AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



EXAM QUESTION PACK

4.5.2 THE HUMAN NERVOUS SYSTEM (PACK 2)

SCORE	PERCENTAGE
/217	%

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Q1.

A group of students is going on an outdoor expedition.
The students need to keep warm in windy conditions.

The table shows the effect of wind speed on how quickly someone gets frostbite at different air temperatures.

Wind speed in metres per second	Air temperature in °C				
	10	0	–10	–20	–30
0					
5					
10					
15					
20					

Key

Time taken to get frostbite:

- No frostbite
- 30 minutes
- 10 minutes
- 5 minutes

(a) (i) Describe the effect of changing air temperature on the time taken to get frostbite.

_____

_____

(1)

(ii) What is the longest time it is safe to stay outside when the air temperature is –20 °C and the wind speed is 10 metres per second?

_____ minutes

(1)

(b) When core body temperature begins to fall, changes may happen in the body.

Which **two** changes will happen when core body temperature begins to fall?

Tick (✓) **two** boxes.

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More blood flows through skin capillaries	
Muscles ‘shiver’	
Blood vessels supplying the skin capillaries constrict	
Sweat glands release more sweat	

(2)
(Total 4 marks)

Q2.

The nervous system allows humans to react to their surroundings.

(a) Sense organs have receptors. Receptors detect *changes in the environment.*

Which word describes *a change in the environment?*

Draw a ring around **one** answer.

an effector **a neurone** **a stimulus**

(1)

(b) The photograph shows a baby.
Labels **A**, **B**, **C**, **D** and **E** show some of the baby’s sense organs.

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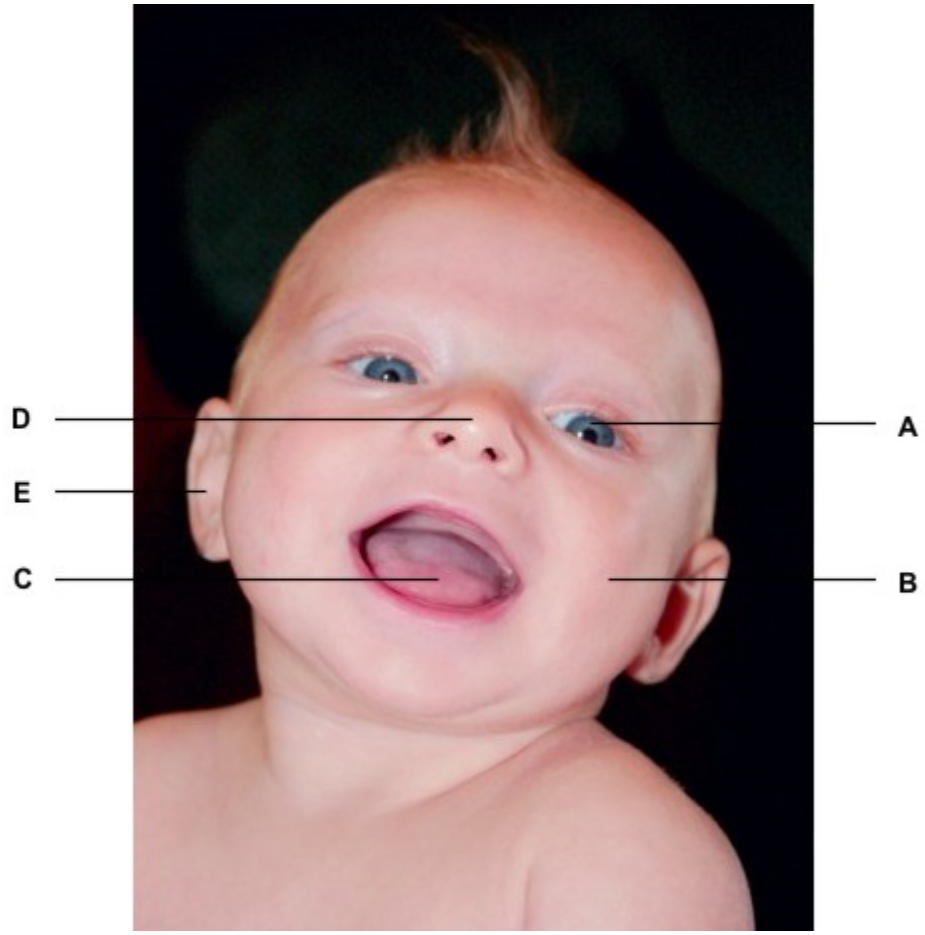


Photo by D. Sharon Pruitt [CC-BY-2.0], via Wikimedia Commons

Answer each question by writing **one** letter, **A**, **B**, **C**, **D** or **E**, in each box.

(i) Which sense organ has receptors sensitive to light? ☐

(1)

(ii) Which **two** sense organs have receptors sensitive to chemicals?

☐ and ☐

(2)

(iii) Which sense organ has receptors sensitive to changes in the baby's position?

☐

(1)

(c) Information from sense organ **A** is passed along nerve cells.
The information is coordinated to produce a response.

Which organ in the body coordinates the information?

_____

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(1)
(Total 6 marks)

Q3.

(a) **List A** gives the names of three stages in trialling a new drug.

List B gives information about the three stages.

Draw a line from each stage in **List A** to the correct information in **List B**.

List A **Stage**	**List B** **Information**
	Used to find if the drug is toxic
Tests on humans including a placebo	
	The first stage in the clinical trials of the drug
Tests on humans using very small quantities of the drug	
	Used to find the optimum dose of the drug
Tests on animals	
	Used to prove that the drug is effective on humans

(3)

(b) Read the passage.

Daily coffee dose delays development of Alzheimer's in humans.

Alzheimer's is a brain disease that causes memory loss in elderly people. Scientists studied 56 mice that had been genetically engineered to develop Alzheimer's.

Before treatment all the mice did badly in memory tests.

Half the mice were given a daily dose of caffeine in their drinking water. The dose was equivalent to the amount of caffeine in six cups of coffee for

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a human.

The other mice were given ordinary water.

After two months, the caffeine-drinking mice did better in memory tests than the mice drinking ordinary water.

The headline for the passage is not justified.

Explain why as fully as possible.

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(Total 6 marks)

Q4.

One group of scientists is working in a hot desert and another group is working in a tropical rainforest.

The table shows information about the scientists and the conditions in the desert and the rainforest.

Information	Hot desert	Rainforest
Mean core body temperature of scientists in °C	37.3	38.9
Air temperature in °C	36.0	35.5
Mean percentage concentration of moisture in the air	9.0	92.0
Mean wind speed at ground level in metres per second	12.0	3.0

(a) Both groups of scientists are doing similar jobs. The jobs cause the scientists to sweat a lot.

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Use information from the table to explain the difference in the mean core body temperature of the two groups of scientists.

_____

_____

_____

_____

_____

(2)

(b) Changes to blood vessels in the skin help to decrease body temperature.

Explain how.

_____

_____

_____

_____

_____

(2)
(Total 4 marks)

Q5.

The temperature in a sauna is much hotter than core body temperature.

A woman sits in a sauna.
The high temperature of the sauna causes the woman's core body temperature to rise.

(a) When the woman's core body temperature rises, the woman's rate of sweating increases.

Explain why.

_____

_____

_____

_____

(2)

(b) The woman comes out of the sauna.
The woman's skin looks redder than when she went into the sauna.

Describe what happened to the blood circulation in her skin to cause this change in colour.

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_____

_____

_____

_____

(2)

(c) After coming out of the sauna the woman gets into a bath of icy water. This makes the woman shiver.

(i) What process brings about shivering?

_____

_____

(1)

(ii) Shivering increases body temperature.

Explain how.

_____

_____

_____

_____

(2)

(Total 7 marks)

Q6.

The photograph shows a new-born baby.



By SCA Svenska Cellulosa Aktiebolaget [CC-BY-2.0], via Wikimedia Commons

(a) New-born babies have reflex actions. The reflex actions help new-born babies to survive.

Draw a line from each reflex action to the way in which it helps the baby to survive.

Reflex action	**How the reflex action helps**

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the baby

If milk goes down the baby's windpipe the baby coughs	Helps the baby to hold on to the mother
If the mother touches the palm of the baby's hand, the baby clenches its fist.	Prevents the baby from choking
If the mother strokes the baby's mouth, the baby begins to suck.	Helps to protect some of the baby's receptors
If a bright light shines on the baby, the baby's eyes shut.	Helps the baby to crawl
	Helps the baby to feed

(4)

(b) Which **two** of the following may be effectors in reflex actions?

Tick (✓) **two** boxes.

Brain ☐

Glands ☐

Motor neurones ☐

Muscles ☐

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Sensory neurones ☐

(2)
(Total 6 marks)

Q7.

Caffeine is a *recreational* drug found in drinks such as coffee and cola.

(a) What is meant by a *recreational drug*?

_____

_____

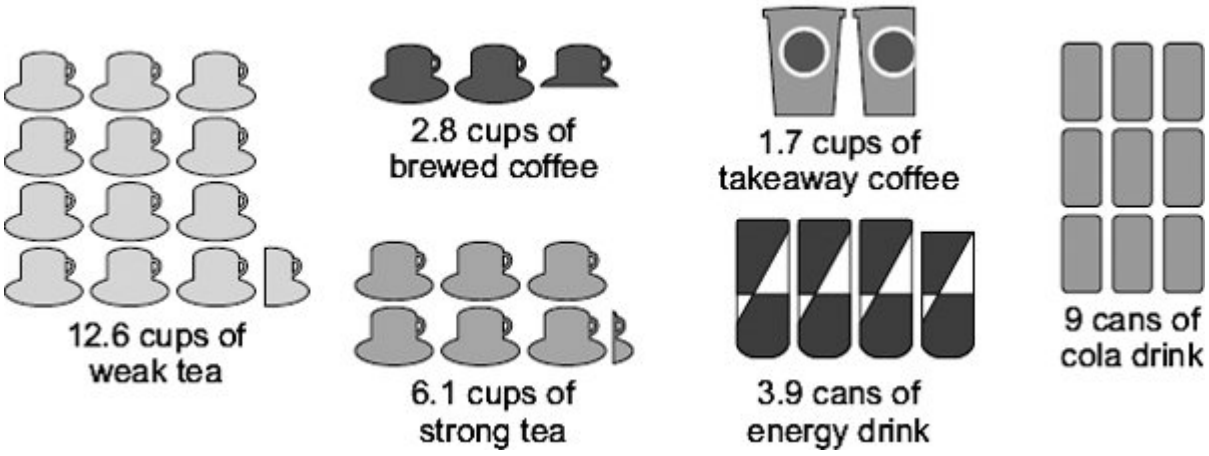
(1)

(b) Scientists investigated the effect on the brain of drinking large amounts of caffeine.

They chose students whose drinks contained caffeine equal to at least seven cups of instant coffee each day.

The diagram compares the amount of caffeine in different drinks.

Seven cups of instant coffee a day equals:



(i) Seven cups of instant coffee contain 315 mg of caffeine.

How much caffeine is there in **one** cup of instant coffee?

_____

Amount of caffeine _____ mg

(1)

(ii) Which drink in the diagram contains the highest amount of caffeine?

Tick (✓) **one** box.

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A cup of weak tea ☐

A cup of takeaway coffee ☐

A can of cola ☐

(1)

(c) Caffeine may cause hallucinations.

One example of a hallucination is hearing voices that are not there.

The scientists found that students who drank more than seven cups of instant coffee per day were three times more likely to have hallucinations than students who drank one cup or less.

Which is the best conclusion?

Tick (✓) **one** box.

Drinking caffeine causes hallucinations. ☐

It is dangerous to drink caffeine. ☐

There is a link between drinking caffeine and hallucinations. ☐

(1)

(Total 4 marks)

Q8.

A walker falls through thin ice into very cold water.

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The walker's core body temperature falls. He may die of hypothermia (when core body temperature falls too low).

(a) (i) Which part of the brain monitors the fall in core body temperature?

_____

(1)

(ii) How does this part of the brain detect the fall in core body temperature?

_____

_____

_____

_____

(2)

(b) While in the water the walker begins to shiver.

Shivering helps to stop the core body temperature falling too quickly.

Explain how.

_____

_____

_____

_____

(2)

(c) The walker had been drinking alcohol.

Alcohol causes changes to the blood vessels supplying the skin capillaries, making the skin look red.

(i) Describe the change to the blood vessels.

_____

_____

(1)

(ii) The walker is much more likely to die of hypothermia than someone who has not been drinking alcohol.

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Explain why.

_____

_____

_____

_____

(2)

(Total 8 marks)

Q9.

Conditions inside the body must be kept constant.

(a) Urea must be removed from the body.

(i) Name the organ which makes urea.

_____

(1)

(ii) Which organ removes urea from the body?

_____

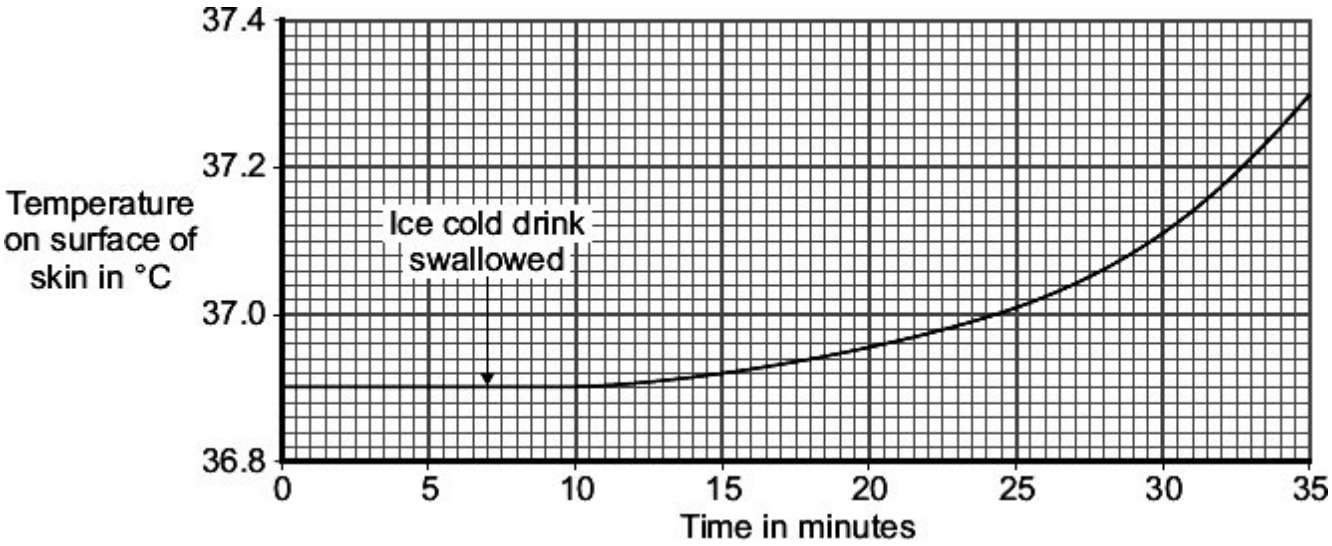
(1)

(iii) What is urea made from?

_____

(1)

A man sat in a room where the temperature was maintained at 40 °C. The temperature on the surface of his skin was monitored for 35 minutes. He swallowed an ice cold drink at the time indicated on the graph.



(b) The sweat glands contribute to the change in the temperature on the surface of the skin shown on the graph.

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Explain how.

_____

_____

_____

_____

_____

_____

(2)

(c) The blood vessels near the surface of the skin also contribute to the changes in skin temperature shown on the graph.

(i) How do the blood vessels in the skin change when the core body temperature falls?

_____

_____

(1)

(ii) How does this change in the blood vessels explain the change in the skin temperature shown on the graph?

_____

_____

(1)

(Total 7 marks)

Q10.

The photograph shows a girl waiting to cross a road.



© Lionel Lassman

(a) Name **two** different sense organs she would use to detect when it is safe to cross the road.

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1. _____

2. _____

(2)

(b) Which sense organ contains receptors that help the girl to keep her balance?

_____

(1)

(c) (i) Complete the sentence.

A car driver automatically brakes if a child dashes out into the road.

This is called a _____ action.

(1)

(ii) Draw a ring around the correct answer to complete the sentence.

In the nervous system, information passes along cells called

effectors
neurones
synapses

.

(1)

(Total 5 marks)

Q11.

Reflex actions are rapid and automatic.

(a) Name the following structures in a reflex action.

(i) The structure that detects the stimulus.

_____

(1)

(ii) The neurone that carries impulses to the central nervous system.

_____

(1)

(iii) The neurone that carries impulses away from the central nervous system.

_____

(1)

(iv) The structure that brings about the response.

_____

(1)

(b) Describe what happens at a synapse when an impulse arrives.

_____

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_____

_____

_____

_____

(2)

(c) Some people have a condition in which information from the skin does not reach the brain.

Explain why this is dangerous for the person.

_____

_____

_____

_____

_____

(2)

(Total 8 marks)

Q12.

During exercise an athlete's core body temperature may rise.

(a) What causes this rise in core body temperature?

_____

_____

(1)

(b) During a long race one athlete did not drink any liquid. Towards the end of the race the amount of sweat he produced began to fall.

(i) This athlete's core body temperature increased more than that of other similar athletes who had drunk enough liquid during the race.

Explain why.

_____

_____

_____

_____

_____

(2)

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(ii) Describe **one** other way in which this athlete's body would respond in order to reduce core body temperature.

_____

_____

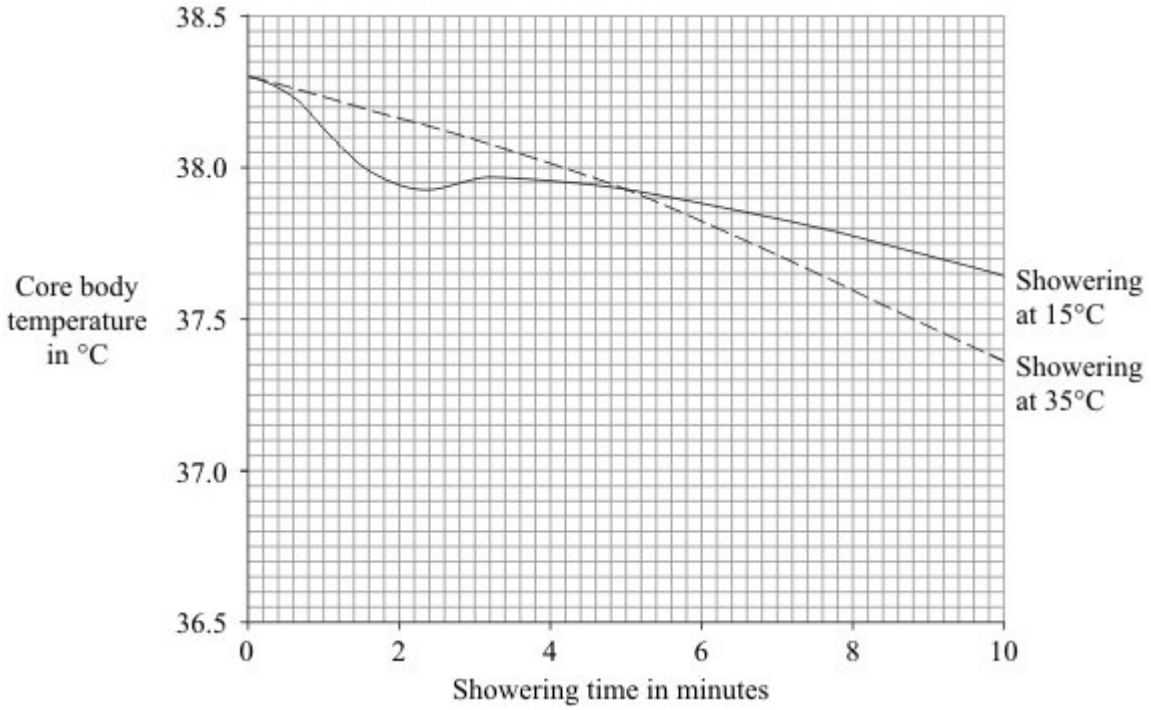
_____

_____

_____

(2)

(c) The graph shows the effects of showering for ten minutes at 15 °C and at 35 °C on core body temperature after a long race.



Suggest an explanation for the differences in core body temperature:

(i) between 0 and 2 minutes

_____

_____

_____

(1)

(ii) between 4 and 10 minutes.

_____

_____

_____

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_____

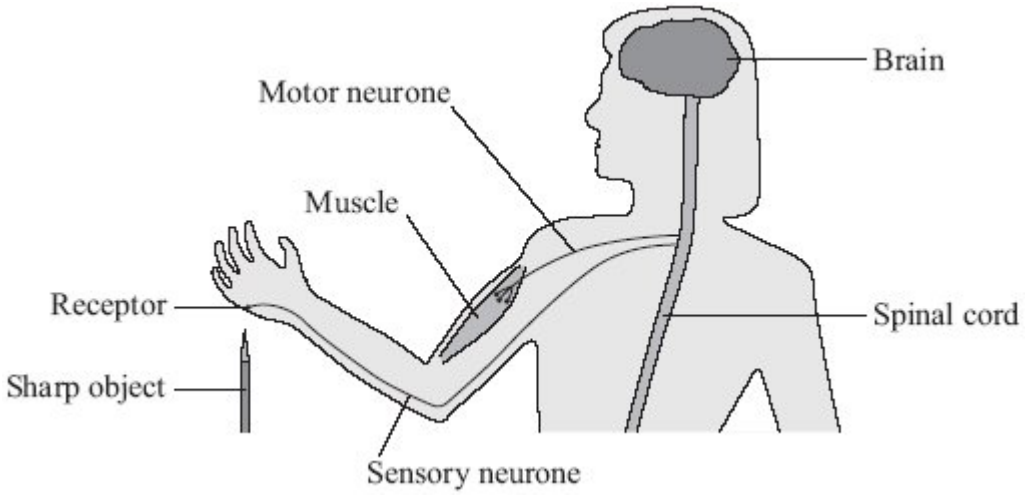
_____

(2)

(Total 8 marks)

Q13.

A student accidentally touches a sharp object.
Her hand is immediately pulled away from the object.
The diagram shows the structures involved in this response.



(a) Use the correct word or phrase **from the diagram** to complete each sentence.

(i) The stimulus is detected by the _____

(1)

(ii) Impulses travel to the central nervous system along a

cell called a _____

(1)

(iii) Impulses travel from the central nervous system to the effector

along a cell called a _____

(1)

(iv) The hand is pulled away from the sharp object by the

_____

(1)

(b) Where in the body are there cells sensitive to:

(i) light _____

(1)

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(ii) sound _____

(1)

(iii) changes in position? _____

(1)

(Total 7 marks)

Q14.

(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)

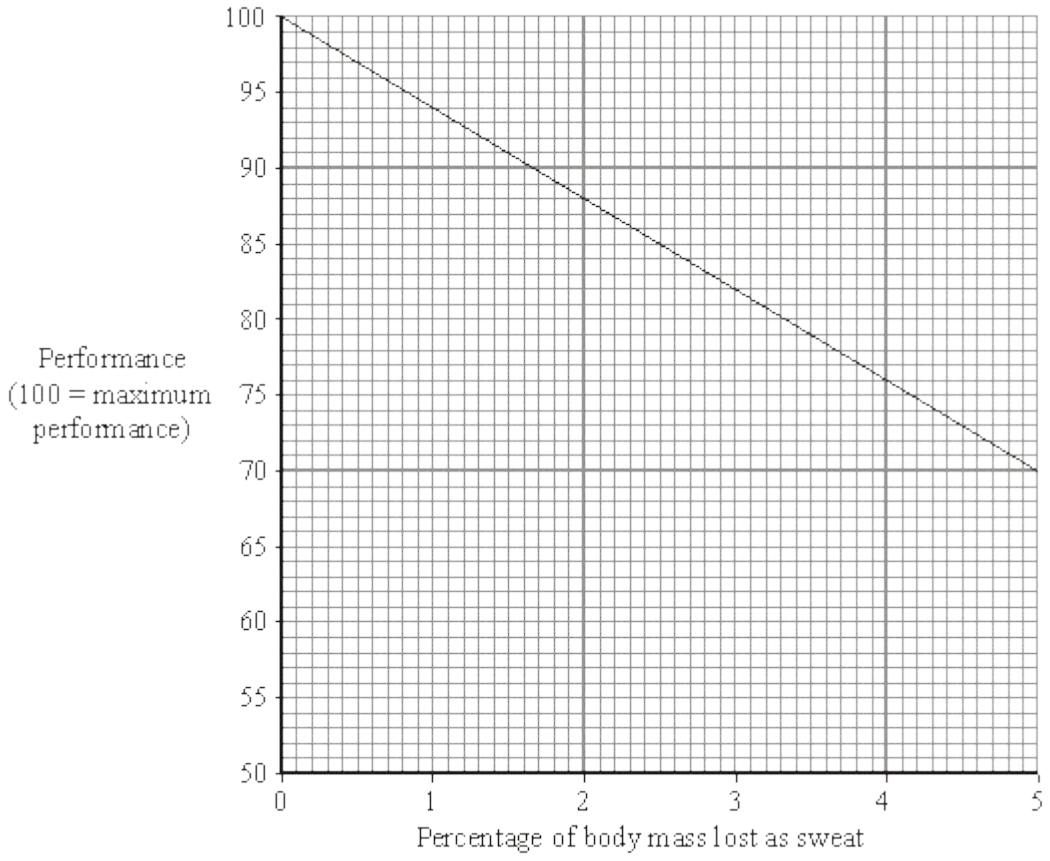
(iii) Excess water leaves the body in a liquid called urine.

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.



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

_____

_____

(1)

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

_____

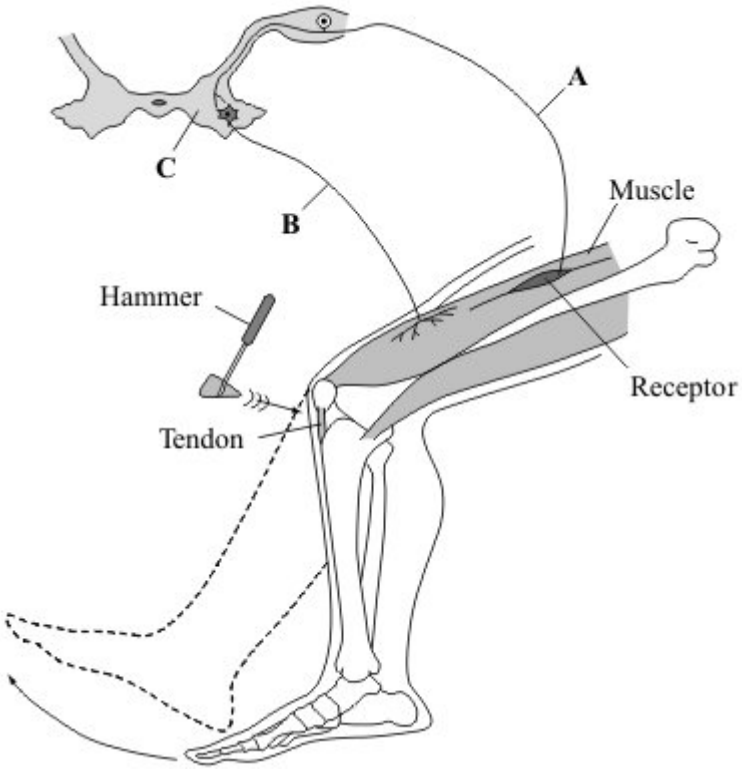
_____

(1)

(Total 5 marks)

Q15.

The diagram shows the structures involved in the knee-jerk reflex. When the tendon is struck with the hammer, the receptor is stimulated and the lower leg moves forward.



(a) Name the structures labelled **A**, **B** and **C**.

A _____

B _____

C _____

(3)

(b) How is information passed from structure **A** to structure **B**?

_____

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_____

(1)

(c) What is the effector in this response?

_____

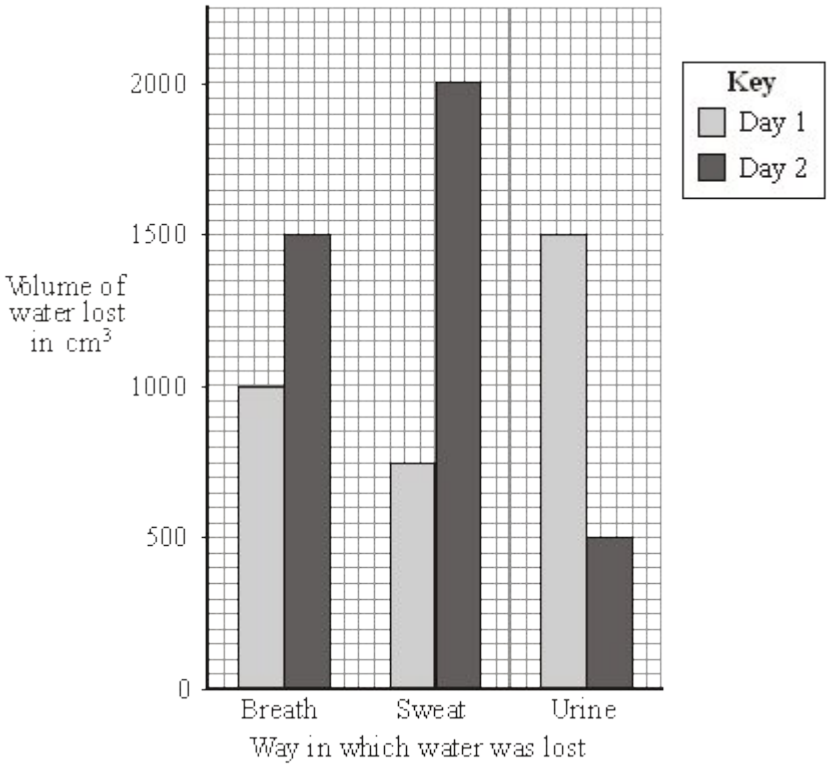
(1)

(Total 5 marks)

Q16.

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)

Q17.

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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

_____

_____

_____

_____

(2)

(ii) The skin

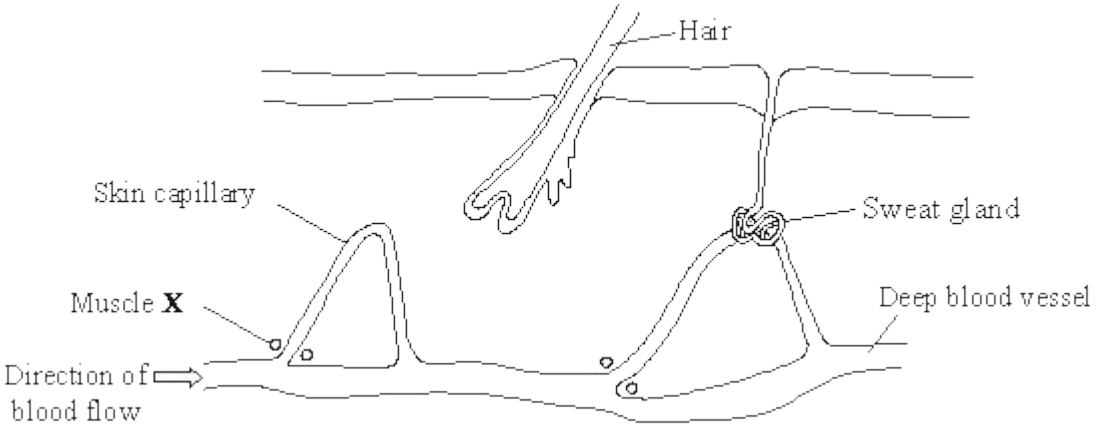
_____

_____

(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)

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Q18.

The drawing shows a group of people in a café.



(a) Use words from the box to answer the questions.

brain	eye	nose	skin	tongue

Which organ contains receptors that allow a person to:

(i) read the newspaper _____

(1)

(ii) smell the coffee _____

(1)

(iii) feel how hot the cup is _____

(1)

(iv) taste the coffee? _____

(1)

(b) A cigarette manufacturer increased the amount of nicotine in cigarettes by 11% between 1997 and 2006. The manufacturer did not tell the public about this change.

(i) Suggest **one** reason why the manufacturer increased the amount of nicotine in the cigarettes.

_____

_____

(1)

(ii) Suggest **one** reason why the manufacturer did not tell the public about the change.

_____

_____

(1)

(Total 6 marks)

Q19.

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

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

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.

$\frac{1}{4}$ ☐

$\frac{1}{3}$ ☐

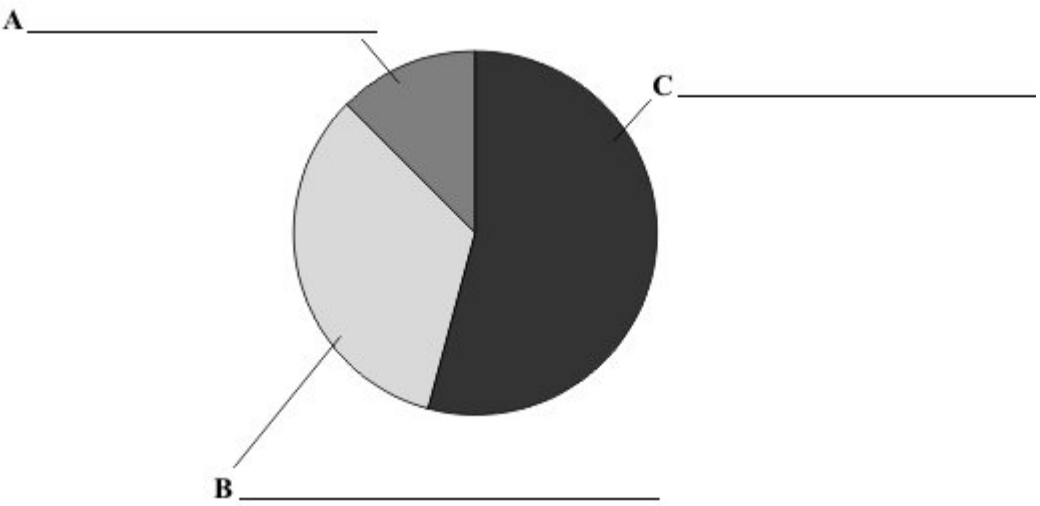
$\frac{1}{2}$ ☐

(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)

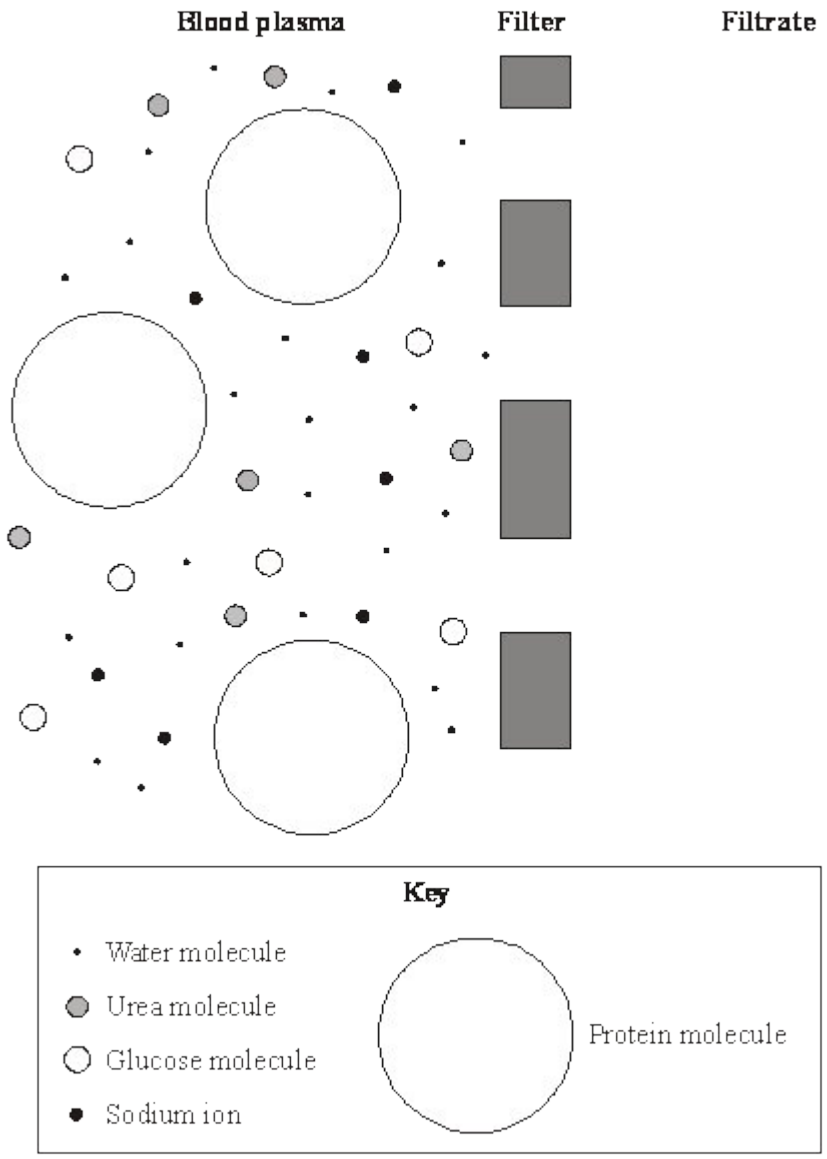
(Total 7 marks)

Q20.

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)

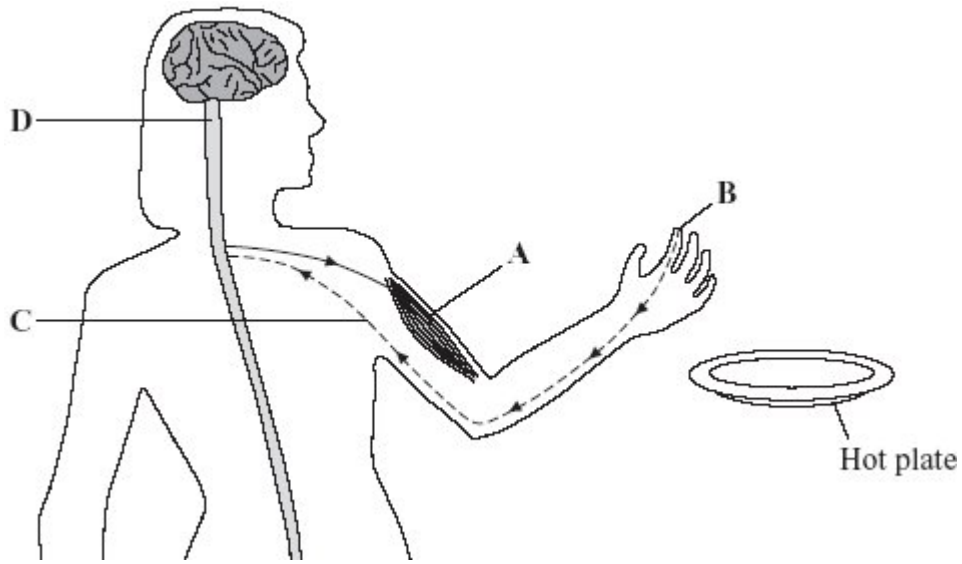
(Total 6 marks)

Q21.

A girl picks up a hot plate. A reflex action causes her to drop it.

The diagram shows some of the structures involved in this reflex action.

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Use words from the box to name the structures labelled **A**, **B**, **C** and **D**.

brain	**gland**	**muscle**	**neurone**	**receptor**	**spinal cord**

A _____

B _____

C _____

D _____

(Total 4 marks)

Q22.

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)

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(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)

Q23.

Each week, an athlete trains on 5 days (training days) but does not train on the other 2 days (rest days).

The table shows how water losses from the athlete's body are different on a rest day from those on a training day.

	Volume of water lost in cm^3	
Method	**Rest day**	**Training day**
Urine	1500	900
Sweating	625	2400
Breathing	450	1500
Faeces	125	120
Total	2700	

(a) Complete the table to show the total volume of water lost by the athlete on a training day.

(1)

(b) Explain why the athlete sweats more on a training day.

_____

_____

_____

_____

(2)

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(c) On a training day, the athlete needs to take in more water.

Explain why the athlete needs to take in more water on a training day.

_____

_____

_____

_____

(2)

(Total 5 marks)

Q24.

(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.

(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.

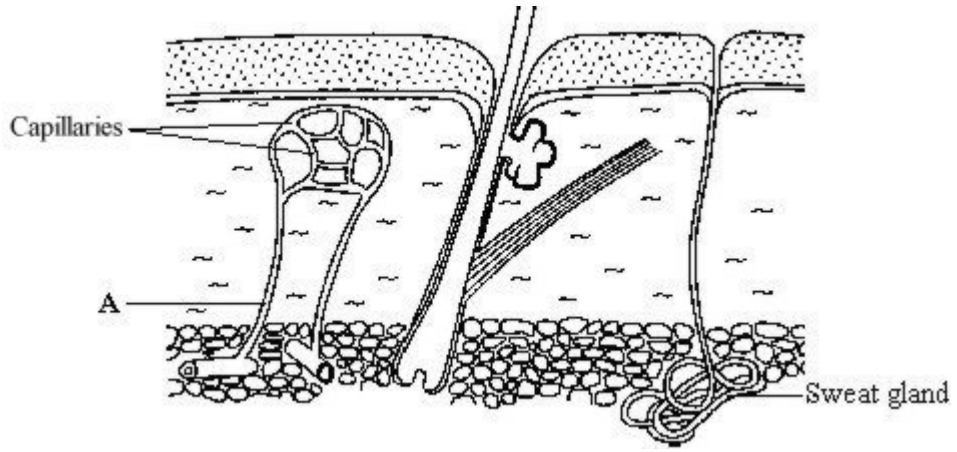
_____

_____

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.

_____

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_____

_____

_____

_____

(3)

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

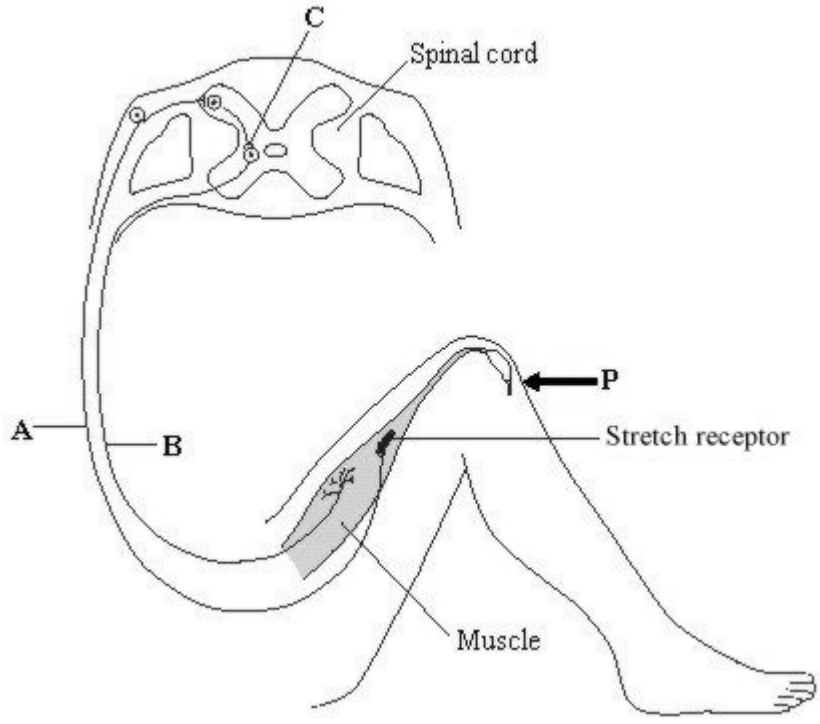
_____

(1)

(Total 7 marks)

Q25.

The diagram shows the nervous pathway which is used to coordinate the knee-jerk reflex. When the person is hit at point **P**, the lower leg is suddenly raised.



(a) (i) Name the type of neurone labelled **A**. _____

(1)

(ii) **On the diagram**, draw arrows next to the neurones labelled **A** and **B** to show the direction in which an impulse moves in each neurone.

(1)

(b) How is information passed across the synapse at **C**?

_____

(1)

(c) **On the diagram**, label the effector with the letter **X**.

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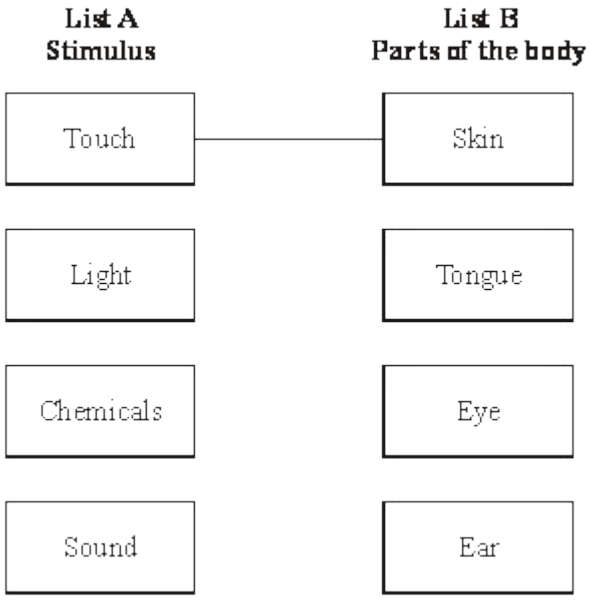
(1)

(Total 4 marks)

Q26.

(a) List **A** gives the names of four stimuli. List **B** gives four parts of the human body.

Draw a straight line from each stimulus in List **A** to the part of the body in List **B** which has receptors for that stimulus.
(One has been done for you.)



(3)

(b) Complete the following sentence by choosing the correct words from the box.

brain	**glands**	**motor**	**sensory**

To make us aware of a stimulus, impulses are sent along a _____

neurone to the _____

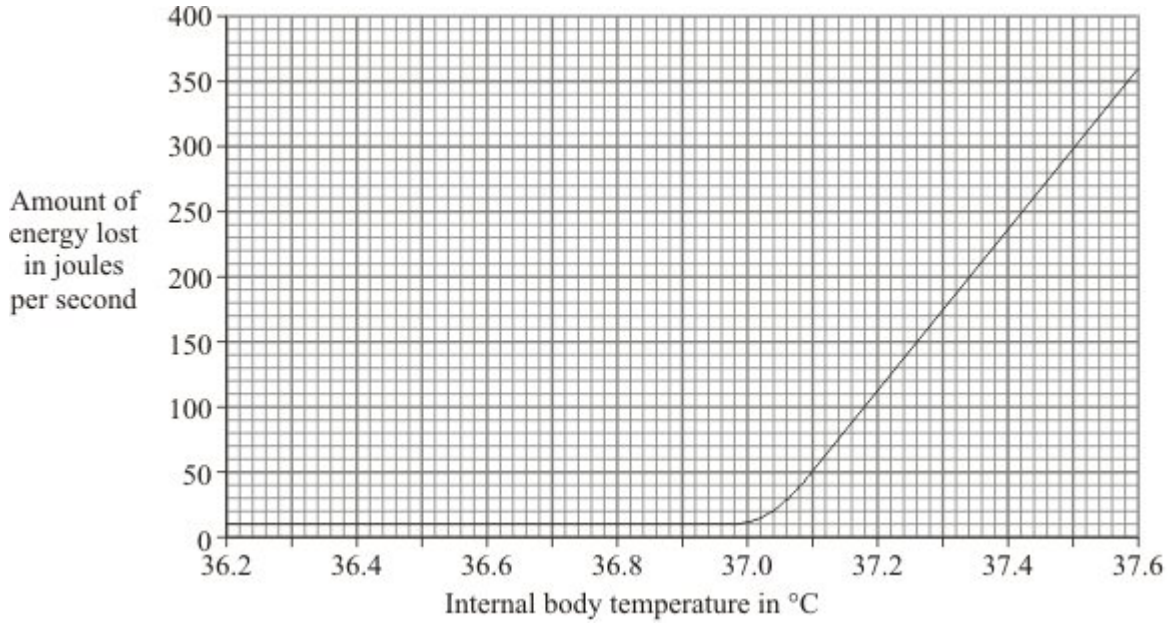
(2)

(Total 5 marks)

Q27.

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.

_____

_____

_____

_____

_____

_____

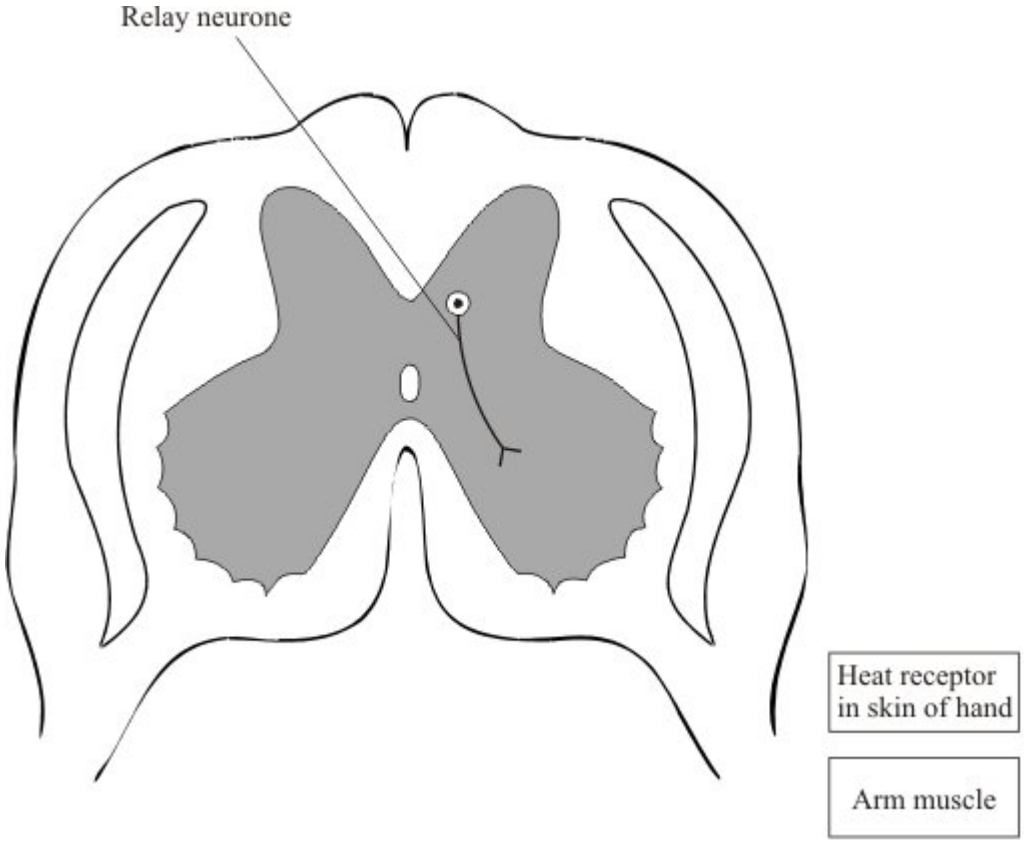
(3)

(Total 7 marks)

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Q28.

The diagram shows a section through the spinal cord.



(a) Coordination of a reflex movement of the arm, in response to the hand touching a hot object, involves three neurones. One of these, the relay neurone, is shown in the diagram. Complete the nerve pathway between the receptor and the muscle on the diagram by drawing and labelling:

(i) the sensory neurone;

(ii) the motor neurone.

(2)

(b) The nerve pathway linking the heat receptor in the hand with the arm muscle is about 1.5 metres in length. It would take the nervous impulse 0.02 seconds to travel this distance along a neurone. However, it takes about 0.5 seconds for the arm to start moving during the reflex response to the heat stimulus.

Explain the difference.

_____

_____

_____

_____

(2)

(Total 4 marks)

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Q29.

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.

_____

_____

_____

_____

_____

_____

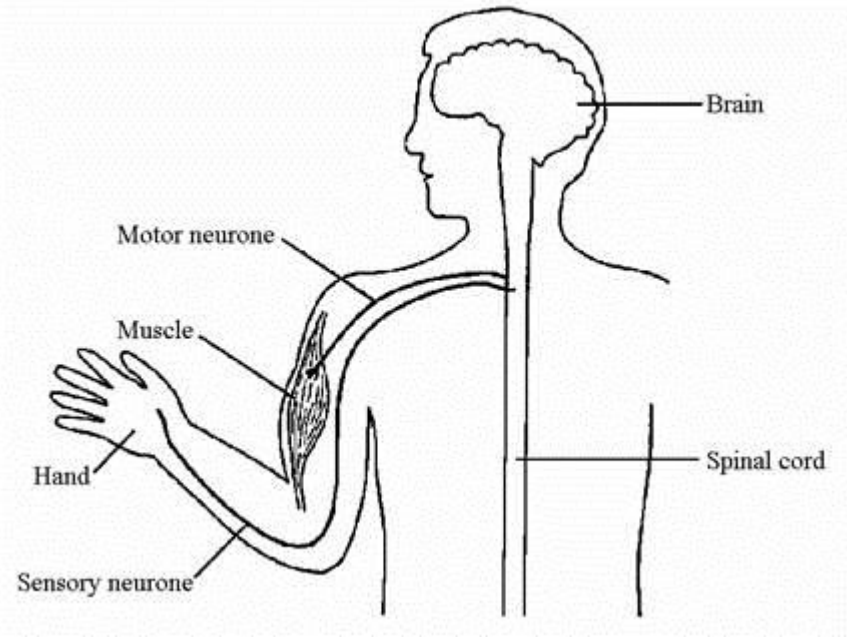
_____

(Total 6 marks)

Q30.

The diagram shows a reflex pathway in a human.

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(a) Label the *receptor* on the diagram.

(1)

(b) Label the *effector* on the diagram.

(1)

(c) (i) Suggest a stimulus to the hand that could start a reflex response.

_____

(1)

(ii) Describe the response that this stimulus would cause. _____

_____

_____

(1)

(d) Put arrows on the diagram to show the direction of the path taken by the nerve impulses.

(1)

(Total 5 marks)

Q31.

Humans use receptors to help them to respond to stimuli in the environment. Match up each receptor with the correct sense. One has been done for you.

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Receptor	Sense
ear	hearing
skin	taste
tongue	balance
skin	touch
eye	smell
ear	sight
nose	temperature

(Total 5 marks)

Q32.

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

Sugar + _____ = _____ + _____ + energy

(3)

(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.

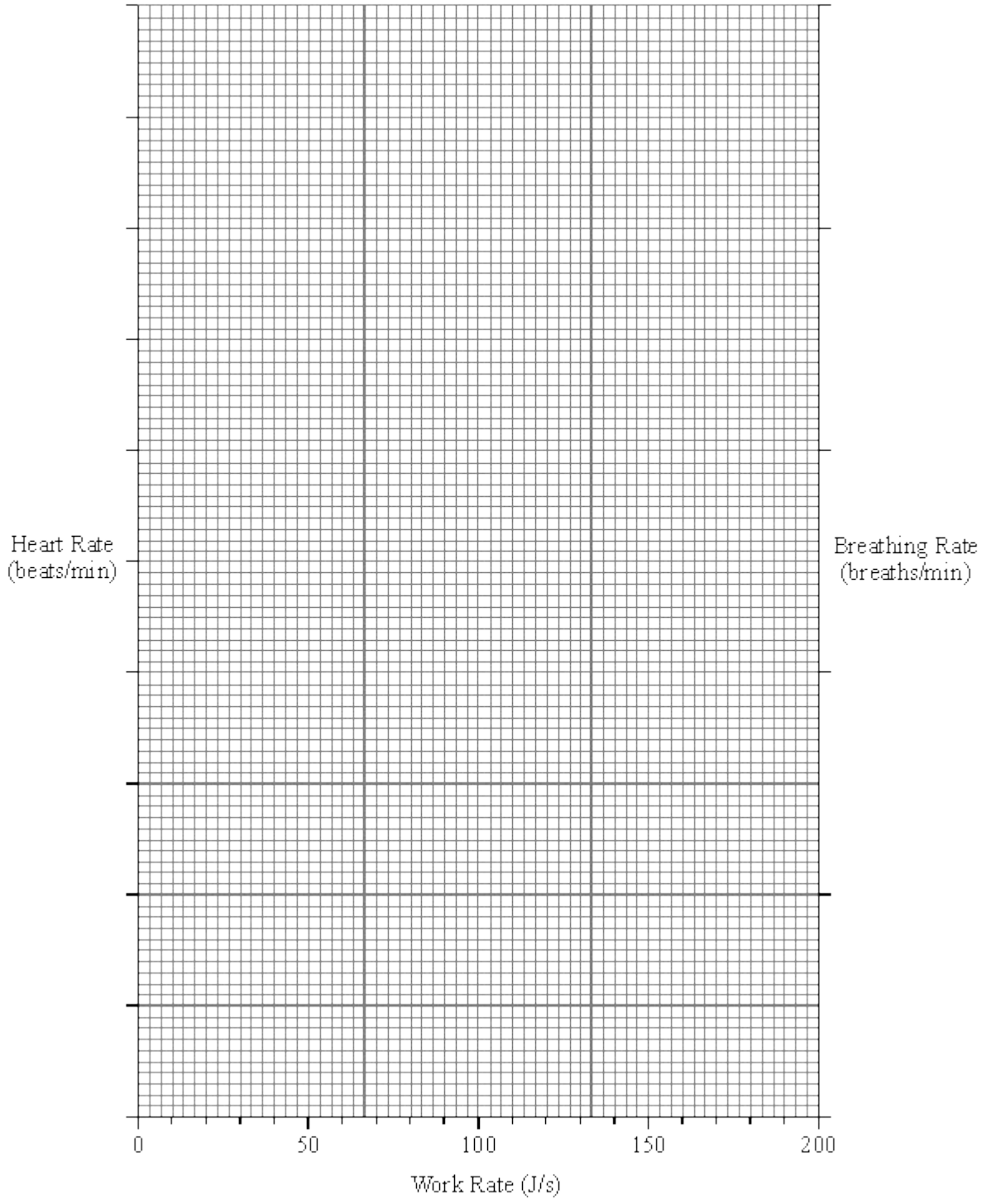
The table below shows the results which were obtained.

WORK RATE (J/s)	HEART RATE (beats/min.)	BREATHING RATE (breaths/min.)

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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.



(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; _____

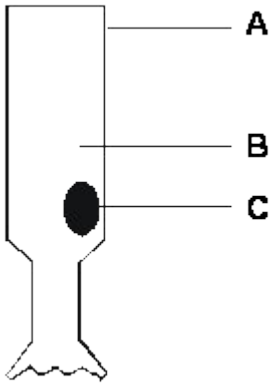
(iii) the effector. _____

(3)

(Total 15 marks)

Q33.

The drawing below shows a light-sensitive (receptor) cell from the eye. The structures labelled A, B and C, can be found in most animal cells.



(a) Name the structures labelled A, B and C.

A _____

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B _____

C _____

(3)

(b) Describe, as fully as you can, what happens in the nervous system when this receptor cell is stimulated by light.

_____

_____

_____

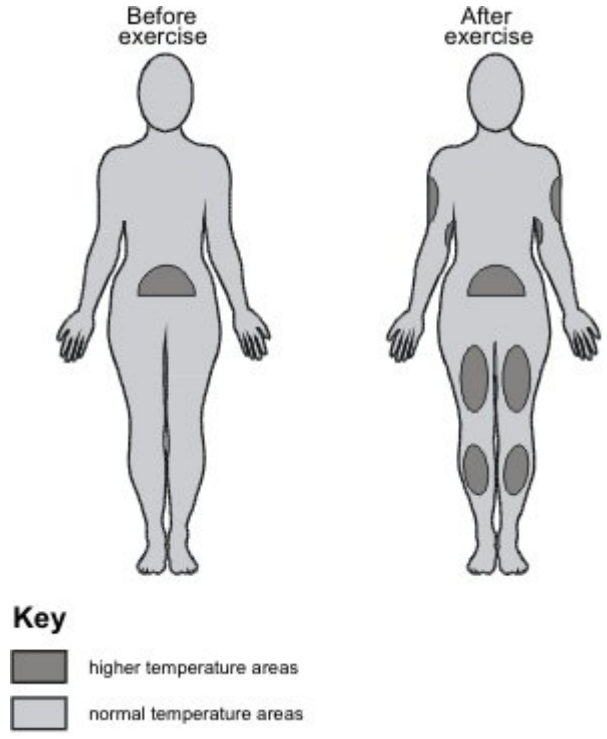
_____

(3)

(Total 6 marks)

Q34.

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.

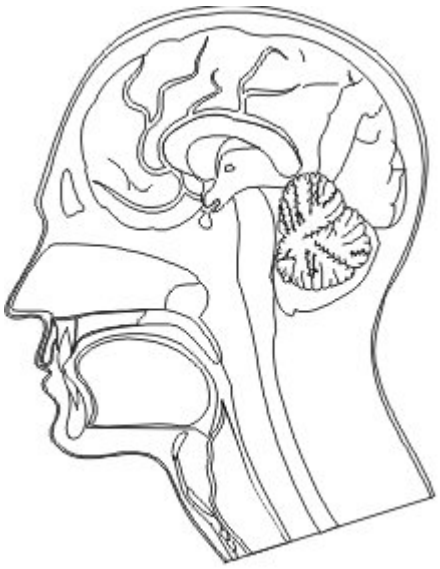


Explain, as fully as you can, the body mechanisms which affected the skin temperature to give the results shown in the drawings.

(Total 8 marks)

Q35.

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(a) **On the diagram**, use guidelines to label:

1 the brain;

2 the spinal cord.

(2)

(b) Some students are investigating the behaviour of a mouse. They use a large empty box. The box has squares marked on the floor, as shown in the diagram.

(C = corner square, S = side square, I = inside square)

C_1	S_1	S_2	S_3	C_2
S_{10}	I_1	I_2	I_3	S_4
S_9	I_6	I_5	I_4	S_5
C_4	S_8	S_7	S_6	C_3

They put a mouse in the empty box. They record which square the mouse is in every minute for 15 minutes. They get these results.

Time (minutes)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Position of mouse	C_1	C_1	S_2	C_3	C_3	S_9	I_3	C_1	C_1	C_1	S_8	C_4	C_4	C_1	S_2

(i) Fill in the table below to show how much time the mouse spends in the corner squares (C), the side squares (S) and the inside squares (I).

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POSITION	TIME (minutes)
Corner (C)	
Side (S)	
Inside (I)	

(3)

(ii) What pattern is shown by the results?

_____

_____

(1)

(iii) Suggest how the behaviour of the mouse might help its survival.

_____

_____

_____

_____

(2)

(Total 8 marks)

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