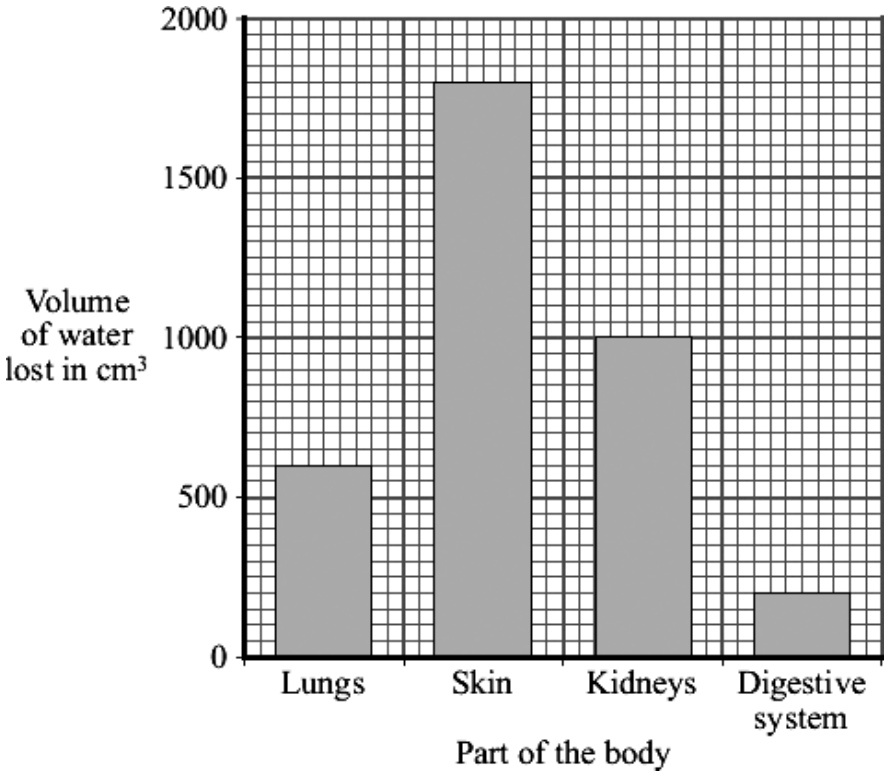
Q17. Water is lost from several parts of the body.

(a) Draw **one** line from each body part to the substance in which water is lost.

Body Part	Substance
Kidneys	Urine
Lungs	Faeces
Skin	Sweat
	Breath

(3)

(b) The bar chart shows the volume of water a person lost from different parts of the body during a warm day.



(i) What volume of water was lost through the skin on the warm day?

Tick (✓) **one** box.

600 cm^3 ☐

1600 cm^3 ☐

1800 cm^3 ☐

(1)

(ii) What effect would colder weather have on the amount of water lost through the skin?

Draw a ring around your answer.

decreases **increases** **stays the same**

(1)

(iii) Give a reason for your answer.

.....

.....

(1)

(c) What effect does cold weather generally have on the amount of urine produced?

Draw a ring around your answer.

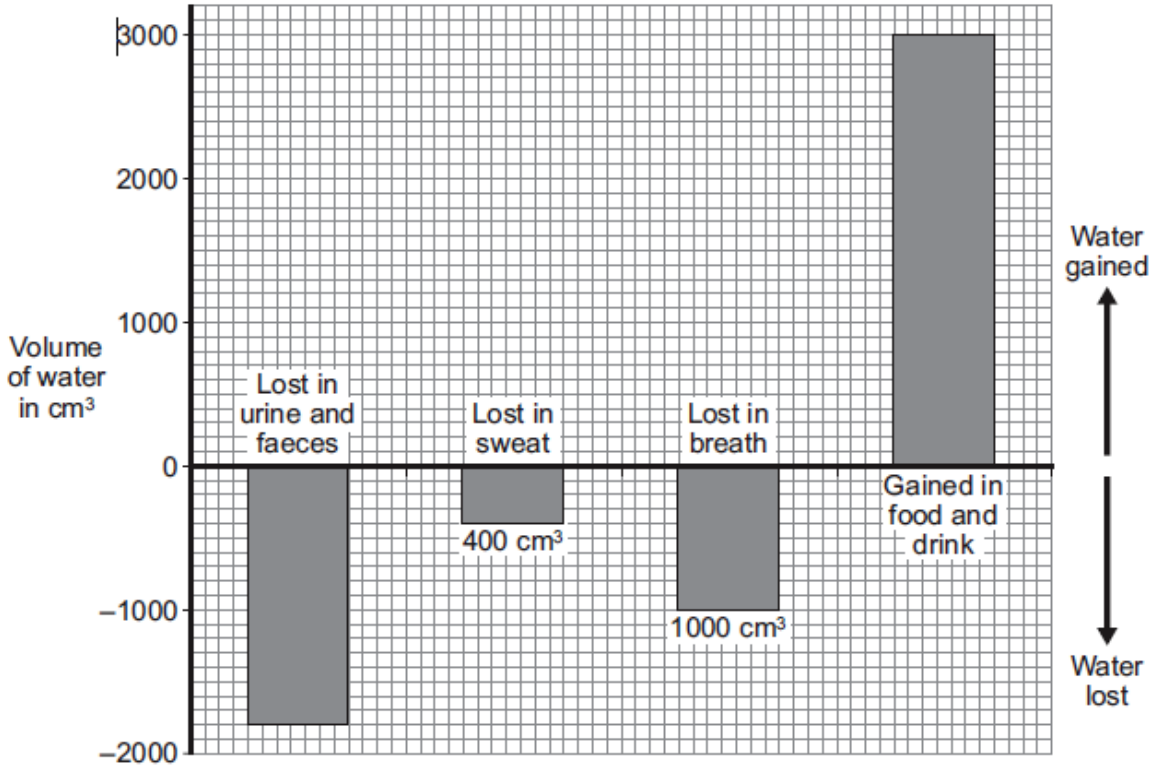
decreases **increases** **stays the same**

(1)

(Total 7 marks)

Q18. The bar chart shows different ways in which water is lost from and gained by the body on one day.

The volumes of water lost in the sweat and in the breath are labelled on the bars.



(a) How much water was lost in the urine and faeces? ..... cm^3

(1)

(b) Water is lost from the body in urine, faeces, sweat and breath.

What was the total volume of water lost from the body on this day?

Show clearly how you work out your answer.

.....

.....

Answer = ... cm^3

(2)

(c) The volume of water lost should balance the volume of water gained.

What should the person do to balance the water gained with the water lost?

.....

.....

.....

.....

(2)
(Total 5 marks)

Q19. Our bodies control the concentration of glucose in the blood.

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

(a) The concentration of glucose in the blood is controlled by a

hormone called

- carbohydrase.
- insulin.
- protease.

(1)

(b) This hormone is produced by the

- intestine.
- stomach.
- pancreas.

(1)

(c) If the body does not produce enough of this hormone,

the person develops

- diabetes.
- cystic fibrosis.
- Huntington's disease.

(1)
(Total 3 marks)

Q20. (a) Urine contains mineral ions, and other substances, dissolved in water.

What effect will each of the activities in **Table 1** have on the concentration of mineral ions in the urine?

Use words from the box to complete **Table 1**.

increase	**decrease**	**stay the same**

Table 1

Activity	**Concentration of mineral ions in urine**
Drinking a large bottle of water	
Eating salty foods such as potato crisps	

(2)

(b) A person with kidney disease may be treated by having a kidney transplant.

Table 2 shows the effect of a person's age on the success of a kidney transplant.

Table 2

	Age of patient	
	50-59 years	**Over 60 years**
Percentage of kidneys rejected	38	23
Percentage of kidneys which continued to work for at least 5 years	82	87
Percentage of patients who survived for at least 10 years	82	76

Some doctors think that people over 60 years of age should not be given transplants.

From the data in the table, do you agree with these doctors?

Draw a ring around your answer. **Yes / No**

Give **two** reasons for your answer.

1 .....

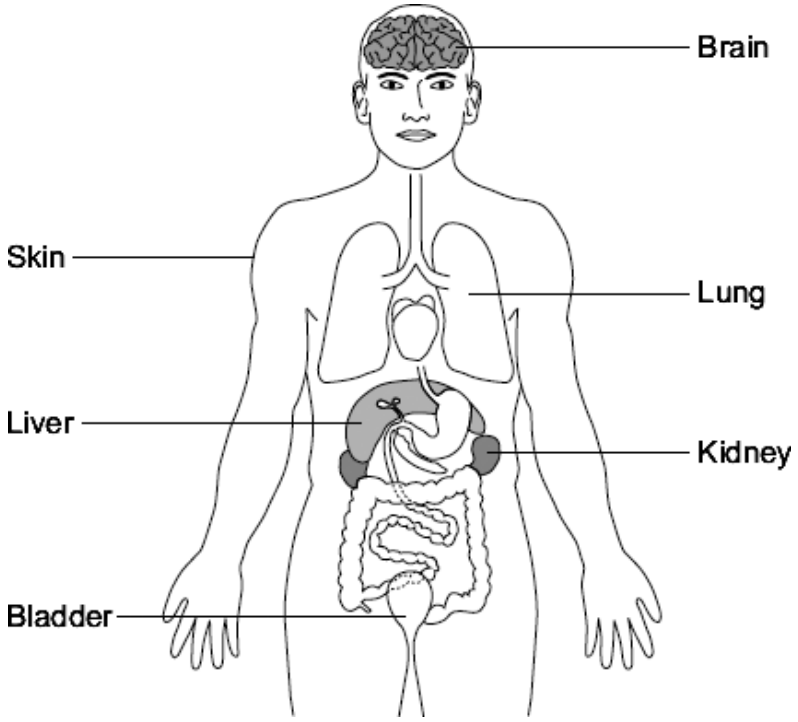
.....

2 .....

.....

(2)
(Total 4 marks)

Q21. (a) The diagram shows organs which help to control conditions inside the body.



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

(i) Carbon dioxide is removed from the body by the

kidney.
lung.
skin.

(1)

(ii) Urine is made in the

kidney.
lung.
skin.

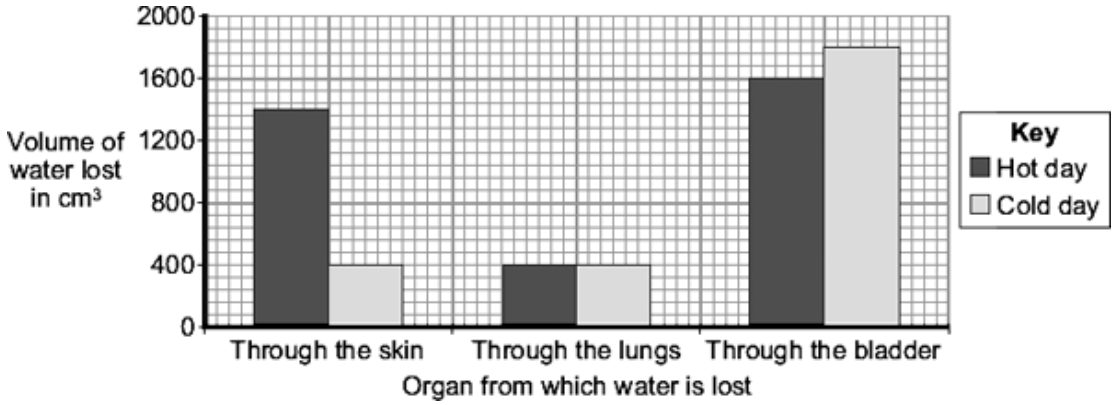
(1)

(iii) Urine is stored in the

bladder.
liver.
skin.

(1)

(b) The bar chart shows the volume of water lost from different organs of the body.
The information is shown for a hot day and for a cold day.



(i) Look at the bar chart.

How does the volume of water lost on the hot day compare with the volume of water lost on the cold day for each organ?

Complete the table using words from the box.

the same	**less**	**more**

Organ	**Volume of water lost on a hot day compared with volume of water lost on a cold day**
Skin	
Lungs	
Bladder	

(3)

(ii) In total, more water is lost on the hot day than on the cold day.

How does the increase in the volume of water lost on the hot day help to control the body temperature?

.....

.....

(1)
(Total 7 marks)

Q22. The kidneys produce urine.

The table shows the composition of a sample of urine from one person.

Substance	Percentage
Ions	2.5
Urea	2.6
Water	

(a) (i) Calculate the percentage of water in this sample of urine.

Show clearly how you work out your answer.

.....

.....

Percentage of water = ... %

(2)

(ii) The urine of a healthy person does **not** contain protein.

What is the reason for this?

Tick (✓) **one** box.

Protein molecules in the plasma cannot pass through the filter in the kidney. ☐

Protein molecules in the plasma can pass through the filter in the kidney and are then reabsorbed. ☐

There are no protein molecules in the plasma. ☐

(1)

(b) Dialysis can be used to treat a person with kidney disease.

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

(i) The dialysis machine contains membranes that are

fully permeable.

impermeable.

partially permeable.

(1)

(ii) At the end of a dialysis session, the concentration of substances in the blood would be

higher than
lower than
the same as

the concentration of substances in the dialysis fluid.

(1)

(c) For most patients, a kidney transplant is better than continued treatment by dialysis.

Kidney transplants have some disadvantages.

Give **one** disadvantage of a kidney transplant.

.....

.....

(1)

(Total 6 marks)

Q23. The volume of water the body needs depends on a number of factors.

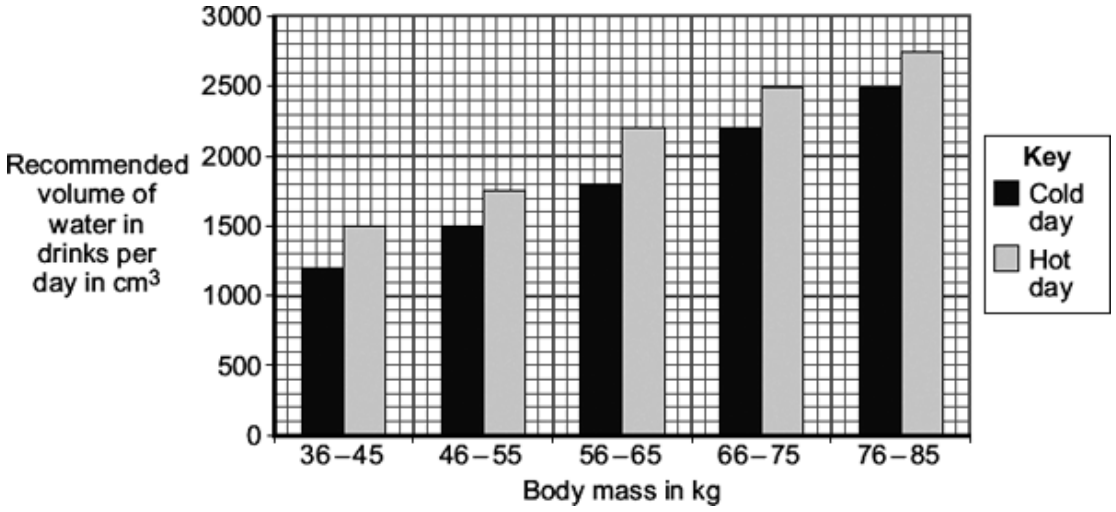
(a) Water enters the body in drinks.

Give **one** other way the body can get water.

.....

(1)

(b) The chart shows the recommended volume of water that women of different body masses should drink, on a cold day and on a hot day.



(i) Describe the relationship between body mass and the recommended volume of water that a woman should drink.

.....

.....

(1)

(ii) What is the recommended volume of water that a 70 kg woman should drink on a cold day?

..... cm^3

(1)

(iii) While following a diet, the 70 kg woman loses 10 kg of body mass.

Calculate how much less water she is recommended to drink on a cold day.

Use information from the chart.

Show clearly how you work out your answer.

.....

.....

.....

Answer = ... cm^3

(2)

(c) It is recommended that women should drink more water on a hot day than on a cold day.

Why?

.....

.....

.....

.....

(2)

(d) Excess water is lost from the body in urine.

Name the organ that produces urine.

.....

(1)
(Total 8 marks)

Q24. Doctors use dialysis to treat patients with kidney failure.

The table shows the sizes of molecules of some of the substances found in blood plasma.

Substance	**Size of molecule in arbitrary units**
Water	18
Sodium ion	23
Urea	60
Glucose	180
Albumin (a blood protein)	68 000

(a) Use information from the table to answer the questions.

(i) Albumin is a blood protein. Albumin is **not** removed from the blood during dialysis.

Explain why.

.....

.....

.....

.....

(2)

(ii) During a dialysis session, one patient's body mass decreased by 2 kilograms.

This decrease was mainly due to removal from the blood of one of the substances in the table.

Which substance was this? .....

(1)

(iii) The substance you named in part (a)(ii) was able to pass through the dialysis membrane.

Draw a ring around the correct answer to complete the sentence.

The substance passed through because the

membrane was

impermeable.
partially permeable.
surrounded by capillaries.

(1)

(b) For most patients, a kidney transplant is better than continued treatment using dialysis.

Kidney transplants have some disadvantages.

Give **two** disadvantages of kidney transplants.

1 .....

.....

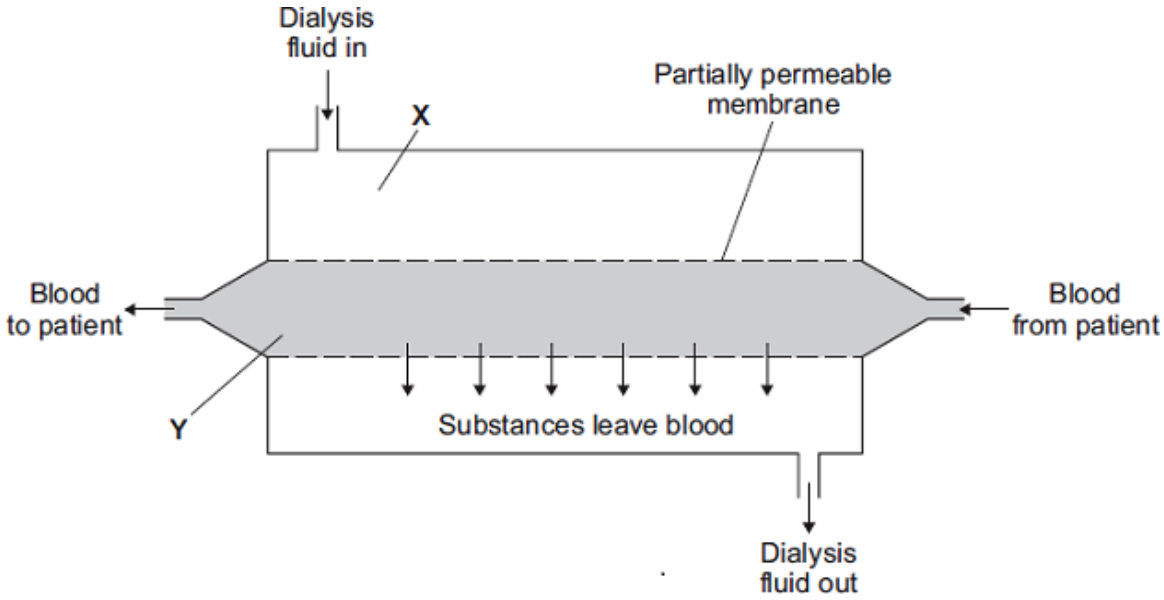
2 .....

.....

(2)
(Total 6 marks)

Q25. 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	51 000
	medical care in 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 patient 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)

Q26. 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**

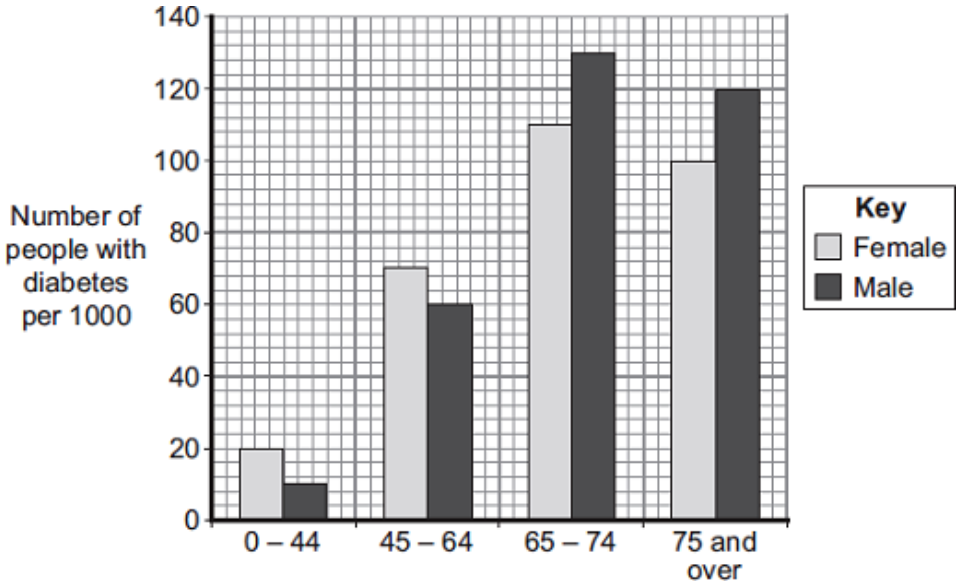
(1)

(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)

Q27. Type 1 diabetes develops when the body does not produce enough insulin.

(a) Which organ produces insulin?

.....

(1)

(b) One treatment for diabetes is to inject insulin.

The table gives the properties of four different types of insulin, **A**, **B**, **C** and **D**.

Type of insulin	Time taken for the insulin to begin to work in minutes	Time taken for insulin to reach maximum concentration in the blood in minutes	Time when insulin is no longer effective in hours
A	15-20	30-90	3-4
B	30-60	80-120	4-6
C	120-240	360-600	14-16
D	240-360	600-960	18-20

(i) Some people with diabetes need to inject insulin just before a meal to stop a big increase in blood sugar concentration.

Which type of insulin, **A**, **B**, **C** or **D**, should these people with diabetes inject just before a meal?

.....

Give the reason for your answer.

.....

.....

(2)

(ii) A person with diabetes is told to inject type **B** insulin immediately after breakfast at 09.00.
The person with diabetes is told to then inject a second type of insulin at lunchtime at 12.00.
The second type of insulin should keep the blood sugar level under control for the rest of the 24 hours.

Which type of insulin, **A**, **C** or **D**, should this person with diabetes inject at lunchtime?

.....

Give the reason for your answer.

.....

.....

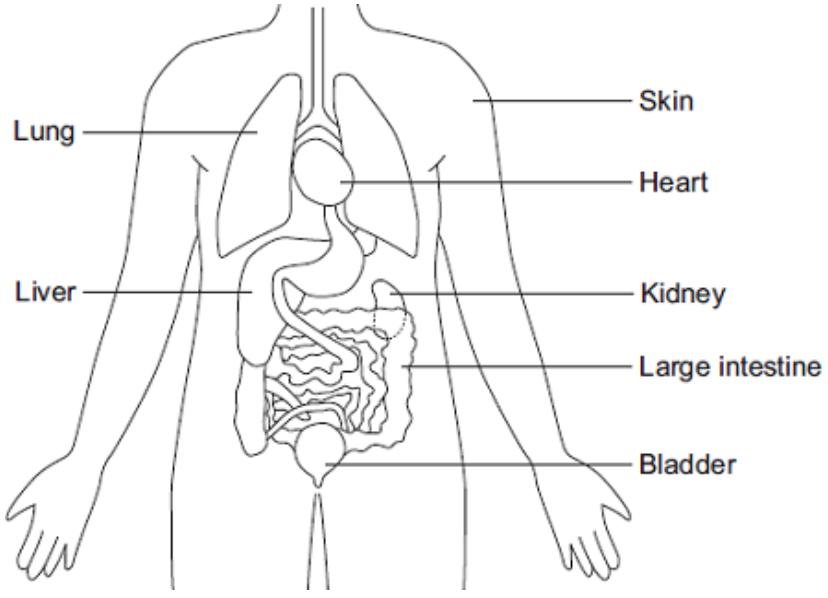
(2)

(iii) Apart from injecting insulin, give **one** other way in which Type 1 diabetes can be controlled.

.....

(1)
(Total 6 marks)

Q28. 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 .....

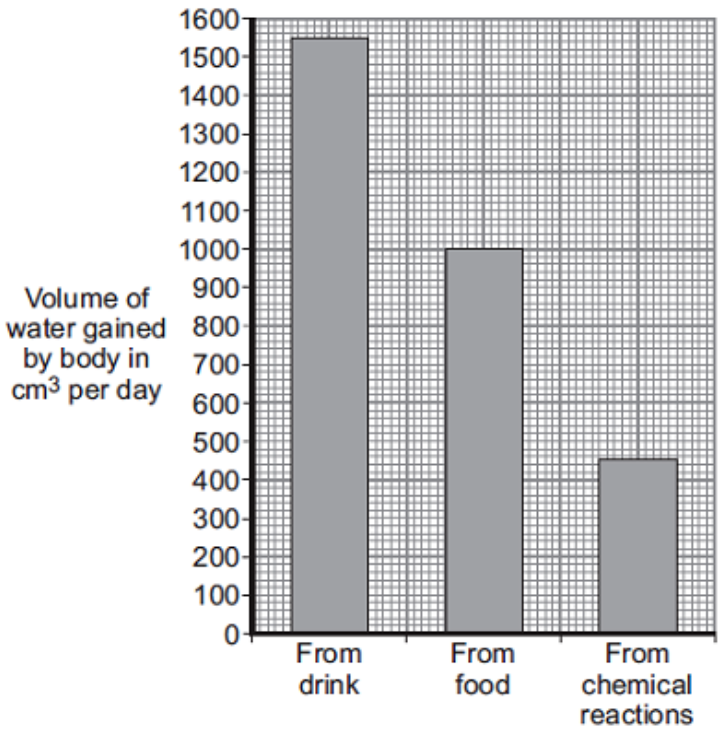
(1)

(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.

.....

.....

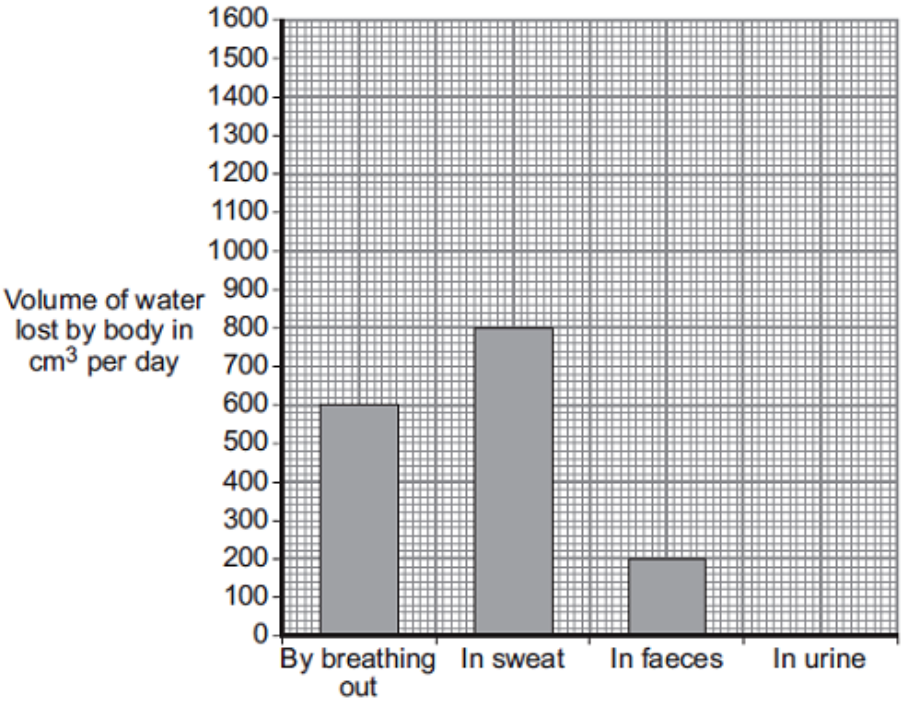
.....

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)