

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

INTERNATIONAL GCSE COMBINED SCIENCE

C

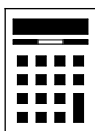
Paper 1 Biology Core

Wednesday 26 October 2022 07:00 GMT Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:

- a pencil and a ruler
- a scientific calculator.



Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- 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.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 100.
- You are expected to use a scientific calculator where appropriate.

For Examiner's Use

Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	



N 0 V 2 2 9 2 0 4 B C 0 1

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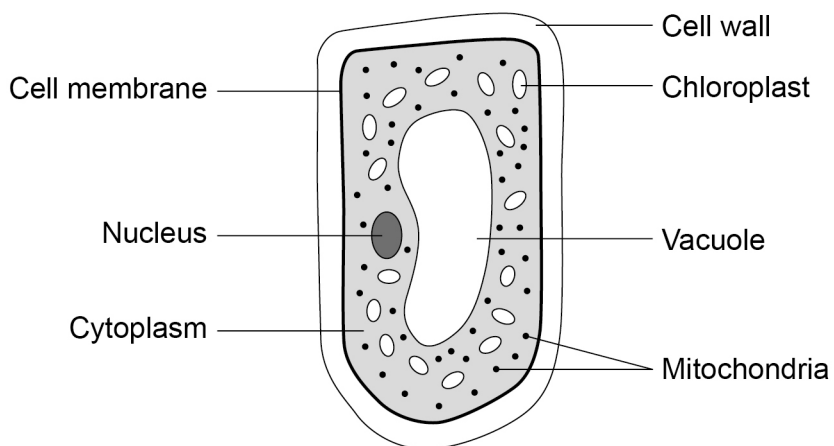
Answer **all** questions in the spaces provided.

0 1

Plants have different cells, tissues and organs.

Figure 1 shows a plant cell.

Figure 1



0 1 . 1

Which part of the plant cell is made from cellulose?

[1 mark]

Tick (✓) **one** box.

Cell wall

☐

Cytoplasm

☐

Nucleus

☐

0 1 . 2

Which part of the plant cell absorbs light for photosynthesis?

[1 mark]

Tick (✓) **one** box.

Cell membrane

☐

Chloroplast

☐

Vacuole

☐

Turn over ►



0 1 . 3 Complete the word equation for photosynthesis.

Choose the answer from the box.

[1 mark]

glycogen

oxygen

starch

carbon dioxide + water → glucose + _____

0 1 . 4 Plant cells carry out both photosynthesis and respiration.

Complete **Table 1** to show when photosynthesis takes place and when respiration takes place.

[2 marks]

Put **one** tick (✓) in each row.

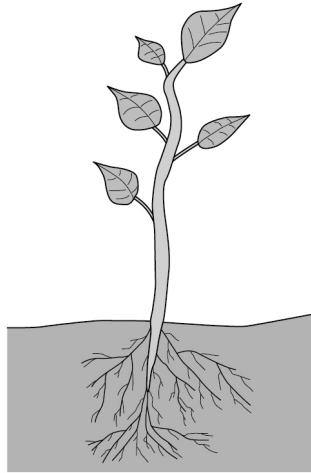
Table 1

Process	When the process takes place		
	All the time	Only when it is dark	Only when it is light
Photosynthesis			
Respiration			



Figure 2 shows some organs of a plant.

Figure 2



0 1 . 5

Leaves are plant organs.

Name **two other** plant organs.

[2 marks]

1 _____

2 _____

Question 1 continues on the next page

Turn over ►



The lower surface of a leaf has holes called stomata.

Gases enter a leaf through the stomata.

A student used a microscope to count the number of stomata in 1 mm^2 of the lower surface of a leaf.

0 1 . 6 The student counted the number of stomata in three areas on the same leaf.

Table 2 shows the results.

Table 2

Area	Number of stomata in 1 mm^2
1	84
2	97
3	63
Mean	X

Calculate value **X** in **Table 2**.

Give your answer to the nearest whole number.

[3 marks]

X (nearest whole number) = _____



0 1 . 7

Why did the student use a microscope to count the stomata?

[1 mark]

0 1 . 8

Water is lost from plants through stomata.

Suggest why plants that live in a dry habitat have very few stomata.

[1 mark]

12

Turn over for the next question

Turn over ►



0 2

The human body is organised into cells, tissues, organs and organ systems.

0 2 . 1

Complete the sentence.

Choose the answer from the box.

[1 mark]**circulatory****digestive****nervous**

The stomach and liver are part of the _____ system.

0 2 . 2

Which organ contains receptors that are sensitive to chemicals?

[1 mark]

Tick (✓) **one** box.

Ear

☐

Skin

☐

Tongue

☐**0 2 . 3**

Complete the sentence.

Choose the answer from the box.

[1 mark]**epithelial****glandular****muscular**

Enzymes are produced by _____ tissue.



0 2 . 4

What type of cells are produced in the male reproductive organs?

[1 mark]

0 2 . 5

Draw **one** line from each type of blood cell to the function of the blood cell.

[2 marks]

Type of blood cell	Function of the blood cell
	To carry impulses
Red blood cell	To digest glucose
White blood cell	To produce antibodies
	To transport oxygen

0 2 . 6

Mitosis produces new cells for growth.

How many new cells are produced when **one** body cell divides by mitosis?

[1 mark]

Question 2 continues on the next page

Turn over ►



A nucleus controls the activities of a cell.

0 2 . 7 What is contained in the nucleus of a cell?

[1 mark]

Tick (✓) **one** box.

Antibodies

☐

Chromosomes

☐

Mitochondria

☐

0 2 . 8 What type of human cell does **not** have a nucleus?

[1 mark]

Tick (✓) **one** box.

Egg cell

☐

Red blood cell

☐

White blood cell

☐

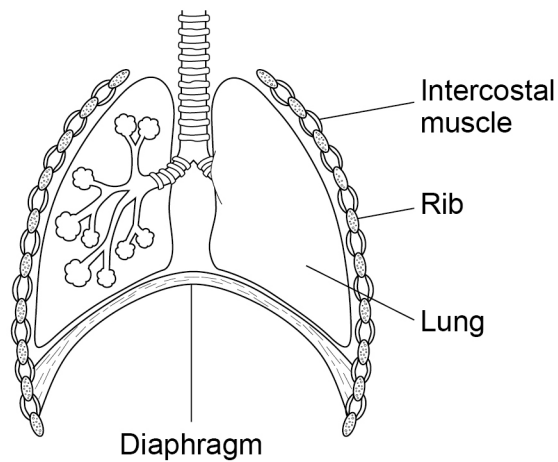
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0 3**Figure 3** shows the human breathing system.**Figure 3****0 3 . 1**

The diaphragm and intercostal muscles contract to move air into the lungs when a person breathes in.

Complete the sentences.

[2 marks]

When a person breathes in, the diaphragm moves _____.

When a person breathes in, the ribcage moves _____.



A student investigated the effect of exercise on breathing rate.

The student ran at different speeds on a running machine.

Figure 4 shows a student on a running machine.

Figure 4



The breathing rate of the student was recorded at each speed.

0 3 . 2 Which variable should be kept the same during the investigation?

[1 mark]

Tick (✓) **one** box.

Breathing rate

☐

Room temperature

☐

Running speed

☐

Question 3 continues on the next page

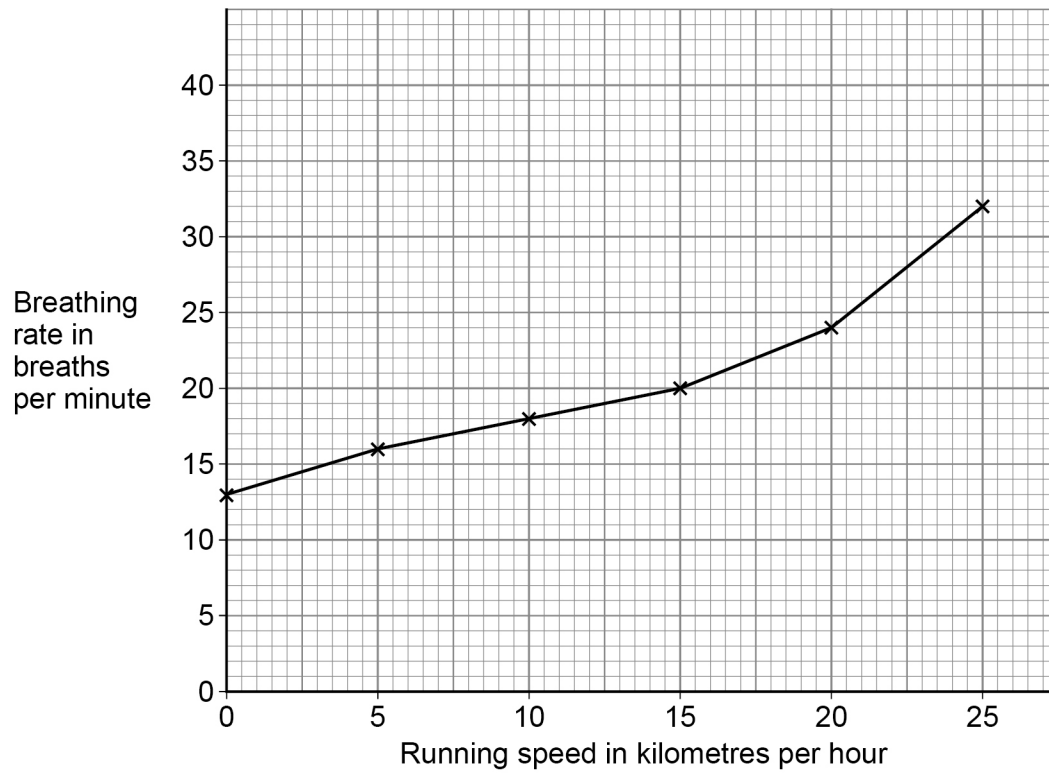
Turn over ►



The breathing rate of the student was measured at rest and at five different speeds.

Figure 5 shows the results.

Figure 5



0 3 . 3

Give **one** conclusion about the effect of running speed on the body.

Use **Figure 5**.

[1 mark]



0 3 . 4

Running speed is 0 kilometres per hour when a person is at rest.

What was the breathing rate when the student was at rest?

Use **Figure 5**.**[1 mark]**

Breathing rate = _____ breaths per minute

0 3 . 5The volume of air in each breath when the student was at rest was 0.43 dm^3 .

Calculate the volume of air breathed in per minute at rest.

Use your answer from Question **03.4**.**[2 marks]**

Volume of air breathed in per minute = _____ dm^3 **Question 3 continues on the next page****Turn over ►**

Table 3 shows the percentages of gases:

- in the air breathed into the lungs
- in the air breathed out of the lungs.

Table 3

Gas	Percentage of gas in air	
	breathed into the lungs	breathed out of the lungs
Carbon dioxide	0.04	4
Nitrogen	79	79
Oxygen	21	16

0 3 . 6

Compare the percentages of each of the gases in the air breathed out of the lungs with the air breathed into the lungs.

[3 marks]



0 3 . 7 Which process in the body releases energy?

[1 mark]

Tick (✓) **one** box.

Diffusion

☐

Osmosis

☐

Respiration

☐

0 3 . 8 Explain why the body uses more oxygen during exercise than at rest.

[3 marks]

0 3 . 9 Muscle cells produce lactic acid during intense exercise.

Which body fluid removes lactic acid from the muscles?

[1 mark]

Tick (✓) **one** box.

Bile

☐

Blood

☐

Sweat

☐

Turn over ►



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0 4

Disorders and diseases are conditions that affect many people.

0 4 . 1

Draw **one** line from each condition to the cause of the condition.

[2 marks]

Condition

Cause

Measles

A pathogen

Allele inherited from parents

Polydactyly

Obesity

Radiation from the Sun

0 4 . 2

How many **pairs** of chromosomes are in a human body cell?

[1 mark]

Tick (✓) **one** box.

2

☐

4

☐

23

☐

46

☐

0 4 . 3

Name **one** condition that is caused by the inheritance of an extra chromosome.

[1 mark]

Question 4 continues on the next page

Turn over ►



0 4 . 4

Dominant alleles always control the development of a characteristic.

Complete the sentence.

Choose the answer from the box.

[1 mark]

asexual

recessive

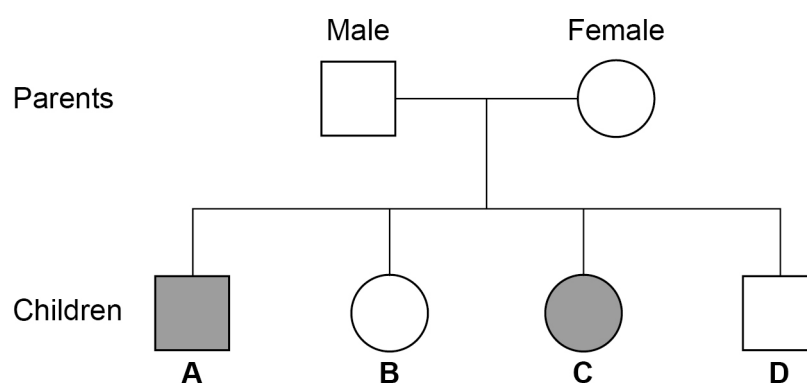
resistant

Alleles that have **no** effect when a dominant allele is present are _____.

Cystic fibrosis is an inherited disorder.

Figure 6 shows the inheritance of cystic fibrosis in one family.

Figure 6



Key

■ and ● have cystic fibrosis

□ and ○ do **not** have cystic fibrosis

0 4 . 5

Which child in **Figure 6** is male and does **not** have cystic fibrosis?

[1 mark]



The gene that can cause cystic fibrosis has two alleles:

- **N** is the allele for **not** having cystic fibrosis
- **n** is the allele for having cystic fibrosis.

0 4 . 6

Complete **Figure 7** to show how the alleles from the parents in **Figure 6** are passed on to their children.

[2 marks]

Figure 7

		Female parent	
		N	n
Male parent	N	NN	
	n		

Question 4 continues on the next page

Turn over ►



Type 2 diabetes is a condition that may develop as a person gets older.

Figure 8 shows two methods for monitoring blood glucose levels at home.

Figure 8

Blood test	Sniffer dog
	
Blood tests are taken several times a day. A finger is pricked so that it bleeds.	A dog lives with a person who has diabetes.
Drops of blood are added to a blood glucose monitor.	The dog can detect low blood glucose levels.
The monitor gives a value to show the blood glucose level.	The dog alerts the person when their blood glucose level falls too low.

0 4 . 7

Compare the advantages of using blood tests with the advantages of using a sniffer dog to monitor blood glucose levels.

[4 marks]



0 4 . 8

Which **two** characteristics are important in a dog chosen to work as a sniffer dog?**[2 marks]**Tick (✓) **two** boxes.

Easy to groom

☐

Excellent sense of smell

☐

Fast runner

☐

Good at hunting

☐

Responds well to training

☐

14**Turn over for the next question****Turn over ►**

0 5

A plant produces seeds by sexual reproduction.

The seeds grow into new plants.

0 5 . 1

Why do the new plants have different characteristics from each other?

[2 marks]

Tick (✓) **two** boxes.

Environmental conditions affect growth.

☐

Some of the seeds contain more genetic information.

☐

The new plants have genetic information from two parents.

☐

The parent plants have more chromosomes.

☐

The seeds grow into genetically identical plants.

☐

Flower farmers grow millions of flowering plants to harvest and sell.

0 5 . 2

The farmers use tissue culture to produce the plants.

Suggest **one** advantage of using tissue culture to produce large numbers of flowering plants instead of growing the plants from seeds.

[1 mark]



Farmers use fertilisers to improve the growth of plants.

The fertilisers contain mineral ions.

0 5 . 3 Plants absorb nitrate ions from the soil.

What do plants use nitrate ions for?

[1 mark]

Tick (✓) **one** box.

To make glucose

☐

To make protein

☐

To make starch

☐

Question 5 continues on the next page

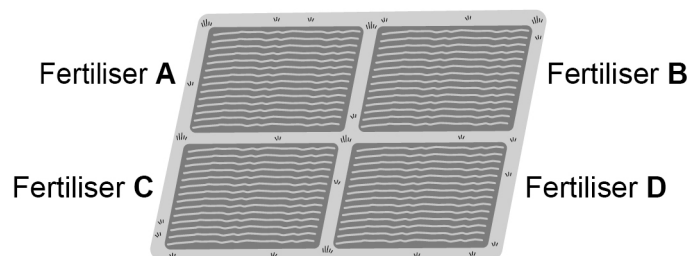
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A farmer investigated the effect of four different fertilisers on the growth of flowering plants.

Figure 9 shows a field divided into four sections.

Figure 9



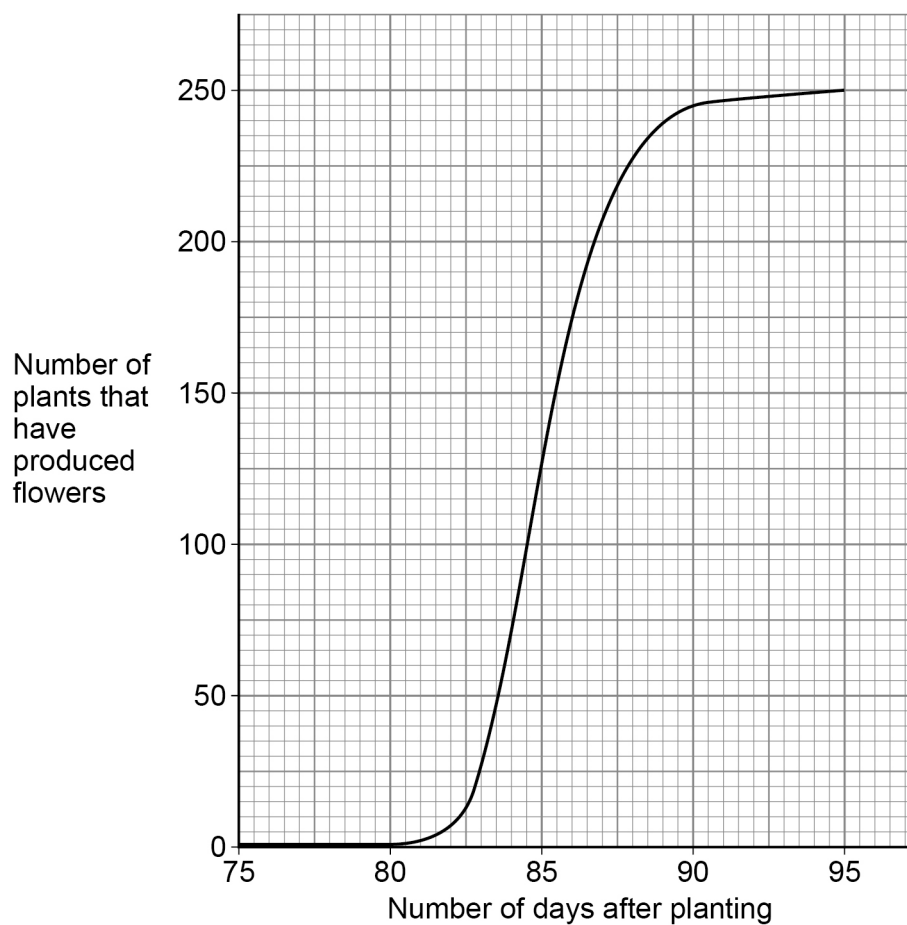
250 identical flowering plants were planted in each section of the field.

A different fertiliser was used in each section.

The number of plants that had produced flowers was recorded each day.

Figure 10 shows the results from 75 to 95 days after planting in the section with fertiliser **A** added.

Figure 10



0 5 . 4 How many days after planting had half of the plants produced flowers?

Use **Figure 10**.

[1 mark]

_____ days

The farmer measured the heights of the plants.

0 5 . 5 Complete **Table 4**.

Give the reason why the results were collected as described.

[2 marks]

Table 4

Collection of results	Reason
Only a sample of plants were measured, not all of them.	_____ _____
Plants were selected randomly in each section.	_____ _____

Question 5 continues on the next page

Turn over ►



0 5 . 6 Plants from each section of the field were measured.

Table 5 shows the results.

Table 5

Fertiliser	Mean height of plants in mm
A	387
B	374
C	391
D	303

Give **two** conclusions about the effects of the different fertilisers on plant height.

[2 marks]

- 1 _____
- _____
- 2 _____
- _____

0 5 . 7 Each fertiliser improved the growth of the flowering plants.

Suggest **one other** factor the farmer should consider when deciding which fertiliser to use.

[1 mark]

- _____
- _____



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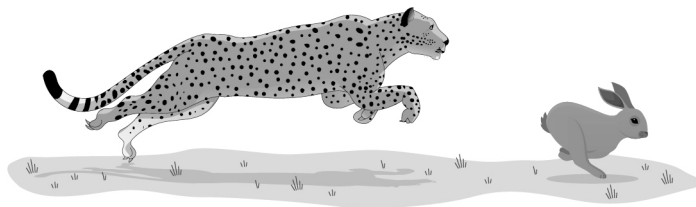


0 6

The nervous system enables organisms to respond to their environment.

Figure 11 shows a rabbit running away from a predator.

Figure 11



0 6 . 1

Give **two** organs that the rabbit uses to detect the predator.

[2 marks]

1 _____

2 _____

0 6 . 2

Which **two** structures are part of the central nervous system (CNS)?

[2 marks]

Tick (✓) **two** boxes.

Brain

☐

Pancreas

☐

Skin

☐

Spinal cord

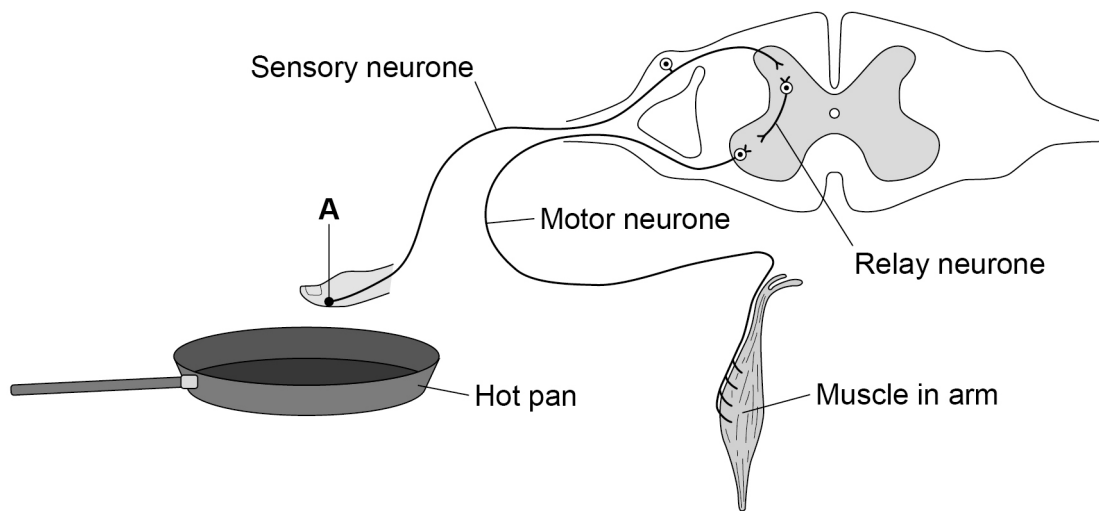
☐

Tongue

☐


Figure 12 shows the neurones and parts of the body involved in a response to touching a hot pan.

Figure 12



Not to scale

0 6 . 3 The reflex action helps to prevent damage to the finger if it touches the hot pan.

Complete the sentences.

Use **Figure 12**.

[4 marks]

Receptors in the finger detect the _____.

Impulses are sent along _____.

Impulses reach the muscle in the arm so the muscle _____.

Damage is prevented because the withdrawal response is very _____.

0 6 . 4 There is a synapse between the relay neurone and the motor neurone on **Figure 12**.

How is the impulse passed from the sensory neurone across the synapse to the relay neurone?

[1 mark]

Turn over ►



0 7 . 2 Adult penguins show parental care for their offspring.

Give **two** reasons why parental care is a successful evolutionary strategy for penguins.

[2 marks]

1 _____

2 _____

0 7 . 3 Penguins stand very close together in large groups.

What is the name of this behavioural adaptation?

[1 mark]

Question 7 continues on the next page

Turn over ►

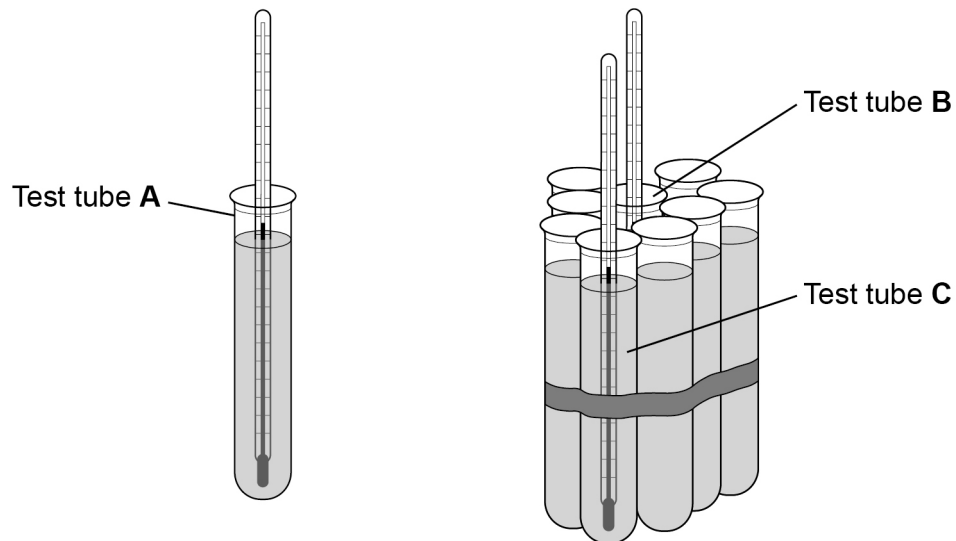


A student investigated if penguins that stand close together stay warmer than penguins that stand alone.

The student used test tubes filled with hot water to represent the penguins.

Figure 14 shows a single test tube and a group of test tubes.

Figure 14



0 7 . 4

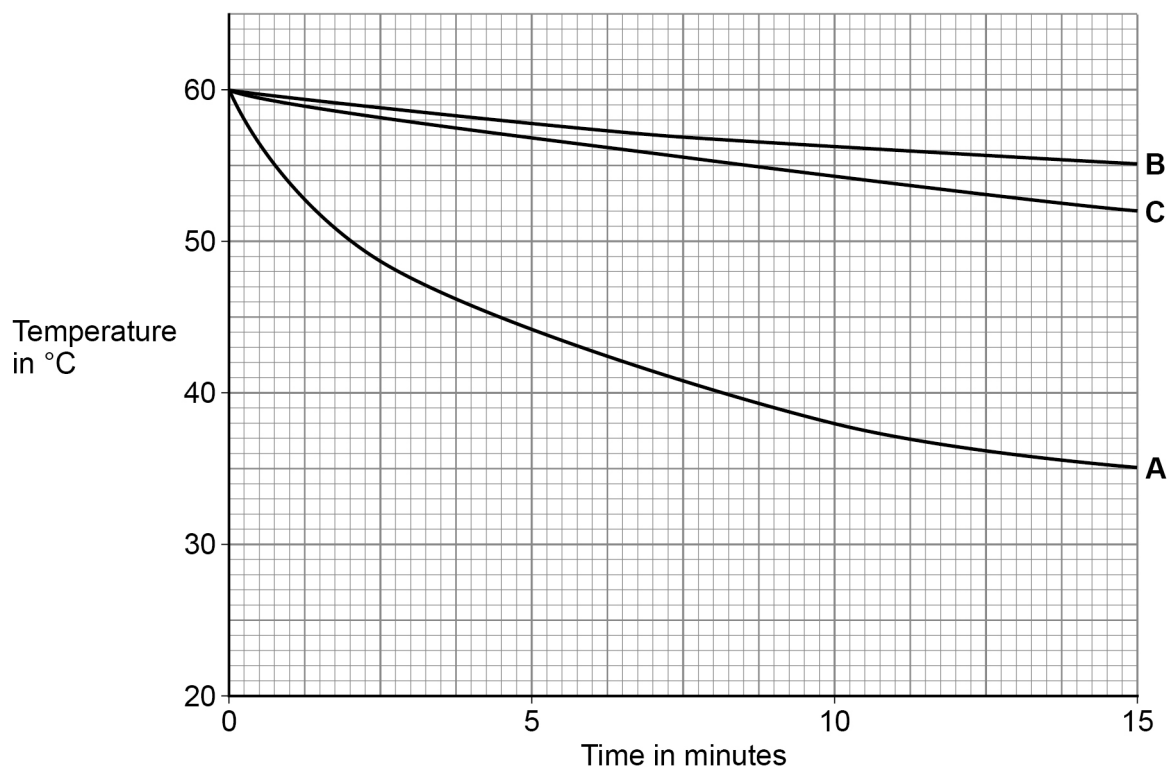
The student added the same volume of water to each test tube at the start.

Describe a method the student could use to make a valid comparison of the temperature **changes** in test tubes **A**, **B** and **C**.

[4 marks]

Figure 15 shows the results.

Figure 15



0 7 . 5

Give **one** reason why standing close to each other in a group benefits penguins more than standing alone.

Use **Figure 15**.

[1 mark]

Question 7 continues on the next page

Turn over ►



0 7 . 6

The temperature of the water in all the test tubes eventually decreased to the same temperature as the environment.

The body temperature of penguins in a group is **always higher** than the temperature of the environment.

Give **one** reason why the body temperature of the penguins **does not** decrease to the same temperature as the environment.

[1 mark]

0 7 . 7

Suggest **one** advantage of using laboratory equipment instead of living organisms to study animal behaviour.

[1 mark]

16

Turn over for the next question

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0 8

A student investigated the effect of different antibiotics on the growth of one species of bacteria.

The student used agar plates spread with the bacteria.

This is the method used.

1. Soak 3 paper discs in antibiotic **A**.
2. Use forceps to place the discs onto the agar plate.
3. Repeat steps 1–2 for antibiotic **B** and for antibiotic **C**.
4. Repeat steps 1–2 with discs soaked in distilled water.
5. Incubate the agar plates at 25 °C for 24 hours.
6. Measure the diameter of the clear zone around each disc.

0 8 . 1

Describe **two** aseptic techniques to avoid contamination during a practical activity using bacteria.

[2 marks]

- 1 _____
- _____
- 2 _____
- _____

0 8 . 2

There was no clear zone around the disc soaked in distilled water.

Suggest **one** reason why discs soaked in distilled water were used.

[1 mark]

- _____
- _____



0 8 . 3 Complete **Table 6** to identify variables in the experiment.

Put **one** tick (✓) in each row.

[3 marks]

Table 6

	Dependent variable	Independent variable	Control variable
Diameter of clear zone around antibiotic disc			
Incubation temperature			
Species of bacteria used			
Type of antibiotic used			

Question 8 continues on the next page

Turn over ►



The student calculated the area of the clear zone around each disc soaked in antibiotic.

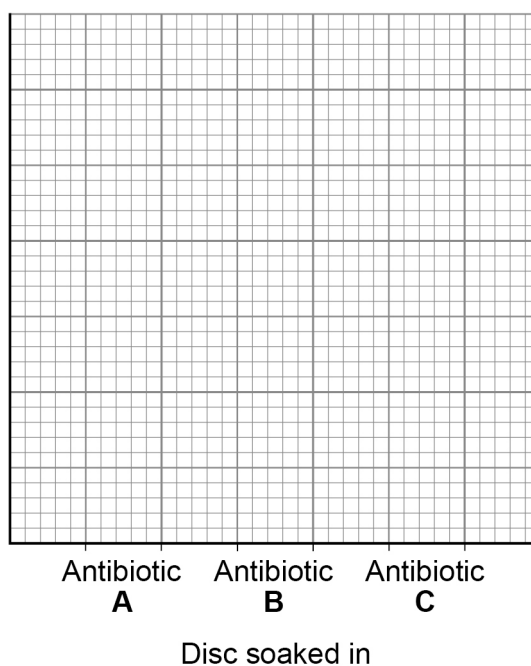
Table 7 shows the results.

Table 7

Disc	Mean area of clear zone in mm ²
Antibiotic A	120
Antibiotic B	10
Antibiotic C	88

0 8 . 4 **Figure 16** is an incomplete bar chart for the data in **Table 7**.

Figure 16



Complete **Figure 16**.

You should:

- label the y-axis
- add the correct scale to the y-axis
- plot the data from **Table 7**.

[4 marks]



0	8	.	5
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Which antibiotic in **Table 7** should be used to treat an infection by this species of bacteria?

Give the reason for your answer.

[1 mark]

Antibiotic _____

Reason _____

Question 8 continues on the next page

Turn over ►



The student investigated the effect of the antibiotics on a different species of bacteria.

Figure 17 shows the agar plate after incubation.

Figure 17



0 8 . 6

Calculate the area of the clear zone for Antibiotic **A**.

The diameter of the clear zone for Antibiotic **A** is 12.0 mm.

Give your answer to **3** significant figures.

$$\text{Area} = \pi r^2$$

Use $\pi = 3.14$

[3 marks]

Area (3 significant figures) = _____ mm²



08.7

The student did **not** need to measure all the clear zones to conclude which antibiotic was the most effective.

Suggest why.

[1 mark]

15

END OF QUESTIONS



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