A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

GCSE
COMBINED SCIENCE: TRILOGY

Foundation Tier
Biology Paper 2F
8464/B/2F

F

Friday 7 June 2019   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]

For this paper you must have:
- a ruler
- a scientific calculator.

INSTRUCTIONS

- **Use black ink or black ball-point pen.**

- **Answer ALL questions in the spaces provided.**

- **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

0	1	.	1

Conditions inside the human body are controlled.

What is the control of conditions inside the body called? [1 mark]

Tick (✓) ONE box.

	Excretion

	Fertilisation

	Homeostasis

	Osmosis

0 1 . 2

What are the TWO ways information is sent to control body conditions?
[2 marks]

Tick (✓) TWO boxes.

☐ **By antigens**

☐ **By hormones**

☐ **By muscles**

☐ **By nerve impulses**

☐ **By red blood cells**

[Turn over]

0 1 . 3

One condition in the body that needs to be controlled is the level of water.

Give ONE other condition in the human body that needs to be controlled.
[1 mark]

_____

_____
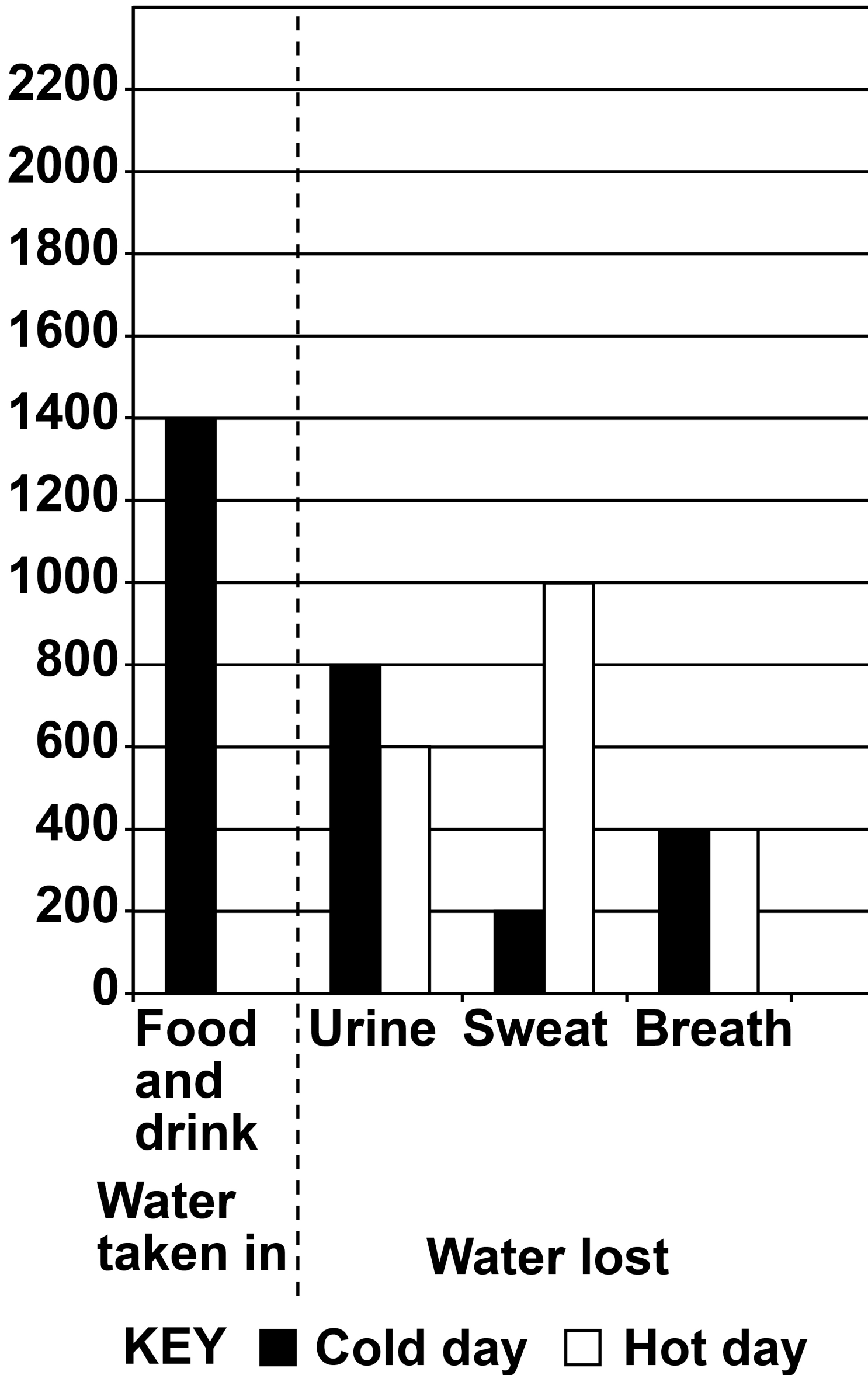
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[Turn over]

FIGURE 1

Volume of water in cm^3

KEY ■ Cold day □ Hot day

FIGURE 1, on page 8, shows the volumes of water taken in and lost by one person.

The volume for water taken in on a hot day has NOT been plotted on the bar graph.

| 0 | 1 | . | 4 |

The person lost 1400 cm^3 of water on the cold day.

How much extra water did they lose on the hot day? [2 marks]

_____

_____

_____

_____

_____

Extra volume of water lost =

_____ cm^3

0 1 . 5

Explain why the volume of water lost on a hot day is higher than on a cold day.

[2 marks]

_____

_____

_____

_____

_____

$\boxed{0}\boxed{1}.\boxed{6}$

A boy drank 750 cm^3 of water.

His total intake of water for that day was 3000 cm^3

Calculate the percentage of the boy's total intake that the 750 cm^3 represents. [2 marks]

_____

_____

_____

_____

_____

Percentage = _____ %

$\boxed{\frac{}{10}}$

0	2

Some students estimated the population of daisy plants in a field.

This is the method used.

1. **Place a quadrat randomly on the field.**
2. **Count and record the number of daisy plants in the quadrat.**
3. **Repeat steps 1 and 2 another four times.**

0	2	.	1

How could the students have made sure the quadrats were placed randomly?
[1 mark]

_____

_____

_____

0 2 . 2

Describe the piece of equipment called a quadrat. [1 mark]

_____

_____

_____

[Turn over]

TABLE 1 shows the results.

TABLE 1

Quadrat number	Number of daisy plants
1	8
2	11
3	4
4	6
5	16
Mean	X

| 0 | 2 | . | 3 |

Calculate mean value X. [1 mark]

_____

_____

_____

X = _____ daisy plants

| 0 | 2 | . | 4 |

The field is a rectangle 100 m wide and 150 m long.

Calculate the area of the field. [1 mark]

_____

_____

Area = _____ m^2

[Turn over]

BLANK PAGE

| 0 | 2 | . | 5 |

The quadrat used by the students had an area of 1.0 m^2

Estimate the population of daisy plants in the field.

Use your answers to Question 02.3 and Question 02.4 [2 marks]

_____

_____

_____

_____

_____

Estimated population =

_____ daisy plants

[Turn over]

0	2	.	6

More daisy plants grew in some parts of the field compared to other areas of the field.

Give TWO biotic factors that may affect where daisy plants grow in the field.
[2 marks]

1 _____

_____

2 _____

_____

0 2 . 7

The students noticed that the daisy plants growing near a building were smaller.

Explain why smaller daisy plants grew near the building. [2 marks]

_____

_____

_____

_____

_____

[Turn over]

10

0 3

Animals have adaptations to survive in their environment.

These adaptations may be structural, behavioural or functional.

0 3 . 1

Draw ONE line, on the opposite page, from each animal adaptation to the type of adaptation it is. [2 marks]

ANIMAL ADAPTATION

TYPE OF ADAPTATION

| Male palm cockatoos use sticks to beat on hollow branches to attract females. |

| Structural |

| The harmless hornet moth has black and yellow stripes to look like a bee or wasp. |

| Behavioural |

| Sea spiders have automatic muscle contractions that move oxygen around their bodies. |

| Functional |

[Turn over]

Plants also have adaptations.

Orchid plants have adaptations which make them one of the most successful plant groups.

Orchids rely on insects for pollination.

FIGURE 2 shows an orchid.

FIGURE 2

0 3 . 2

Which TWO features help orchids survive? [2 marks]

Tick (✓) TWO boxes.

☐ **Brightly coloured flowers**

☐ **Large quantities of pollen**

☐ **No scent**

☐ **Oval shaped leaves**

☐ **Small leaves**

[Turn over]

Many orchid species grow in tropical rainforest ecosystems.

| 0 | 3 | . | 3 |

What name describes the variety of all the different species found in an ecosystem? [1 mark]

Tick (✓) ONE box.

☐ **Biodiversity**

☐ **Evolution**

☐ **Feeding relationship**

☐ **Habitat**

| 0 | 3 | . | 4 |

Some species of orchid may become extinct because of deforestation.

Give ONE reason why tropical rainforests are being cut down. [1 mark]

_____

_____

[Turn over]

0 3 . 5

Give ONE factor that might cause a species of orchid to become extinct.

Do NOT refer to deforestation in your answer. [1 mark]

_____

_____

Scientists have analysed the entire genetic material of one species of orchid.

0 3 . 6

What chemical is the genetic material made from? [1 mark]

_____

_____

0 3 . 7

What is the name for the entire genetic material of an organism? [1 mark]

_____

_____

[Turn over]

9

0	4

A cat breeder noticed that four kittens from one Siamese cat mother had a new blue colour at the tip of their tails.

0	4	.	1

What has caused the new colour to appear? [1 mark]

Tick (✓) ONE box.

	Fertilisation

	Mitosis

	Mutation

0 4 . 2

The cat breeder wants to use selective breeding so that all new kittens have blue tail tips.

**Describe the process of selective breeding the cat breeder could use.
[3 marks]**

_____

_____

_____

_____

_____

_____

_____

[Turn over]

0 4 . 3

Suggest ONE reason why the cat breeder wants to have all new kittens with the blue tail tips. [1 mark]

_____

_____

_____

| 0 | 4 | . | 4 |

Siamese cats can suffer from heart defects.

Why might there be more Siamese cats with heart defects amongst the kittens with blue tail tips? [1 mark]

Tick (✓) ONE box.

☐ **They are clones**

☐ **They are formed by mitosis**

☐ **They are formed by sexual reproduction**

☐ **They are produced by inbreeding**

[Turn over]

With each pregnancy, the cat breeder expected that:

- **50% of the kittens would be male**

- **50% of the kittens would be female.**

The sex chromosomes in cats are inherited in the same way as in humans.

The sex chromosomes are X and Y.

0 4 . 5

Give the combination of sex chromosomes present in a male cat and in a female cat. [1 mark]

Male cat   _____

Female cat   _____

0 4 . 6

The cat breeder expected 50% male kittens and 50% female kittens.

Complete the Punnett square in FIGURE 3 to show why. [2 marks]

FIGURE 3

Female cat

Male cat

[Turn over]

| 0 | 4 | . | 7 |

In the first pregnancy there was one male kitten and three female kittens.

Give the reason why there were NOT two kittens of each sex. [1 mark]

_____

_____

_____

$\overline{}$
10

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[Turn over]

FIGURE 4 shows a food chain in a garden.

FIGURE 4

bean plant ⟶ **blackfly** ⟶ **spider** ⟶ **blackbird**

0 5 . 1

Which term describes the spider in this food chain?
[1 mark]

Tick (✓) ONE box.

☐ **Primary consumer**

☐ **Producer**

☐ **Secondary consumer**

☐ **Tertiary consumer**

[Turn over]

0 5 . 2

Many of the spiders in the garden died.

What is likely to happen to the number of blackflies in the garden? [1 mark]

Tick (✓) ONE box.

☐ **Decrease**

☐ **Increase**

☐ **Stay the same**

0 5 . 3

Give a reason for your answer to Question 05.2 [1 mark]

_____

_____

_____

[Turn over]

TABLE 2 shows the estimated biomass of organisms in the garden.

TABLE 2

Organism	Biomass in g
Bean plants	225
Blackflies	115
Spiders	65
Blackbirds	10

| 0 | 5 | . | 4 |

What conclusion can be made about biomass in food chains? [1 mark]

_____

_____

_____

[Turn over]

Repeat of TABLE 2

Organism	Biomass in g
Bean plants	225
Blackflies	115
Spiders	65
Blackbirds	10

0	5	.	5

Complete FIGURE 5, on the opposite page.

You should:

- **label the y-axis**

- **plot the data from TABLE 2.**

[3 marks]

FIGURE 5
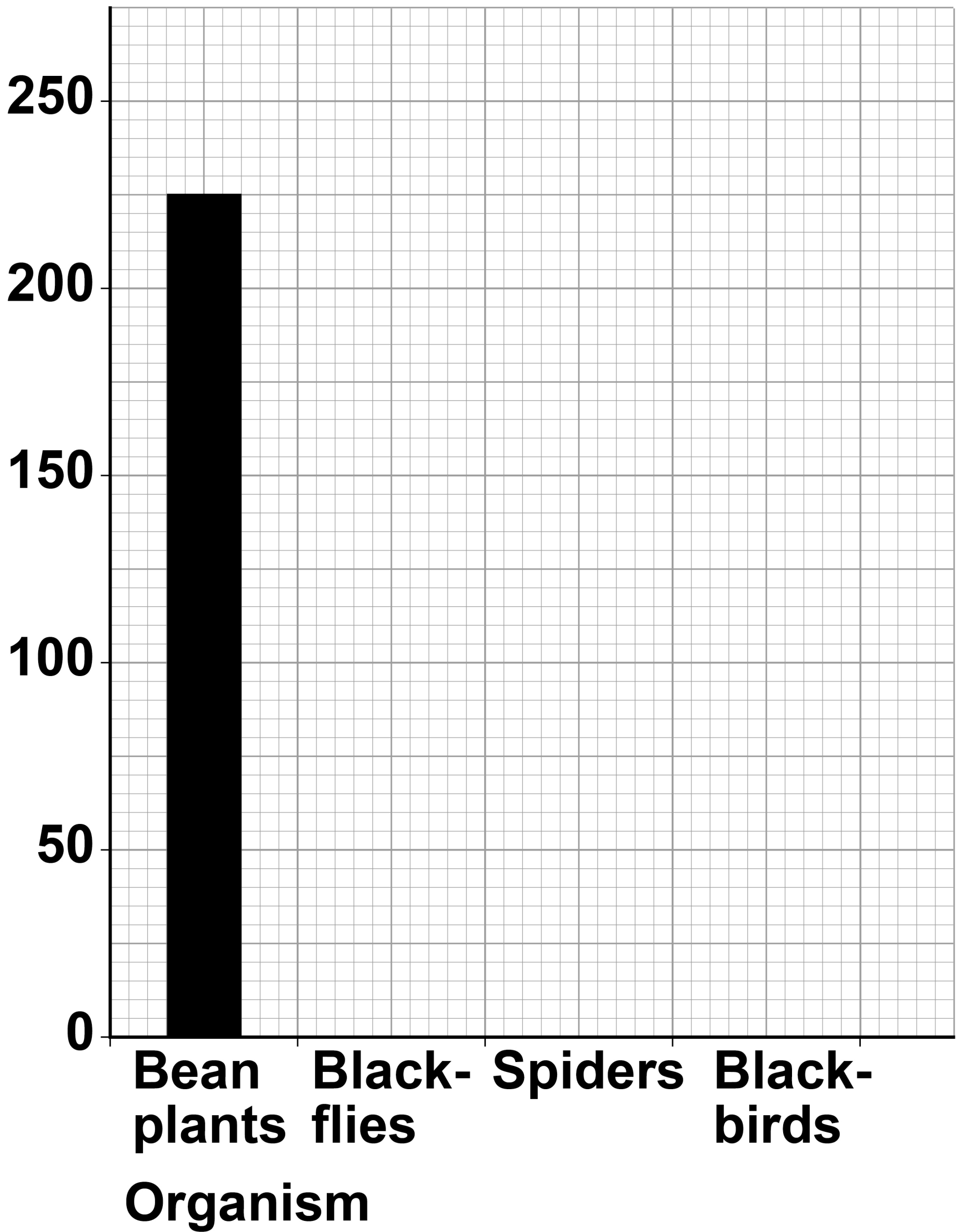
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| 0 | 5 | . | 6 |

Explain why a garden is NOT a stable community. [2 marks]

_____

_____

_____

_____

_____

[Turn over]

| 9 |

| 0 | 6 |

Some students investigated the effect of drinking caffeine on reaction time.

They used a drink containing 32.25 mg of caffeine per 100 cm^3

This is the method used.

1. **Divide the students into four groups, A, B, C and D.**

2. **Measure and record the reaction time of each student using the ruler-drop test.**

3. **Students in:**

   - **group A drink 200 cm^3 of water**

   - **group B drink 200 cm^3 of the caffeine drink**

   - **group C drink 400 cm^3 of the caffeine drink**

   - **group D drink 600 cm^3 of the caffeine drink.**

4. **Repeat step 2 after 15 minutes.**

0 6 . 1

Describe how to do the ruler-drop test.
[3 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

[Turn over]

0	6	.	2

TABLE 3 shows the mass of caffeine taken in by each student.

TABLE 3

Group	Mass of caffeine in mg
A	0
B	64.5
C	129.0
D	X

Calculate value X. [1 mark]

_____

_____

_____

X = _____ mg

| 0 | 6 | . | 3 |

Why did group A drink water instead of the caffeine drink? [1 mark]

_____

_____

_____

[Turn over]

TABLE 4 was used to convert the results of the ruler-drop test into reaction times.

TABLE 4

Distance in cm	Reaction time in s	Distance in cm	Reaction time in s
2	0.064	28	0.239
4	0.090	30	0.247
6	0.111	32	0.256
8	0.128	34	0.263
10	0.143	36	0.271
12	0.156	38	0.278
14	0.169	40	0.286
16	0.181	42	0.293
18	0.192	44	0.300
20	0.202	46	0.306
22	0.212	48	0.313
24	0.221	50	0.319
26	0.230	52	0.326

0	6	.	4

Estimate the reaction time for a student who recorded a distance of 23 cm [1 mark]

_____

_____

_____

Reaction time = _____ s

[Turn over]

FIGURE 6

Decrease
in reaction
time in s
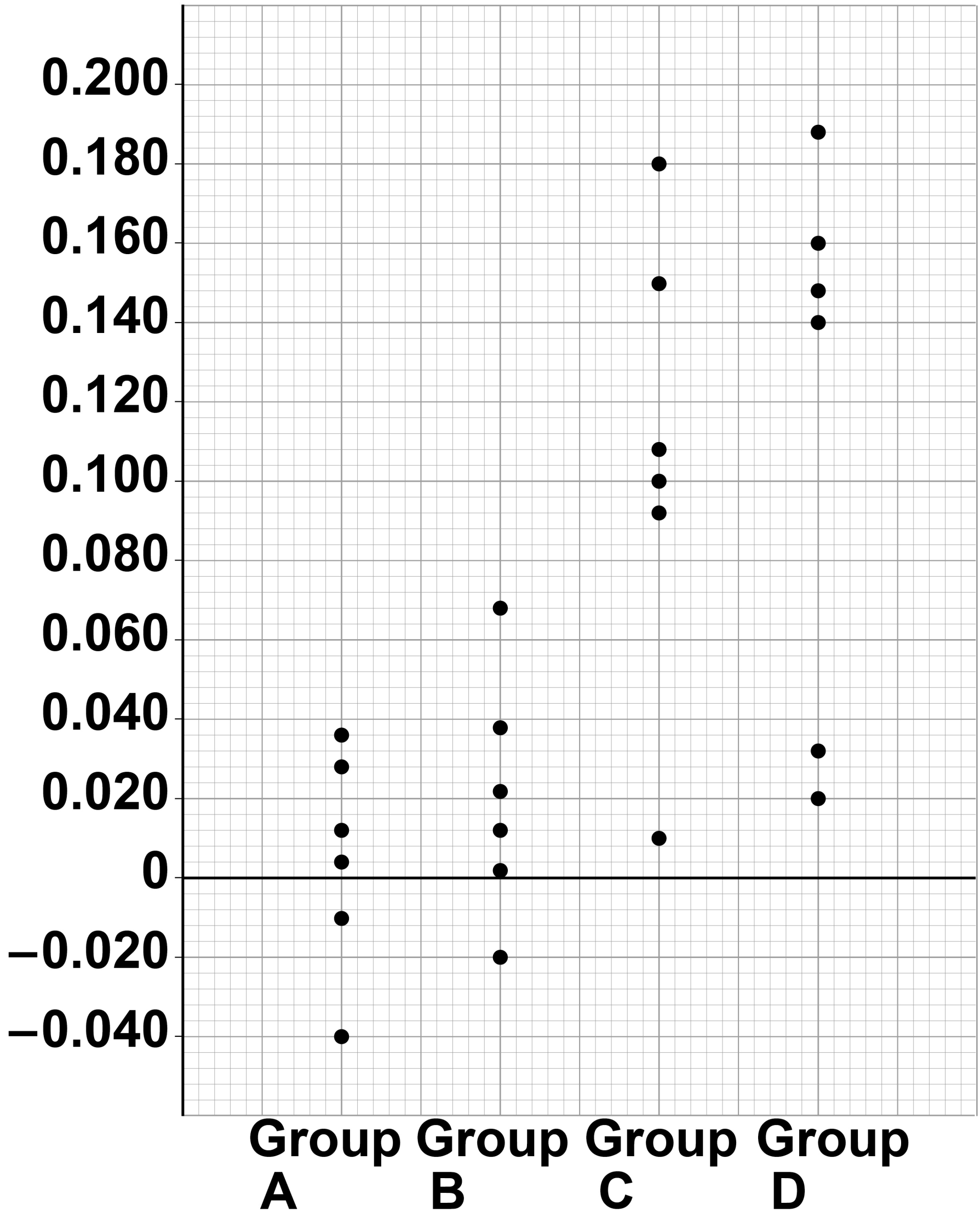
Students calculated the decrease in their reaction time after the drink compared with before the drink.

FIGURE 6, on page 52, shows the results for each student.

| 0 | 6 | . | 5 |

Describe the effect of the mass of caffeine taken in on the decrease in reaction time. [1 mark]

_____

_____

_____

_____

_____

[Turn over]

| 0 | 6 | . | 6 |

For three students the decrease in reaction time was negative.

Give the reason why the value was negative. [1 mark]

_____

_____

_____

| 0 | 6 | . | 7 |

What is the range of results for group C? [1 mark]

_____

_____

| 0 | 6 | . | 8 |

Suggest TWO variables that should have been controlled in this investigation.
[2 marks]

1 _____

_____

_____

2 _____

_____

_____

[Turn over]

0 6 . 9

Explain why the ruler-drop test does NOT involve a reflex action. [2 marks]

_____

_____

_____

_____

_____

13

0	7

There has been a rapid increase in the percentage of carbon dioxide in the atmosphere since 1960.

0	7	.	1

Carbon dioxide is a greenhouse gas that contributes to global warming.

Name ONE other greenhouse gas.
[1 mark]

_____

[Turn over]

07.**2**

Global warming causes climate change.

Give TWO effects of climate change.
[2 marks]

1 _____

_____

_____

2 _____

_____

_____

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[Turn over]

0 7 . 3

Plants take in carbon dioxide from the atmosphere.

FIGURE 7 shows part of the carbon cycle.

FIGURE 7
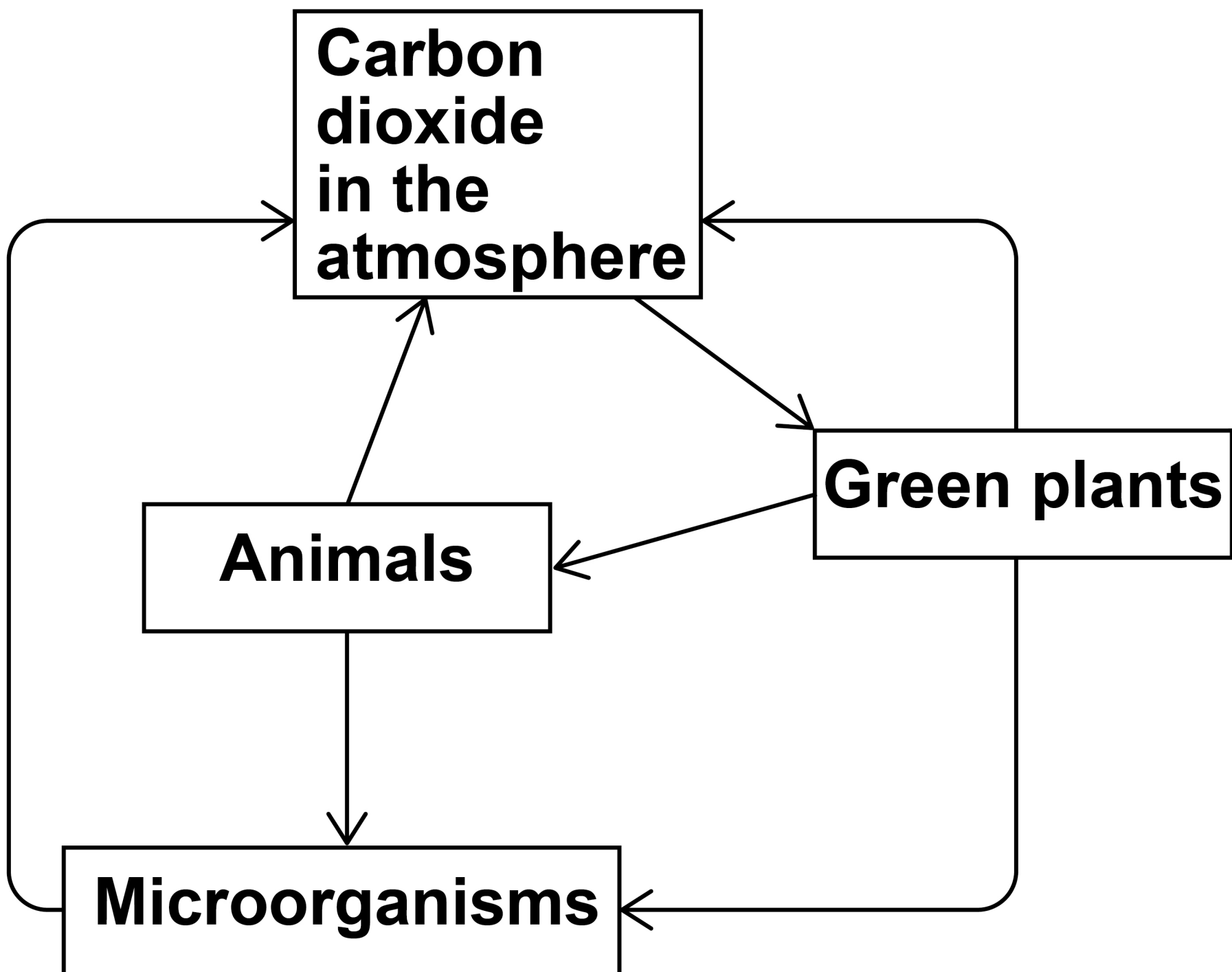
Describe how carbon from the atmosphere is cycled through living organisms. [6 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

[Turn over]

9

END OF QUESTIONS

9

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