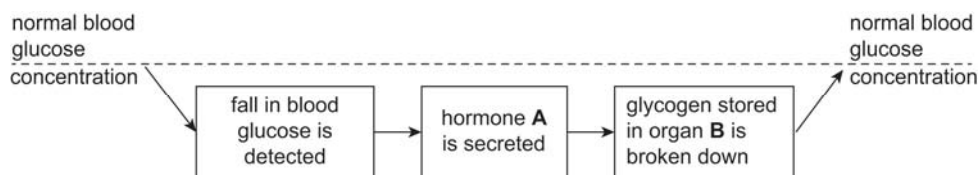


1 The diagram shows some of the events which maintain blood glucose concentration in a mammal.



- a Name:  
 i hormone **A**  
 ii organ **B**.

.....  
 ..... (2 marks)

b Explain why the events shown in the diagram can be described as an example of negative feedback.

..... (1 mark)

c The structure of a glycogen molecule is related to its function in maintaining blood glucose concentration. Explain how.

.....  
 ..... (2 marks)

*AQA Biology, 2004, Unit 6 (Question 2)*

2 One of the functions of the kidney is osmoregulation.

a Explain what is meant by the term osmoregulation.

..... (1 mark)

b The table below shows the composition of some fluids from the body of a healthy adult at rest.

Fluid	Concentration as a percentage of total volume		
	Protein	Glucose	Urea
Blood plasma	8.1	0.1	0.3
Ultrafiltrate at the end of the proximal convoluted tubule			0.03
Urine			1.9

Complete the table to show the values that you would expect for protein and glucose.

(2 marks)

- c i** Give the region of the nephron which is responsible for establishing a gradient of ions across the medulla.

..... (1 mark)

- ii** This gradient of ions leads to the production of concentrated urine. Explain how.

.....  
 .....  
 ..... (3 marks)

- 3** Students carried out an investigation into the functioning of the human kidney. Each student emptied their bladder and recorded the volume of urine, then immediately drank a litre of de-ionised water.

They collected urine samples at 30-minute intervals over a period of 2 hours. The volume of urine was measured and the chloride ion concentration determined by titration.

The data obtained from one of the students is shown in the table below.

Time/minutes	Volume of urine/cm <sup>3</sup>	Chloride ion concentration/g 100 cm <sup>-3</sup>
0	53	1.3
30	81	0.91
60	246	0.61
90	182	0.56
120	56	1.23

- a** Calculate the percentage increase in volume of urine in the first 60 minutes. Show your working.

.....  
 ..... (2 marks)

- b i** Use your knowledge and the information shown in the table to explain the change in volume of urine over the period of the investigation.

.....  
 .....  
 ..... (3 marks)

- ii** Explain why the concentration of salt in the urine changed between 0 and 60 minutes.

..... (1 mark)

**4** When insulin binds to receptors on liver cells, it leads to the formation of glycogen from glucose. This lowers the concentration of glucose in liver cells.

- a** Explain how the formation of glycogen in liver cells leads to a lowering of blood glucose concentration.

.....  
 ..... (2 marks)

People with type II diabetes have cells with low sensitivity to insulin. About 80% of people with type II diabetes are overweight or obese. Some people who are obese have gastric bypass surgery (GBS) to help them to lose weight.

Doctors investigated whether GBS affected sensitivity to insulin. They measured patients' sensitivity to insulin before and after GBS. About half of the patients had type II diabetes. The other half did not, but were considered at high risk of developing the condition.

The table shows the doctors' results. The higher the number, the greater the sensitivity to insulin.

Patients	Mean sensitivity to insulin/ arbitrary units (± standard deviation)	
	Before gastric bypass surgery	1 month after gastric bypass surgery
Did not have diabetes	0.55 (±0.32)	1.30 (±0.88)
Had type II diabetes	0.40 (±0.24)	1.10 (±0.87)

- b The doctors concluded that many of the patients who did not have type II diabetes were at high risk of developing the condition.

Use the data in the table to suggest why they reached this conclusion.

.....  
..... (2 marks)

- c The doctors also concluded that GBS cured many patients' diabetes but that some were not helped very much.

Do these data support this conclusion? Give reasons for your answer.

.....  
.....  
..... (3 marks)

AQA Biology, 2014, Unit 5 (Question 4)

- 5 a The control of water balance in the body involves negative feedback.

- i Describe what is meant by negative feedback.

..... (1 mark)

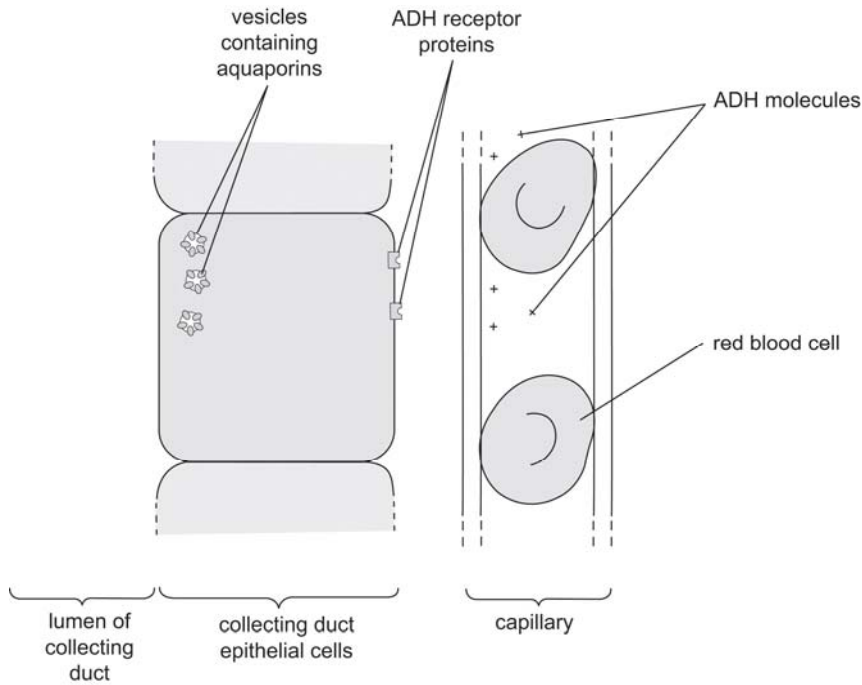
- ii Water is removed from the body via the kidneys. Give **two** other ways in which water is removed from the body.

.....  
..... (2 marks)

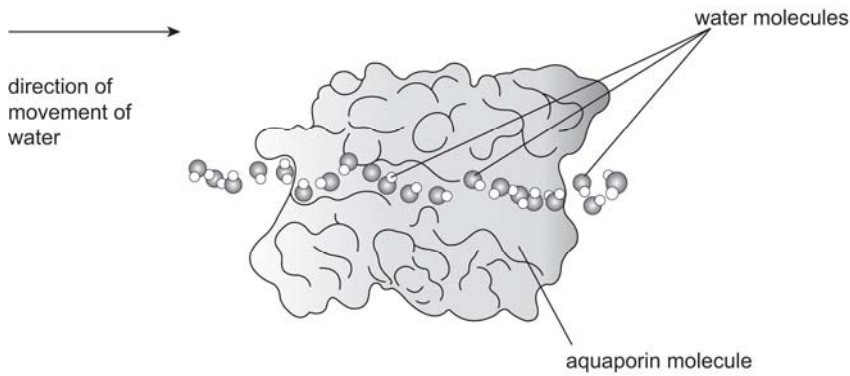
- iii Name the part of the brain which acts as the coordinator in the control of water balance.

..... (1 mark)

- b** Figure 1 shows the cells lining the collecting duct in a human kidney. ADH molecules bind to the receptor proteins and this triggers the vesicles containing aquaporins to bind with the plasma membrane next to the lumen. Figure 2 shows an aquaporin, which is a large channel protein.



**Figure 1**



**Figure 2**

- i** From which gland is ADH released?

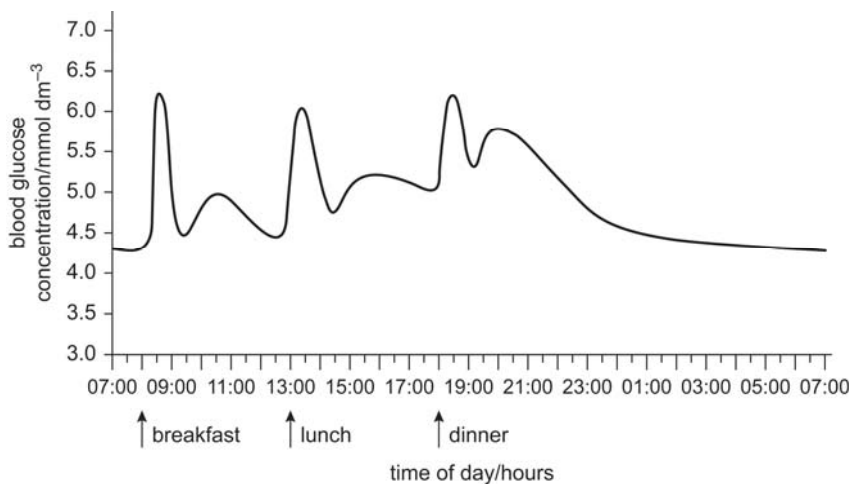
..... (1 mark)

- ii Use the information given to explain how ADH increases the movement of water from the lumen of the collecting duct into the blood.

.....  
 .....  
 .....  
 ..... (4 marks)

*AQA Biology, 2005, Unit 6 (Question 8)*

- 6 A healthy adult male underwent an investigation to monitor his blood glucose levels over 24 hours. The graph below shows the results of the investigation.



The man ate three carbohydrate-rich meals at the times shown below the x-axis.

- a i Write the letter **X** on the graph to show **one** time when the insulin concentration in the blood would be highest.

..... (1 mark)

- ii Explain why you chose this time.

..... (1 mark)

- iii The graph shows blood glucose concentrations in a healthy, non-diabetic adult. Describe **two** ways in which a similar graph, drawn for a diabetic adult, would differ.

.....  
 ..... (2 marks)

**b** A man had a total of 20 g of glucose dissolved in his blood and body fluids.  
The man's rate of energy use at rest was 480 kJ per hour.  
The breakdown of 1 g of glucose releases 16 kJ of energy.

**i** How long would the 20 g of glucose in the man's blood and body fluids last at rest?

Assume that all the man's energy was supplied by the breakdown of glucose.

Give your answer in minutes.

Show your working.

.....

..... (2 marks)

**ii** The time between one meal and the next is greater than the time you calculated in part **bi**.

Extra glucose can be made available during this time to supply the body's needs.

Explain how.

.....

.....

..... (3 marks)

*AQA Biology, 2013, Unit 4 (Question 9)*