1 The human kidney removes urea from the blood.

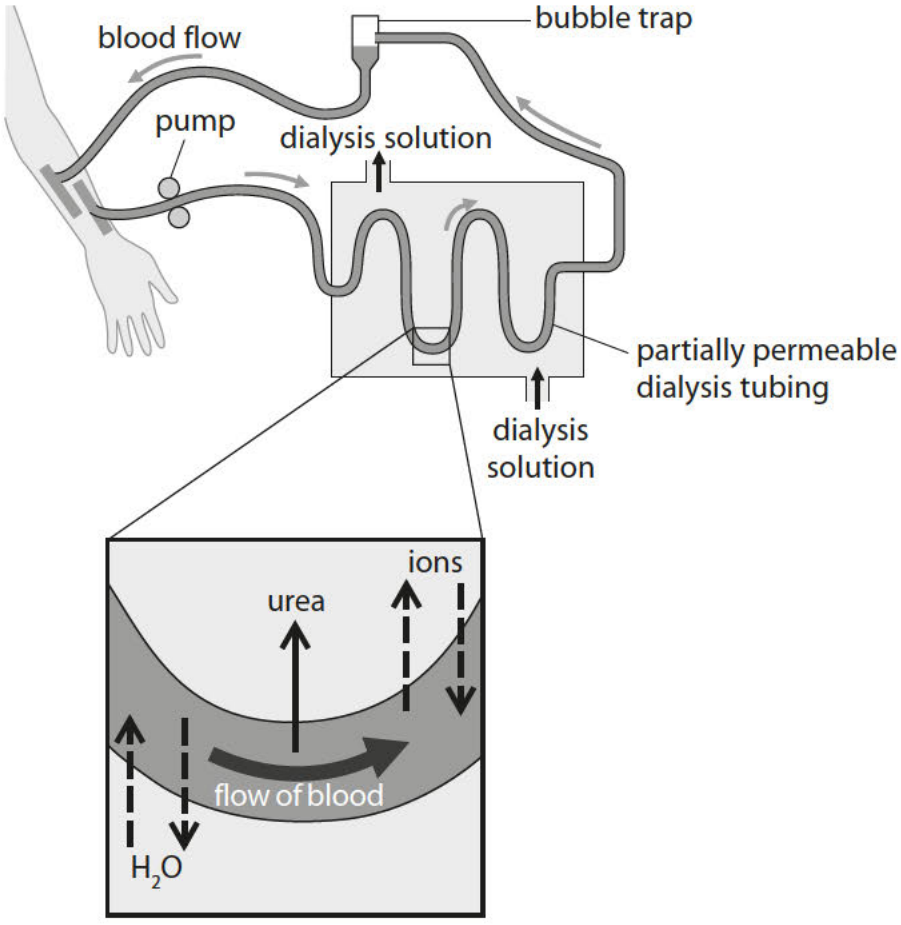
(a) Name **two** other substances the kidney removes from the blood.

(2)

1 .....

2 .....

(b) The diagram shows a simple kidney machine that uses dialysis to remove urea from the blood.



Dialysis allows small molecules to be removed from the blood. This is done by passing the dialysis solution over the tube containing the blood. The small molecules move from a region of high concentration to a region of low concentration.

(i) Give one way in which dialysis is similar to diffusion.

(1)

(ii) Give one way in which dialysis is similar to osmosis.

(1)

(iii) Describe how the kidney machine removes urea from the blood.

(2)

(iv) Another function of the kidney machine is to maintain normal blood glucose concentration.

Suggest how the concentration of glucose in the dialysis solution helps to maintain a normal glucose concentration in the blood.

(2)

(v) Describe **two** processes that take place in the kidney but not in the kidney machine.

(4)

1 .....

.....

.....

.....

2 .....

.....

.....

.....

(c) Kidney failure can be treated by transplanting a healthy donor kidney into the patient.

(i) The procedure involves connecting two blood vessels and a tube to the transplanted kidney.

Name the two blood vessels and the tube.

(2)

blood vessel .....

blood vessel .....

tube .....

(ii) Suggest why the transplanted kidney is placed in the lower abdomen instead of in the kidney's usual location.

(2)

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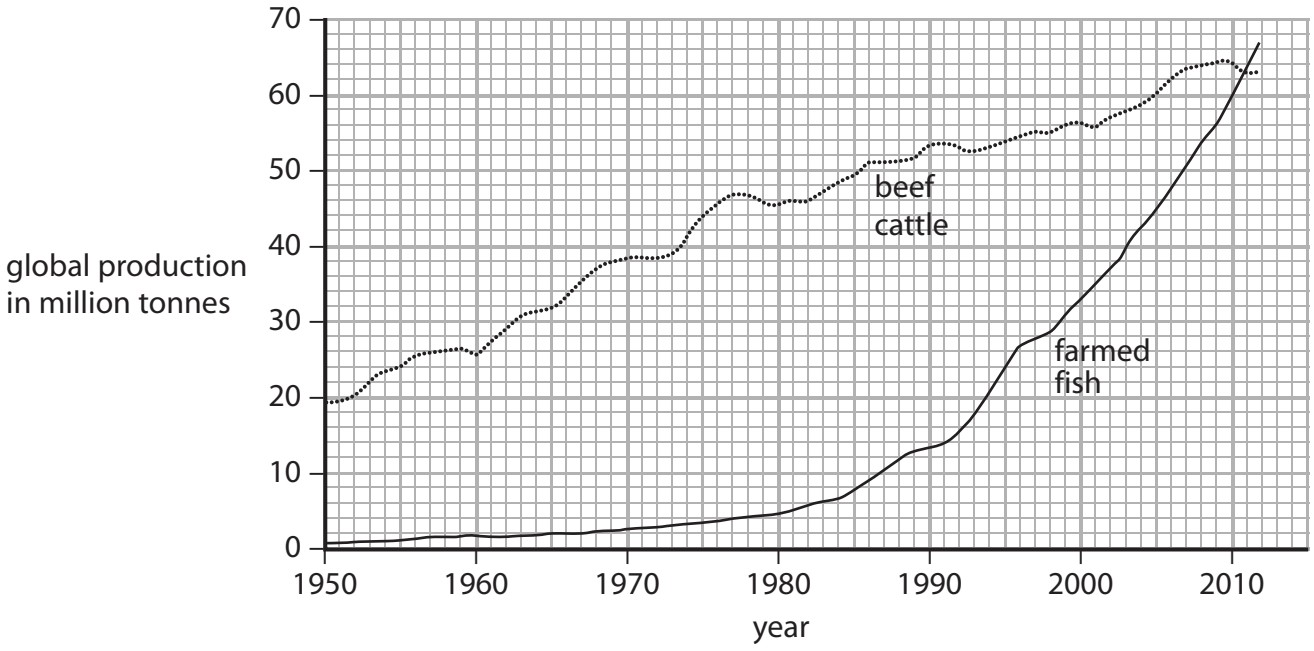
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(Total for Question = 16 marks)

2 Fish and beef cattle are farmed to provide a source of protein for humans.

The graph shows changes in the global production of farmed fish and beef cattle since 1950.



(a) (i) Describe the changes in the global production of farmed fish and beef cattle since 1950.

(3)

(ii) By 2020, the production of farmed fish is expected to be six times greater than in 1990. Calculate the mass of farmed fish expected to be produced in 2020. Show your working.

(2)

mass of farmed fish = ... million tonnes

(b) Describe what happens to fish protein in the human stomach.

(4)

(c) Many molecules in the human body are made from protein.

The table lists some protein molecules, the function of each molecule and the place where each molecule is made.

Complete the table by giving the missing information.

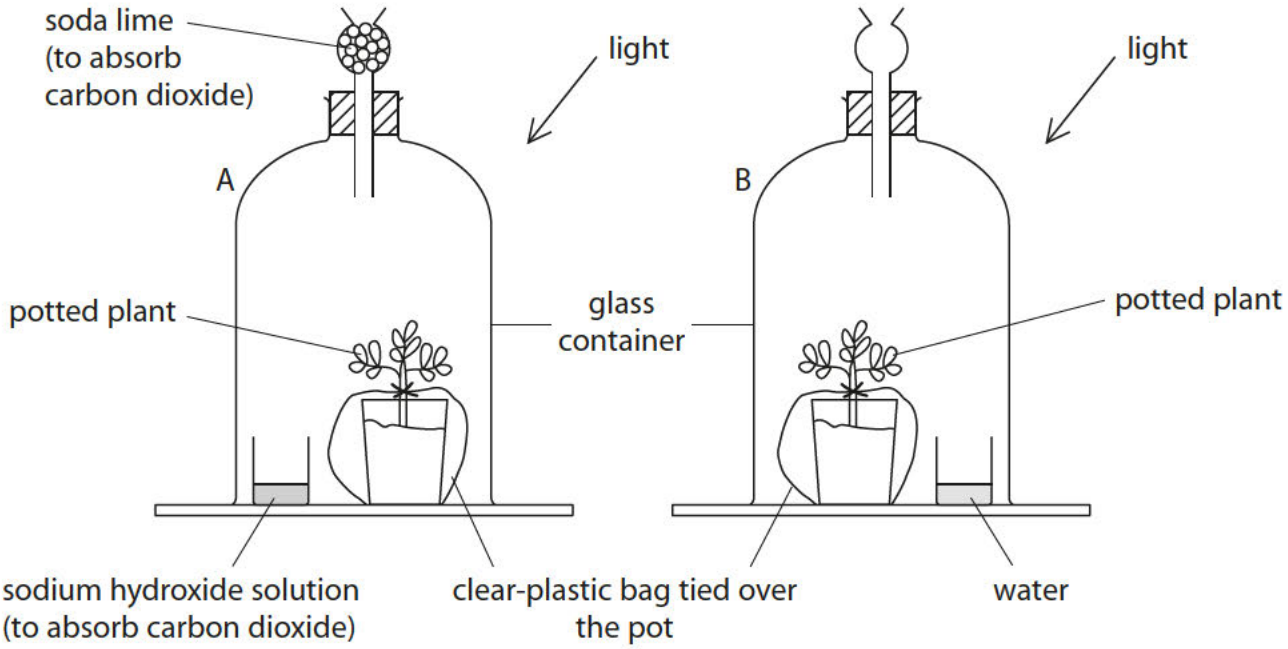
(6)

Protein molecule	Function of protein molecule	Place where protein molecule is made
haemoglobin		red blood cells
	digest starch	salivary gland
insulin		
	binds to antigens on pathogens	

(Total for Question = 15 marks)

3 An experiment is set up to find out if carbon dioxide is needed by plants for photosynthesis. Two plants were destarched and then put in glass containers A and B as shown in the diagram.

After two days in the containers the plant leaves are tested for starch.



(a) (i) Suggest why the pots were covered with clear-plastic bags.

(2)

.....

.....

.....

.....

(ii) What is the purpose of container B?

(1)

.....

(iii) The plant species and the time were kept the same in the experiment.

Suggest two other variables that should be kept the same for the experiment to be valid.

(2)

1 .....

2 .....

(b) The table describes the stages used to test the leaves for starch. It also gives the reason for each stage.

(i) Complete the table by describing stage 2 and giving the reason for stage 4.

(2)

Stage	Reason
1. boil leaf in w er	make cell membranes permeable and prevent any starch digestion
2.	remove chlorophyll
3. dip leaf in w er	hydrate leaf for iodine diffusion
4. add iodine solution o leaf	....

(ii) Explain how stage 1 will prevent any starch digestion.

(1)

.....

.....

(iii) What is meant by the term **diffusion** mentioned in stage 3?

(1)

.....

.....

(iv) Describe the colour of the leaves you would expect after a starch test on

(2)

a leaf from container A.....

.....

a leaf from container B.....

.....

(Total for Question = 11 marks)