OXFORD

INTERNATIONAL
AQA EXAMINATIONS

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

INTERNATIONAL GCSE
COMBINED SCIENCE

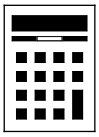
C

Paper 1 Biology Core

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.

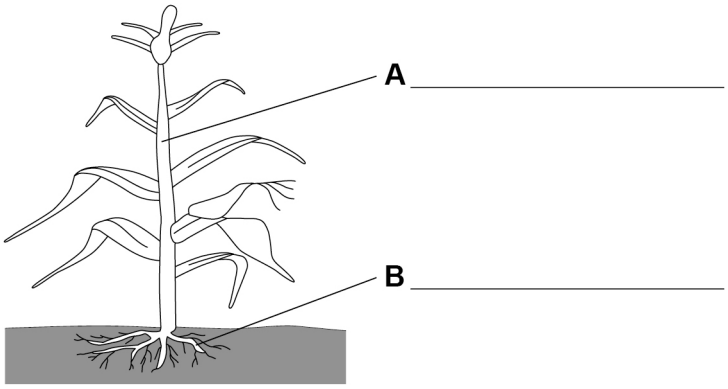
For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

Do not write outside the box

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

0 1 **Figure 1** shows some plant organs.

Figure 1



0 1 . 1 Label the organs **A** and **B** on **Figure 1**.

[2 marks]

0 1 . 2 What term is used for a group of cells with a similar structure and function?

[1 mark]

Tick (✓) **one** box.

Gamete ☐

Organ system ☐

Organism ☐

Tissue ☐

Do not write outside the box

0 1 . 3 What cell is adapted for one particular function?

[1 mark]

Tick (✓) **one** box.

Bacterial cell ☐

Eukaryotic cell ☐

Specialised cell ☐

0 1 . 4 Leaf cells have chloroplasts.

What is the function of chloroplasts?

[1 mark]

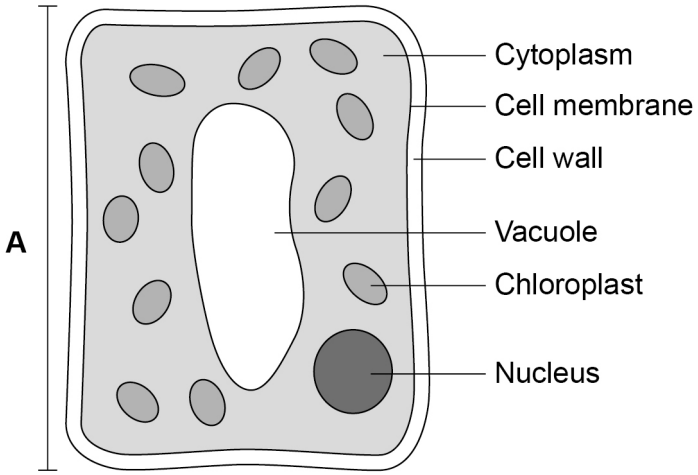
Question 1 continues on the next page

Do not write outside the box

A leaf cell is magnified to produce the image in **Figure 2**.

Line **A** shows the length of the leaf cell in the image.

Figure 2



0 1 . 5 Measure the length of the image, line **A**.

Give your answer in mm.

[1 mark]

Length of the image = _____ mm

Do not write outside the box

0 1 . 6 The magnification of the leaf cell in **Figure 2** is × 750.

The real length of the leaf cell can be calculated using the formula:

$$\text{real length of leaf cell} = \frac{\text{length of image}}{\text{magnification}}$$

Calculate the real length of the leaf cell in **Figure 2**.

Use your answer from Question **01.5**.

[2 marks]

Real length of the leaf cell = _____ mm

0 1 . 7 Give **two** structures in **Figure 2** that are **not** found in animal cells.

[2 marks]

1 _____

2 _____

10

Turn over for the next question

Do not write outside the box

0 2 Respiration takes place in animals.

0 2 . 1 What substances are needed for **aerobic** respiration?

[2 marks]

Tick (✓) **two** boxes.

- Carbon dioxide ☐
- Glucose ☐
- Nitrogen ☐
- Oxygen ☐
- Water ☐

0 2 . 2 Give **two** uses of the energy transferred by respiration in animals.

[2 marks]

1 _____

2 _____

Do not write outside the box

0 2 . 3 Anaerobic respiration can take place in muscle cells.

What are **two** features of **anaerobic** respiration in muscle cells?

[2 marks]

Tick (✓) **two** boxes.

Carbon dioxide is used. ☐

Glycerol is produced. ☐

Lactic acid is produced. ☐

No oxygen is used. ☐

Water is used. ☐

Question 2 continues on the next page

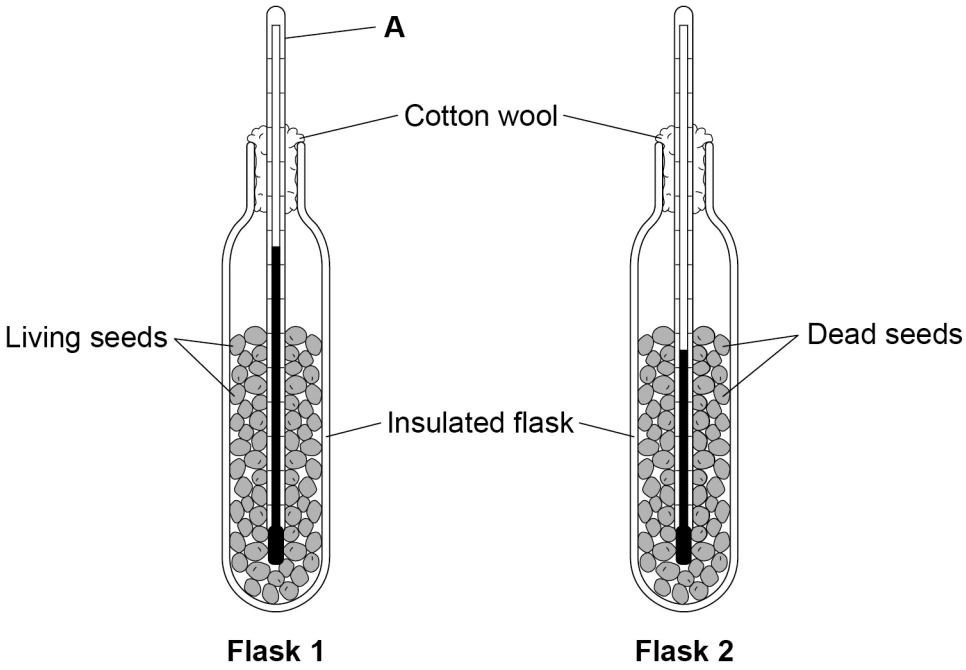
Do not write outside the box

A student investigated energy transfer in plants.

The temperature of plant seeds was measured over a period of 24 hours.

Figure 3 shows the apparatus used.

Figure 3



0 2 . 4 Name the apparatus labelled **A** in **Figure 3**.

[1 mark]

0 2 . 5 Suggest why the flasks used were insulated flasks.

[1 mark]

Do not write outside the box

0 2 . 6 Why were dead seeds used in **Flask 2**?

[1 mark]

0 2 . 7 **Table 1** shows the results.

Table 1

	Temperature in °C	
	Flask 1 Living seeds	**Flask 2 Dead seeds**
Start of experiment	18	18
After 12 hours	26	18
After 24 hours	40	18

What conclusion can be made from the results?

[1 mark]

Tick (✓) **one** box.

Living seeds are larger than dead seeds. ☐

Living seeds grow faster at a low temperature. ☐

Living seeds transfer energy to the environment. ☐

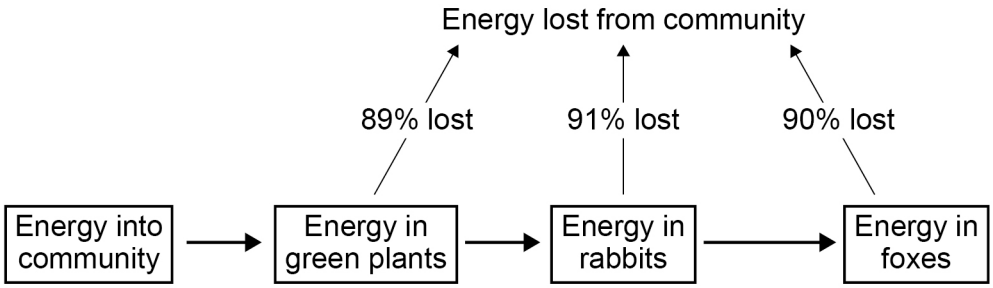
10

Turn over for the next question

Do not write outside the box

0 3 **Figure 4** shows the flow of energy through part of a community of living organisms.

Figure 4



0 3 . 1 What is the source of energy for green plants?

[1 mark]

0 3 . 2 What percentage of the energy in green plants is transferred to rabbits in **Figure 4**?

[1 mark]

0 3 . 3 The energy in the green plants in **Figure 4** is 500 000 J.

Calculate how much energy is transferred to rabbits in **Figure 4**.

Use your answer from Question **03.2**.

[2 marks]

Energy transferred = _____ J

Do not write outside the box

0 3 . 4 How is the energy in animals lost to the environment?

[1 mark]

Tick (✓) **one** box.

By photosynthesis ☐

In digested food ☐

In new growth ☐

In waste materials ☐

In a farmer's corn field:

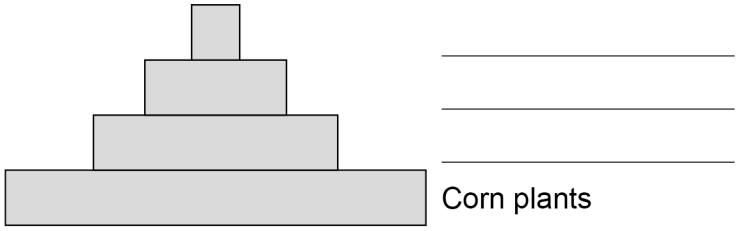
- small insects feed on corn plants
- carabid beetles feed on small insects
- birds feed on carabid beetles.

0 3 . 5 **Figure 5** shows a pyramid of biomass for the organisms in the farmer's corn field.

Complete the pyramid of biomass in **Figure 5**.

[2 marks]

Figure 5



0 3 . 6 Corn plants have fewer damaged leaves when the number of carabid beetles in the corn field is increased.

Suggest **one** reason why.

[1 mark]

_____

_____

Question 3 continues on the next page

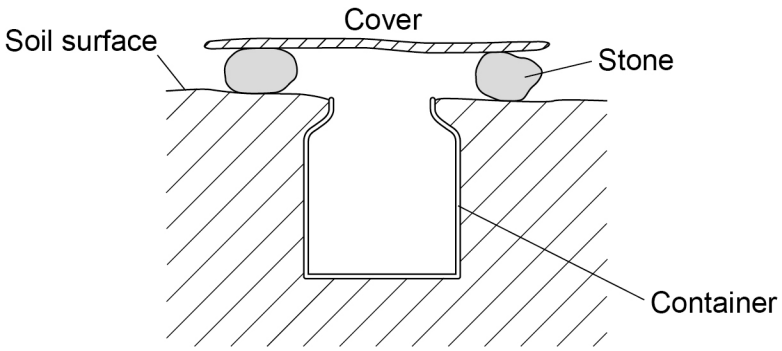
Do not write outside the box

A pitfall trap can be used to collect carabid beetles in the corn field.

The beetles move between the stones and fall into the pitfall trap.

Figure 6 shows a pitfall trap.

Figure 6



0 3 . 7 Suggest **one** reason why a cover is placed above the container.

[1 mark]

0 3 . 8 Describe how the farmer could use pitfall traps to compare the number of carabid beetles in the field in different months.

[3 marks]

Do not write outside the box

0 3 . 9 **Figure 7** shows the number of carabid beetles trapped each month in one year.

Figure 7

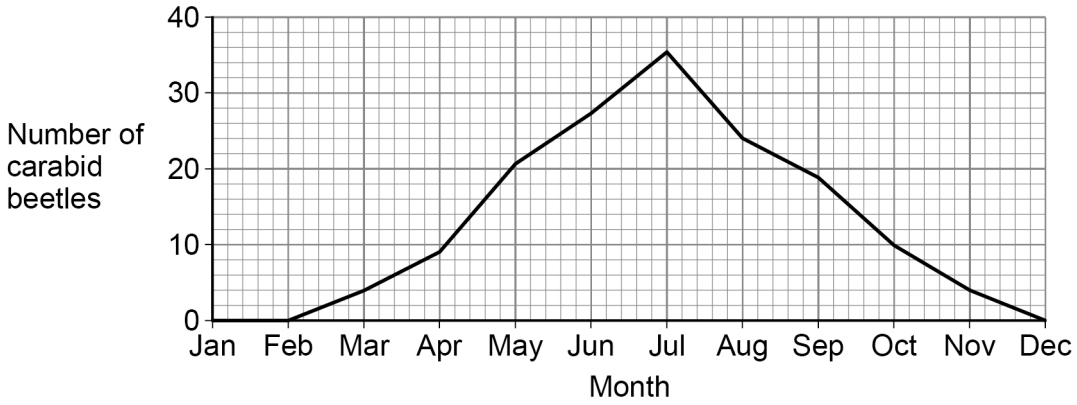
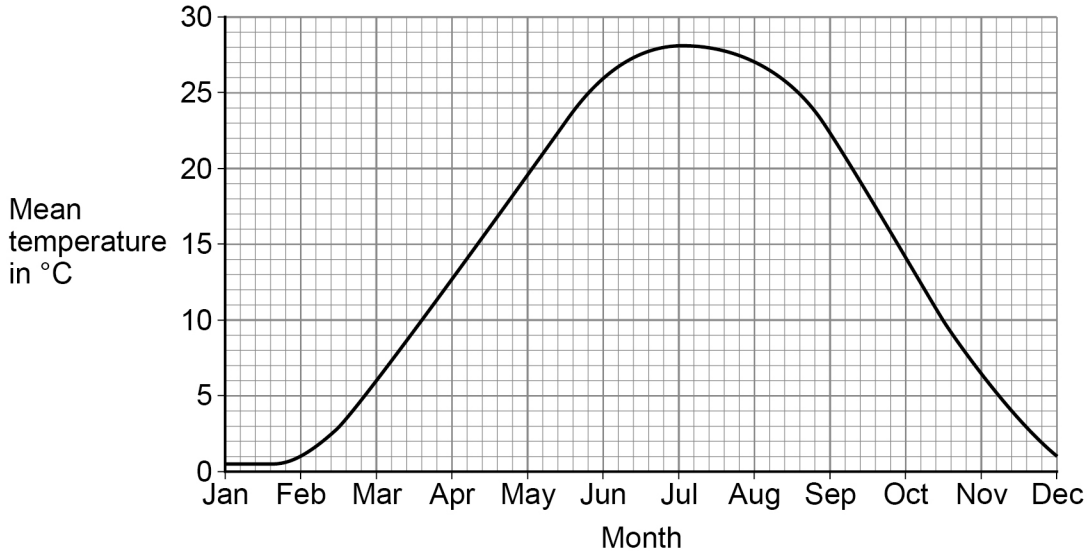


Figure 8 shows the mean temperature during the year.

Figure 8



What do the results suggest about the type of conditions that carabid beetles prefer?

[1 mark]

13

Turn over for the next question

Do not write outside the box

0 4 Animal cells burst when too much water moves into the cells.

0 4 . 1 Complete the sentences.

[2 marks]

Water moves into animal cells by the process of _____.

Water moves into animal cells through the _____.

A scientist investigated the effect of salt solution on animal cells.

This is the method used.

1 Place one drop of a salt solution onto a microscope slide.
2 Add 40 animal cells to the drop of salt solution.
3 After 20 minutes, observe the cells using a microscope.
4 Determine the number of animal cells that have burst.
5 Repeat steps **1** to **4** two more times using the same salt solution.
6 Repeat steps **1** to **5** using different concentrations of salt solution.

The results are shown in **Table 2**.

Table 2

Salt solution	Number of animal cells that burst			
	Test 1	Test 2	Test 3	Mean
W	37	39	36	37.3
X	14	15	31	14.5
Y	2	1	2	1.7
Z	0	2	1	1.0

0 4 . 2 The **Test 3** result for salt solution **X** was **not** used to calculate the mean.

Give the reason why.

[1 mark]

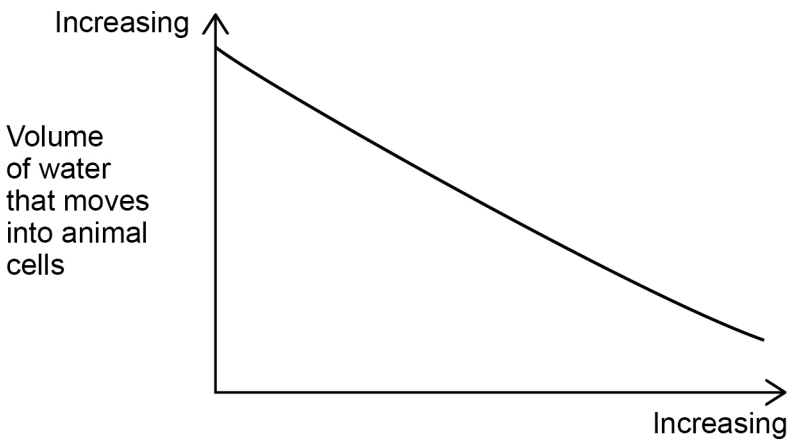
_____

_____

Do not write outside the box

Figure 9 shows the effect of salt solution concentration on the volume of water that moves into animal cells.

Figure 9



0 4 . 3 Describe the trend shown in **Figure 9**.

[1 mark]

0 4 . 4 Which salt solution in **Table 2** has the lowest salt concentration?

Give a reason for your answer.

Use **Figure 9**.

[2 marks]

Salt solution _____

Reason _____

0 4 . 5 Predict how many animal cells will burst if they are placed in water with no salt dissolved in it.

[1 mark]

Question 4 continues on the next page

Do not write outside the box

0 4 . 6 The scientist tested another concentration of salt solution.

The number of animal cells that burst in each of the three tests were:

- 25
- 24
- 27

Calculate the mean number of animal cells that burst.

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

[3 marks]

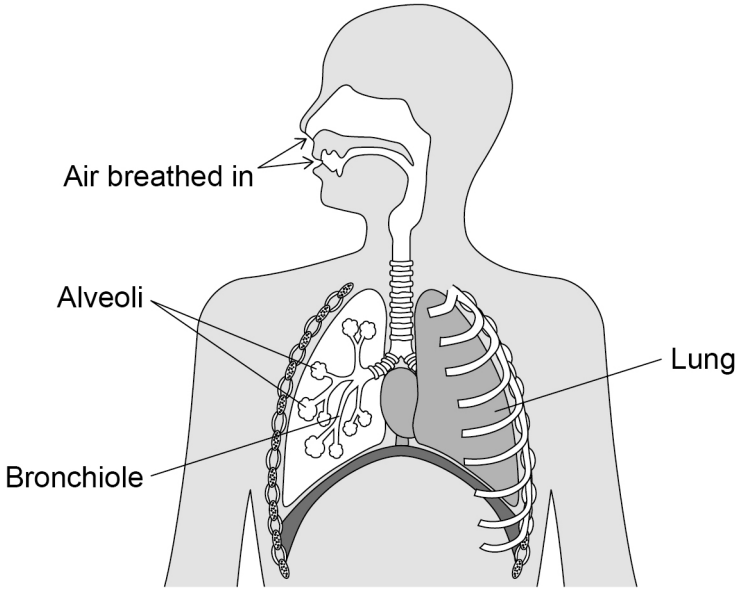
Mean number of animal cells (2 significant figures) = _____

10

Do not write outside the box

0 5 **Figure 10** shows the human breathing system.

Figure 10



0 5 . 1 Describe how oxygen in the lungs enters the blood.

[3 marks]

0 5 . 2 Oxygen is transported to the organs.

Which blood cells transport oxygen?

[1 mark]

Question 5 continues on the next page

Do not write outside the box

0 5 . 3 Complete the pathway taken by the air when it is breathed in.

Choose answers from the box.

[3 marks]

bronchi	**bronchioles**	**diaphragm**
ribs	**trachea**	

Air breathed in

↓

_____

↓

_____

↓

_____

↓

Alveoli

Do not write outside the box

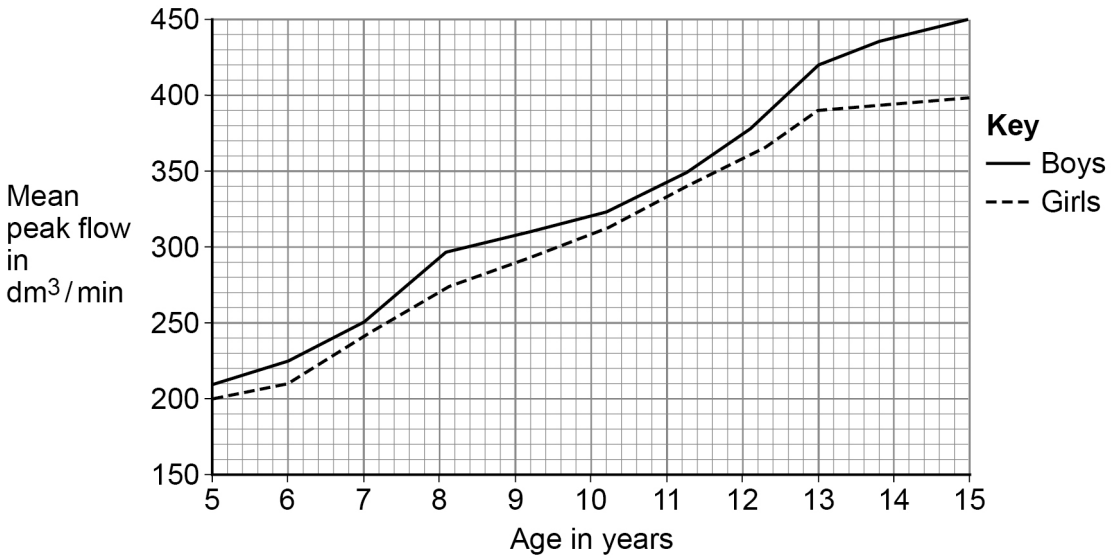
Peak flow is a measurement of how fast a person can blow air out of their lungs.

The peak flow of more than 3000 children aged 5 to 15 years was measured.

The mean peak flow was calculated at each age for boys and for girls.

Figure 11 shows the results.

Figure 11



0 5 . 4 Give **two** conclusions about mean peak flow in boys and girls.

Use information from **Figure 11**.

[2 marks]

1 _____

_____

2 _____

_____

0 5 . 5 What is the mean peak flow for girls aged 13 years?

[1 mark]

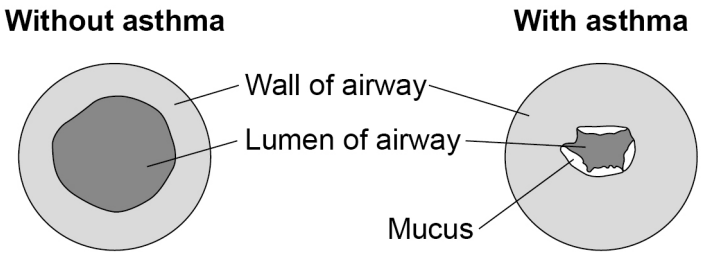
Mean peak flow = _____ dm^3/min

Question 5 continues on the next page

Asthma affects the airways.

Figure 12 shows an airway of a person without asthma and an airway of a person with asthma.

Figure 12



0 5 . 6 Give **two** reasons why a person with asthma finds it harder to breathe than a person without asthma.

Use information from **Figure 12**.

[2 marks]

1 _____

_____

2 _____

_____

Do not write outside the box

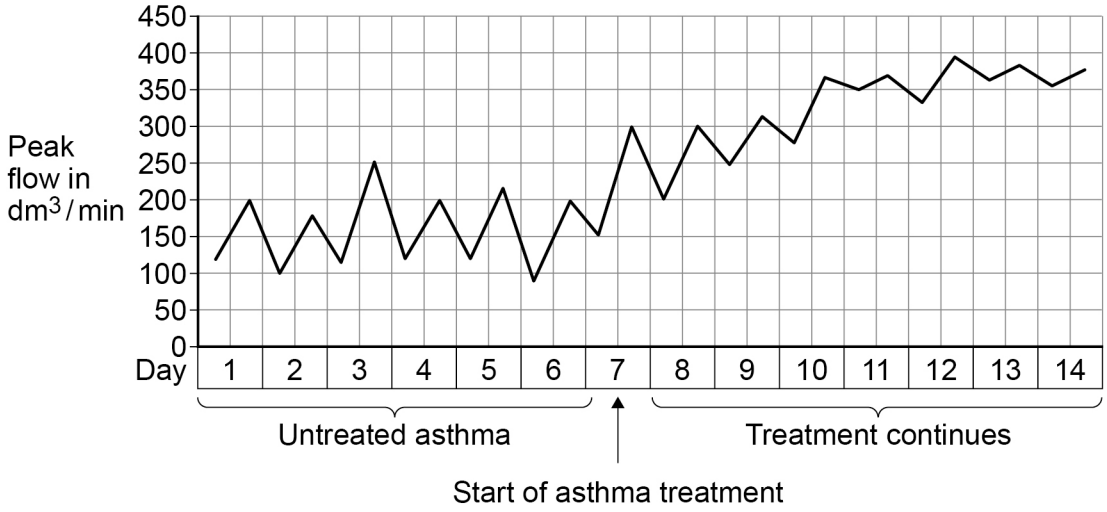
0 5 . 7 Asthma reduces peak flow.

A 13-year-old boy with asthma recorded his peak flow twice a day.

The boy started using an asthma treatment on day seven.

Figure 13 shows the boy's peak flow record.

Figure 13



The mean peak flow for boys aged 13 years is 420 dm^3/min.

Evaluate the effectiveness of the asthma treatment.

Use information from **Figure 13**.

[4 marks]

16

Turn over ►

Do not write outside the box

0 6 Variation in birds may be caused by genes, the environment or both genes and the environment.

0 6 . 1 Complete **Table 3** to show the cause of each variation.

[2 marks]

Tick (✓) **one** box in each row.

Table 3

Variation	Variation caused by		
	Genes only	**Environment only**	**Both genes and environment**
Blood group			
Broken wing			
Mass of bird			

0 6 . 2 Scientists have suggested different theories to explain why organisms change over time.

What is Lamarck's theory?

[1 mark]

Tick (✓) **one** box.

Changes in the environment destroy DNA code. ☐

Changes that give an advantage to an organism are never inherited. ☐

Changes that occur in an organism's lifetime can be inherited. ☐

Do not write outside the box

0 6 . 3 What process leads to changes in the characteristics of a species over time according to the theory of evolution?

[1 mark]

Tick (✓) **one** box.

Asexual reproduction ☐

Cloning ☐

Genetic engineering ☐

Natural selection ☐

Question 6 continues on the next page

Do not write outside the box

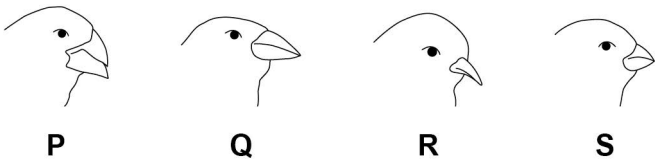
Figure 14 shows a bird.

Figure 14

The beak of the bird is adapted for eating insects.

Figure 15 shows the heads of four species of finch that live on the Galapagos Islands.

Figure 15



0 6 . 4 Which species of finch in **Figure 15** is most likely to eat insects?

Give **one** reason for your answer.

[2 marks]

Species of finch _____

Reason _____

_____

Do not write outside the box

0 6 . 5 It is too far for birds to fly from the mainland to the Galapagos Islands.

A scientist suggested that some finches were carried to the Galapagos Islands by a strong wind thousands of years ago.

Complete the sentences to describe how a new species of finch could develop on one of the Galapagos Islands.

[4 marks]

The long distance causes the mainland finches and island finches

to be _____.

The finches have alleles that control their _____.

Conditions on the Island causes different alleles to be _____.

The mainland finches and island finches are no longer able to

successfully _____.

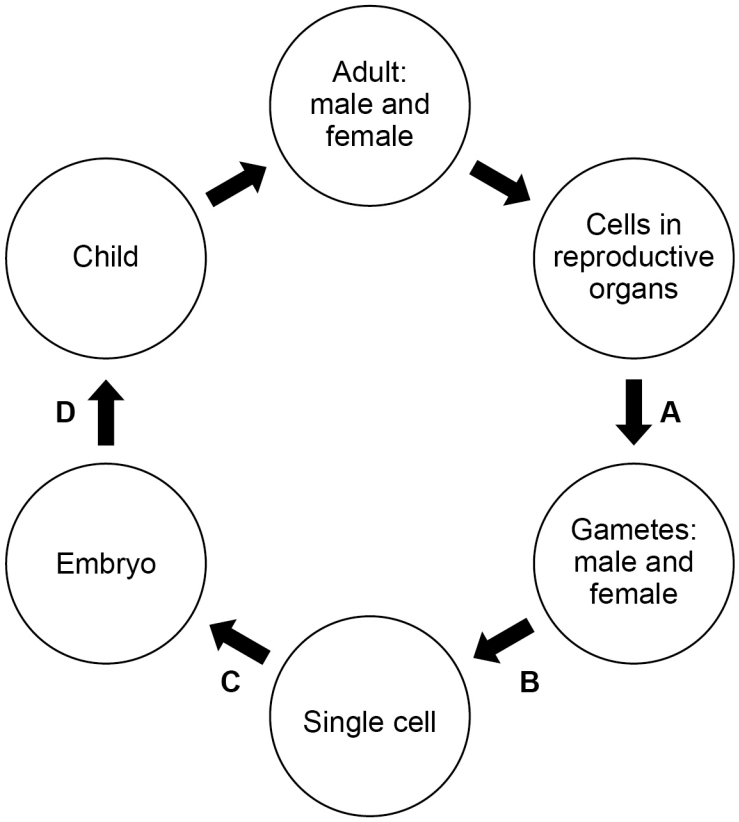
10

Turn over for the next question

Do not write outside the box

0 7 **Figure 16** shows some of the stages in the human life cycle.

Figure 16



0 7 . 1 Complete **Table 4** to identify the processes **A**, **B**, **C** and **D**.

[4 marks]

Tick (✓) **one** box in each row.

Table 4

	Fertilisation	Meiosis	Mitosis
A			
B			
C			
D			

Do not write outside the box

0 7 . 2 What are the different forms of a gene called?

[1 mark]

_____

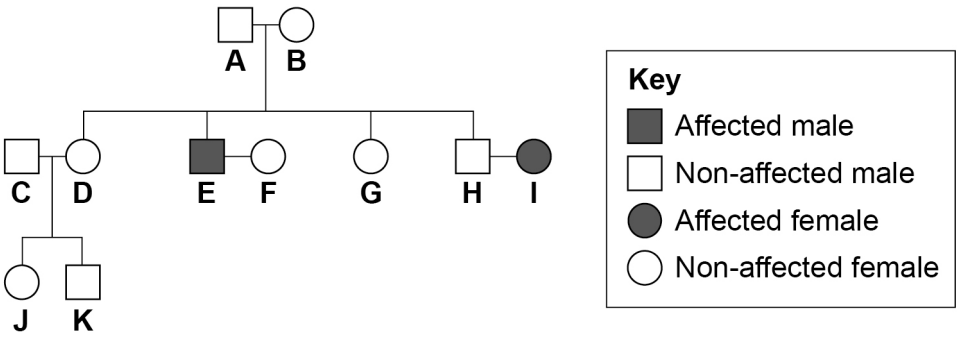
Question 7 continues on the next page

Do not write outside the box

Phenylketonuria (PKU) is a disorder that can be inherited.

Figure 17 shows the inheritance of PKU in one family.

Figure 17



0 7 . 3 How many children do **A** and **B** have?

[1 mark]

_____

0 7 . 4 PKU is caused by the recessive form of a gene.

Use evidence about **A** and **B** and their children in **Figure 17** to support this statement.

[2 marks]

_____

_____

_____

_____

Do not write outside the box

0 7 . 5 Some foods contain an amino acid called phenylalanine.

A high concentration of phenylalanine in the blood may cause brain damage.

A person with PKU cannot remove phenylalanine from the blood when they absorb too much.

Explain how a low protein diet will help prevent brain damage in a person with PKU.
[2 marks]

10

Turn over for the next question

Do not write outside the box

0 8 **Figure 18** shows an athlete ready to run in a race.

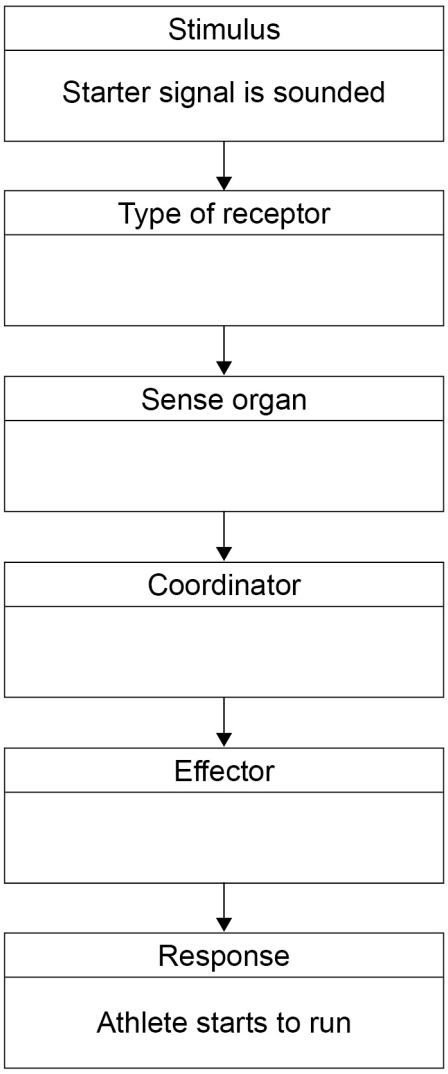
Figure 18

When a starter signal is sounded, the athlete starts to run.

Do not write outside the box

Figure 19 shows how the athlete is able to respond to the stimulus.

Figure 19



0 8 . 1 Complete **Figure 19**.

[4 marks]

0 8 . 2 Name the type of cell that passes impulses from receptors to coordination centres.

[2 marks]

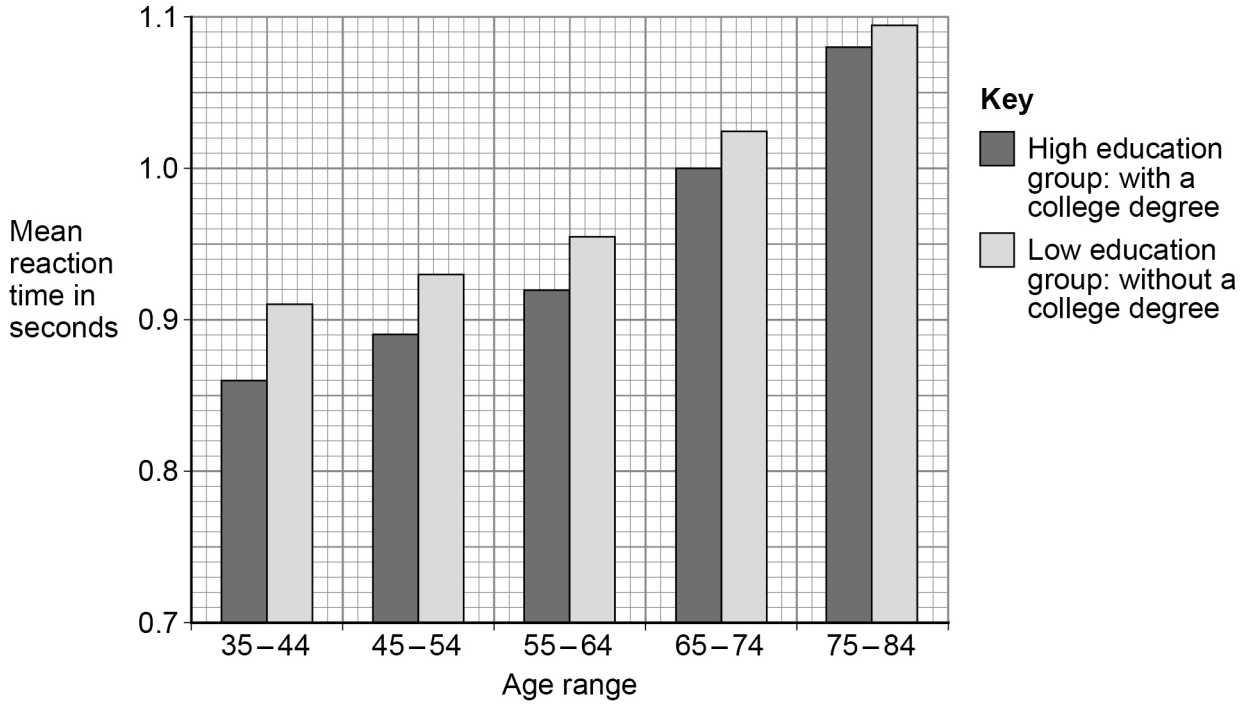
Question 8 continues on the next page

Do not write outside the box

A scientist investigated the effects of age and education level on human reaction time.

Figure 20 shows some of the results.

Figure 20



0 8 . 3 What was the range of the mean reaction time for the high education group?

[1 mark]

Range = _____ to _____ s

0 8 . 4 Describe **two** trends in **Figure 20**.

[2 marks]

1 _____

_____

2 _____

_____

Do not write outside the box

0 8 . 5 The scientist concluded:

'Higher education level has less effect on a person's reaction time as they get older.'

Give evidence from **Figure 20** that supports the scientist's conclusion.

[1 mark]

10

Turn over for the next question

Do not write outside the box

0 9 Bacteria reproduce by dividing into two.

Bacteria can divide every 20 minutes to form a colony.

0 9 . 1 Starting with one cell, the number of bacteria in a colony is calculated using the formula:

$$\text{Number of cells} = 2^n$$

where **n** is the number of cell divisions.

Calculate the number of bacteria in a colony after 2 hours.

[3 marks]

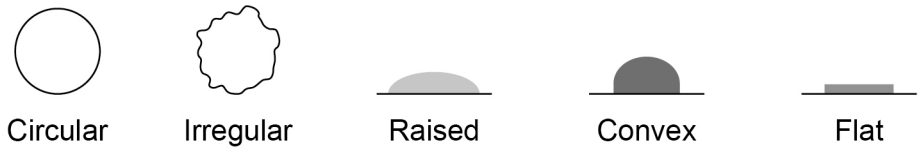
Number of bacteria = _____

Do not write outside the box

Bacteria can be identified by the characteristics of their colony.

Figure 21 shows some bacterial colonies.

Figure 21



0 9 . 2 Suggest **one** characteristic that could be used to identify bacteria on nutrient agar.

[1 mark]

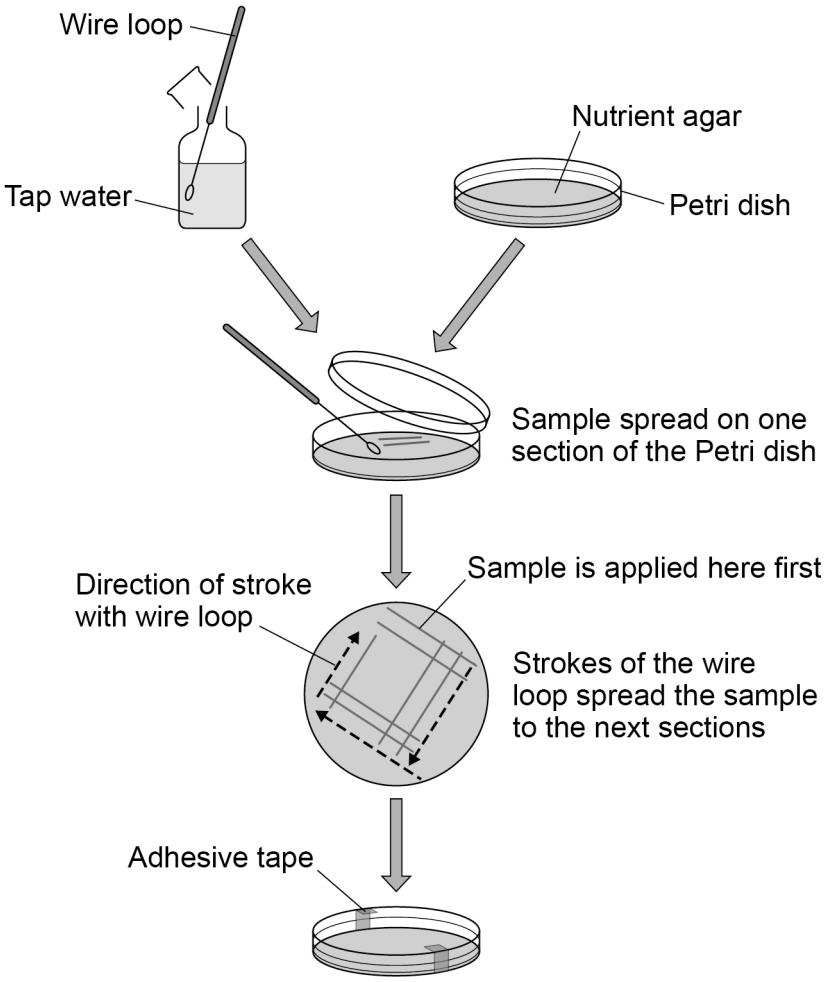
Question 9 continues on the next page

A scientist investigated which bacteria are present in tap water.

The scientist tested two different methods to transfer samples of water onto nutrient agar.

Figure 22 shows method **1**.

Figure 22



Do not write outside the box

0 9 . 3 Give **three** procedures the scientist should use to ensure there are bacteria from **only** the tap water on the nutrient agar.

[3 marks]

1 _____

_____

2 _____

_____

3 _____

_____

Question 9 continues on the next page

Do not write outside the box

In method **2** the scientist pours a small volume of tap water onto the nutrient agar in a Petri dish.

The Petri dishes from method **1** and method **2** are incubated for two days to allow bacterial colonies to grow.

0 9 . 4 Suggest a suitable temperature for incubation of the Petri dishes.

Give a reason for your answer.

[2 marks]

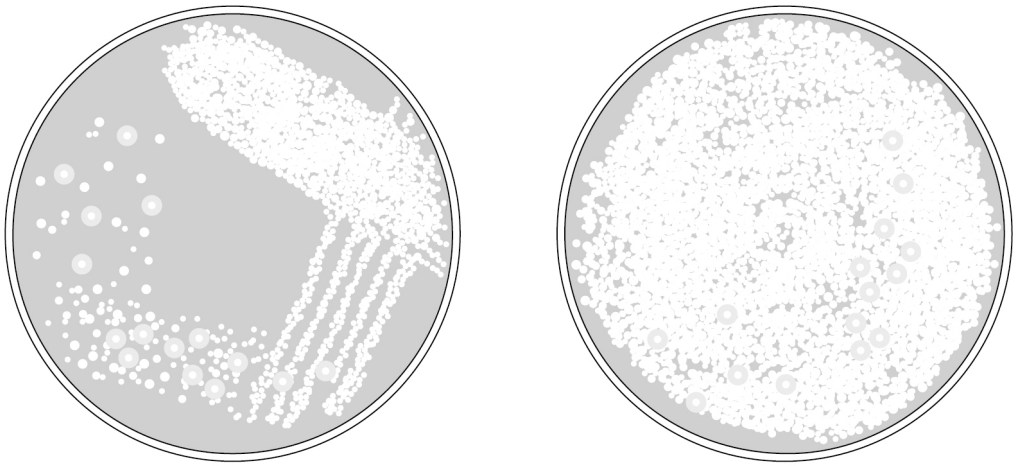
Temperature _____

Reason _____

_____

Figure 23 shows bacterial growth on the Petri dishes after two days.

Figure 23



Method **1** Method **2**

0 9 . 5 Method **1** should be used to identify the bacteria present in the water sample.

Explain why.

[2 marks]

11

END OF QUESTIONS

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