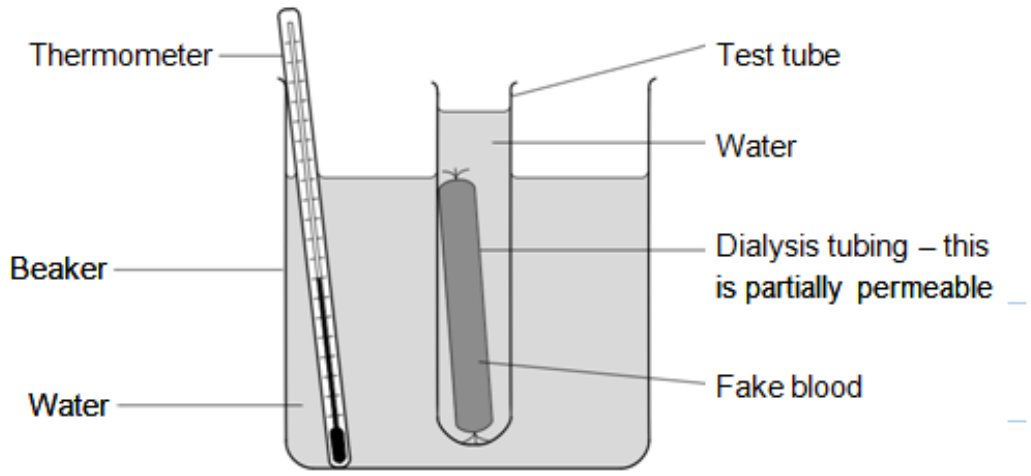
Kidney 3

Q:1 A person's kidneys stop working. The person may be treated using a dialysis machine. Some students made a model of a dialysis machine.

Figure 8 shows the students' model.

Figure 8

Figure 8



The fake blood contained:

water

sodium ions

urea

glucose

protein.

(a) (i) Suggest why the students kept the water in the beaker at 37 °C.

_____

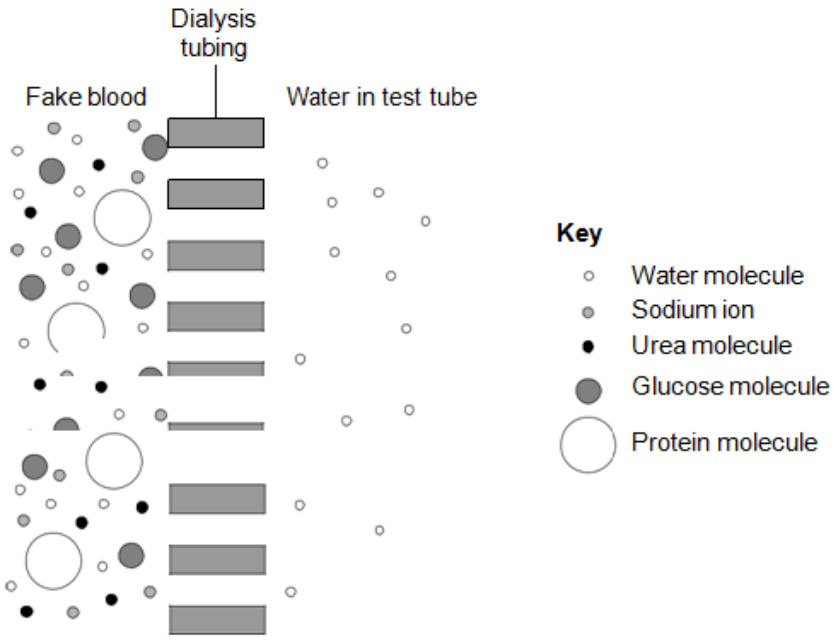
_____

[1 mark]

(a)(ii) The dialysis tubing separates the fake blood from the water in the test tube. Figure 9 shows the fake blood, the dialysis tubing and the water in the test tube.

Figure 9

Figure 9



After 1 hour, the students tested the water in the test tube to see which substances had filtered through from the fake blood.

Name one substance that the students would find in the water in the test tube after 1 hour.

_____

[1 mark]

(a)(iii) Give a reason for your answer to part (a)(ii).

_____

_____

_____

[1 mark]

(a) (iv) In hospitals, dialysis machines use dialysis fluid, not pure water.

Dialysis fluid contains the same concentration of useful substances as the blood.

Which substance is at the same concentration in dialysis fluid as in blood?

Tick (☒) one box.

Glucose ☐

Insulin ☐

Oxygen ☐

[1 mark]

(b) When the kidneys stop working, the person can be treated by a continuous process called CPD.

In CPD:

☒ dialysis fluid is put into the abdomen

☒ the fluid is changed four times a day at home

☒ changing the fluid takes about 45 minutes.

Suggest two advantages of having CPD instead of treatment on a dialysis machine.

1 _____

_____

2 _____

_____

[2 marks]

Q:2(a) Humans need to remove waste products from their bodies. Which organ removes waste carbon dioxide from the body?

Tick (☒) one box.

Liver ☐

Lung ☐

Skin ☐

[1 mark]

(b) Kidneys make urine. Urine is stored in the bladder.

Which one of the following stages is involved in making urine in a healthy kidney?

Tick (✓) one box.

Filtering the blood ☐

Reabsorbing all of the ions ☐

Reabsorbing all of the water ☐

[1 mark]

(c) A healthy kidney keeps the correct amount of water in the blood.

If there is too much water in the blood, what might happen to the blood cells?

Tick (✓) one box.

They will take in water and burst. ☐

There will be no change. ☐

They will lose water and shrink. ☐

[1 mark]

(d) A child has kidney failure.

A doctor recommends dialysis to treat the kidney failure.

Before dialysis starts, the doctor measures the concentration of glucose and of urea in the child's blood.

The concentration of glucose in the dialysis fluid is 6 mmol per dm3.

The results are shown in Table 1.

Table 1

	Concentration in the blood before dialysis starts in mmol per dm^3
Glucose	6
Urea	28

(d) (i) Suggest what the concentration of glucose in the blood will be after the dialysis treatment.

Draw a ring around the correct answer.

less than 6 6 more than 6

[1 mark]

(d) (ii) Suggest what the concentration of urea in the blood will be after the dialysis treatment.

Draw a ring around the correct answer.

Less than 28 28 more than 28

[1 mark]

(d) (iii) Give a reason for your answer to part (d)(ii).

_____

_____

[1 mark]

(e) (i) Some patients have kidney transplants. Transplanted kidneys may be rejected by the body.

Use the correct answer from the box to complete the sentence.

antibodies	hormones	tissues

Transplanted kidneys have proteins on the surface of the cells. These proteins may be attacked by the patient's

_____

(1 mark)

(e) (ii) It is important to prevent rejection of a new kidney.

Which one of the following helps to prevent the kidney from being rejected?

Tick (☒) one box.

Giving the patient antibodies ☐

Giving the patient painkillers ☐

Tissue typing the donor kidney ☐ **[1 mark]**

Q:2 It is important to remove waste products from our bodies.

Healthy kidneys help to keep our internal environment constant.

(a) Describe how a healthy kidney produces urine.

[5 marks]

(b) A child has kidney failure and is treated with dialysis.

Before the dialysis starts, the doctor measures the concentration of urea and glucose in the child's blood.

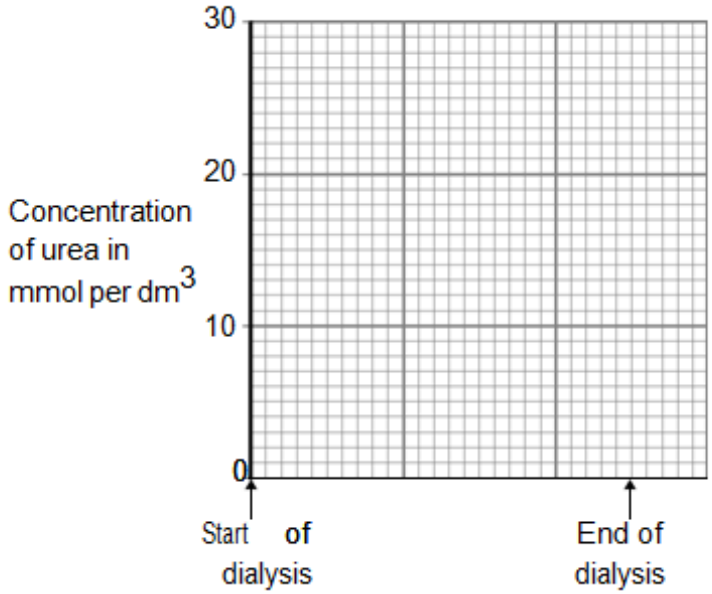
Table 3 shows the results.

	Concentration in the blood before dialysis starts in mmol per dm^3
Urea	28
Glucose	6

The child has a normal blood glucose concentration.

(b) (i) Sketch a graph on Figure 7 to suggest what will happen to the concentration of urea in the blood during dialysis.

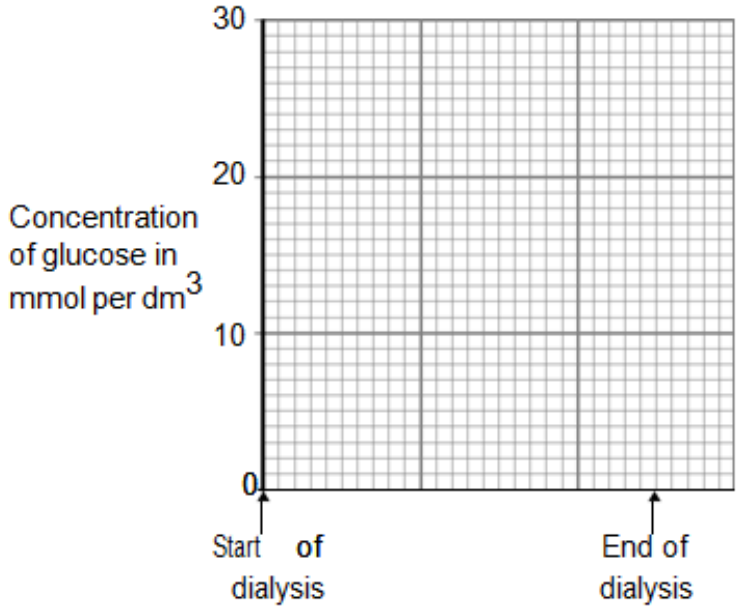
Figure 7



[1 mark]

(b) (ii) Sketch a graph on Figure 8 to suggest what will happen to the concentration of glucose in the blood during dialysis.

Figure 8



[1 mark]

(c) (i) Another way of treating kidney failure is with a kidney transplant.

A transplanted kidney can be rejected.

Explain why the new kidney may be rejected.

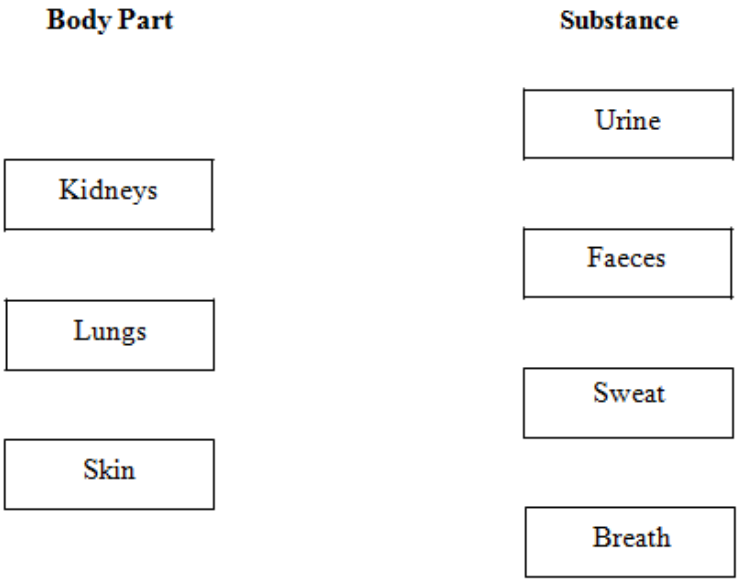
[3 marks]

(c) (ii) Describe one way in which doctors try to prevent kidney rejection.

[1 mark]

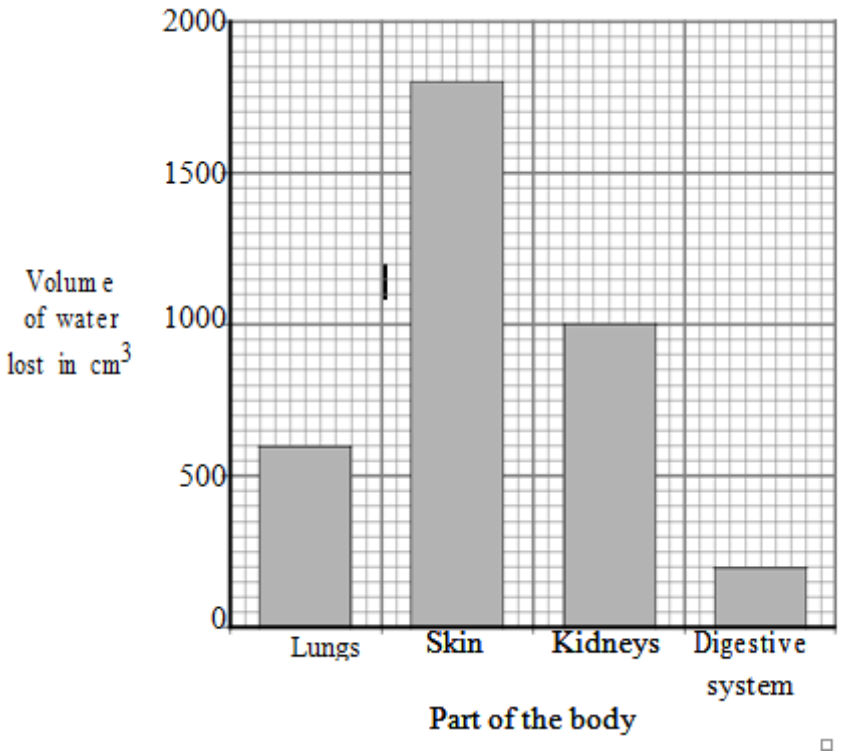
Q:3 Water is lost from several parts of the body.

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



(3 marks)

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



(b) (i) What volume of water was lost through the skin on the warm day? Tick (✓) one box.

600 cm3 ☐

1600 cm3 ☐

1800 cm3 ☐

(1 mark)

(b) (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 mark)

(b)(iii) Give a reason for your answer.

_____

_____

(1 mark)

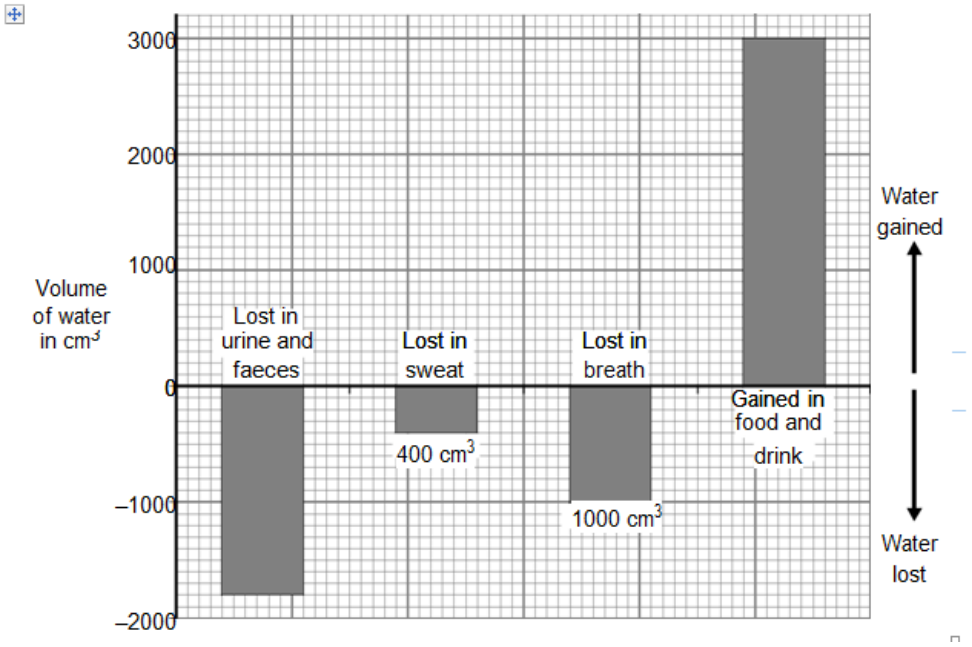
(c) What effect does cold weather generally have on the amount of urine produced? Draw a ring around your answer.

decreases increases stays the same

(1 mark)

Q:4 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? _____ cm3

(1 mark)

(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 = _____ cm3 **(2 marks)**

(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 marks)

TOTAL MARKS=37