



Surname \_\_\_\_\_

Other Names \_\_\_\_\_

Centre Number \_\_\_\_\_

Candidate Number \_\_\_\_\_

Candidate Signature \_\_\_\_\_

I declare this is my own work.

**GCSE**

**COMBINED SCIENCE: TRILOGY**

Foundation Tier

Biology Paper 2F

**8464/B/2F**

**F**

**Monday 1 June 2020**

**Afternoon**

**Time allowed: 1 hour 15 minutes**

**At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.**

**[Turn over]**



JUN208464B2F01

**For this paper you must have:**

- a ruler
- a scientific calculator.

## **INSTRUCTIONS**

- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Answer ALL questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.



## **INFORMATION**

- **The maximum mark for this paper is 70.**
- **The marks for questions are shown in brackets.**
- **You are expected to use a calculator where appropriate.**
- **You are reminded of the need for good English and clear presentation in your answers.**

**DO NOT TURN OVER UNTIL TOLD TO DO SO**



**0 1****This question is about reproduction.****0 1****. 1****Which TWO statements are true for sexual reproduction in humans? [2 marks]****Tick (✓) TWO boxes.****Gametes are formed.****Offspring are clones.****Offspring are genetically identical to parents.****Only one parent is involved.****Sperm and egg fuse.**

**01.2** Humans reproduce by sexual reproduction.

Complete **FIGURE 1** to show the inheritance of sex. [3 marks]

**FIGURE 1**

		<b>Mother</b>	
		<b>X</b>	<b>X</b>
<b>Father</b>	<b>X</b>	<b>XX</b>	

**01.3** Draw a ring around the genotype of all male children in **FIGURE 1**. [1 mark]

[Turn over]



**01.4** When children reach puberty, reproductive hormones cause changes in their bodies.

Draw **ONE** line from each hormone to the change the hormone causes at puberty.  
[2 marks]

**Hormone**

**Change the  
hormone causes at  
puberty**

**Oestrogen**

**Breasts develop**

**Skin turns lighter**

**Voice becomes  
deeper**

**Testosterone**

**Wisdom teeth  
appear**



A woman does NOT want to become pregnant.

She considers two methods of contraception.

**0 1 . 5** Draw ONE line from each method of contraception to how the method prevents pregnancy. [2 marks]

**Method of  
contraception**

**How the method  
prevents pregnancy**

**Condom**

**Embryos do not  
implant in the uterus**

**Hormones stop eggs  
maturing**

**Oral  
contraceptive  
(the pill)**

**Sperm are killed**

**Sperm do not reach  
the egg**

**[Turn over]**



- 01.6** Give ONE advantage and ONE disadvantage of taking oral contraceptives to prevent pregnancy. [2 marks]

**Advantage** \_\_\_\_\_

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**Disadvantage** \_\_\_\_\_

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12



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**0 2**

**Ammonites became extinct millions of years ago.**

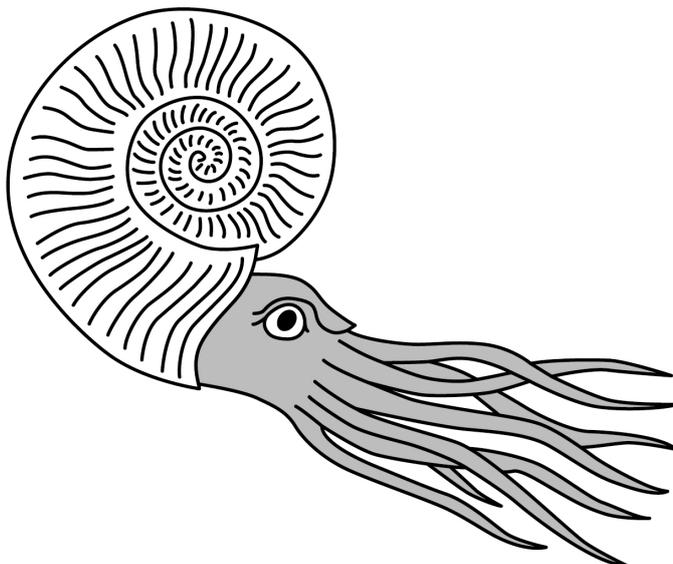
**FIGURE 2 is a photograph of a fossil ammonite.**

**FIGURE 3 is a drawing of what scientists think a living ammonite looked like.**

**FIGURE 2**



**FIGURE 3**



**0 2 . 1** How was the fossil in FIGURE 2 formed?  
[1 mark]

Tick (✓) ONE box.

The ammonite left traces where it moved.

The ammonite shell was replaced by minerals.

The ammonite was frozen in ice.

**0 2 . 2** Suggest why scientists are NOT certain what living ammonites looked like. [1 mark]

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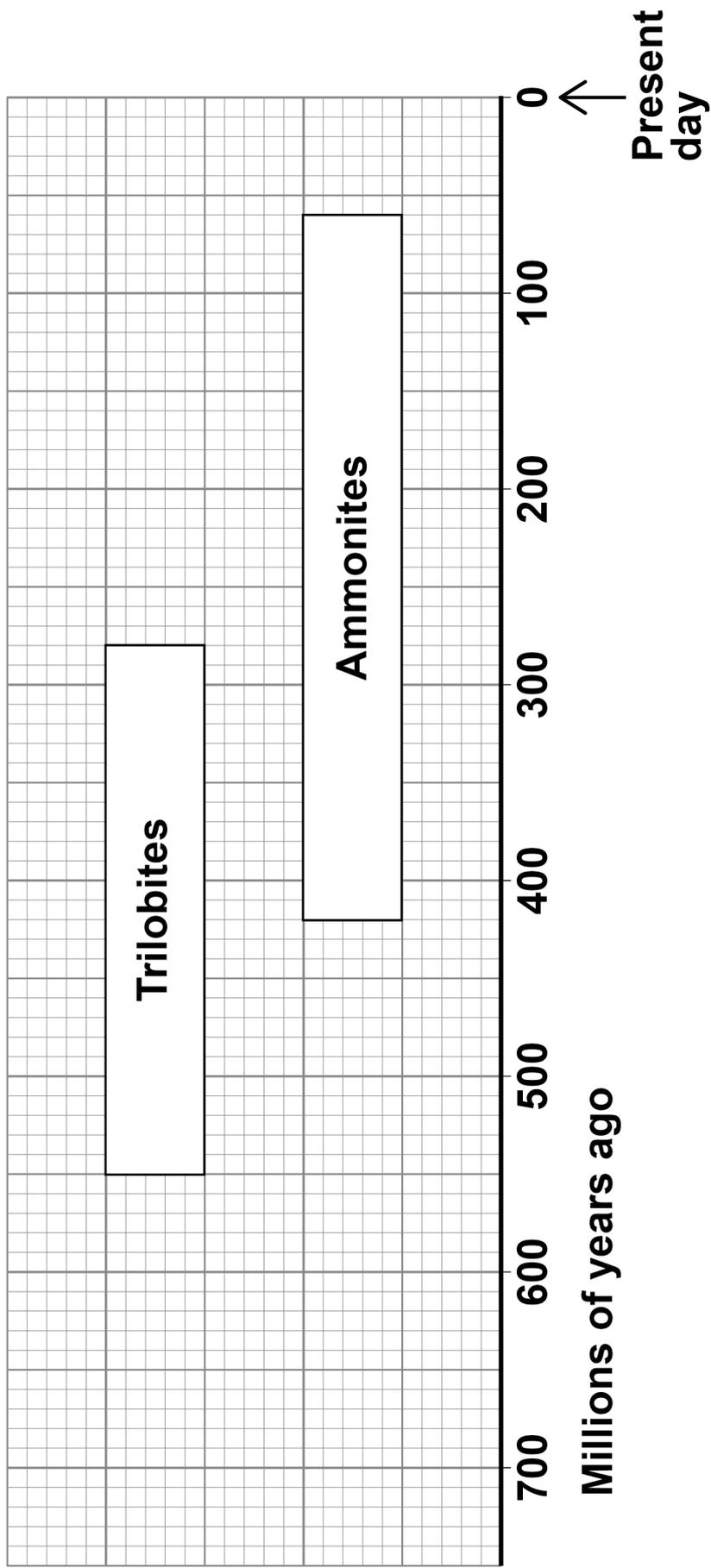
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[Turn over]



**FIGURE 4 shows when two different types of organism were alive on Earth.**

**FIGURE 4**



**0 2 . 3** How many millions of years ago did ammonites become extinct?

Use FIGURE 4. [1 mark]

\_\_\_\_\_ million years

**0 2 . 4** Trilobites lived on Earth for 270 million years.

Calculate how much longer ammonites lived on Earth than trilobites.

Use FIGURE 4. [2 marks]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ million years

[Turn over]



**0 2 . 5** Suggest TWO factors which may have caused ammonites to become extinct. [2 marks]

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



The fossil record provides evidence for the theory of evolution by natural selection.

0 2 . 6

Which scientist proposed the theory of evolution by natural selection? [1 mark]

Tick (✓) ONE box.

Carl Linnaeus

Carl Woese

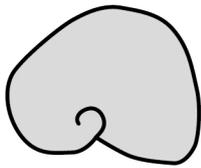
Charles Darwin

[Turn over]

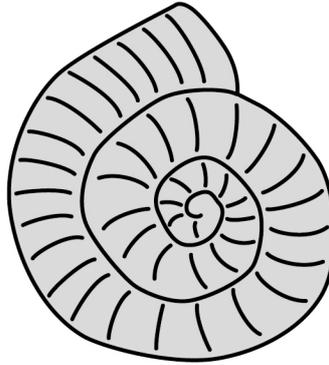


**02.7** FIGURE 5 shows ammonite fossils from three different time periods.

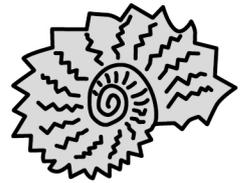
**FIGURE 5**



**400 million  
years ago**



**300 million  
years ago**



**200 million  
years ago**

**How do the fossils in FIGURE 5 give evidence for the theory of evolution by natural selection? [1 mark]**

**Tick (✓) ONE box.**

**All fossils have coiled shells.**

**More recent fossils are bigger.**

**Older fossils are more simple.**

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<b>9</b>



**03** Mineral ions are important chemicals in an ecosystem.

**03.1** Plants take in nitrate ions dissolved in water.

**Which part of a plant takes in nitrate ions?  
[1 mark]**

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**03.2** Name TWO chemicals that are cycled between plants, the soil and the air.

**Do NOT refer to nitrogen or nitrates in your answer. [2 marks]**

**1** \_\_\_\_\_

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**2** \_\_\_\_\_

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**[Turn over]**







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**0 4**

**Homeostasis regulates the internal conditions of the human body.**

**0 4 . 1**

**Which two processes are regulated by homeostasis? [2 marks]**

**Tick (✓) TWO boxes.**

**Controlling water output in urine**

**Defending the body against pathogens**

**How quickly you walk**

**Keeping cool on a hot day**

**Waking up in the morning**

**[Turn over]**

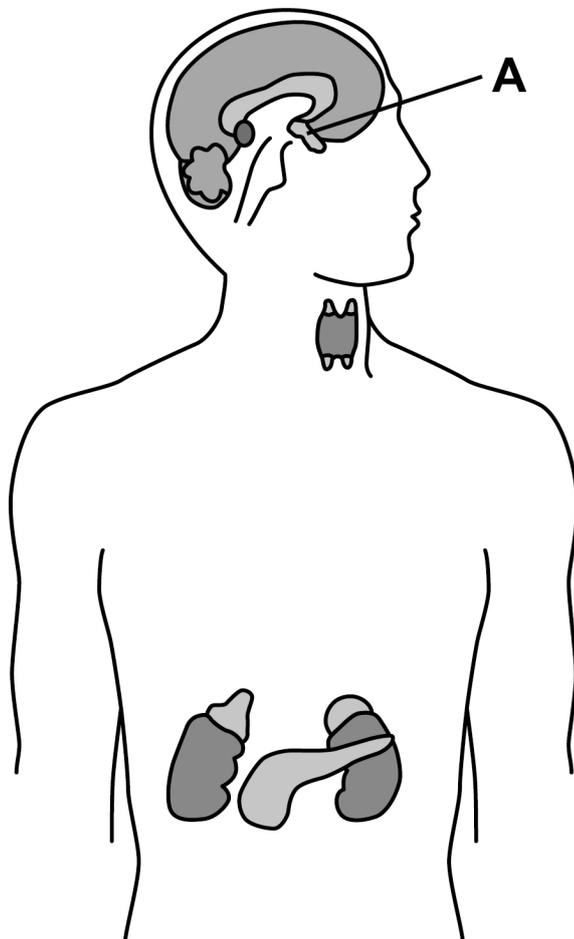


Hormones are produced by glands in the endocrine system.

Each hormone has an effect on a target organ.

FIGURE 6 shows glands of the endocrine system.

FIGURE 6



**0 4 . 2** What is the name of gland A? [1 mark]

Tick (✓) ONE box.

**Pancreas**

**Pituitary**

**Thyroid**

**Before eating a sugar-coated cereal a person had a blood glucose concentration of 5.2 mmol/dm<sup>3</sup>**

**Soon after eating the cereal the person had a blood glucose concentration of 8.4 mmol/dm<sup>3</sup>**

**0 4 . 3** Calculate the increase in the blood glucose concentration. [1 mark]

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**Increase = \_\_\_\_\_ mmol/dm<sup>3</sup>**

**[Turn over]**



- 0 4 . 4** The person needed medication to decrease their blood glucose concentration.

**Suggest what disorder the person has.  
[1 mark]**

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- 0 4 . 5** There is a problem with the hormone control of the person.

**What is the problem? [1 mark]**

**Tick (✓) ONE box.**

- The blood is not taking hormones to target organs.
- The pancreas is not releasing insulin.
- The pituitary gland is not being stimulated.



**0 4 . 6** The person:

- works in an office
- drives to work
- is overweight
- watches the television and reads every night
- drinks a hot chocolate every night.

**Suggest TWO lifestyle changes the person could make to help treat their disorder.  
[2 marks]**

**1** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**[Turn over]**

\_\_\_\_\_  
**8**



**0 5** This question is about biodiversity.

**A farmer:**

- **grows only wheat crops**
- **has used all his small fields to make a few large fields**
- **cuts down trees in his woodlands to burn as fuel.**

**0 5 . 1** What are **TWO** ways the farmer could increase biodiversity on his farm?  
**[2 marks]**

**Tick (✓) TWO boxes.**

**Cut down trees to grow wheat**

**Plant hedgerows around his fields**

**Plant many different crops in his fields**

**Put fences around his fields**

**Put fertiliser on his wheat crop**



**Students investigated the effect of cutting down trees in the woodland.**

**This is the method used.**

- 1. Mark out a 10 m by 10 m area where trees have been removed.**
- 2. Place a 1 m × 1 m quadrat at six random positions in the area.**
- 3. Record the number of plant species present.**
- 4. Record the number of invertebrate species seen among dead leaves on the ground.**
- 5. Repeat steps 1 to 4 in an area where there are trees.**

**0 5 . 2 Suggest ONE improvement the students could make to their method. [1 mark]**

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**[Turn over]**



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**0 5 . 3** The students made this prediction:

**‘There will be more invertebrate species living in the area where there are trees.’**

**Explain why the students’ prediction may be correct. [2 marks]**

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**[Turn over]**

**TABLE 1** shows the students' results.

**TABLE 1**

Quadrat	Number of plant species		Number of invertebrate species	
	Area with no trees	Area with trees	Area with no trees	Area with trees
1	8	2	4	10
2	6	2	3	6
3	7	0	4	8
4	6	3	5	14
5	20	4	2	9
6	8	1	6	13
Mean	7	2	4	10

**0 5 . 4** The students decided that one result was anomalous.

Draw a ring around the anomalous result in **TABLE 1**. [1 mark]



**0 5 . 5** How does removing trees affect the number of invertebrate species living among the dead leaves on the ground?

Use TABLE 1. [1 mark]

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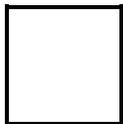
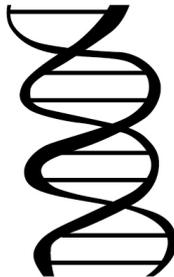
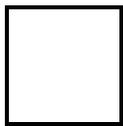
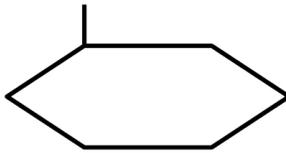
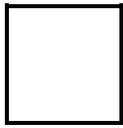
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**[Turn over]**



**06****This question is about DNA and genes.****06****.1****Which diagram represents a DNA molecule?  
[1 mark]****Tick (✓) ONE box.**

**0 6 . 2** Describe the structure of a DNA molecule.  
[1 mark]

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**0 6 . 3** A gene is a small section of DNA on a chromosome.

Complete the sentences. [2 marks]

A gene codes for a particular sequence of

\_\_\_\_\_ .

This sequence makes a specific

\_\_\_\_\_ .

[Turn over]



**06.4** What is meant by the term genome? [1 mark]

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**0 6 . 5**

The complete human genome is now known.

Which important scientific advance was made using knowledge of the human genome? [1 mark]

Tick (✓) ONE box.

Discovering antibiotic resistant bacteria

Finding more foods to eat from tropical forests

Tracing how aboriginal people spread across Australia

Working out when the last ice age ended

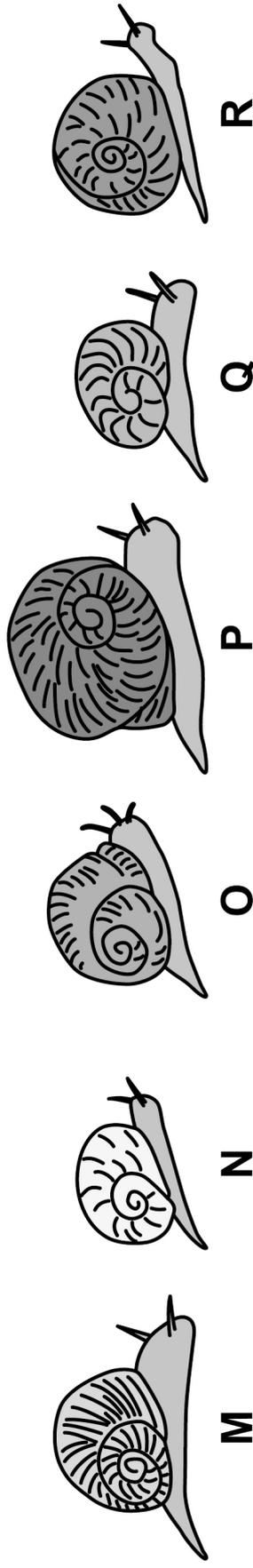
[Turn over]



A student found six different snails of one species in his garden.

FIGURE 7 shows the snails.

FIGURE 7



0 6 . 6 All the snails are different.

What scientific term describes differences in characteristics between individuals of a species? [1 mark]

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06.7

A change in DNA has caused snail P to be very different from the other five snails.

Suggest why there might be an increasing number of snails similar to snail P in each future generation. [2 marks]

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[Turn over]

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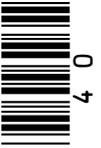
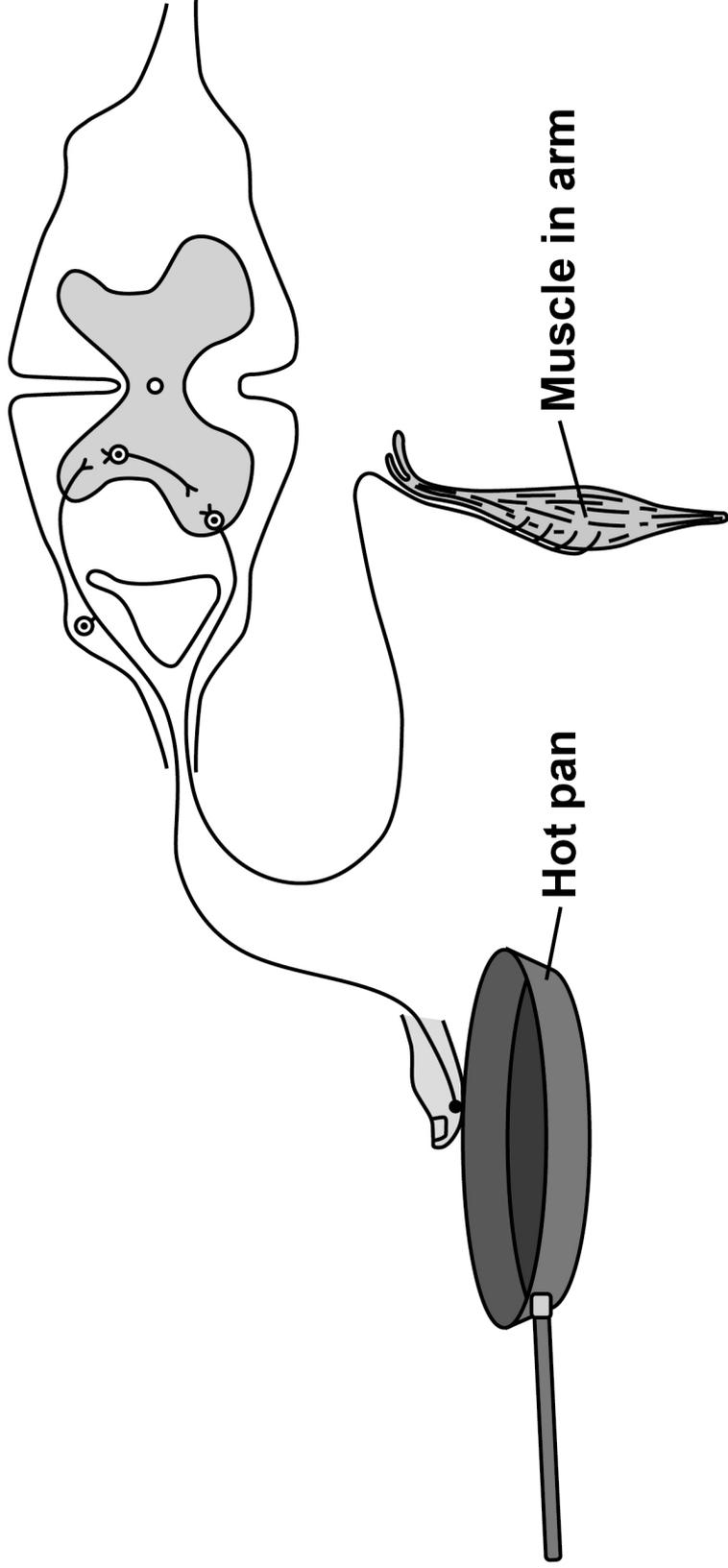


**07** Human reactions are a response to an external change.

**07.1** Reflex actions help to protect the body against damage.

**FIGURE 8** shows the nervous pathway for a reflex action.

**FIGURE 8**



**A stimulus from the hot pan will cause the muscle in the arm to contract and move the finger away.**

**Describe how the stimulus from the hot pan reaches the muscle in the arm.**  
**[4 marks]**

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**[Turn over]**

**07.2** A student investigated whether using the right hand or the left hand had an effect on reaction time.

**The student only tested right-handed people.**

**Describe a method for the student's investigation.**

**Include details of the test you would use for reaction time. [4 marks]**

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**[Turn over]**



A different student carried out an investigation to see if playing tennis improved reaction time.

The student used two groups of six people.

TABLE 2 shows the results.

TABLE 2

Person	Reaction time in seconds	
	People who play tennis	People who do not play tennis
1	0.2	0.3
2	0.4	0.4
3	0.3	0.6
4	0.4	0.5
5	0.2	0.3
6	0.3	0.2
Mean	$\bar{x}$	0.4



**07.3** Calculate mean value X in TABLE 2. [2 marks]

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**X =** \_\_\_\_\_ **seconds**

**07.4** What is the dependent variable in the student's investigation? [1 mark]

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**[Turn over]**



The student concluded:

‘Playing tennis improves reaction time.’

**07.5** Give ONE piece of evidence which supports the conclusion. [1 mark]

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**07.6** Give ONE piece of evidence which does NOT support the conclusion. [1 mark]

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**END OF QUESTIONS**

13









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For Examiner's Use	
Question	Mark
1	
2	
3	
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5	
6	
7	
<b>TOTAL</b>	

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