AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



EXAM QUESTION PACK

4.5.1 HOMEOSTASIS (PACK 3)

SCORE	PERCENTAGE
/126	%

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Q1.

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

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

(a) (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)

(b) 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.

_____

_____

(1)

(c) (i) Describe how a kidney dialysis machine works.

_____

_____

_____

_____

_____

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_____

(3)

(ii) Use the data in the table to suggest the concentration that the salt in the dialysis fluid should be. Explain your answer.

Concentration _____

Explanation _____

_____

_____

(2)

(Total 8 marks)

Q2.

(a) Explain, as fully as you can, why respiration has to take place more rapidly during exercise.

_____

_____

_____

(2)

(b) During exercise the process of respiration produces excess heat. Explain how the body prevents this heat from causing a rise in the core (deep) body temperature.

_____

_____

_____

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_____

_____

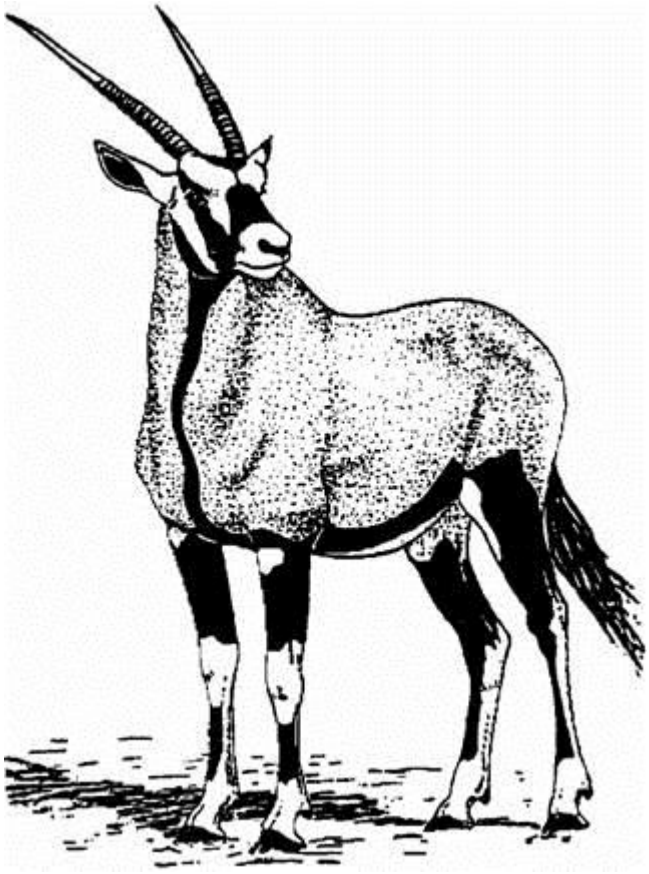
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(Total 6 marks)

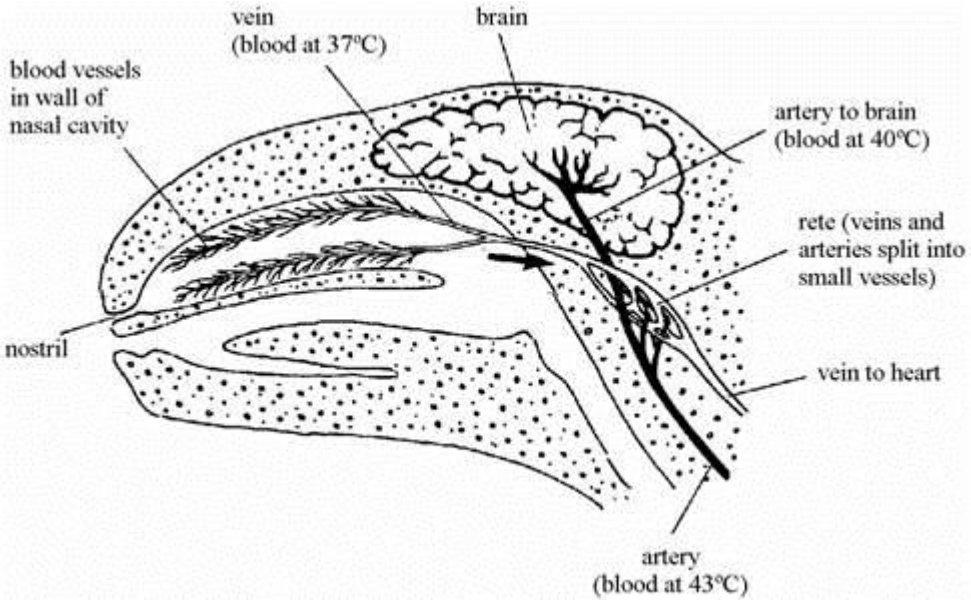
Q3.

The gemsbok is a large herbivore that lives in herds in desert areas of South Africa. Gemsboks feed on plants that are adapted to living in dry conditions. There are not many rivers, lakes or ponds that can provide drinking water for the animals. The desert areas are hot during the day but cool at night. As the air cools at night it becomes moist, and the plants absorb the moisture.

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Although the gemsbok lives in hot conditions, it does not sweat. During the day its body temperature can rise, but it is important that blood reaching the brain does not rise above 40°C. The drawing shows how the blood system is adapted to cool the blood which flows to the brain.



(i) Suggest an advantage to the gemsbok of **not** sweating.

_____

_____

(1)

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(ii) Explain how the blood is cooled in the cavities of the nose.

_____

_____

_____

_____

(2)

(iii) How does the structure of the rete help in keeping the brain cool?

_____

_____

_____

_____

(2)

(Total 5 marks)

Q4.

The table shows four ways in which water leaves the body, and the amounts lost on a cool day.

	WATER LOSS (cm^3)	
	COLD DAY	HOT DAY
Breath	400	the same
Skin	500	
Urine	1500	
Faeces	150	

(a) (i) Fill in the table to show whether on a hot day the amount of water lost would be

less **more** **the same**

The first answer has been done for you.

(3)

(ii) Name the process by which we lose water from the skin.

_____

(1)

(b) On a cool day the body gained 2550 cm^3 of water.
1500 cm^3 came directly from drinking.
Give **two** other ways in which the body may gain water.

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1. _____

2. _____

(2)

(Total 6 marks)

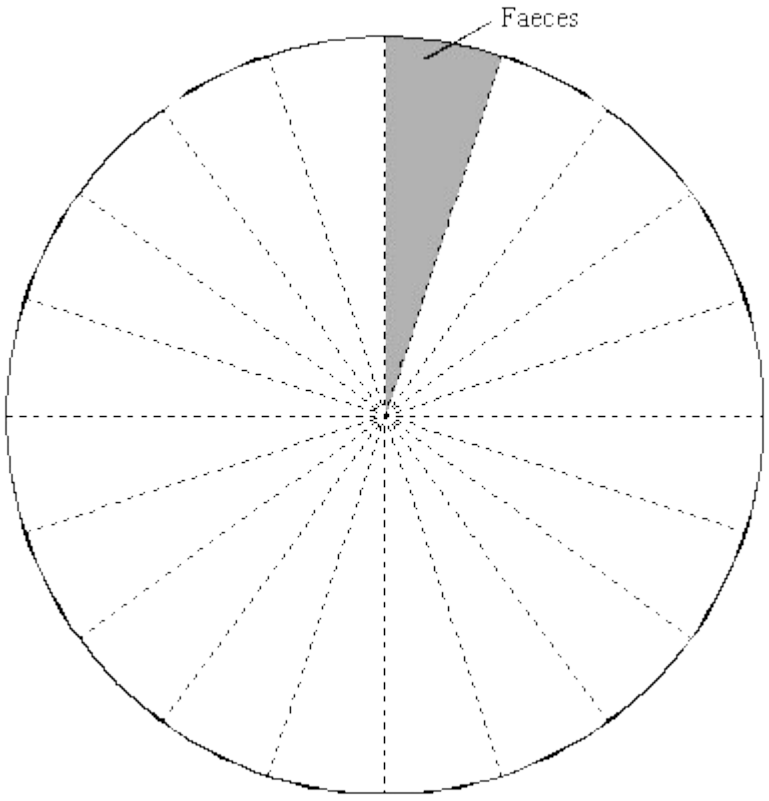
Q5.

The table shows how much water is lost in different ways from a student's body.

Way in which water is lost	Percentage of total
Breath	15
Faeces	5
Sweat	50
Urine	30

(a) Complete the pie chart.

One part has been done for you. Remember to label the pie chart.



(3)

(b) The table is about waste products which are removed from the student's body.

Complete the table by using the correct words from the box.

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amino acids	breath	circulation	digestion	fatty acids
glucose	respiration	sweat	urine	

Waste product	How it is produced	How it leaves the body
carbon dioxide	by _____	in _____
urea	from _____	in _____

(4)

(Total 7 marks)

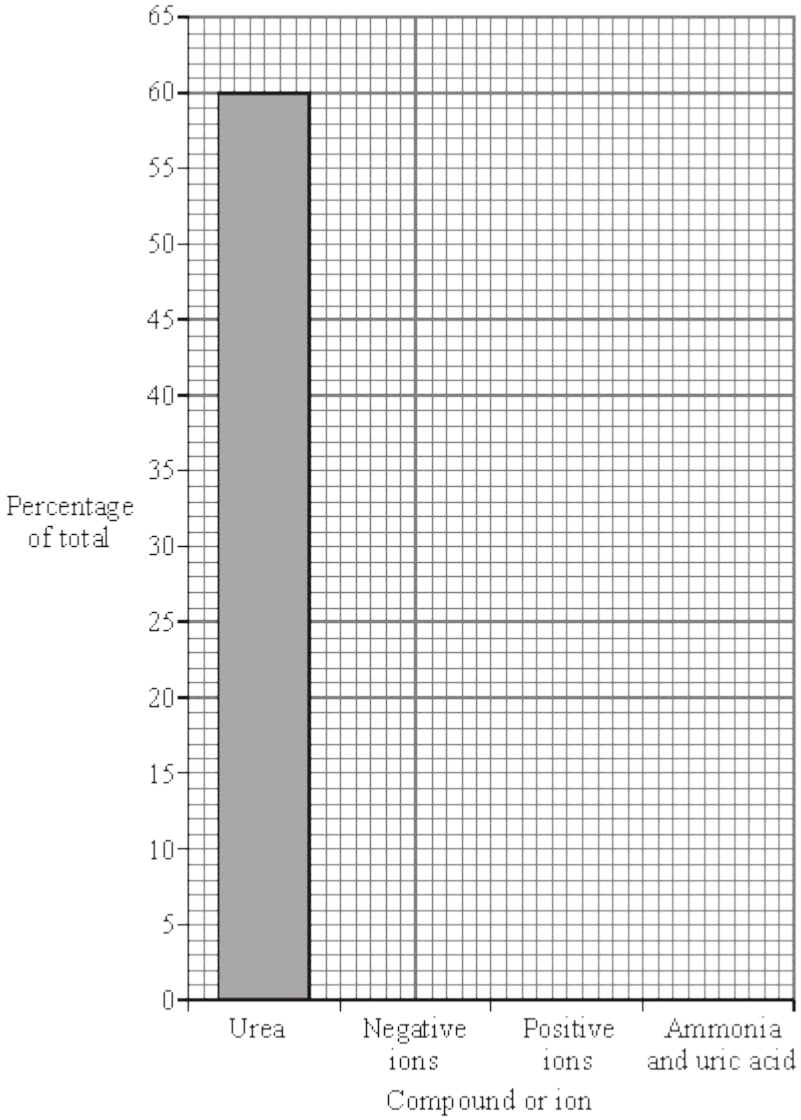
Q6.

(a) The table shows the compounds and ions dissolved in a student's urine.

Compound or ion	Percentage of total
urea	60
negative ions	25
positive ions	10
ammonia and uric acid	5

(i) Complete the bar chart. One bar has been drawn for you.

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(2)

(ii) There is a total of 10 g of compounds and ions dissolved in a sample of this student's urine. Calculate the mass of urea in the sample. Show clearly how you work out your answer.

_____

_____

_____

Mass of urea _____ g

(2)

(b) Use words from the box to complete the sentences.

anus	bladder	kidneys	liver	lungs

Plasma transports carbon dioxide from the body to the _____ .

Plasma transports urea from the _____ to the _____ .

(3)

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(Total 7 marks)

Q7.

The table shows the amounts of some of the substances filtered, reabsorbed and excreted by the kidneys in one day.

Substance	Amount filtered	Amount reabsorbed	Percentage reabsorbed	Amount excreted
water		178.5 litres	99.2 %	1.5 litres
urea	56 g	28 g	50 %	28 g
glucose	800 units	800 units	100 %	0
sodium	25 200 units	25 050 units		150 units
chloride	18 000 units	17 850 units	99.2 %	150 units

(a) Calculate the amount of water filtered by the kidneys in one day.

_____

Amount _____ litres

(1)

(b) Calculate the percentage of the filtered sodium that was reabsorbed. Show clearly how you work out your answer.

_____

_____

Percentage reabsorbed _____

(1)

(Total 2 marks)

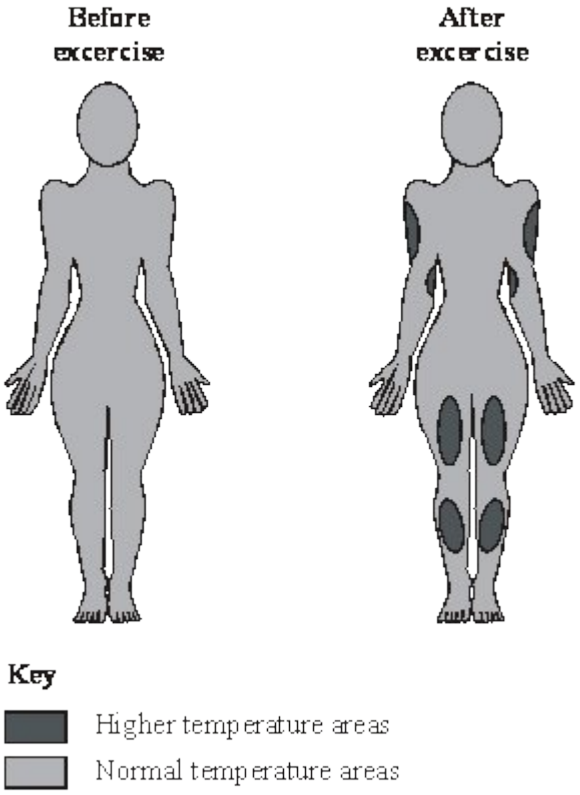
Q8.

The temperature at the surface of the skin can be measured by using a technique called thermography.

In this technique, areas with higher temperature appear as a different colour on the thermographs.

The drawings below show the results of an investigation in which thermographs were taken from a person before and after exercise.

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Describe and explain, as fully as you can, the effects of exercise on skin temperature.

_____

_____

_____

_____

_____

_____

_____

_____

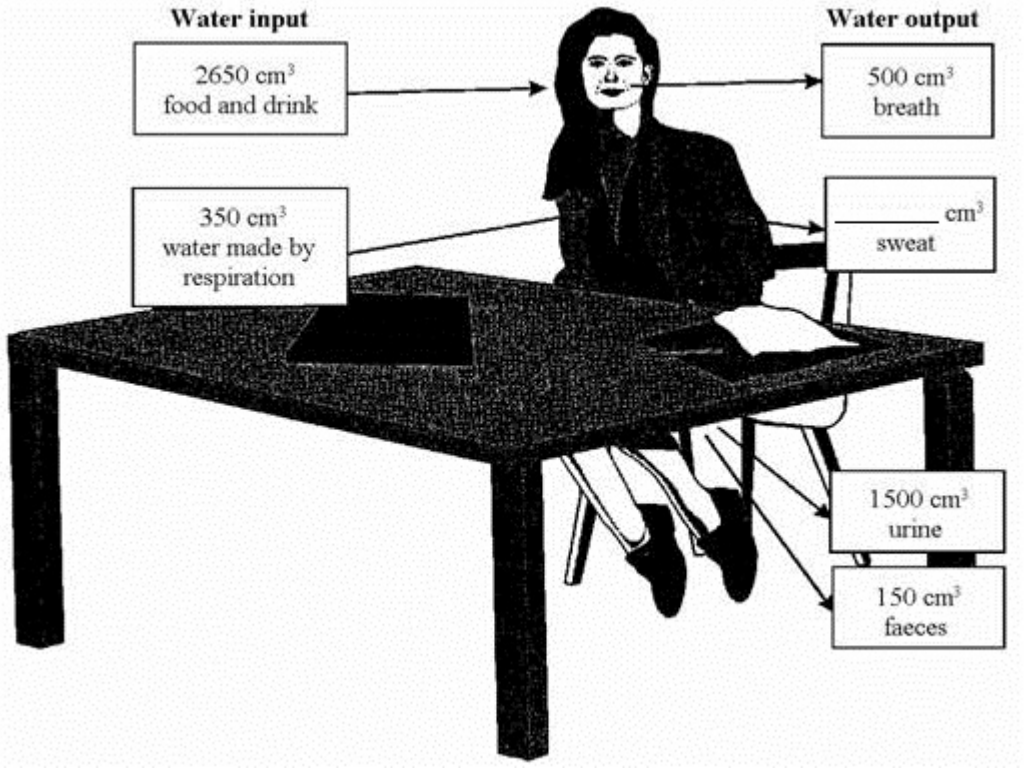
(Total 3 marks)

Q9.

The diagram shows a water balance for a girl who spends most of the day working at a desk. It is not complete.

(a) Complete the diagram by writing in the volume of sweat produced.

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(1)

(b) The next day she spent much of the day training, doing many different types of exercise.

State how **each** of the following would change and why it would be different from the previous day.

(i) The amount of water given off as sweat.

_____

_____

_____

(2)

(ii) The amount of water breathed out.

_____

_____

_____

(2)

(iii) The amount of urine passed, if she had the same water intake as on the previous day.

_____

_____

_____

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(2)

(c) Which organ controls the amount of water in the body?

_____

(1)

(Total 8 marks)

Q10.

Information is passed to target organs in the body by hormones.

(a) (i) How do hormones travel around the body?

_____

(1)

(ii) What name is given to the organs that secrete hormones?

_____

(1)

(b) Explain the cause of diabetes and how it is controlled.

_____

_____

_____

_____

(3)

(Total 5 marks)

Q11.

The table compares the percentages of various substances in a person's blood and their urine.

Substance	Blood	Urine
Water	92.00%	95.00%
Glucose	0.10%	0
Salt	0.37%	0.60%
Urea	0.03%	2.10%

(a) How does the level of urea in urine compare with the level of urea in the blood?

_____

(2)

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(b) The kidney produces urine by filtering the liquid part of blood and then re-absorbing some of the filtered substances.

Use this information to explain the difference in the level of urea in urine compared to the level of urea in blood.

_____

_____

_____

_____

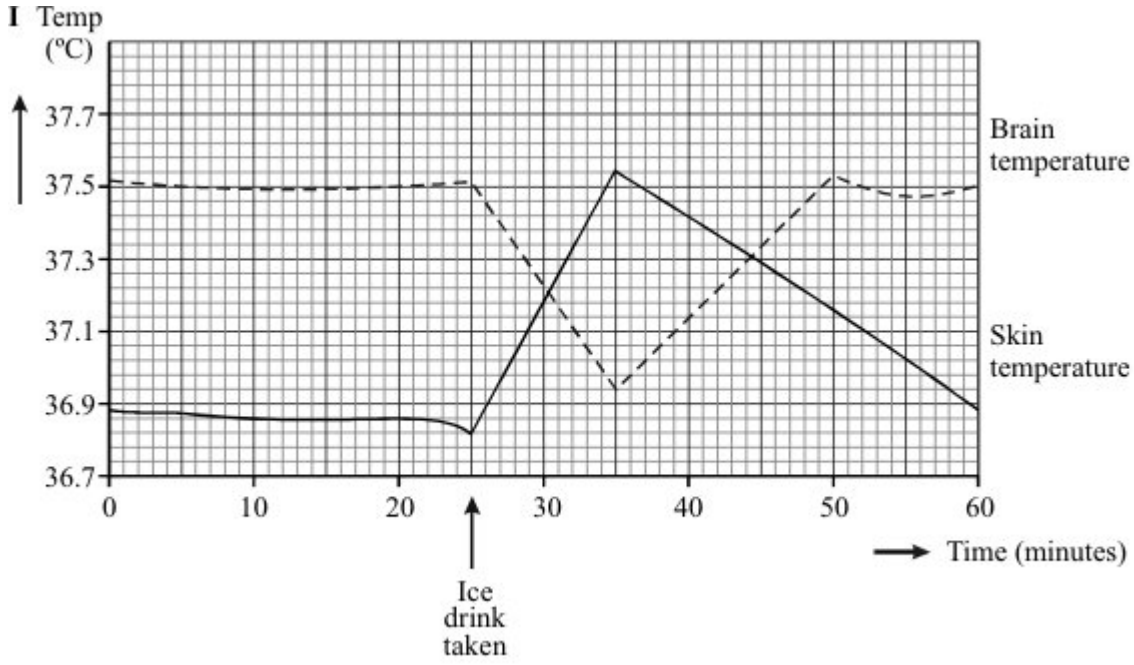
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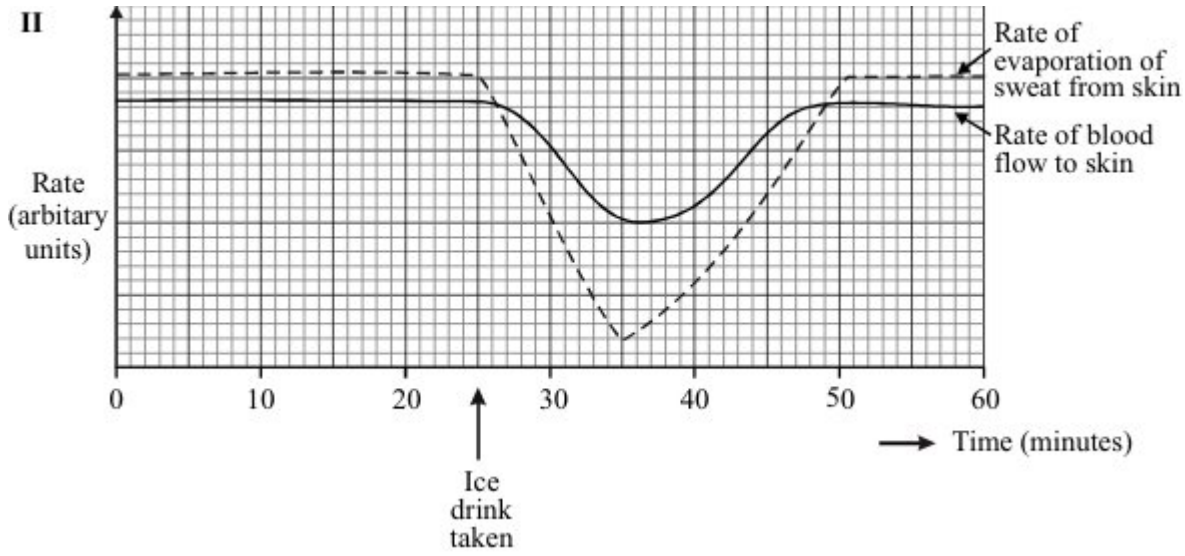
Q12.

On a hot day, a student has an iced drink.

Graphs I and II show some of the changes to the student's body produced by the iced drink.



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Use the information from the graphs to explain, as fully as you can, why the temperature of the student's skin rises after she has taken the iced drink.

_____

_____

_____

_____

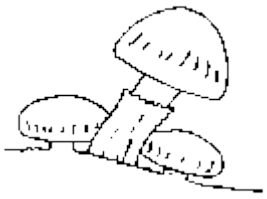
_____

_____

(Total 4 marks)

Q13.

Mushrooms can be grown on compost. The compost is made by mixing straw and manure which rot down.



(a) Write down **three** things which are needed for the straw and manure to rot.

1. _____

2. _____

3. _____

(3)

(b) Some substances, like plastic, are not biodegradable.

What does this mean?

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_____

_____

(1)

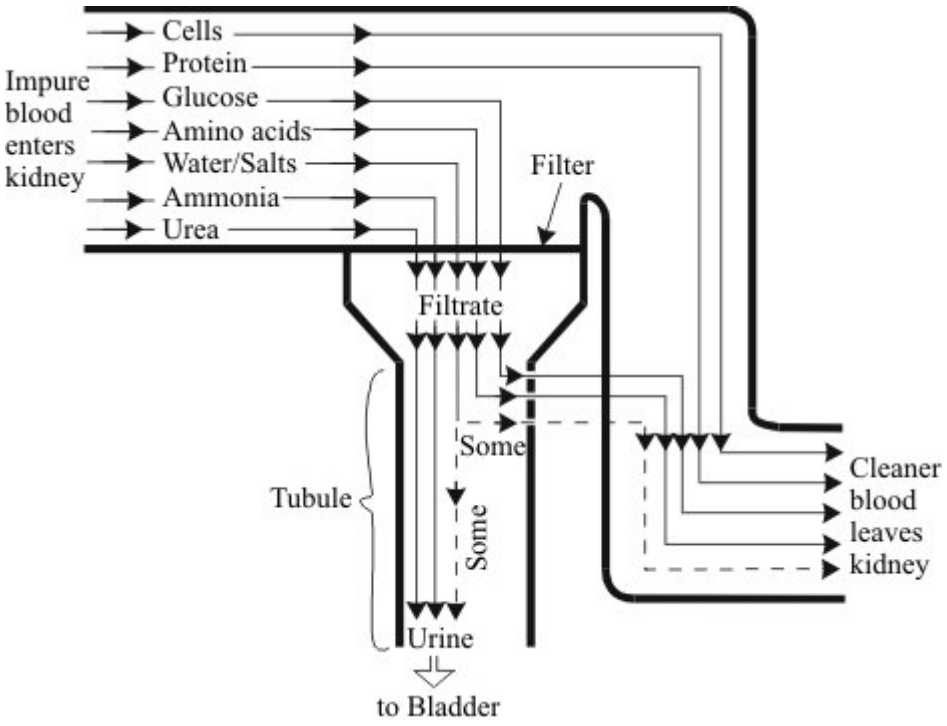
(Total 4 marks)

Q14.

The job of our kidneys is to remove unwanted substances from our blood.

Substances which are needed in the blood must not be lost.

The flow-diagram below shows how the kidneys do this job.



(a) Describe what happens to the glucose and amino acids in the kidney.

_____

_____

_____

_____

(4)

(b) A man has 5 litres of blood in his body.

In one day:
- the kidneys filter out 170 litres of liquid from the blood.
- he produces 1.5 litres of urine.

(i) What % of the filtered liquid is reabsorbed?

_____

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_____

(2)

(ii) The man became ill because his kidneys would not absorb as much of the filtered liquid.

Write down **two** ways the man would be affected by this.

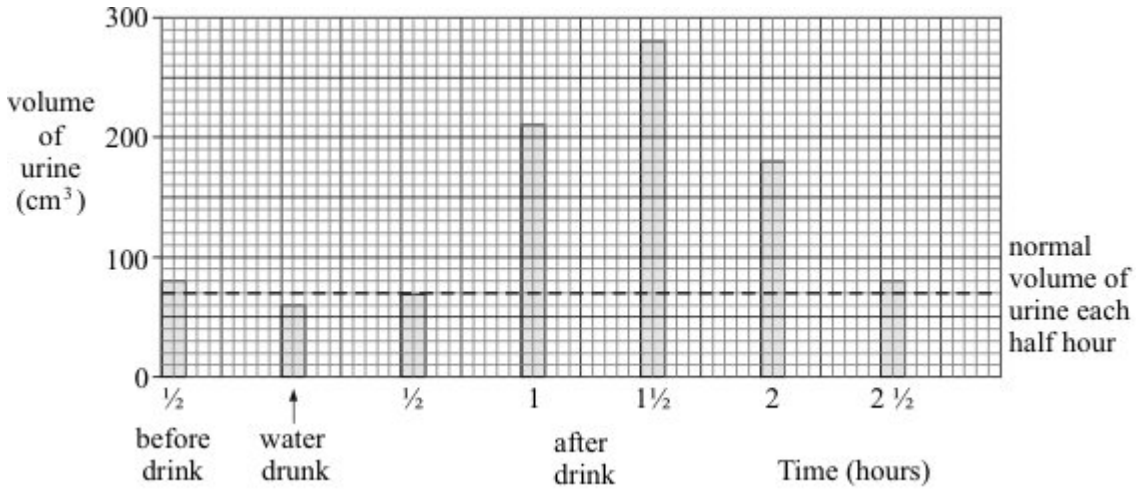
_____

_____

(2)

(c) In an experiment the man drank 800cm³ of water.

The diagram shows the effect this had on the volume of urine the man produced each 30 minutes.



Describe, in as much detail as you can, how drinking the water affected the volume of urine produced afterwards.

_____

_____

_____

_____

_____

_____

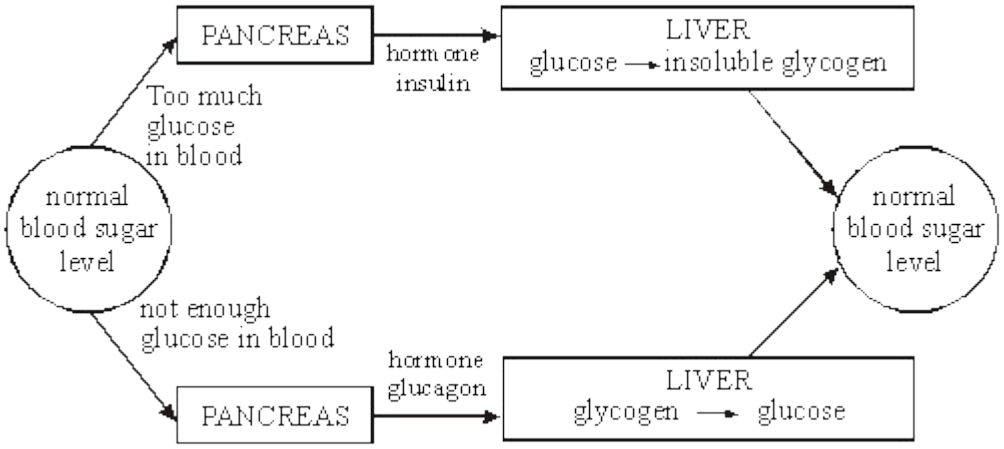
_____

(5)

(Total 13 marks)

Q15.

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The diagram shows how the blood sugar level is controlled in the body.

Explain fully what would happen if somebody ate some glucose tablets.

_____

_____

_____

_____

_____

_____

(Total 4 marks)

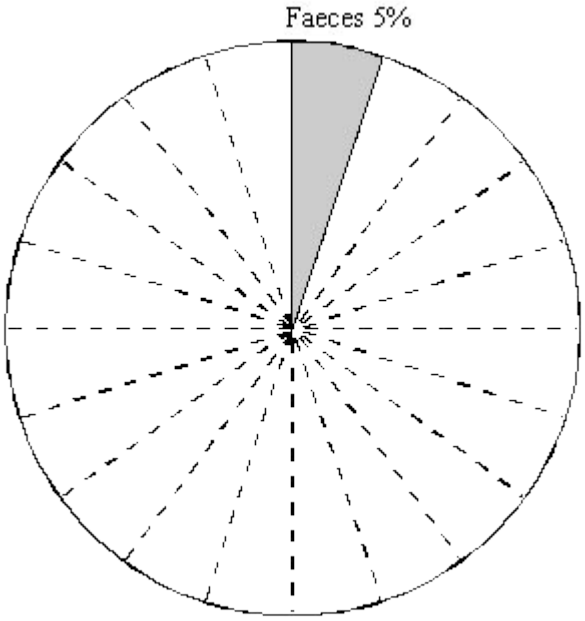
Q16.

The table below shows how the body loses water.

HOW WATER IS LOST	% (PERCENTAGE)
Breathing	10
Faeces	5
Sweat	45
Urine	40

Complete the diagram by showing the water loss for breathing, sweat and urine.

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(Total 3 marks)

Q17.

Kidneys are important as they remove waste from blood and balance our water needs.

Kidney failure can be treated by transplant or dialysis using a kidney "machine".

The money for expensive treatment for a few people could be used to provide more patients with less expensive treatment for other complaints.

Dialysis – kidney "machines"
Most expensive
Need own machine or share machine in hospital
Restricted life – special diet, must return to machine
Can be used while patient waits for transplant

Kidney transplant
Very expensive but cheaper than dialysis
Need kidney from relative or from "newly" dead person
Independent
Transplant may be rejected

Discuss the advantages and disadvantages of using dialysis or kidney transplants to keep people alive.

_____

_____

_____

_____

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_____

_____

_____

(Total 5 marks)

Q18.

The figures below show the levels of carbon dioxide in air from 150 000 years ago.

TIME	CARBON DIOXIDE CONCENTRATION
1500 years ago	270 parts per million
1800 AD	290 parts per million
1957	315 parts per million
1983	340 parts per million

(a) Explain why carbon dioxide levels in the atmosphere are changing.

_____

_____

_____

_____

_____

(3)

(b) It is suggested that the increased level of carbon dioxide in the air is causing the atmosphere to warm up (the "Greenhouse Effect").

Describe, as fully as you can, **two** major effects of global warming and how these may affect the human population.

_____

_____

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_____

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_____

(6)

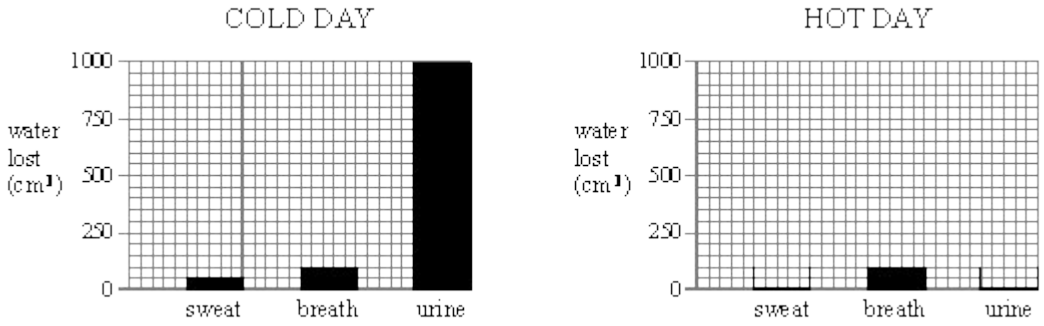
(Total 9 marks)

Q19.

The table shows how much water is lost from a boy's body on a cold day and on a hot day.

WATER LOST (cm^3)	COLD DAY	HOT DAY
in sweat	50	300
in breath	100	100
in urine	1000	750

(a) Use the figures in the table to complete the bar-chart for a hot day.



(2)

(b) How do the figures for the hot day compare with those for the cold day? Answer in as much detail as you can.

_____

_____

_____

_____

(4)

(c) The boy does the same things for the same amount of time on both days. Explain why the amounts of water lost in sweat and urine change.

Sweat _____

_____

Urine _____

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_____

(2)

(Total 8 marks)

Q20.

The table shows how much water is lost from a boy's body on a cold day and on a hot day.

WATER LOST (cm^3)	COLD DAY	HOT DAY
in sweat	50	300
in breath	100	100
in urine	1000	750

(a) How do the figures for the hot day compare with those for the cold day? Answer in as much detail as you can.

_____

_____

_____

_____

_____

(2)

(b) The boy does the same things for the same amount of time on both days.

Explain why the amounts of water lost in sweat and urine change.

Sweat _____

_____

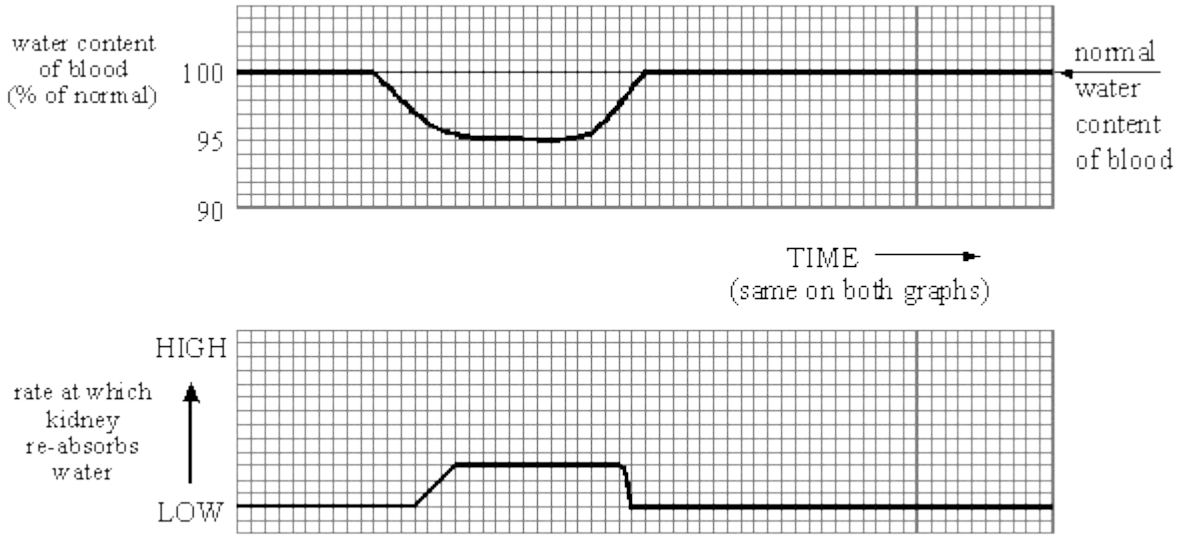
Urine _____

_____

(2)

(c) The rate at which the kidney re-absorbs water depends on the percentage of water in the blood.

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Describe, as fully as you can, what the graphs tell you.

_____

_____

_____

_____

(4)

(d) How does your body control the rate at which your kidney re-absorbs water?

_____

_____

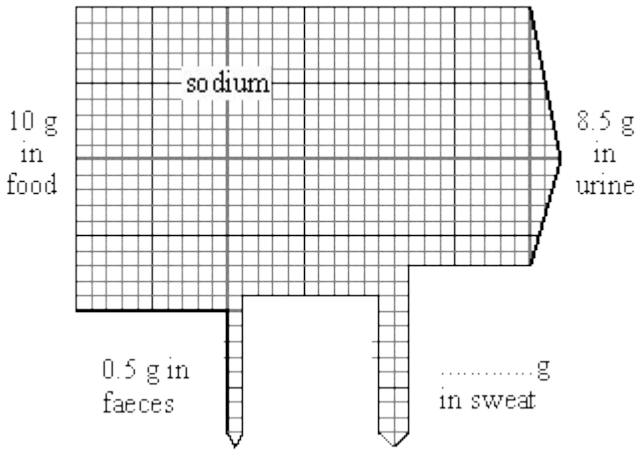
(2)

(Total 10 marks)

Q21.

To stay healthy, the amount of sodium in your body must not change very much.

On average, a girl takes in 10 grams of sodium a day in the food she eats.
The diagram shows what happens to this sodium.



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(a) Add the missing figure to the diagram.

(1)

(b) The girl goes on holiday to a very hot place.
Her diet stays the same but she now loses 12g of sodium each day in sweat.

(i) How will this affect the amount of sodium she loses each day in her urine?

_____

(1)

(ii) What should the girl do to make sure that her body still contains enough sodium?

_____

(1)

(c) Usually, there is no glucose in urine. All of the glucose is re-absorbed from your kidney tubules back into your blood. Complete the following sentences to describe how this happens.

The glucose is re-absorbed by a process called _____

This process is needed because some of the glucose is re-absorbed against

_____

(2)

(Total 5 marks)

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