Kidneys 2

Q:1(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 marks)

(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 _____

_____

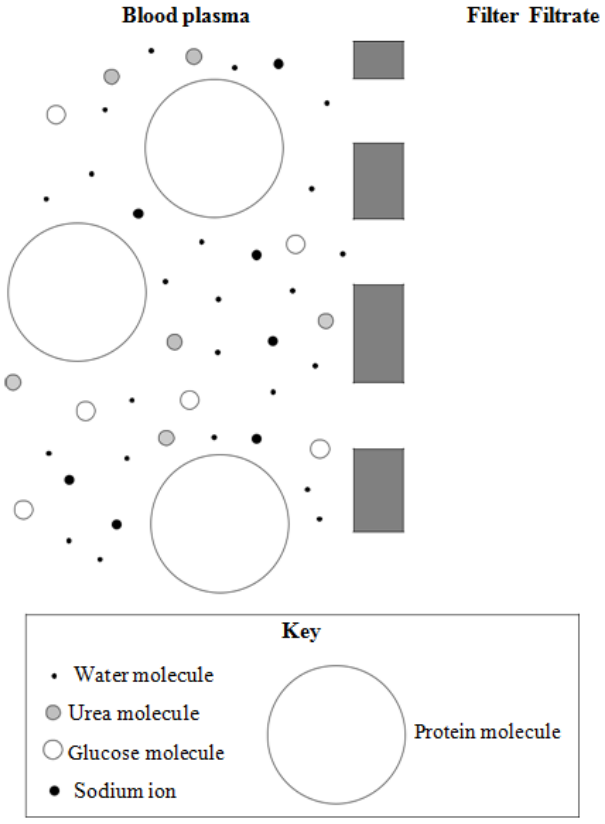
2 _____

_____

(2 marks)

Q:2 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 marks)

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

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

_____

_____

(1 mark)

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

After filtration, all the glucose is reabsorbed / released / respired .

(1 mark)

(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.

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

less
more
the same amount

of urine.

(1 mark)

(c)(ii) This is because he would produce

less
more
the same amount of

sweat.

(1 mark)

Q:3 **(a)** Which two of the following substances are found in the urine of a healthy person? Tick () two boxes.

Glucose ☐

Mineral ions ☐

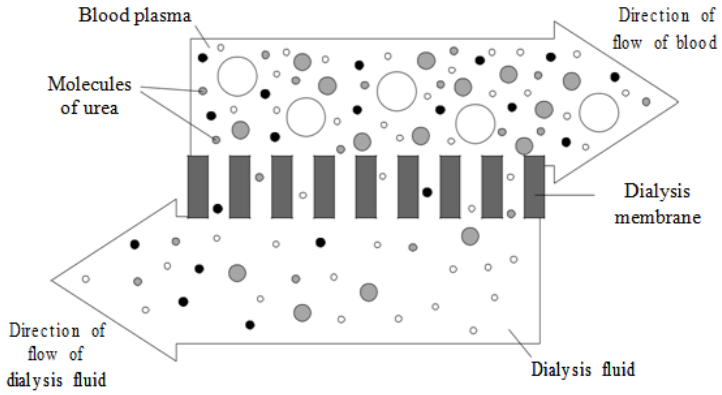
Proteins ☐

Water ☐

(2 marks)

(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.

(b)(i) During dialysis, | blood cells | urea | dialysis fluid | moves out of the blood plasma .

(1 mark)

(b)(ii) During dialysis, urea moves into the | blood cells | blood plasma | dialysis fluid | .

(1 mark)

(b)(iii) Urea moves by the process of | diffusion | digestion | transpiration | .

(1 mark)

(b)(iv) To allow the movement of urea, the dialysis membrane is | impermeable | partially permeable | thick | .

(1 mark)

(b)(v) The urea can pass through the membrane because the urea molecules are | large | round | small | .

(1 mark)

(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. ☐

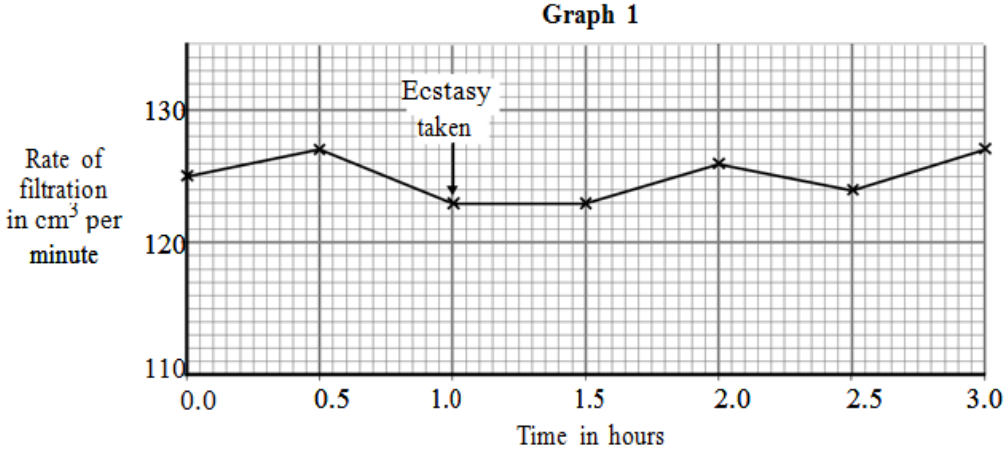
yearly costs are higher than for dialysis. ☐

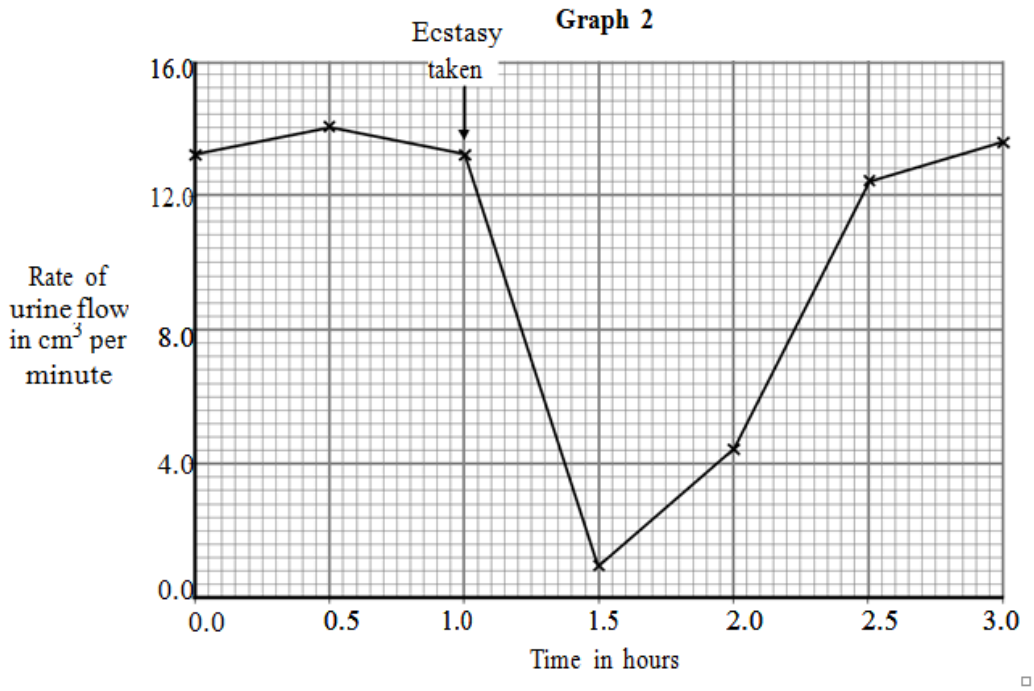
(1 mark)

Q:4 Taking the drug ecstasy affects the rate of urine flow from the kidneys.

Graph 1 shows the rate of filtration by the kidneys of a healthy person. Graph 2 shows the rate of urine flow from the kidneys of the same person.

One hour after the first measurement, the person took ecstasy.





(a) Describe the effect of taking ecstasy on

(a)(i) the rate of filtration

_____

_____

(1 mark)

(a)(ii) the rate of urine flow.

_____

_____

(1 mark)

(b) Use information from the graphs and your understanding of how the kidney works to answer the following questions.

(b)(i) Suggest an explanation for the change in the rate of urine flow after the person took ecstasy.

_____

_____

_____

_____

(2 marks)

(b)(ii) After a person has taken ecstasy, the concentration of ions in the blood changes.

Suggest an explanation for this.

_____

_____

_____

_____

(2 marks)

Q:5 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.

(a) (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 mark)

(a) (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 mark)

(a) (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 mark)

(a) (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 mark)

(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.

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

- more urine.
- less urine.
- the same amount of urine.

(1 mark)

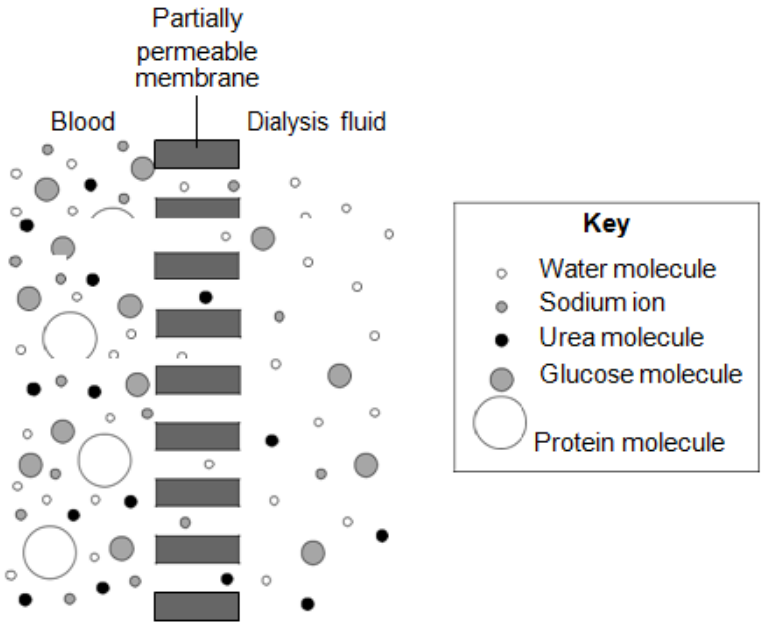
(b) (ii) On the hot day the athlete's urine will be

- more concentrated.
- less concentrated.
- the same concentration.

(1 mark)

Q:6 Dialysis can be used to treat a person with kidney disease.

The diagram shows blood and dialysis fluid separated by a partially permeable membrane.



Blood plasma and dialysis fluid contain several substances dissolved in water.

The table shows the concentrations of some of these substances in dialysis fluid and in the blood plasma of a person with kidney disease immediately before dialysis.

Substance	Concentration of substance in grams per dm^3	
	Blood plasma of person with kidney disease	Dialysis fluid
Sodium ions	3.26	3.15
Urea	0.45	0.00
Glucose	0.90	0.99
Protein	60.00	0.00

(a) Protein molecules are not able to move from the blood to the dialysis fluid.

Use information from the diagram to explain why.

_____

_____

(1 mark)

(b) Urea molecules move from the blood into the dialysis fluid.

(b) (i) Give the name of this type of movement. _____ **(1 mark)**

(b) (ii) Why do the urea molecules move in this direction?

Use information from the table to help you to answer this question.

_____

_____

(1 mark

(c) The concentration of sodium ions in the blood plasma will change during dialysis.

Suggest a value for the concentration of sodium ions in the plasma at the end of dialysis.

Use information from the table.

Concentration of sodium ions = ... grams per dm3 **(1 mark)**

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

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

1 _____

_____

2 _____

_____

(2 marks)

(d) (ii) Give two possible disadvantages of having a kidney transplant.

1 _____

_____

2 _____

_____

(2 marks)

TOTAL MARKS=38