A

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

F

8464/B/2F

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.**

0 1 . 2

Humans reproduce by sexual reproduction.

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

FIGURE 1

		Mother	
		X	X
Father	X	XX	

0 1 . 3

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

[Turn over]

0 1 . 4

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

On the opposite page, 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

[Turn over]

A woman does NOT want to become pregnant.

She considers two methods of contraception.

0 1 . 5

On the opposite page, 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
Oral contraceptive (the pill)	Hormones stop eggs maturing
	Sperm are killed
	Sperm do not reach the egg

[Turn over]

0 1 . 6

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

Advantage _____

_____

Disadvantage _____

_____

_____

12

BLANK PAGE

[Turn over]

0 2

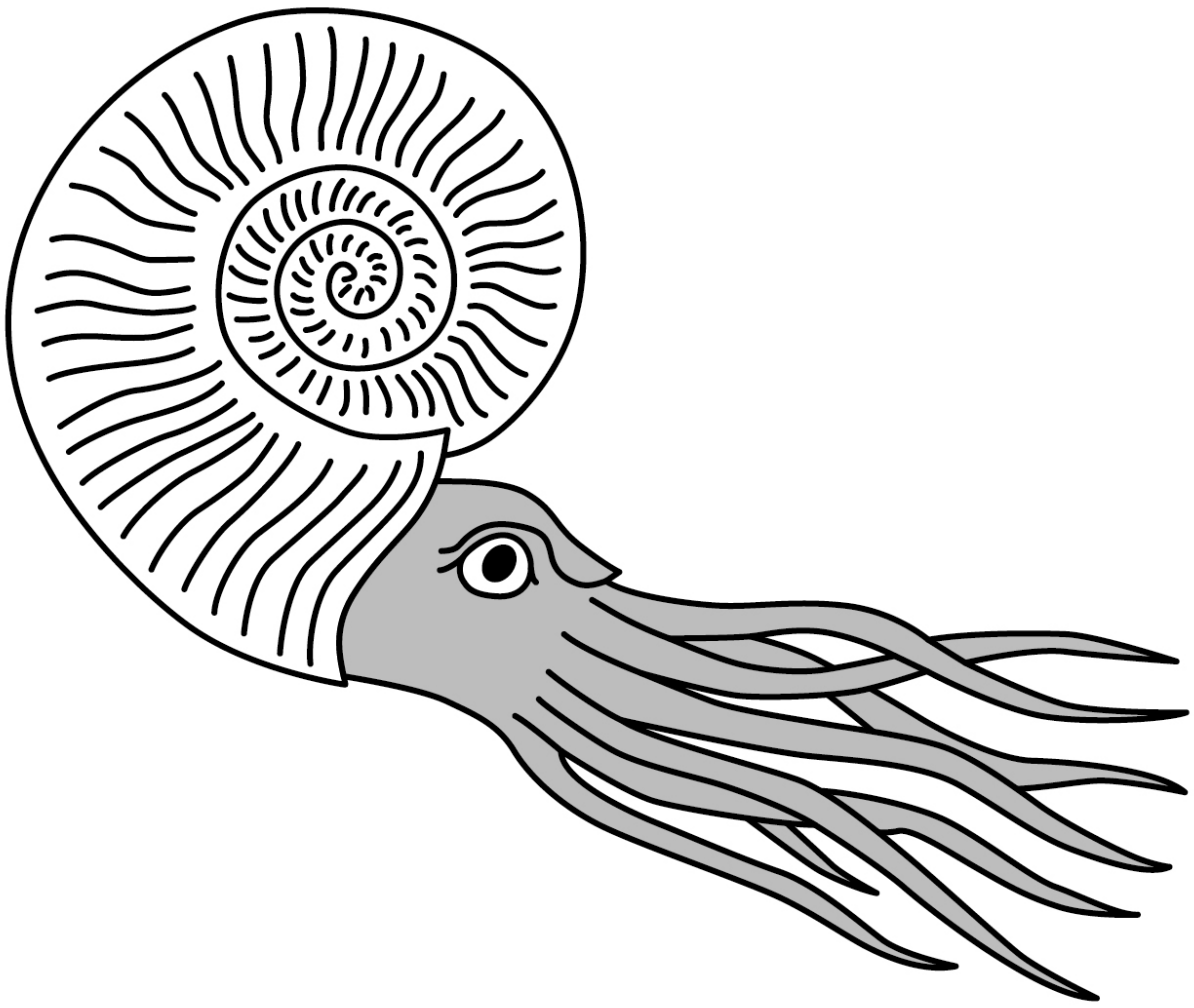
Ammonites became extinct millions of years ago.

FIGURE 2 is a photograph of a fossil ammonite.

FIGURE 3, on the opposite page, is a drawing of what scientists think a living ammonite looked like.

FIGURE 2

FIGURE 3



[Turn over]

0 2 . 1

How was the fossil in FIGURE 2, on page 12, formed? [1 mark]

Tick (✓) ONE box.

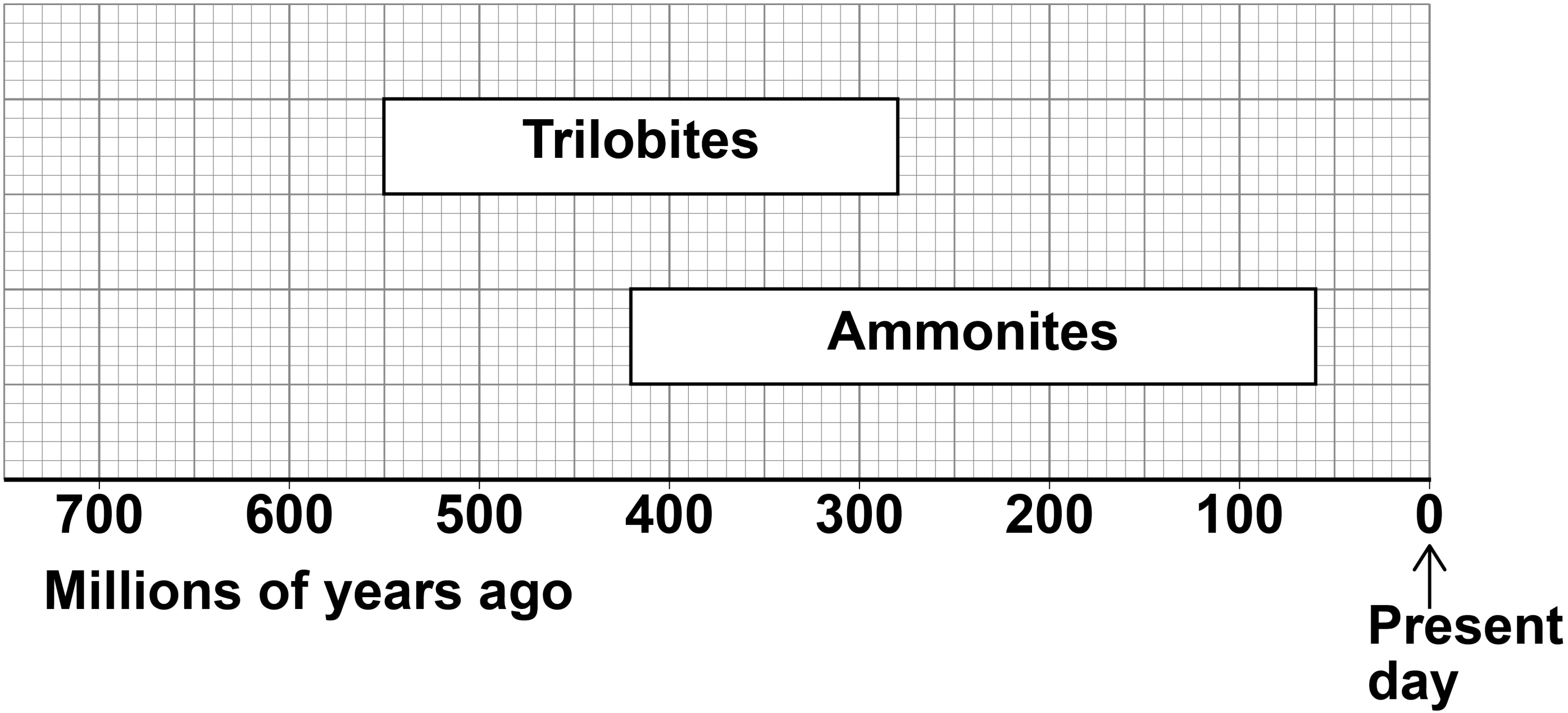
- ☐ **The ammonite left traces where it moved.**
- ☐ **The ammonite shell was replaced by minerals.**
- ☐ **The ammonite was frozen in ice.**

0 2 . 2

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

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

BLANK PAGE

0 2 . 4

Trilobites lived on Earth for 270 million years.

Calculate how much longer ammonites lived on Earth than trilobites.

Use FIGURE 4, on page 16. [2 marks]

_____ million years

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**

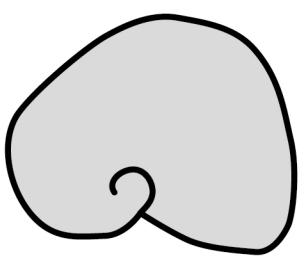
☐ **Charles Darwin**

[Turn over]

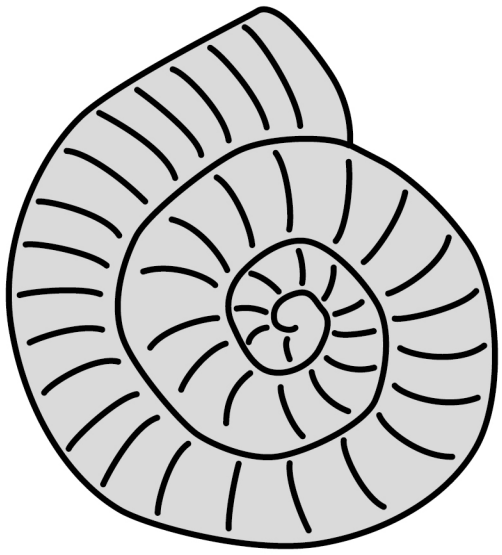
0 2 . 7

FIGURE 5 shows ammonite fossils from three different time periods.

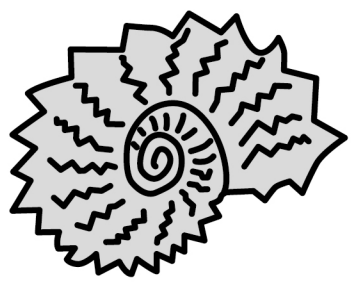
FIGURE 5



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.**

9

0 3

Mineral ions are important chemicals in an ecosystem.

0 3 . 1

Plants take in nitrate ions dissolved in water.

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

_____

_____

0 3 . 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 _____

_____

2 _____

_____

0 3 . 3

All the chemicals in a plant are recycled when the plant dies.

Describe how:

- **microorganisms recycle chemicals**
- **the chemicals are used again by new plants.**

[6 marks]

[Turn over]

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**

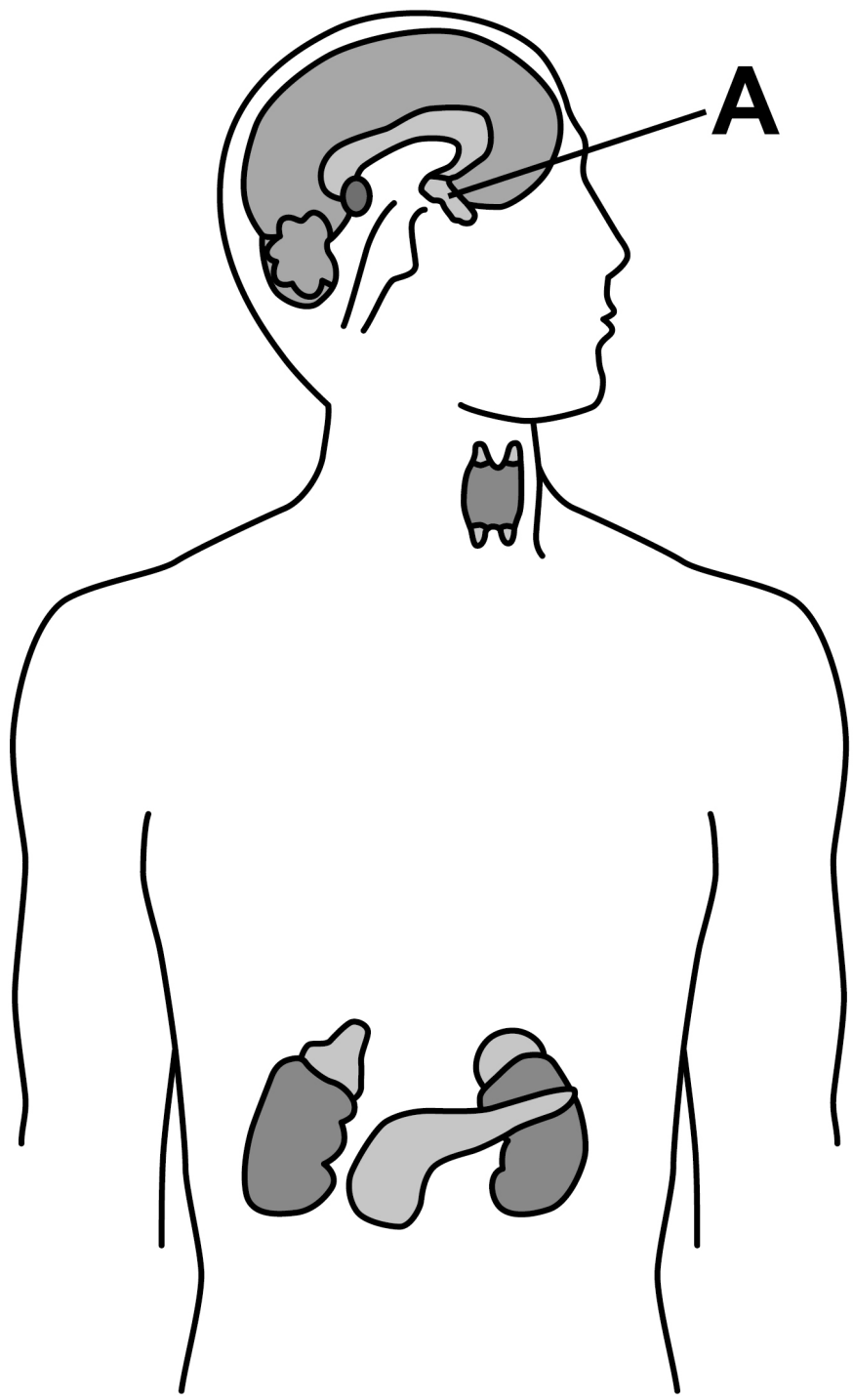
[Turn over]

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**

[Turn over]

Before eating a sugar-coated cereal a person had a blood glucose concentration of 5.2 mmol/dm^3

Soon after eating the cereal the person had a blood glucose concentration of 8.4 mmol/dm^3

0 4 . 3

Calculate the increase in the blood glucose concentration. [1 mark]

Increase = _____ mmol/dm^3

0 4 . 4

The person needed medication to decrease their blood glucose concentration.

Suggest what disorder the person has.

[1 mark]

_____

_____

[Turn over]

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 _____

_____

_____

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**

[Turn over]

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]

_____

_____

[Turn over]

BLANK PAGE

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]

TABLE 1, on the opposite page, shows the students' results.

0 5 . 4

The students decided that one result was anomalous.

Draw a ring around the anomalous result in TABLE 1, on the opposite page. [1 mark]

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

BLANK PAGE

0 5 . 5

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

Use TABLE 1, on page 43. [1 mark]

[Turn over]

0 5 . 6

There were more plant species growing in the area where there were no trees.

Explain why. [3 marks]

10

BLANK PAGE

[Turn over]

0 6

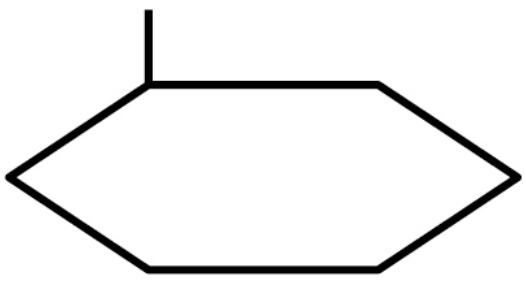
This question is about DNA and genes.

0 6 . 1

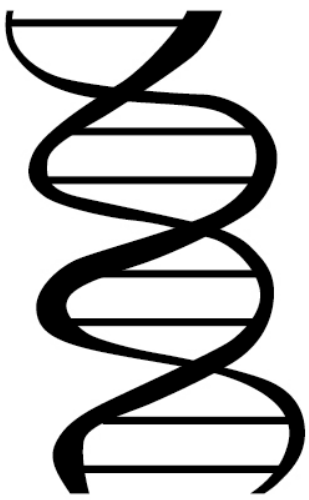
Which diagram represents a DNA molecule? [1 mark]

Tick (✓) ONE box.

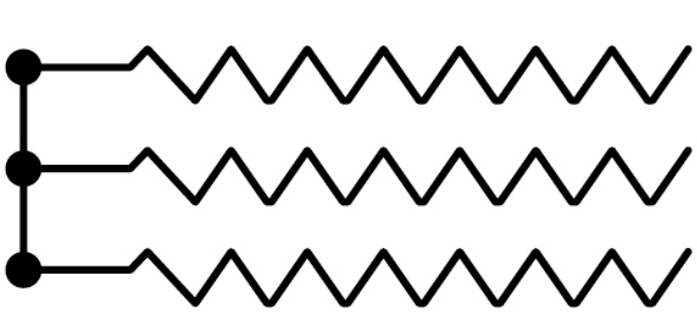
☐



☐



☐



[Turn over]

0 6 . 2

Describe the structure of a DNA molecule. [1 mark]

_____

_____

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 _____ .

0 6 . 4

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

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**

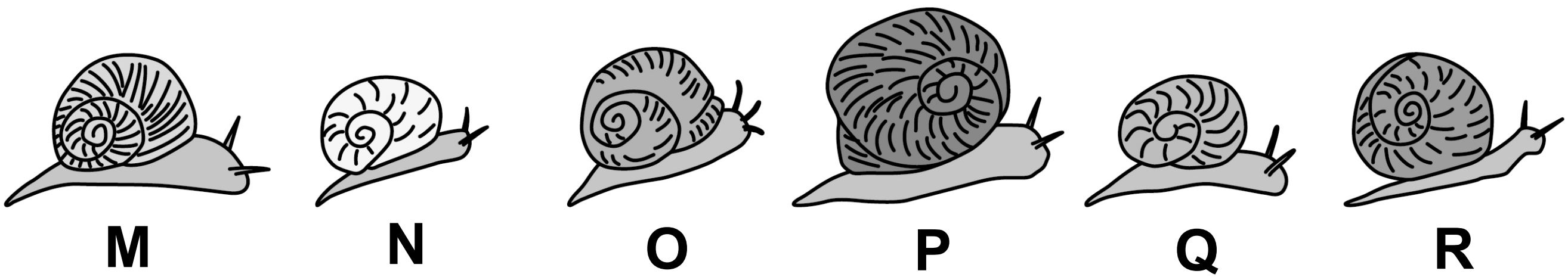
BLANK PAGE

[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]

BLANK PAGE

0 6 . 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]

0 7

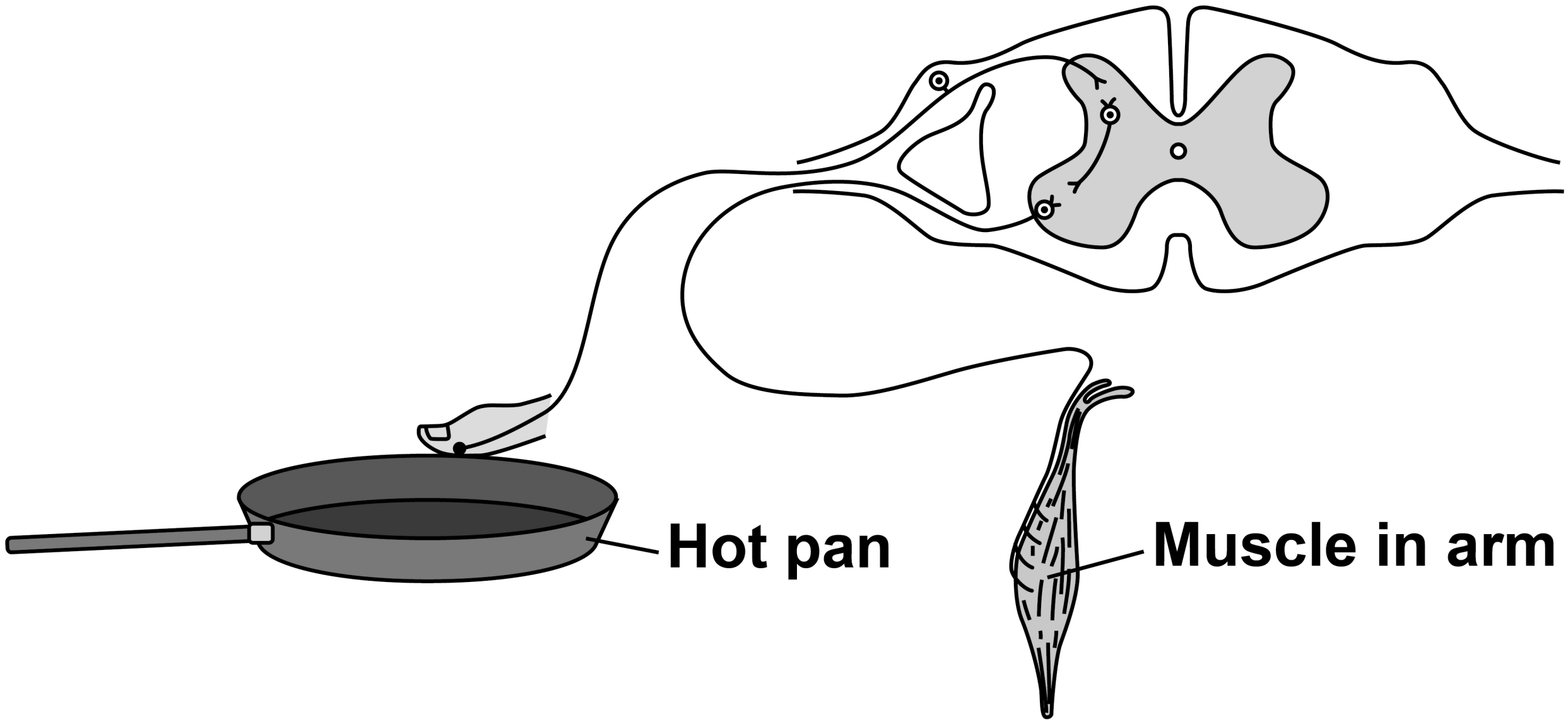
Human reactions are a response to an external change.

0 7 . 1

Reflex actions help to protect the body against damage.

FIGURE 8, on the opposite page, shows the nervous pathway for a reflex action.

FIGURE 8



[Turn over]

BLANK PAGE

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]

0 7 . 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]

[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	X	0.4

0 7 . 3

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

X = _____ seconds

0 7 . 4

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

The student concluded:

‘Playing tennis improves reaction time.’

0 7 . 5

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

0 7 . 6

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

END OF QUESTIONS

13

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

BLANK PAGE

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	