

Name:

Date:

B5 - Test 4
HOMEOSTASIS
Intermediate

GCSE

BIOLOGY

AQA - Triple Science

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

Information

- The marks for the questions are shown in brackets

1.

Many human actions are reflexes.

(a) Which **two** of the following are examples of reflex actions?

Tick **two** boxes.

Jumping in the air to catch a ball

Raising a hand to protect the eyes in bright light

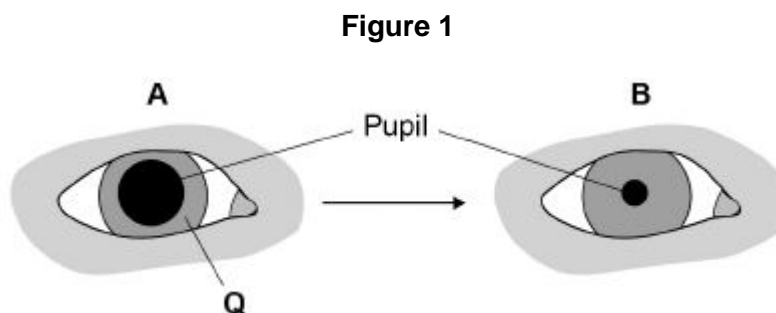
Releasing saliva when food enters the mouth

Running away from danger

Withdrawing the hand from a sharp object

(2)

Figure 1 shows how the size of the pupil of the human eye can change by reflex action.



(b) Name **one** stimulus that would cause the pupil to change in size from **A** to **B**, as shown in **Figure 1**.

(1)

(c) Structure **Q** causes the change in size of the pupil.

Name structure **Q**.

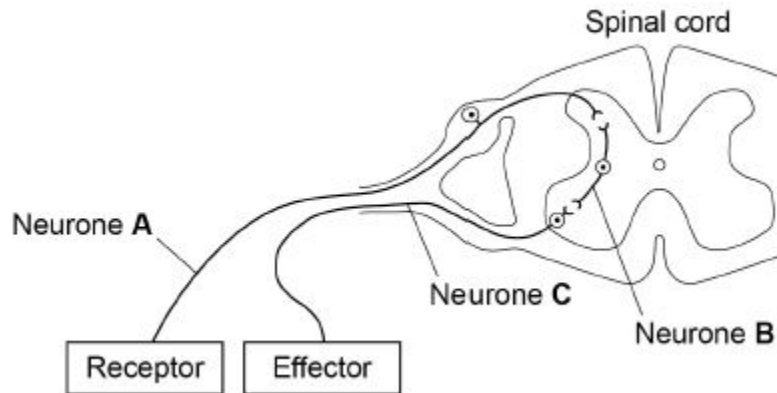
(1)

(d) Describe how structure **Q** causes the change in the size of the pupil from **A** to **B**.

(1)

(e) **Figure 2** shows some structures involved in the coordination of a reflex action.

Figure 2



- (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.

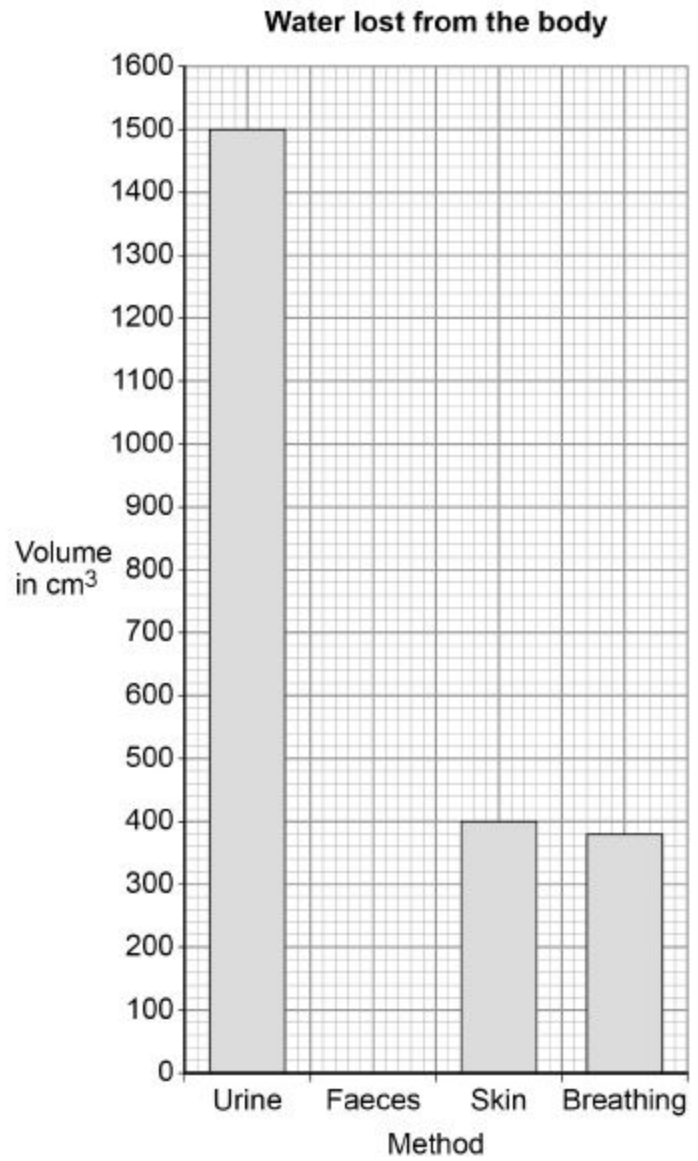
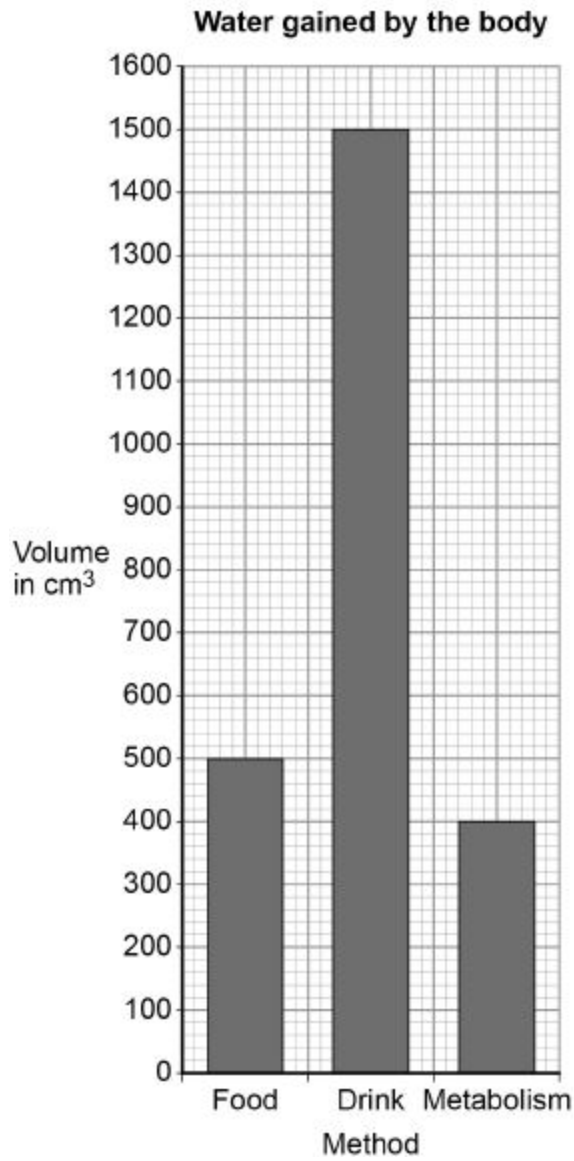
To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

(4)
(Total 6 marks)

3.

It is important to maintain water balance in the body.

The graphs below show how much water a person gained and lost by different methods in one day.



When water is balanced, the volume of water taken in by the body is equal to the volume of water lost from the body.

(a) Calculate the volume of water the person lost in one day in faeces.

Use information from the graphs above.

Volume lost in faeces = _____ cm³

(2)

(b) The graphs above show that one method of gaining water is by metabolism.

Which metabolic process produces water?

Tick **one** box.

- | | |
|-------------------------------------|--------------------------|
| Breakdown of protein to amino acids | <input type="checkbox"/> |
| Changing glycogen into glucose | <input type="checkbox"/> |
| Digestion of fat | <input type="checkbox"/> |
| Respiration of glucose | <input type="checkbox"/> |

(1)

The next day, the person ran a 10-kilometre race.

The volume of water lost from the body through the skin and by breathing increased.

(c) Explain why more water was lost through the skin during the race.

(2)

(d) Explain why more water was lost by breathing during the race.

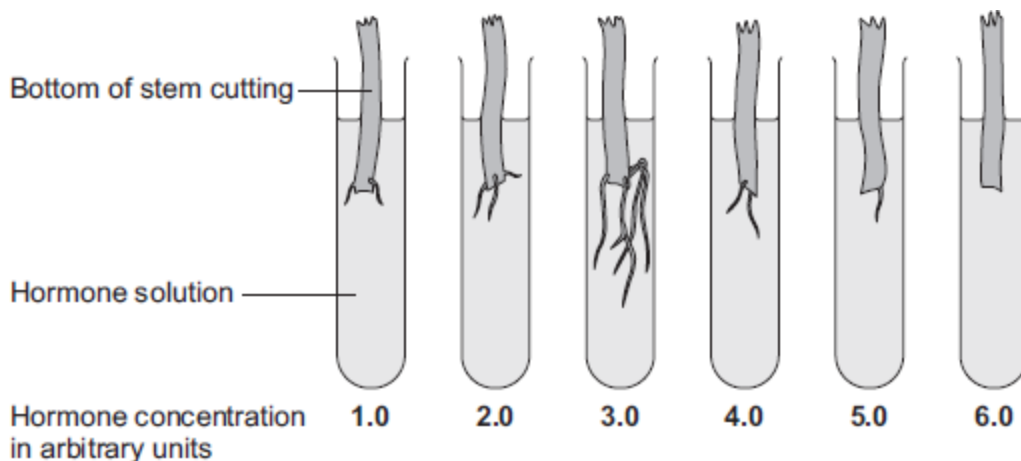
(3)
(Total 8 marks)

4.

(a) A student investigated the effect of a plant hormone on the growth of roots by plant cuttings.

The student took six stem cuttings from the same plant. He put the cuttings in test tubes containing hormone solutions of different concentrations.

The image below shows the six cuttings after 2 weeks.



(i) What is the best concentration of hormone for encouraging root growth?

_____ arbitrary units

(1)

(ii) Give **two** functions of plant roots.

1. _____

2. _____

(2)

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

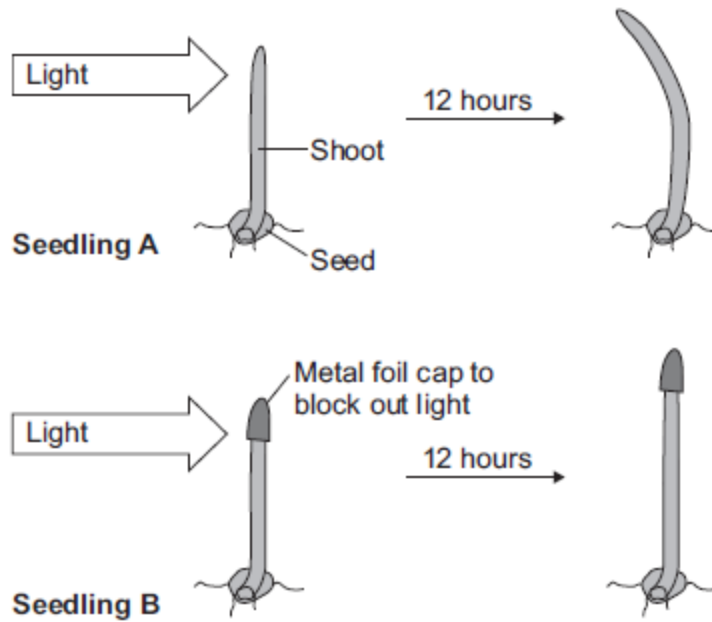
Taking cuttings to produce new plants is an example of

- asexual reproduction.
- genetic engineering.
- sexual reproduction.

(1)

(b) Another student investigated the effect of light, shining from one side, on the growth of plant shoots.

The diagram below shows how the student treated the shoots and the results she obtained after 12 hours.



(i) What is the response to light shown by **Seedling A** called?

Tick (✓) **one** box.

cloning

a reflex

a tropism

(1)

(ii) The student concluded that the shoot **tip** is sensitive to light.

What evidence is there in the diagram above for this conclusion?

(2)

(c) The seedling produces a hormone which helps to control its response to light.

(i) What is the name of the hormone?

Tick (✓) **one** box.

auxin

glucagon

glycerol

(1)

(ii) How does the hormone control the response of **Seedling A** to light shining from one side?

(4)

(Total 12 marks)

5.

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.

(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)

6.

This question is about the nervous system.

(a) Describe the difference between the function of a receptor and the function of an effector.

In your answer you should give **one** example of a receptor and **one** example of an effector.

(4)

(b) Synapses are important in the nervous system.

(i) What is a synapse?

(2)

(ii) Describe how information passes across a synapse.

(2)

(c) Reflexes may be co-ordinated by the brain or by the spinal cord.

(i) The reflexes from sense organs in the head are co-ordinated by the brain.

Name a sense organ involved in a reflex co-ordinated by the spinal cord.

(1)

- (ii) The table shows information about reflexes co-ordinated by the brain and reflexes co-ordinated by the spinal cord.

Organ co-ordinating the reflex	Mean length of neurones involved in cm	Mean time taken for reflex in milliseconds	Mean speed of impulse in cm per millisecond
Brain	12	4	3
Spinal cord	80	50	

Calculate the mean speed of the impulse for the reflex co-ordinated by the spinal cord.

Mean speed = _____ cm per millisecond

(1)

- (iii) In reflexes co-ordinated by the brain there are **no** relay neurones.

Suggest why there is a difference in the mean speed of the impulse for the two reflexes.

(2)

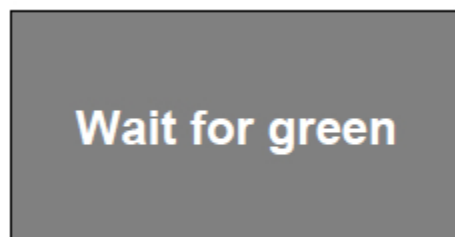
(Total 12 marks)

7.

Three students measured their reaction times.

The students used a computer program.

The image below shows the image displayed on the computer screen.



This is the method used:

1. Sit facing the computer screen.
2. Click the mouse button as quickly as possible when the computer screen turns green.
3. Record the time taken as shown on the computer screen.
4. Repeat steps 2 and 3 a further 9 times.

The table shows the students' results.

Attempt number	Time in milliseconds		
	Student A	Student B	Student C
1	275	260	272
2	259	268	268
3	251	251	275
4	261	256	266
5	260	244	270
6	263	280	283
7	259	468	274
8	256	258	278
9	255	255	286
10	248	277	275
Mean	259	282	275

(1 second = 1000 milliseconds)

- (a) Suggest why measuring reaction time with a computer is more accurate than measuring reaction time with a stopwatch.

(1)

(b) The students measured 10 reaction times for each person rather than 3 reaction times.

Explain why.

(2)

(c) Explain why the mean for student **B** has been calculated incorrectly.

Use information from the table.

(2)

(d) Calculate the ratio of student **C**'s mean reaction time to student **A**'s mean reaction time.

Give your answer to 3 significant figures.

Ratio student **C** : student **A** = _____ : 1

(2)

(e) Student **A** wanted to present his mean result in seconds, in standard form.

What is the correct way of doing this?

Tick **one** box.

259×10^{-3} seconds

0.259×10^{-3} seconds

2.59×10^{-1} seconds

0.259×10^{-4} seconds

(1)

(f) Student **C** said the results from this investigation showed that he had the fastest reactions.

Give **two** reasons why student **C**'s statement is **not** correct.

1. _____

2. _____

(2)

(g) The reaction the students investigated is **not** a reflex action.

Give the reason why.

(1)

(Total 11 marks)