AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



EXAM QUESTION PACK

4.5.1 HOMEOSTASIS (PACK 2)

SCORE	PERCENTAGE
/278	%

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Q1.

(a) Use words from the box to complete the sentences about controlling conditions in our bodies.

kidneys	liver	lungs	skin

(i) When we breathe out, water leaves the _____

(1)

(ii) When we sweat, water leaves the body through the _____

(1)

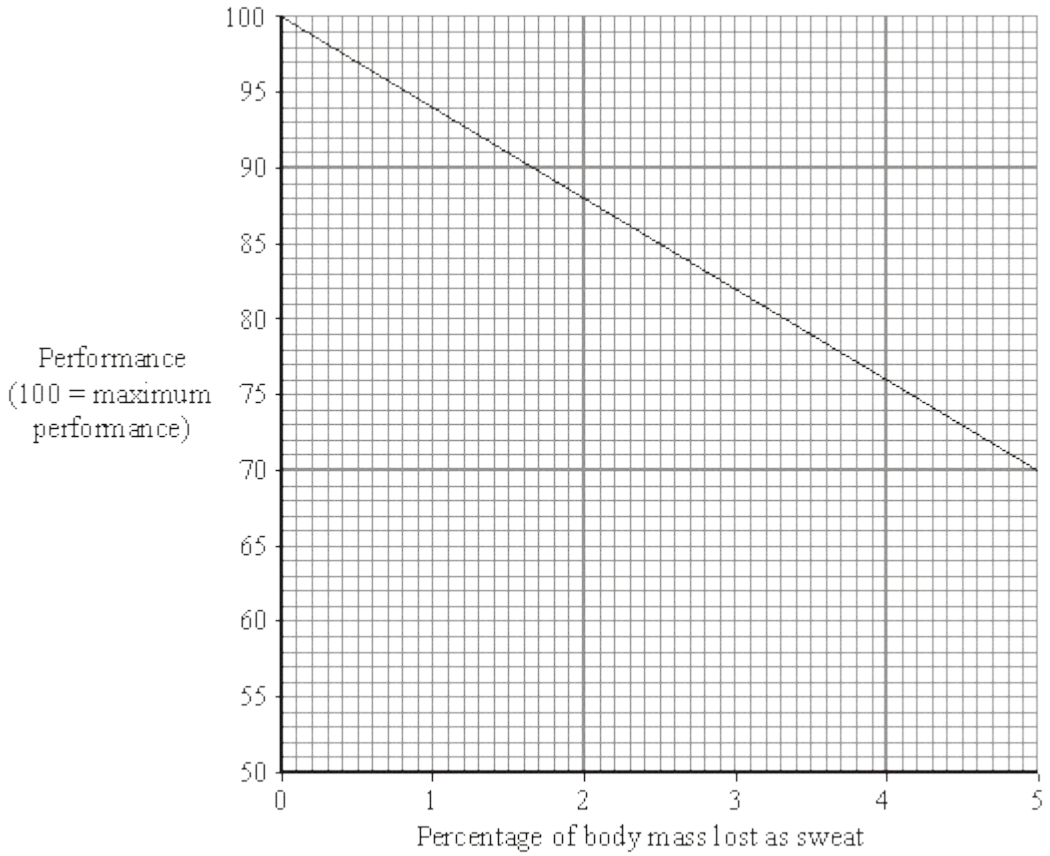
(iii) Excess water leaves the body in a liquid called urine.

Urine is produced by the _____

(1)

(b) We lose a lot of sweat during exercise. When this happens, we cannot perform as well as we could at the start of the exercise.

The graph shows the effect of losing sweat on the performance of an athlete.



(i) Describe the effect of losing sweat on performance.

_____

_____

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(1)

(ii) How can athletes reduce this effect on performance?

_____

_____

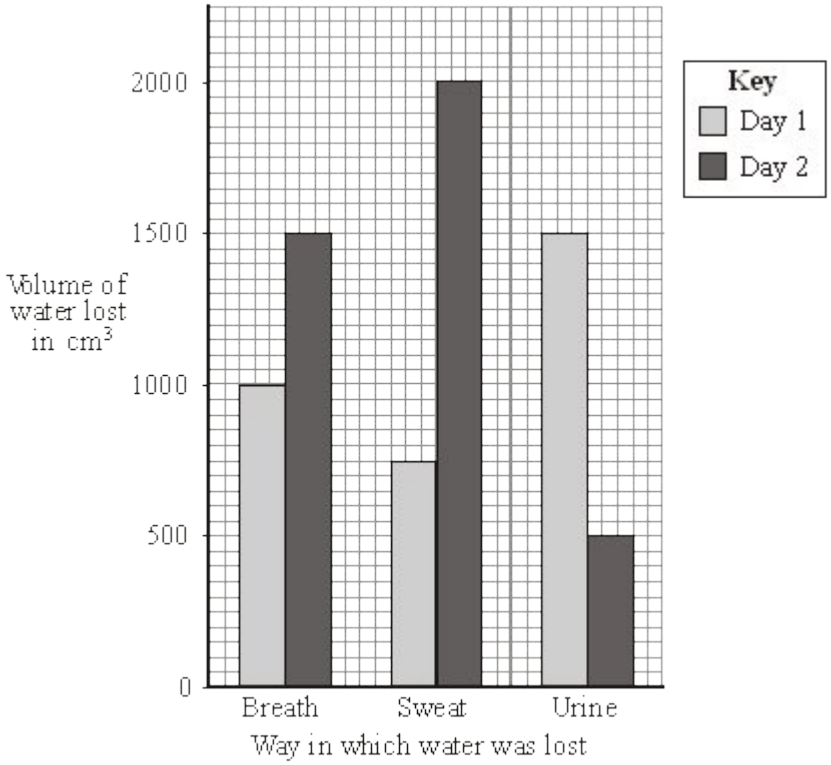
(1)

(Total 5 marks)

Q2.

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.

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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)

Q3.

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The pancreas is involved in digestion and controlling the internal conditions of the body.

(a) Name **two** digestive enzymes produced by the pancreas.

1. _____

2. _____

(2)

(b) Diabetes may be caused by a lack of insulin.

Part of the treatment for someone with diabetes is to pay careful attention to the diet.

(i) Give **one** symptom of diabetes.

_____

_____

(1)

(ii) Give **one** way in which a diabetic may be advised to change their diet.

_____

_____

(1)

(iii) How does this change in diet help the diabetic?

_____

_____

(1)

(iv) State **one** other way in which the symptoms of diabetes may be treated.

_____

(1)

(c) Many of the cells in the pancreas contain large numbers of ribosomes.

What is the function of ribosomes in a cell?

_____

_____

(1)

(Total 7 marks)

Q4.

The brain and the skin are involved in monitoring and controlling body temperature.

(a) Describe the parts played by the brain and the skin in monitoring body temperature.

(i) The brain

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_____

_____

_____

_____

(2)

(ii) The skin

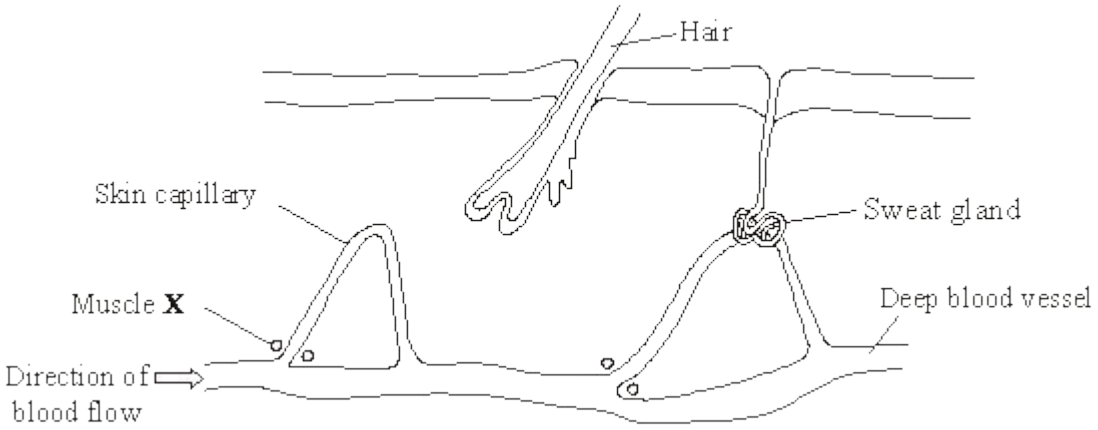
_____

_____

(1)

(b) The diagram shows a section through part of the skin.

The muscle labelled **X** controls the flow of blood into the skin capillary. When muscle **X** contracts, the flow of blood into the skin capillary is reduced.



Explain the role of muscle **X** in the control of body temperature.

_____

_____

_____

_____

_____

_____

_____

(3)

(Total 6 marks)

Q5.

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

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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.

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_____

_____

(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.

(a) Why is glucose found in the blood but not in the urine? Use your knowledge of how the kidney works to explain your answer as fully as you can.

_____

_____

_____

_____

_____

_____

(3)

(b) The table shows the concentrations of dissolved substances in the urine of a healthy person and the urine of a person with one type of kidney disease.

	Concentration in grams per dm^3

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Substance	Urine of healthy person	Urine of person with kidney disease
Protein	0	6
Glucose	0	0
Amino acids	0	0
Urea	21	21
Mineral ions	19	19

(i) Suggest an explanation for the difference in composition of the urine between the healthy person and the person with the kidney disease.

_____

_____

_____

_____

(2)

(ii) The person with the kidney disease could be treated either by using a dialysis machine or by having a kidney transplant operation.

What are the advantages and disadvantages of having a kidney transplant operation rather than dialysis?

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 9 marks)

Q7.

The volume of water that the body loses must balance the volume of water that it gains.

Tables 1 and **2** show losses and gains of water by the body in one day.

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Table 1
Losses of water by the body

Method	Volume in cm^3
breathing	300
sweating	600
faeces	
urine	100
Total	**2400**

Table 2
Gains of water by the body

Method	Volume in cm^3
drinking	1300
food	800
chemical reactions	300
Total	**2400**

(a) (i) Calculate the volume of urine lost by the body.

Show clearly how you work out your answer.

_____

_____

Volume of urine lost by the body = _____ cm^3

(2)

(ii) What proportion of water gained by the body comes from food?

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

$\frac{1}{4}$ ☐

$\frac{1}{3}$ ☐

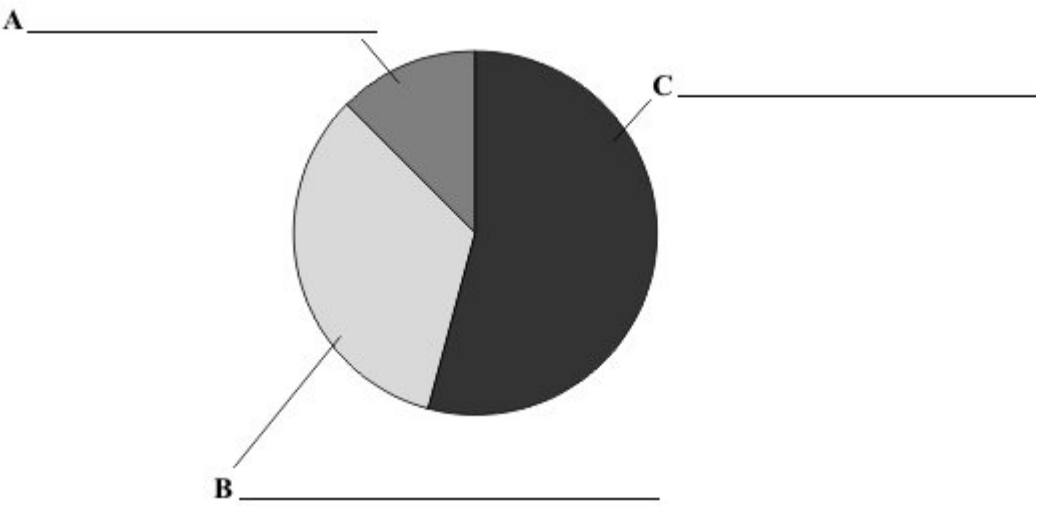
$\frac{1}{2}$ ☐

(1)

(b) One pupil decided to show the figures from **Table 2** as a pie chart.

Label sections **A**, **B** and **C** of the pie chart.

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(1)

(c) How does sweating help the body?

_____

_____

(1)

(d) On a hotter day, the volumes of water lost and gained will be different.

What differences will there be?

Tick (✓) **two** answers from the list.

- More sweat produced ☐
- More faeces produced ☐
- More food eaten ☐
- Less urine produced ☐
- Less liquid drunk ☐

(2)

(Total 7 marks)

Q8.

The hormone insulin is a protein. Insulin is produced in the pancreas and controls blood glucose concentration.

(a) Which organ in the body monitors blood glucose concentration?

_____

(1)

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(b) We now know that a lack of the hormone insulin causes diabetes. In the early twentieth century there was no known cure for diabetes.

Frederick Banting and Charles Best carried out a number of experiments on dogs.

In the first experiment they removed part of the pancreas from a healthy dog (dog **A**). They ground up the pancreas tissue and injected an extract into dog **B**, whose pancreas had been removed to make it diabetic. Dog **B**'s diabetes was **not** cured.

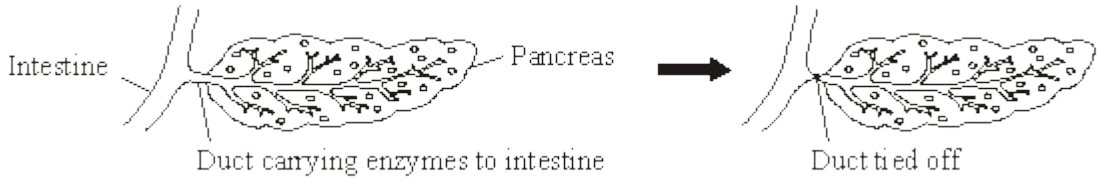
Banting thought that an enzyme produced in the pancreas of dog **A** had digested the hormone before it was injected.

Name the enzyme that might have been responsible for digesting the hormone.

_____

(1)

(c) In the second experiment with another healthy dog, Banting and Best tied off the duct which normally carries digestive enzymes out of the pancreas. This did **not** kill the dog.



(i) The dog survived even though enzymes from the pancreas could not digest food in the intestine.

Explain why the dog survived.

_____

_____

_____

(1)

(ii) As a result of these experiments, a method was developed to extract insulin from the pancreas.

Insulin is used to treat humans with diabetes.

The amount of insulin injected needs to be carefully controlled.

Explain why.

_____

_____

_____

(1)

(d) Evaluate the use of dogs in experiments of this type.

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Remember to include a conclusion to your evaluation.

_____

_____

_____

_____

_____

_____

_____

(3)

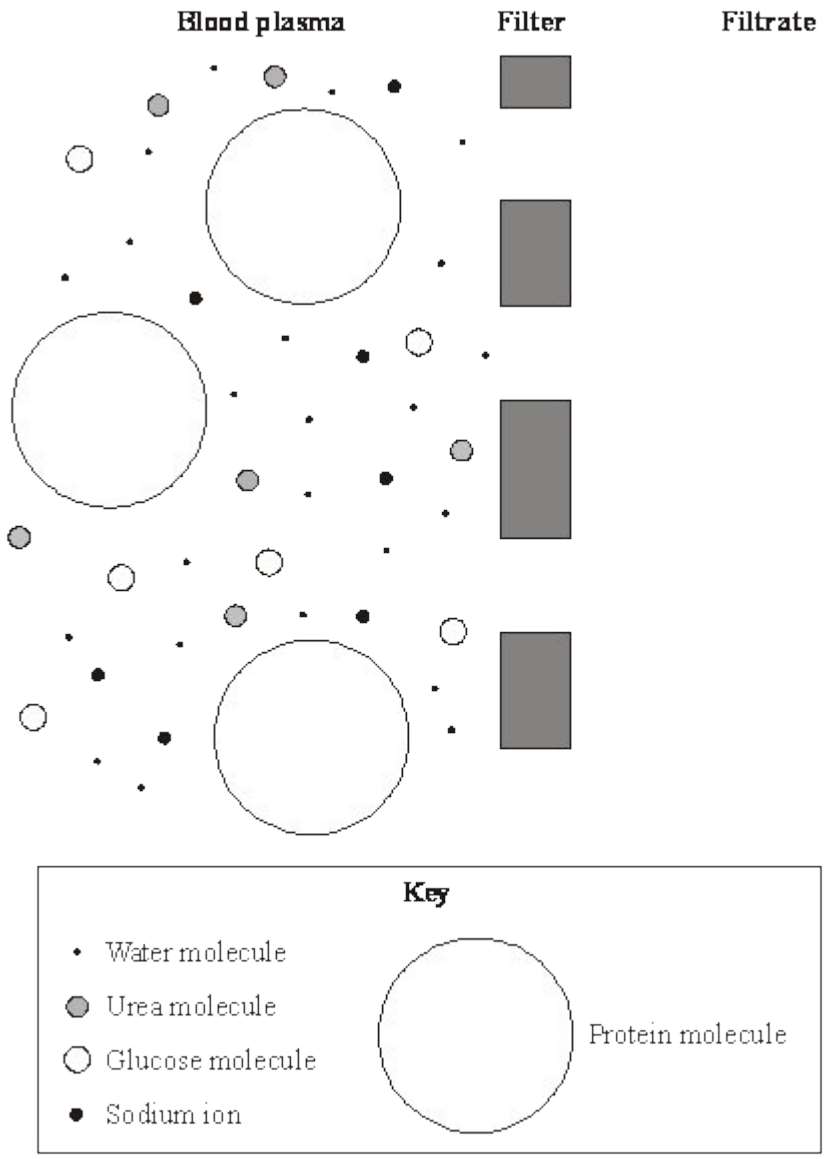
(Total 7 marks)

Q9.

The kidneys filter the blood.

The diagram shows the site of filtration in the kidney.

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(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	

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(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)

Q10.

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

Substance	Concentration in grams per dm^3		
	Plasma	**Filtrate**	**Urine**
Water	900.0	900.0	950.0
Protein	78.0	0.0	0.0

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Glucose	0.8	0.8	0.0
Amino acids	0.4	0.4	0.0
Urea	0.3	0.3	20.0
Sodium ions	2.8	2.8	3.5

(a) (i) Protein is **not** present in the filtrate.

Explain why.

_____

_____

(1)

(ii) Glucose is filtered out of the blood by the kidney and is then completely reabsorbed back into the blood.

What is the evidence for this in the table?

_____

_____

_____

_____

(2)

(iii) Glucose is reabsorbed into the blood by active transport.

Give **two** ways in which active transport differs from diffusion.

1. _____

_____

2. _____

_____

(2)

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

Explain what causes this.

_____

_____

(1)

(Total 6 marks)

Q11.

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A runner might drink a special 'sports drink' at intervals during a marathon race. The table shows the substances present in a sports drink.

Substance	Percentage
Water	
Sugar	5.0
Ions	0.2

(a) Complete the table to show the percentage of water in the sports drink.

(1)

(b) The runner sweats and also breathes heavily during the race.

(i) Why does the runner need to sweat?

_____

(1)

(ii) Which **two** substances in the table are lost from the body in sweat?

_____

(1)

(iii) Which substance in the table is lost from the body during breathing?

_____

(1)

(c) How does the sugar in the sports drink help the athlete during the marathon?

_____

_____

(2)

(Total 6 marks)

Q12.

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.

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- 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.

_____

_____

_____

_____

_____

_____

_____

_____

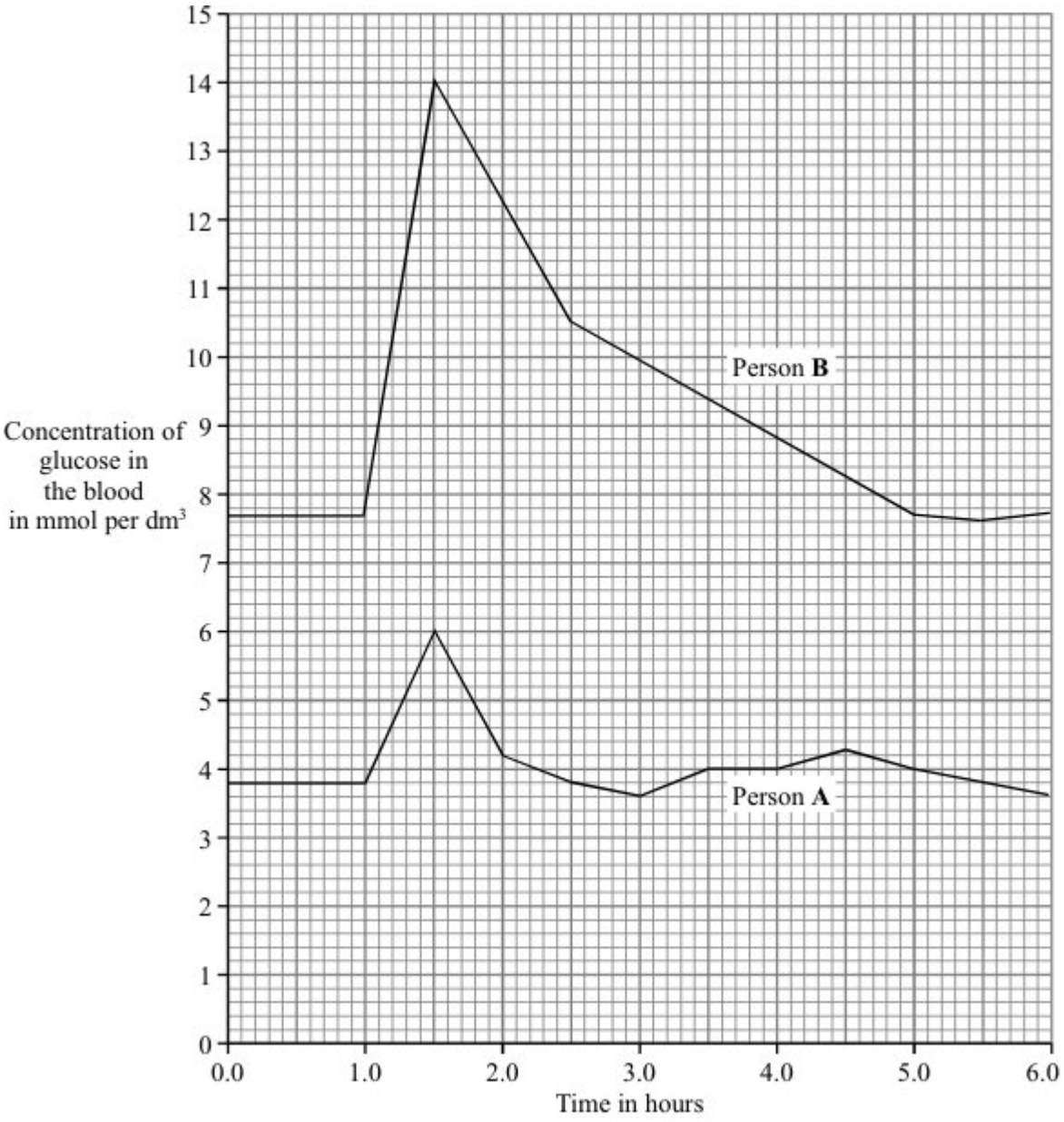
(4)

(Total 5 marks)

Q13.

The graph shows the concentration of glucose in the blood of two people. Person **A** is a non-diabetic. Person **B** has diabetes. Each person ate 75 grams of glucose at 1.0 hours.

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(a) (i) What was the maximum concentration of glucose in the blood of Person **A**?

_____ mmol per dm^3

(1)

(ii) After eating the glucose, how long did it take for the concentration of glucose in the blood of Person **B** to return to normal?

_____ hours

(1)

(b) A diabetic person does not produce enough insulin.

(i) Which organ produces insulin?

_____

(1)

(ii) Write the letter **X** on the graph to show one time when the blood of Person **A** would contain large amounts of insulin.

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(1)

(c) A high concentration of glucose in the blood can harm body cells as a result of osmosis.
Explain why.

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 8 marks)

Q14.

The table shows the concentrations of some substances in human blood plasma, in the filtrate produced by the kidney and in the urine.

	Concentration in grams per dm^3		
Substance	**Blood plasma**	**Filtrate**	**Urine**
Glucose	1.0	1.0	0.0
Amino acids	0.5	0.5	0.0
Urea	0.3	0.3	20.0
Protein	80.0	0.0	0.0
Ions	7.2	7.2	15.0
Water	912.0	990.0	970.0

(a) Explain why:

(i) the concentration of glucose in the filtrate is the same as in the blood plasma;

_____

_____

(1)

(ii) there is no glucose present in the urine.

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_____

_____

(1)

(b) Suggest why there is no protein present in either the filtrate or the urine.

_____

_____

(1)

(c) The volume of water removed in the urine is variable. Explain how the human body reduces the volume of urine produced when less water is consumed.

_____

_____

_____

_____

_____

_____

(3)

(Total 6 marks)

Q15.

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.

_____

_____

_____

_____

_____

_____

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_____

_____

(4)

(Total 5 marks)

Q16.

Hormones are sometimes used to regulate human reproduction.

(a) (i) What is a hormone?

_____

_____

(1)

(ii) How are hormones transported around the body?

_____

_____

(1)

(b) Describe the benefits and possible problems that may result from the use of hormones to regulate human reproduction. You should refer to fertility drugs and contraceptives in your answer.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 6 marks)

Q17.

(a) Each day, a boy ate food containing 12 000 kilojoules of energy. The boy's body used 80 per cent of this energy to maintain his core temperature.

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(i) Name the process which releases energy from food.

_____

(1)

(ii) Calculate the amount of energy that the boy would use each day to maintain his core body temperature. Show clearly how you work out your final answer.

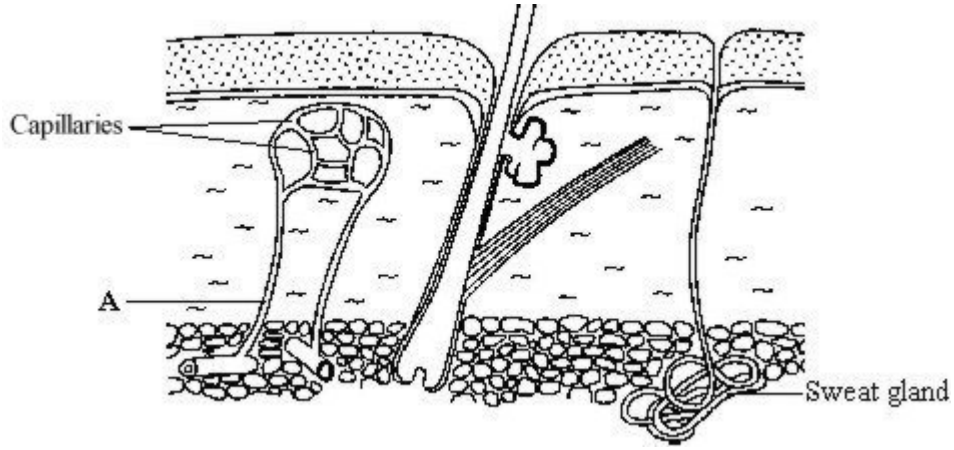
_____

_____

Amount of energy used each day = _____ kJ

(2)

(b) The diagram shows a section through human skin.



Explain how structure **A** helps to cool the body on a hot day.

_____

_____

_____

_____

_____

(3)

(c) Body temperature is monitored and controlled by the thermoregulatory centre. Where in the body is the thermoregulatory centre?

_____

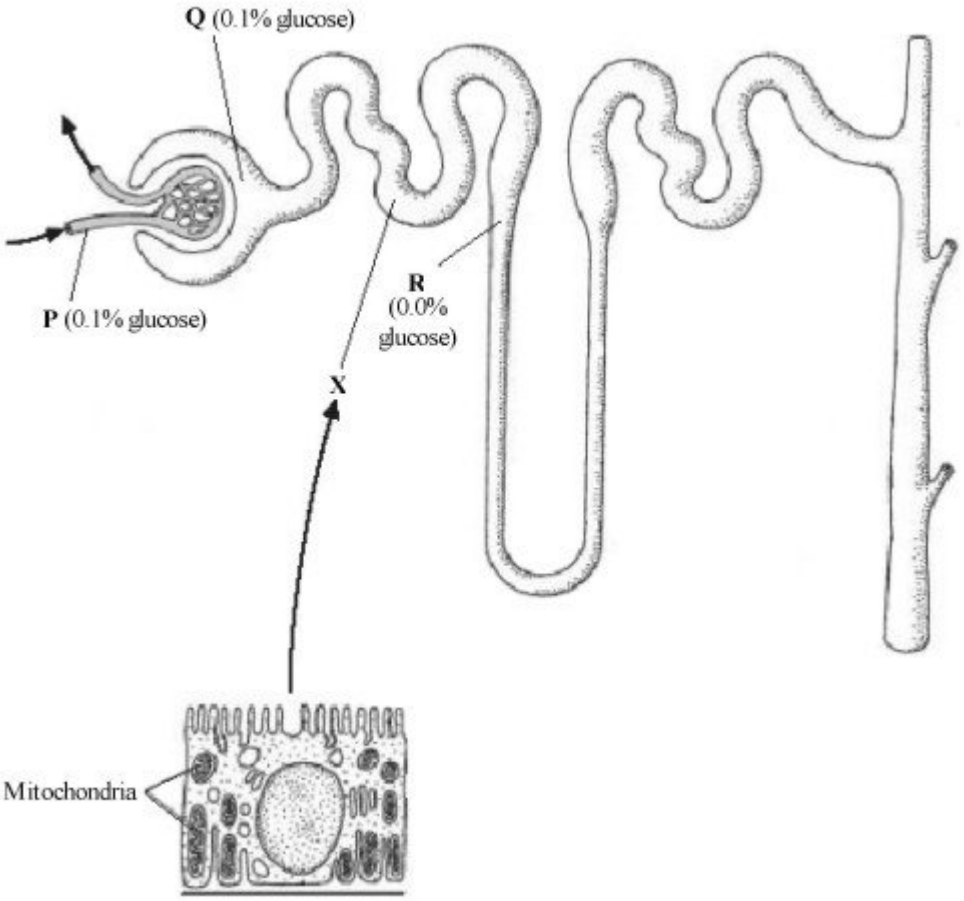
(1)

(Total 7 marks)

Q18.

The diagram shows the structure of a kidney tubule.

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Cell in wall of Region X.

All of these cells have
large numbers of mitochondria.

(a) Give the full name of the process which takes place in the mitochondria.

_____

(2)

(b) The concentration of glucose in the blood at **P**, and in the fluid at **Q**, is 0.1 per cent. The concentration of glucose in the fluid at **R** is 0.0 per cent.

Use information from the diagram, and your own biological knowledge, to explain the change in glucose concentration from point **P** through to point **R**.

_____

_____

_____

_____

_____

_____

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_____

_____

_____

_____

(5)

(Total 7 marks)

Q19.

Figure 1 shows a food chain containing three organisms.

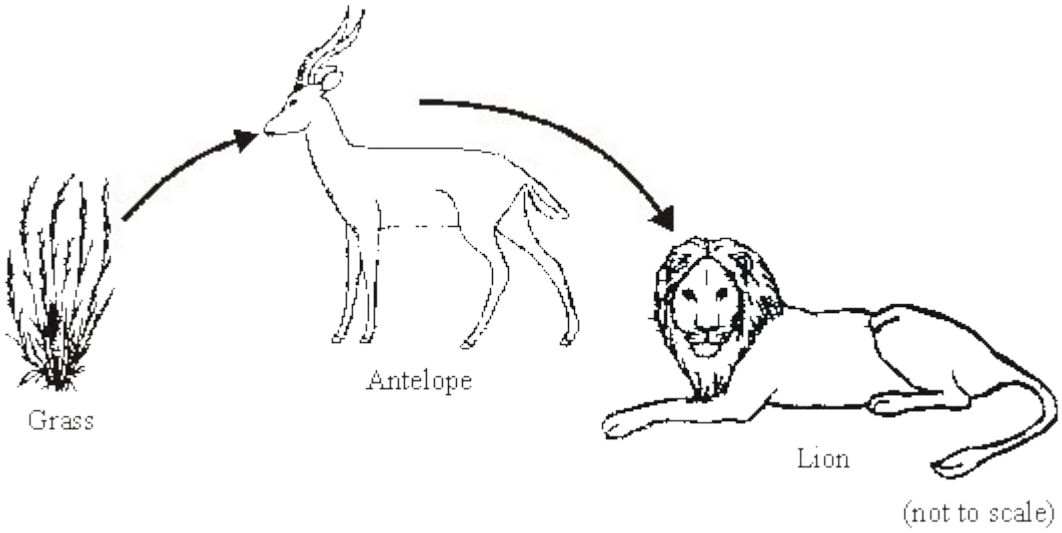


Figure 1

(a) (i) In this food chain, name:

the predator; _____

the prey. _____

(2)

(ii) What is the source of energy for the grass?

Draw a ring around **one** answer.

carbon dioxide **light** **nitrates** **water**

(1)

(iii) **Figure 2** shows a pyramid of biomass for the organisms in **Figure 1.**

Write the names of the organisms on the correct lines in **Figure 2.**

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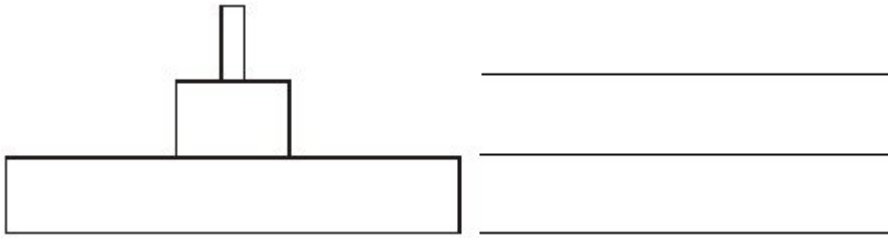


Figure 2

(1)

(b) Waste materials, like faeces from the animals, will decay,

(i) What sort of organisms cause decay?

_____

(1)

(ii) **Three** of the following conditions help decay to occur rapidly.

Which conditions do this?

Draw a ring around each of the **three** answers.

aerobic **anaerobic** **cold** **dry** **moist** **warm**

(3)

(iii) The list below gives four substances. Two of these substances are produced by decay and can be used by the grass.

Which **two** substances are these?

Tick (✓) **two** boxes.

Carbon dioxide	☐
Mineral salts	☐
Oxygen	☐
Protein	☐

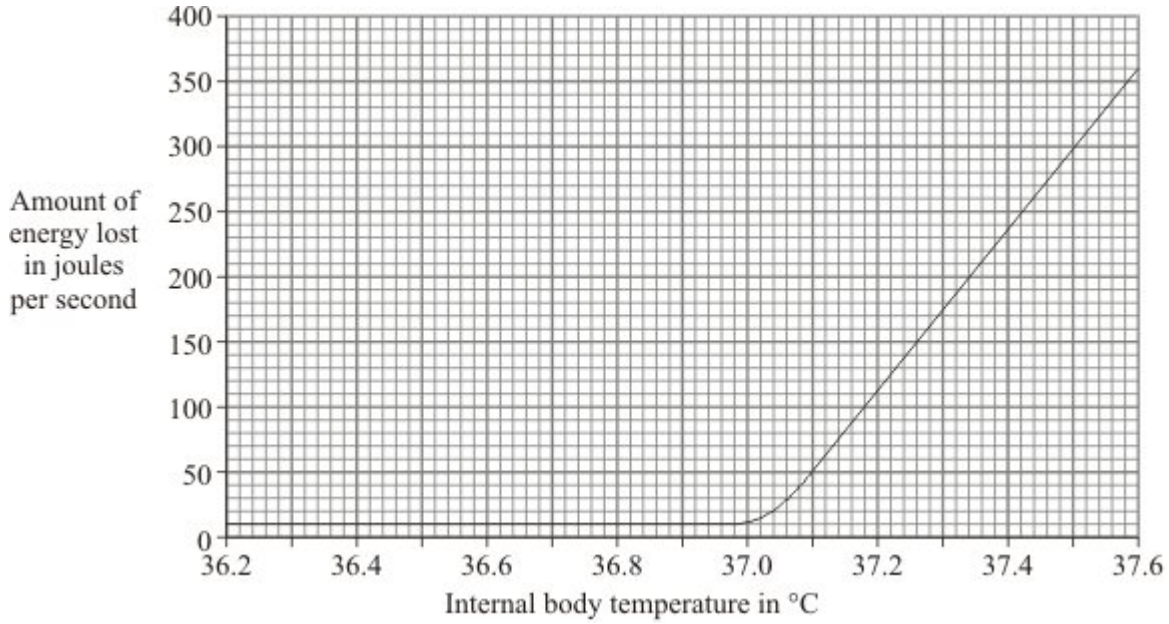
(2)

(Total 10 marks)

Q20.

The internal body temperature determines how much a person sweats. The graph shows the effect of different internal body temperatures on a person's rate of energy loss by sweating.

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(a) How much more energy was lost from the body each second by sweating when the body temperature was 37.6 °C than when it was 36.6 °C? Show clearly how you work out your final answer.

_____

_____

Amount of energy = _____ joules per second

(2)

(b) Explain why a person would feel more thirsty when the body temperature was 37.6 °C than when it was 36.6 °C.

_____

_____

_____

_____

(2)

(c) Explain how sweating helps to control body temperature.

_____

_____

_____

_____

_____

_____

(3)

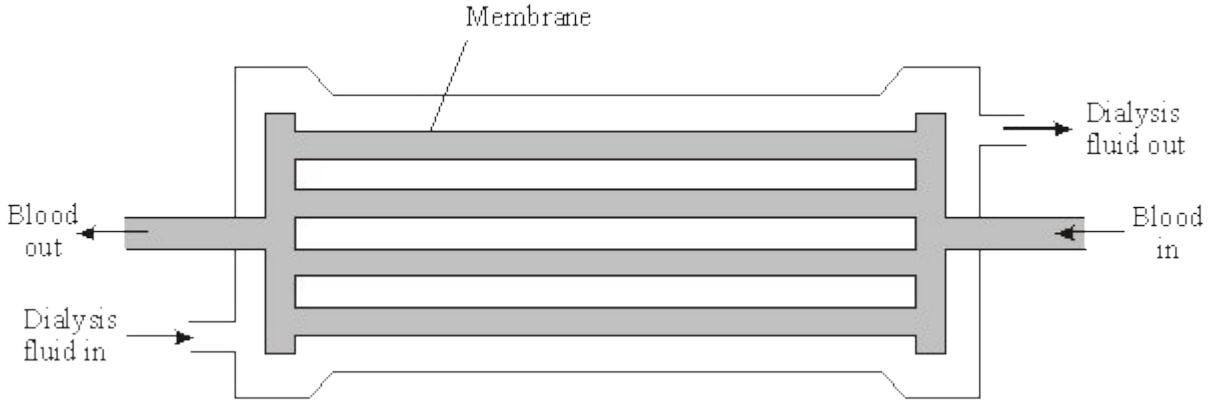
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Q21.

A woman suffers a minor infection that affects her kidneys. She is sent to hospital for treatment with a dialysis machine.

A simplified diagram of a dialysis machine is shown below.



(a) Explain why the membrane is important in the dialysis machine.

_____

_____

(2)

(b) Some of the components of the woman's blood and of the dialysis fluid entering the machine are shown in the table.

Component	Woman's blood entering machine	Dialysis fluid entering machine
Blood cells	✓	✗
Glucose	✓	✓
Urea	✓	✗

Key: ✓ = present ✗ = absent

Use the information in the table to explain the composition of the dialysis fluid entering the machine.

_____

_____

_____

_____

_____

_____

_____

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(4)

(c) One alternative to treatment with a dialysis machine is to have a kidney transplant.

Suggest why a kidney transplant might **not** be suitable in this woman's case.

_____

_____

_____

(2)

(d) Before dialysis treatment begins, the dialysis machine must be filled with blood. The woman has blood group **O**.

(i) What features of her blood make it group **O**?

_____

_____

(2)

(ii) Why must the blood in the dialysis machine, before her treatment begins, also be blood group **O**?

_____

(1)

(Total 11 marks)

Q22.

(a) Why is the removal of water from the body an example of homeostasis?

_____

_____

_____

_____

(1)

(b) Why is homeostasis important in the body?

_____

_____

_____

(1)

(c) This system also excretes a substance called urea.

What is excretion, and why is it necessary in the body?

_____

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_____

_____

_____

_____

(2)

(Total 4 marks)

Q23.

The pictures show three mammals and their average body temperature in ˚C.

Hamster | Horse | Sheep



36.8 °C | 38.0 °C | 39.2 °C

NOT TO SCALE

Describe **three** different ways by which most mammals are able to maintain a constant body temperature when the temperature of the environment falls.

_____

_____

_____

_____

_____

_____

_____

(Total 6 marks)

Q24.

Coordination of the body can be affected by chemicals called hormones

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(a) (i) Where are hormones produced?

_____

(1)

(ii) How do hormones move around the body?

_____

(1)

(b) Insulin is a hormone.

(i) Where is insulin produced?

_____

(1)

(ii) Explain the role of insulin in controlling blood sugar levels.

_____

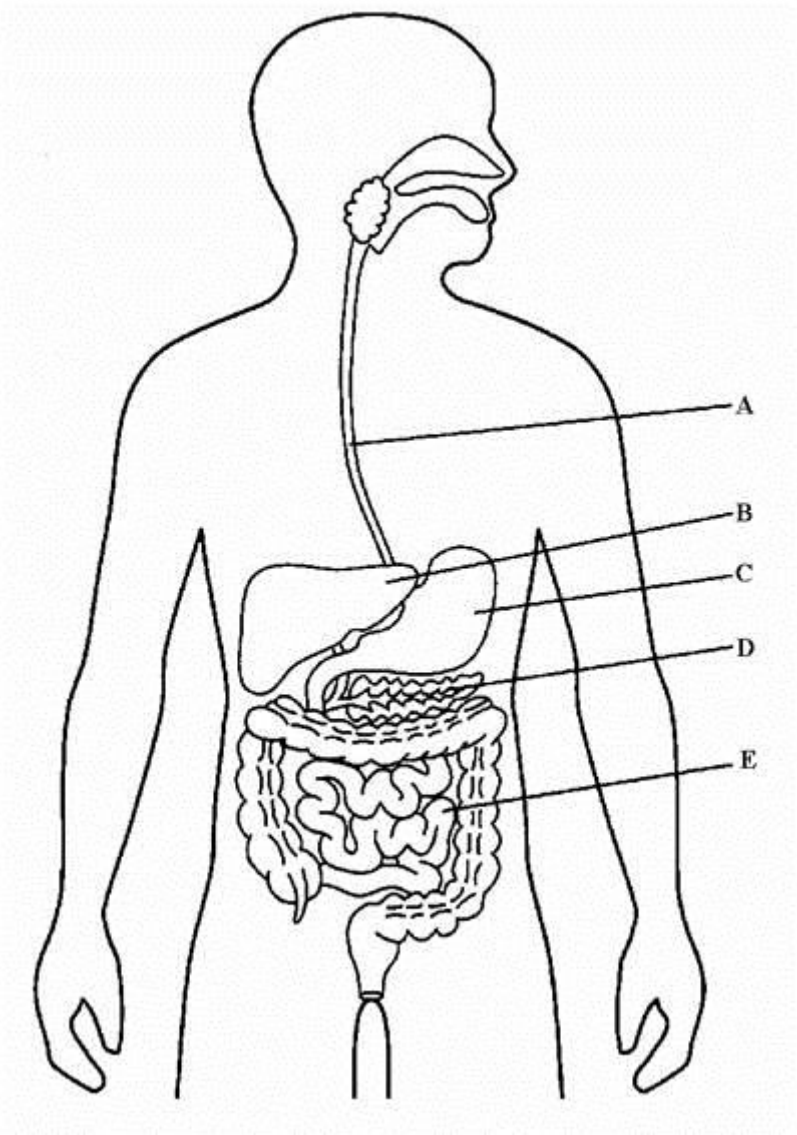
(4)

(Total 7 marks)

Q25.

The diagram shows part of the human digestive system.

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(i) Name part **B**.

_____

(1)

(ii) Describe the role of **B** and **D** in reducing blood sugar levels.

_____

_____

_____

_____

_____

(2)

(Total 3 marks)

Q26.

(a) One food chain in the wood is:

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Hazel tree nuts → squirrels → owls

(i) What does this food chain tell us?

_____

_____

(2)

(ii) Which **one** of the organisms in the food chain is a producer?

_____

(1)

(iii) This year the hazel bushes have produced very few nuts.

Explain, as fully as you can, how this might affect the populations of:

1. squirrels;

_____

_____

_____

_____

2. owls.

_____

_____

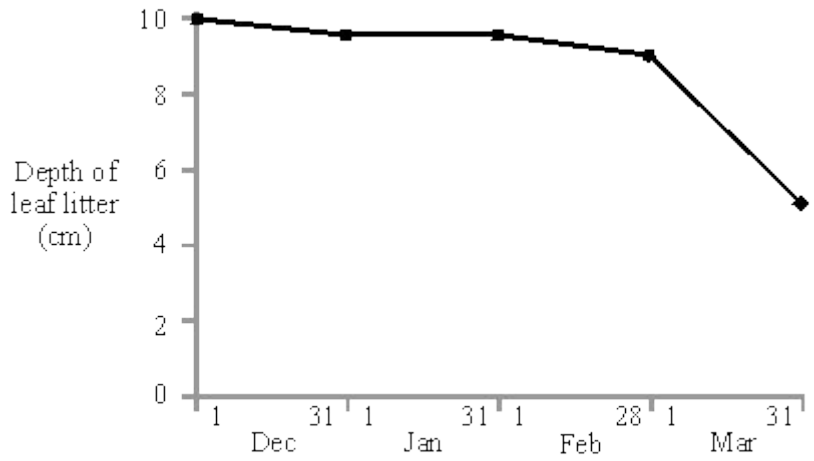
_____

_____

(4)

(b) An area of the floor of the wood 1 m² was fenced off so that animals could not reach it. The graph below shows the depth of leaf litter (dead leaves) inside the fence over the next few months.

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Explain, as fully as you can,

(i) why the depth of the leaf litter decreased;

_____

_____

_____

(1)

(ii) how this decrease happened.

_____

_____

_____

(1)

(iii) In which month does leaf litter disappear fastest? Explain why.

_____

_____

_____

_____

(2)

(Total 11 marks)

Q27.

(a) During respiration, sugar is oxidised to release energy. Complete the equation for respiration.

Sugar + _____ = _____ + _____ + energy

(3)

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(b) The photograph below shows an athlete using an exercise machine. The machine can be adjusted to vary the rate at which the athlete is required to work.



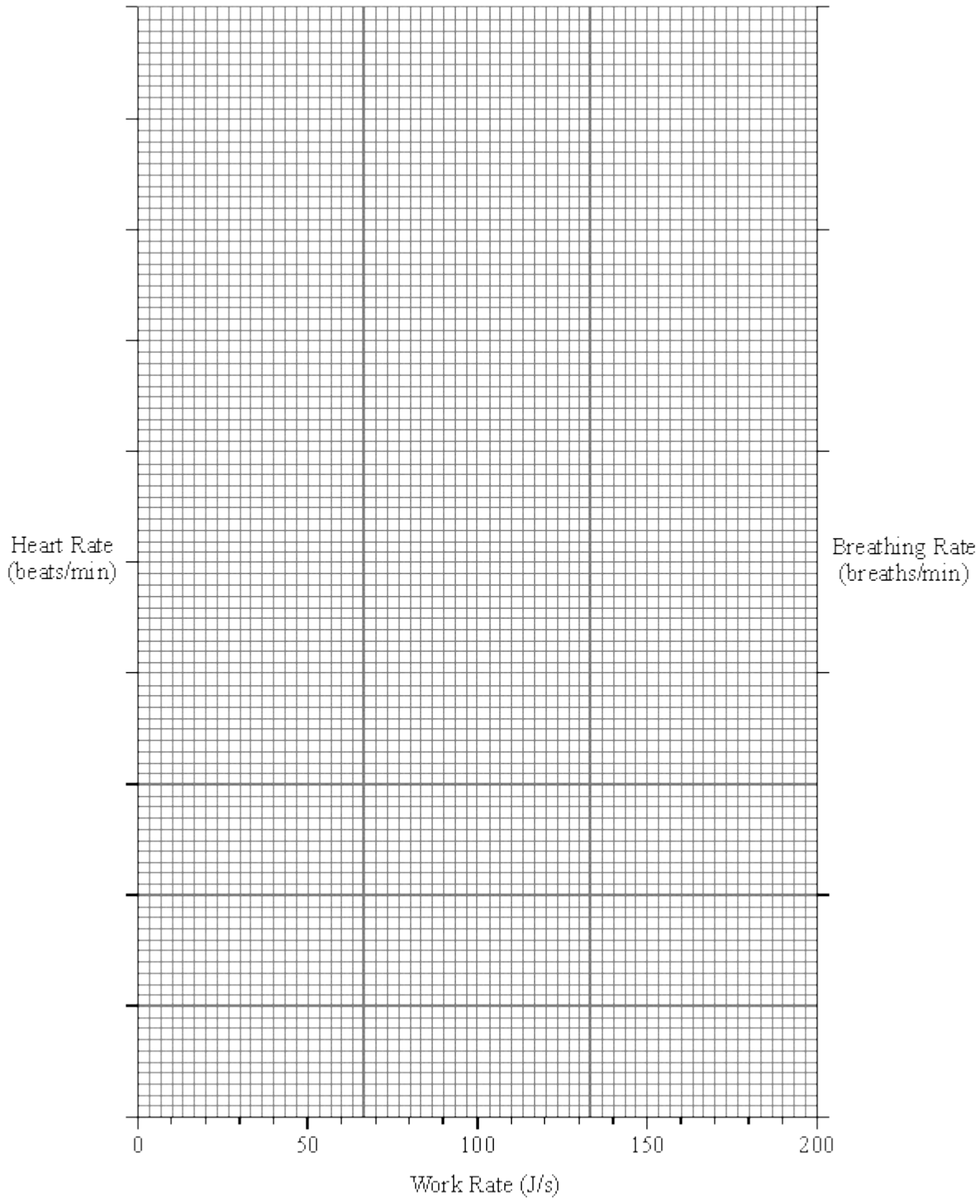
The athlete's heart rate and breathing rate were measured at different work rates.

The table below shows the results which were obtained.

WORK RATE (J/s)	HEART RATE (beats/min.)	BREATHING RATE (breaths/min.)
0	86	9.6
60	106	10.0
80	112	10.4
100	122	10.4
120	135	11.4
140	143	14.5
160	156	15.8
200	174	30.5

Plot the data on the graph paper below.

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(3)

(c) Explain, as fully as you can, the advantages to the body in the change in breathing and heart rates.

_____

_____

_____

_____

_____

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_____

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_____

(6)

(d) This increase in the rate of heart-beat is a response to a stimulus. For this response suggest:

(i) the stimulus; _____

(ii) the co-ordinator; _____

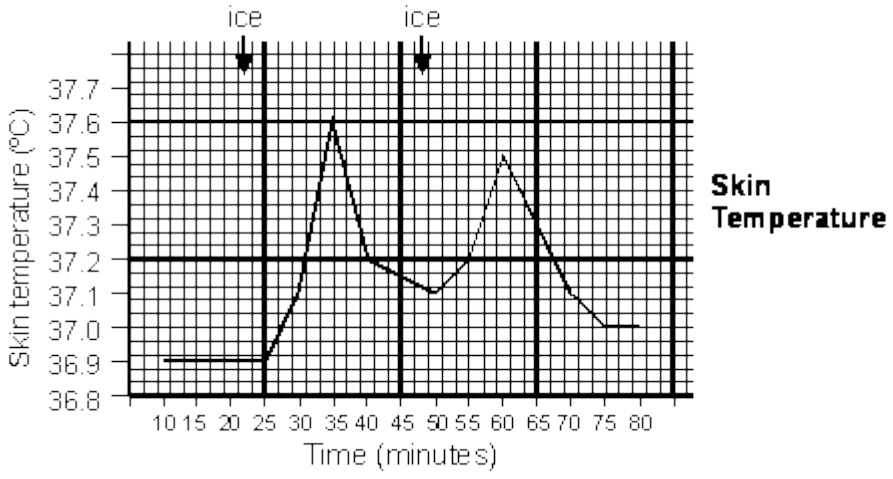
(iii) the effector. _____

(3)

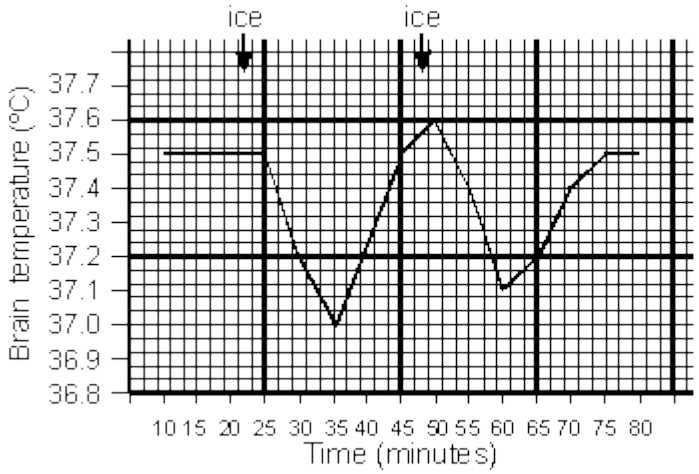
(Total 15 marks)

Q28.

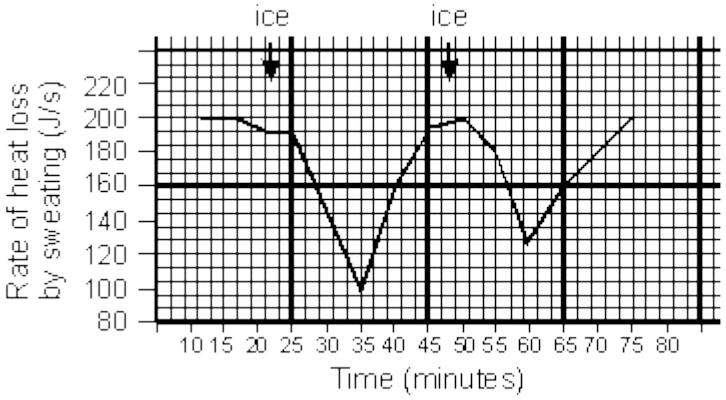
The graphs show the results of an investigation into the control of sweating in humans. The subject was placed in a chamber where the temperature was maintained at 45ºC. The subject swallowed ice at the times indicated on the graphs.



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Brain Temperature



Rate of Heat Loss by Sweating

(a) What was the relationship between swallowing ice and the subject's

(i) skin temperature?

_____

_____

(1)

(ii) brain temperature?

_____

_____

(1)

(iii) rate of heat loss by sweating?

_____

_____

(1)

(b) Explain, as fully as you can, why the subject's brain temperature, skin temperature and rate of heat loss by sweating were affected by swallowing ice in the way shown by the graphs.

_____

_____

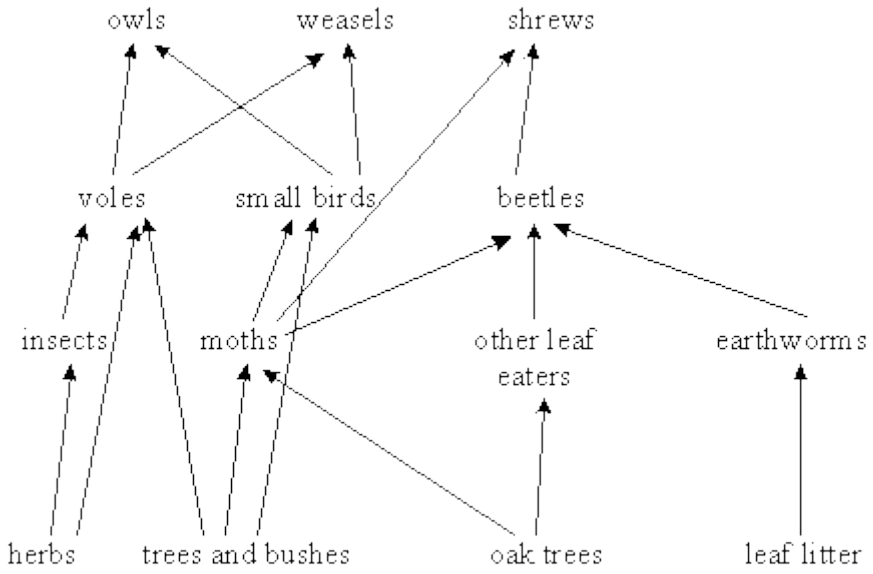
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(8)

(Total 11 marks)

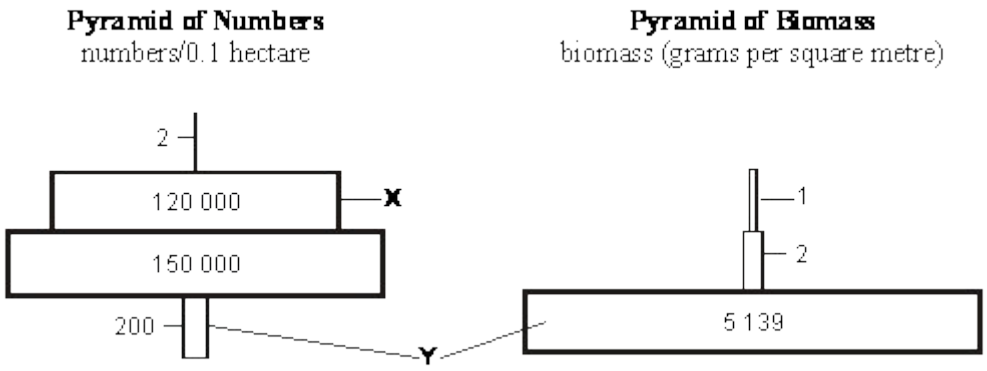
Q29.

The diagram below shows a food web for a wood.



(a) The diagrams below show a pyramid of the numbers and a pyramid of the biomass for 0.1 hectare of this wood.

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(i) Name **one** organism from the level labelled X.

_____

(1)

(ii) Explain, as fully as you can, why the level labelled Y is such a different width in the two pyramids.

_____

_____

_____

_____

(3)

(b) Explain, as fully as you can, what eventually happens to energy from the sun which is captured by the plants in the wood.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

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_____

_____

(10)

(Total 14 marks)

Q30.

(a) Describe, as fully as you can, the job of

(i) the circulatory system.

_____

_____

(2)

(ii) the digestive system.

_____

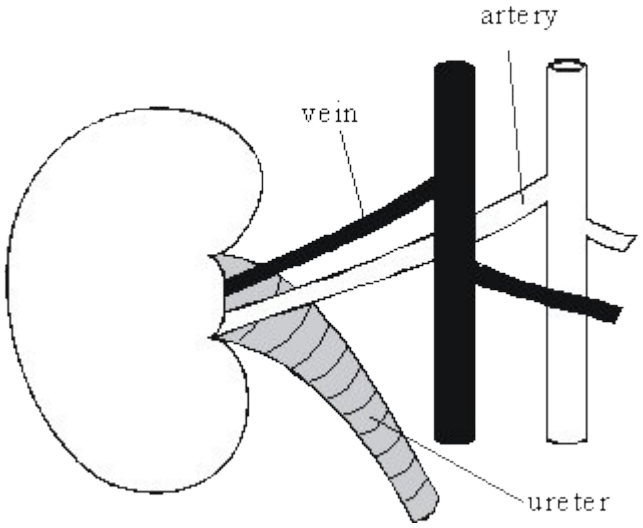
_____

_____

_____

(3)

(b)



The drawing shows a kidney, its blood supply and the ureter (a tube which carries urine from the kidney to the bladder). The amount and composition of the urine flowing down the ureter change if the blood in the artery contains too much water. Describe these changes and explain how they take place.

_____

_____

_____

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_____

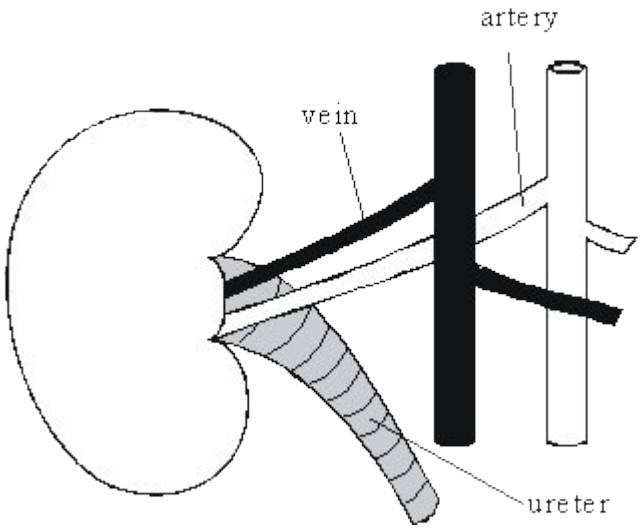
_____

_____

(4)

(Total 9 marks)

Q31.



(a) The drawing shows a kidney, its blood supply and the ureter (a tube which carries urine from the kidney to the bladder). The amount and composition of the urine flowing down the ureter changes if the blood in the artery contains too much water. Describe these changes and explain how they take place.

_____

_____

_____

_____

_____

_____

(4)

(b) (i) Describe, as fully as you can, **two** methods of treating patients who suffer from kidney failure.

1. _____

_____

_____

_____

2. _____

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_____

_____

_____

(4)

(ii) Compare the advantages and disadvantages of the two methods of treatment which you have described.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

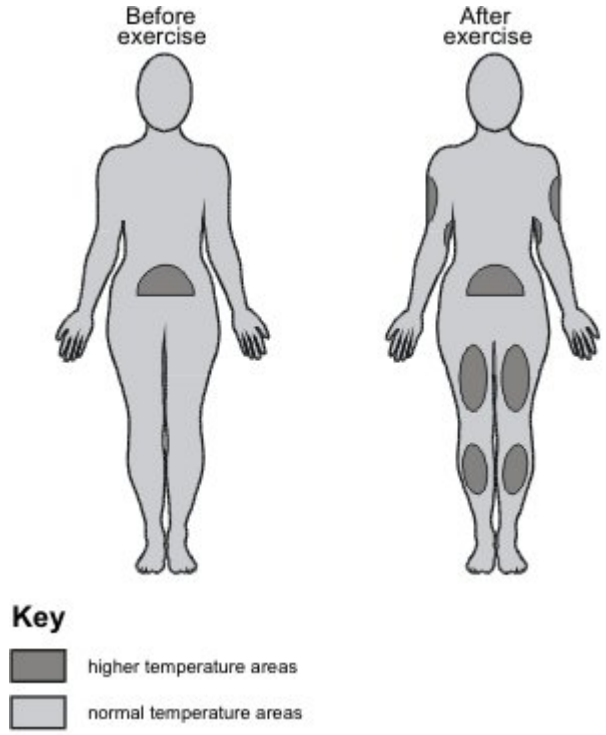
(5)

(Total 13 marks)

Q32.

The temperature at the surface of the skin can be measured by using a technique called thermography. Areas with higher temperature appear as a light shade on the thermographs. The drawings below show the results of an investigation in which thermographs were taken before and after exercise.

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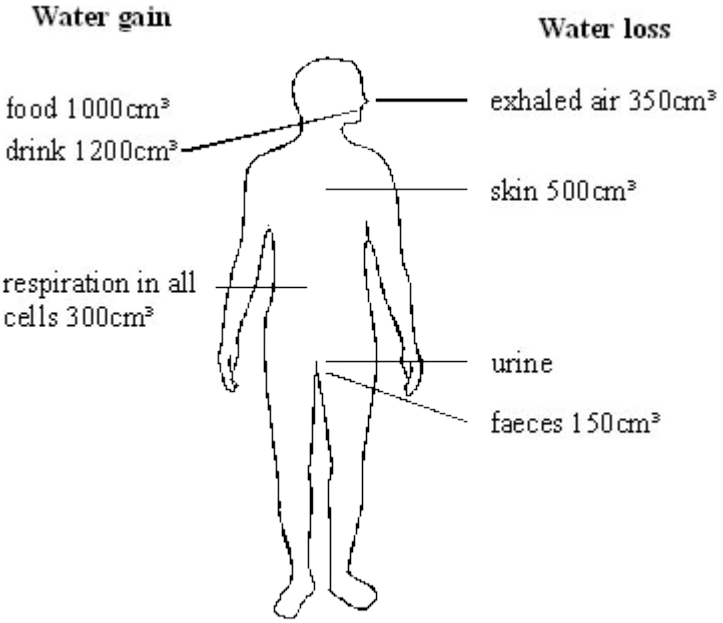


Explain, as fully as you can, the body mechanisms which affected the skin temperature to give the results shown in the drawings.

(Total 8 marks)

Q33.

The diagram shows the mean daily input and output of water for an adult.



The kidneys keep the water content of the body constant by controlling the volume of water passed out in the urine.

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(i) Use data from the diagram to calculate the mean daily output of water in urine. Show your working.

Answer _____ cm^3

(2)

(ii) Describe how the amount of water in the body is controlled by the kidneys.

_____

_____

_____

_____

(3)

(Total 5 marks)

Q34.

Read the following passage which is from an advice book for diabetics.



Insulin Reactions

Hypoglycaemia or 'hypo' for short, occurs when there is too little sugar in the blood.
It is important always to carry some form of sugar with you and take it immediately you feel a 'hypo' start. A hypo may start because:

- you have taken too much insulin, or
- you are late for a meal, have missed a meal altogether, have eaten too little at a meal, or
- you have taken a lot more exercise than usual.

The remedy is to take some sugar.

An insulin reaction usually happens quickly and the symptoms vary – sweating, trembling, tingling of the lips, palpitations, hunger, pallor, blurring of the vision, slurring of speech, irritability, difficulty in concentration.

Do not wait to see if it will pass off, as an untreated 'hypo' could lead to unconsciousness.

(a) Many diabetics need to take insulin.

(i) Explain why.

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_____

_____

_____

_____

(2)

(ii) Explain why there is too little sugar in the blood if too much insulin is taken.

_____

_____

_____

_____

(3)

(iii) Explain why there is too little sugar in the blood if the person exercises more than usual.

_____

_____

_____

_____

(3)

(b) Suggest why sugar is recommended for a ‘hypo’, rather than a starchy food.

_____

_____

_____

_____

(3)

(c) Explain how the body of a healthy person restores blood sugar level if the level drops too low.

_____

_____

_____

_____

(3)

(d) Explain, using insulin as an example, what is meant by negative feedback.

_____

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_____

_____

_____

(3)

(Total 17 marks)

Q35.

The kidneys remove waste materials from the liquid part of the blood.

(a) What name is given to the solution of waste stored in the bladder? _____

(1)

(b) The table shows the concentration of certain substances

- in the liquid part of the blood
- in the liquid that has just been filtered from the blood in the kidneys
- in the solution in the bladder.

SUBSTANCE	CONCENTRATION (%)		
	IN LIQUID PART OF BLOOD	IN LIQUID THAT HAS BEEN FILTERED IN THE KIDNEYS	IN LIQUID IN THE BLADDER
Protein	7.0	0	0
Salt	0.35	0.35	0.5
Glucose	0.1	0.1	0
Urea	0.03	0.03	2.0

(i) Which **one** of these substances does **not** pass into the liquid that is filtered in the kidneys?

_____

(1)

(ii) Suggest **one** reason why this substance does **not** pass out of the blood.

_____

(1)

(c) What happens to the glucose in the liquid that is filtered in the kidneys?

_____

(1)

(d) Explain why the concentration of urea in the liquid in the bladder is much greater than the concentration of urea in the liquid that is filtered in the kidneys.

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(1)

(Total 5 marks)

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