

Please write clearly in block capitals.

Centre number

Candidate number

Surname _____

Forename(s) _____

Candidate signature _____

INTERNATIONAL GCSE BIOLOGY

Paper 1

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a ruler with millimetre measurements
- 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 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.

Information

- There are 90 marks available on this paper.
- 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.

Advice

In all calculations, show clearly how you work out your answer.

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



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

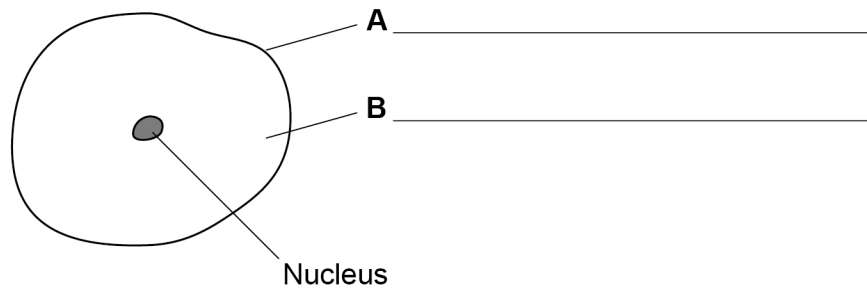
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0 1

This question is about animal cells.

Figure 1 shows an animal cell.

Figure 1



0 1 . 1

Label parts **A** and **B** on **Figure 1**.

[2 marks]

0 1 . 2

The nucleus of the animal cell contains chromosomes.

Name the molecule chromosomes are made from.

[1 mark]

0 1 . 3

Animal cells divide to produce new cells in damaged tissue.

What is the name of this cell division?

Tick (✓) **one** box.

[1 mark]

Differentiation

Fertilisation

Mitosis



0 1 . 4 Uncontrolled cell division causes tumours to form.

A tumour can be malignant or benign.

Give **two** features of malignant tumours that make them different from benign tumours.

[2 marks]

1 _____

2 _____

0 1 . 5 Research shows that tobacco smoke increases the risk of a tumour forming.

Name **one** other factor that increases the risk of a tumour forming.

[1 mark]

Question 1 continues on the next page

Turn over ►



Information was collected about deaths from lung cancer and the number of cigarettes smoked per day.

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Table 1 shows the information.

Table 1

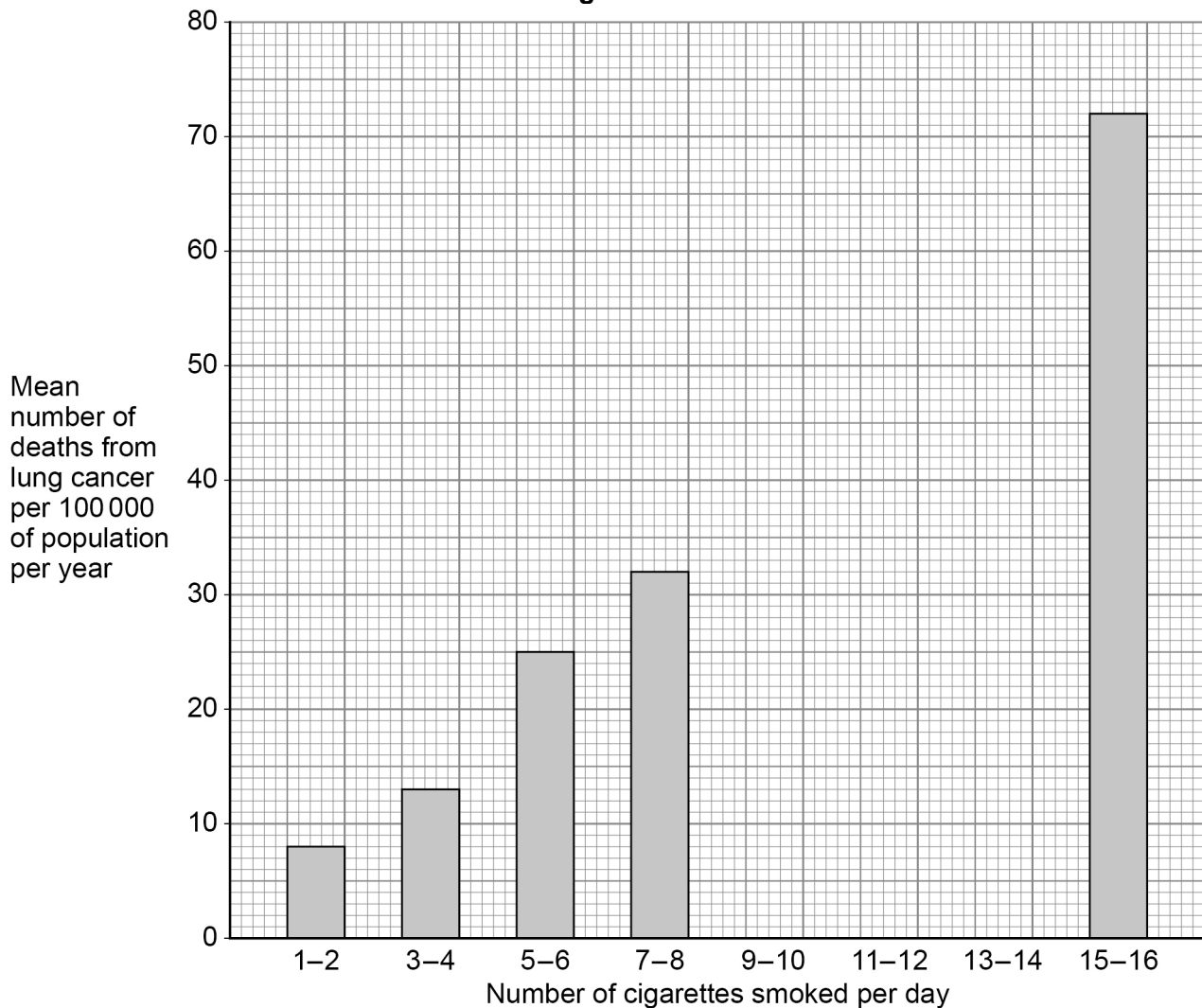
Number of cigarettes smoked per day	Mean number of deaths from lung cancer per 100 000 of population per year
1 – 2	8
3 – 4	13
5 – 6	25
7 – 8	32
9 – 10	42
11 – 12	50
13 – 14	64
15 – 16	72

0 1 . 6

Complete **Figure 2** using data from **Table 1**.

[2 marks]

Figure 2



0 1 . **7** Between which two groups is there the largest increase in death rate?

Use **Table 1**.

Tick (✓) **one** box.

[1 mark]

(7 – 8) to (9 – 10)

(9 – 10) to (11 – 12)

(11 – 12) to (13 – 14)

(13 – 14) to (15 – 16)

0 1 . **8** The number of people who smoke cigarettes has decreased since the 1990s.

Suggest **one** reason why.

Do **not** refer to cost in your answer.

[1 mark]

11

Turn over for the next question

Turn over ►



0 2

Owls are large birds.

Owls eat mice and small birds.

0 2

. 1

Which food chain is the most efficient at transferring energy from plants to owls?

Tick (✓) **one** box.

[1 mark]

Plants → caterpillars → mice → owl

Plants → caterpillars → small birds → owl

Plants → insects → spiders → small birds → owl

Plants → mice → owl

0 2

. 2

Give a reason for your answer to **Question 2.1**.

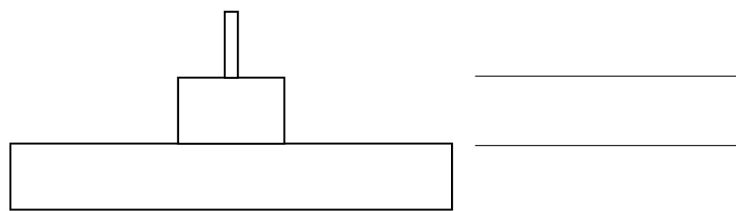
[1 mark]

0 2

. 3

A different food chain is shown below.

Plant → rabbit → fox

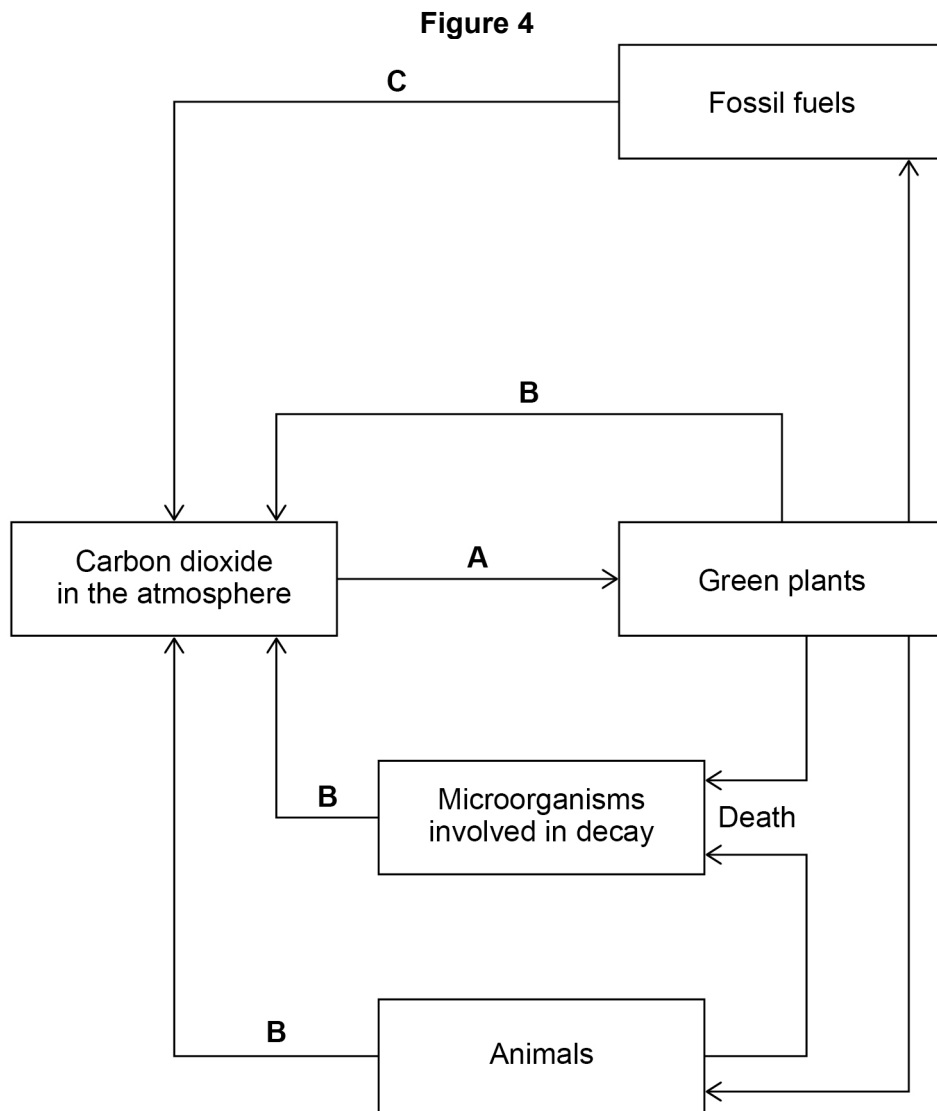
Figure 3 shows a pyramid of biomass for this food chain.**Figure 3**Complete **Figure 3** with the names of the organisms from the food chain.

[1 mark]



Figure 4 shows part of the carbon cycle.

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0 2 . 4 Name the processes **A**, **B** and **C** in **Figure 4**.

[3 marks]

A _____

B _____

C _____

Question 2 continues on the next page

Turn over ►



0 2 . 5

Increased levels of carbon dioxide in the atmosphere contribute to global warming.

Give **two** possible effects of global warming.

[2 marks]

1 _____

2 _____



0 2 . 6 Methane is a gas released by animals.

Table 2 shows the mass of methane released by four different animals in one year.

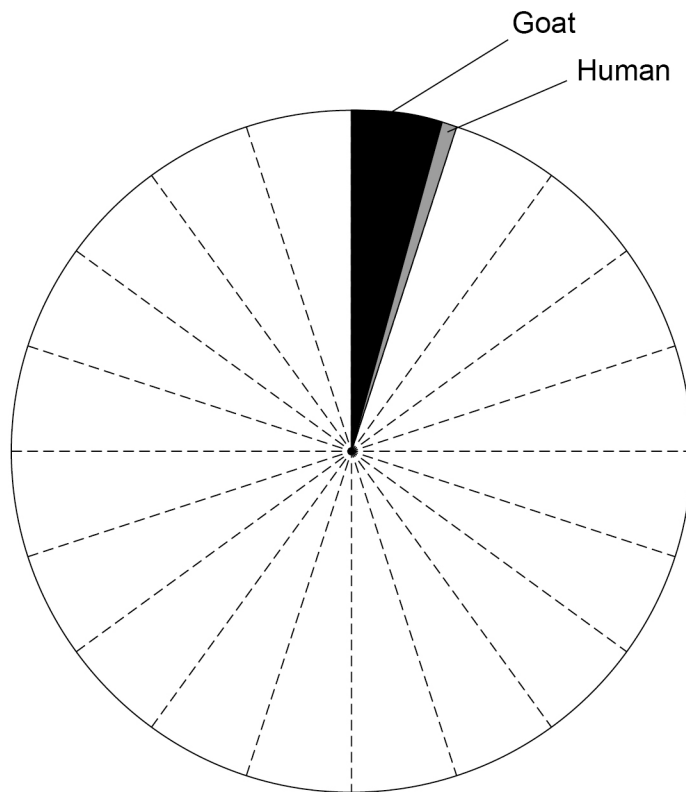
Table 2

Animal	Mass of methane released per year in kg
Cow	85
Sheep	10
Goat	4
Human	1

Complete **Figure 5** using data from **Table 2**.

[2 marks]

Figure 5



0 2 . 7 In 2007 project 'Clean Cow' was set up to reduce the methane emissions from cows.

Explain why cows have been chosen in a project to benefit the environment.

[2 marks]

12

Turn over ►



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0 3 . 1 A leaf is a plant organ.

Name **two** other plant organs.

[2 marks]

1 _____

2 _____

A leaf has many pores called stomata.

0 3 . 2 Water vapour is lost from a plant by diffusion through the stomata.

At what temperature would most water vapour be lost from a leaf?

Tick (✓) **one** box.

[1 mark]

20 °C

25 °C

30 °C

35 °C

0 3 . 3 The size of the stomata can be controlled.

What parts of the leaf control the size of the stomata?

Tick (✓) **one** box.

[1 mark]

Guard cells

Palisade cells

Phloem cells

Xylem cells

Question 3 continues on the next page

Turn over ►



Stomata can be found on the upper and lower surfaces of leaves.

Some students investigated water loss from leaves.

This is the method used.

1. Take four leaves of the same size from the same plant and label the leaves **A, B, C** and **D**.
2. Cover **A, B** and **C** with grease as shown in **Table 3**.
3. Do not cover **D** with any grease.
4. Record the mass of each leaf.
5. Hang the leaves from a string as shown in **Figure 6**.
6. After 24 hours record the mass of each leaf again.
7. Calculate the mass of water lost from each leaf.

Figure 6

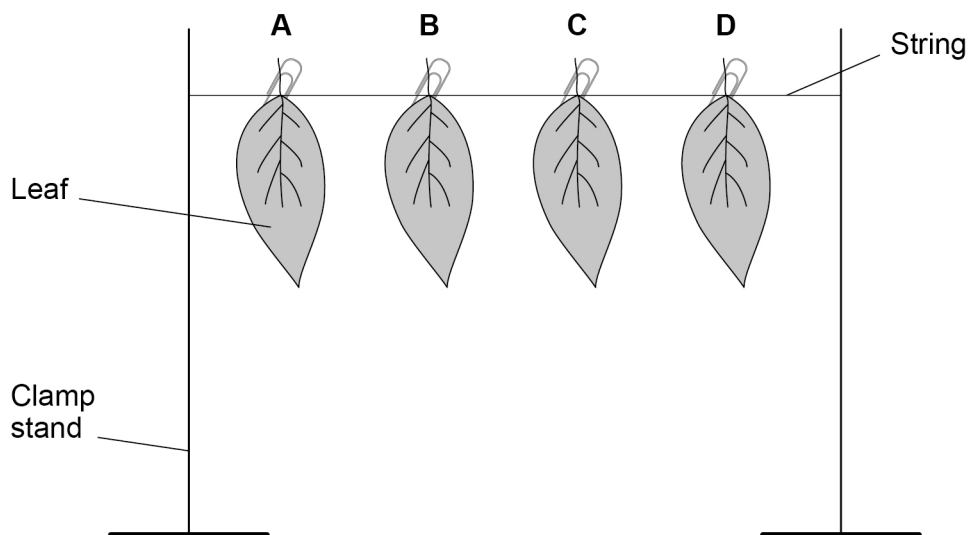


Table 3 shows the results.

Table 3

Leaf	Surfaces with grease	Mass of water lost from leaf in grams (g)
A	both	0.03
B	lower only	0.09
C	upper only	0.93
D	none	1.11



0 3 . 4 What was the purpose of the grease on leaves **A**, **B** and **C**?

[1 mark]

0 3 . 5 Explain the results of the investigation for leaf **A** and leaf **C**.

[4 marks]

A _____

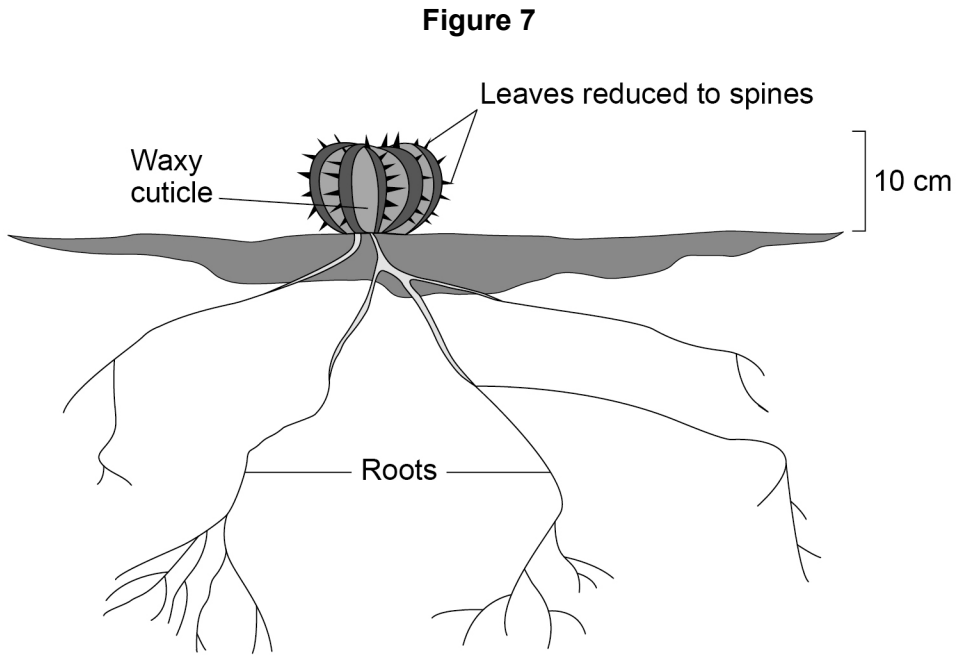
C _____

Turn over ►



0 3 . 6 Cacti are plants that live in the desert.

Figure 7 shows a cactus.



Explain how **one** adaptation shown in **Figure 7** helps the cactus survive in the desert. **[2 marks]**

Adaptation _____

Explanation _____

11



0 4

This question is about white blood cells and pathogens.

0 4 . 1

White blood cells have cell membranes.

Describe the function of the cell membrane.

[1 mark]

0 4 . 2

Give **three** ways white blood cells defend the body against pathogens.

[3 marks]

1

2

3

Ebola is a disease caused by a viral pathogen.

The Ebola virus attaches to the cell membranes of some body cells.

The Ebola virus can spread very quickly by direct contact with infected patients or their body fluids.

0 4 . 3

In countries where there are outbreaks of Ebola, people are advised to wash their hands regularly.

Suggest how regular hand washing reduces the spread of the Ebola virus.

[1 mark]

0 4 . 4

Suggest **one** other way to reduce the spread of the Ebola virus.

[1 mark]

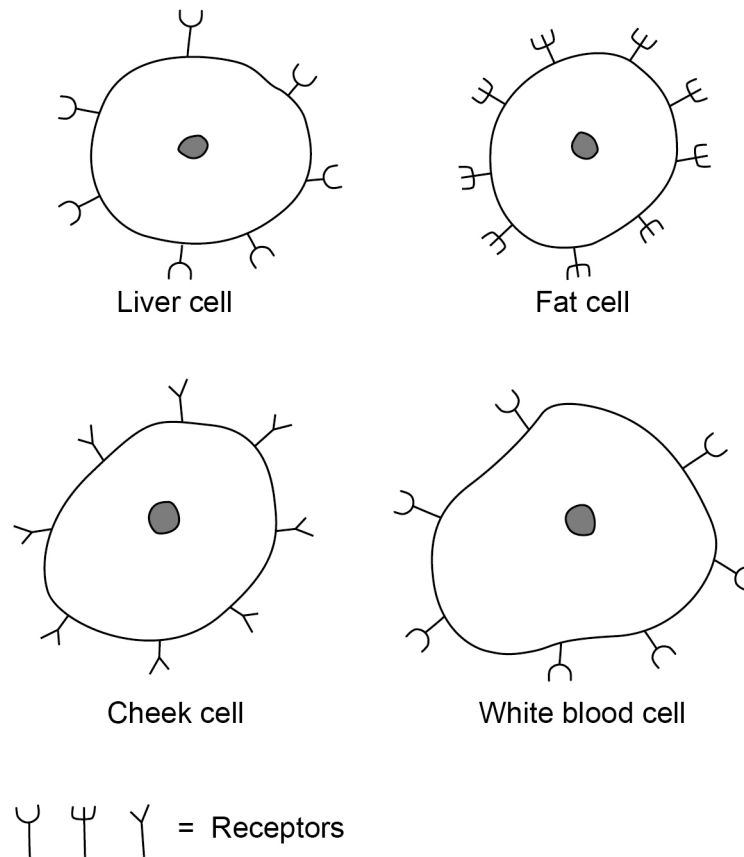
Turn over ►

0 4 . 5 Receptors are proteins that are found on the surface of cell membranes.

These receptors can be different on every type of body cell.

Figure 8 shows four body cells and their receptors.

Figure 8



Suggest why the Ebola virus only affects liver cells and white blood cells.

[1 mark]



Ebola viruses enter the cells and reproduce rapidly. The cells then burst and release many copies of the viruses.

When white blood cells burst they release proteins that block blood flow to the liver.

The liver fails because there is a lack of blood flow.

0 4 . 6 A failing liver cannot produce sufficient chemicals for blood clotting.

Suggest **one** symptom a person might have if the blood does **not** clot.

[1 mark]

0 4 . 7 Brain cells can be damaged by toxins.

Liver failure can cause brain damage.

Explain how liver failure can cause brain damage.

[3 marks]

11

Turn over ►



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0 5

This question is about animal behaviour.

0 5 . 1

Animals use different methods of communication.

Draw **one** line from each method of communication to the example of that method.**[3 marks]****Method of communication****Example**

Chemical

colour markings on a bird

Sound

a cat 'spraying' its territory with
urine

Visual

a bird chirping

a cat licking another cat

young bears play fighting

Question 5 continues on the next page**Turn over ►**

Alligators lay their eggs in nests made from vegetation.

The sex of alligator offspring depends on the temperature of the nest they are incubated in.

30 years ago scientists investigated the effect of temperature on the sex of alligator offspring.

This is the method the scientists used.

1. They removed a large number of alligator eggs from nests within 12 hours of laying.
2. They randomly placed the eggs into groups and incubated them in a laboratory.
3. They incubated the eggs at different temperatures.
4. After 60 days the scientists removed the eggs and recorded the sex of any living offspring.

Some of the scientists' results are shown in **Table 4**.

Table 4

Temperature in °C	Sex of offspring
< 26	Did not survive
30	All female
≥ 34	All male
> 36	Did not survive

0 5 . 2 Predict a temperature that would result in a mix of male and female offspring.

[1 mark]

_____ °C

0 5 . 3 Many people think this investigation was **not** ethical.

Suggest **one** reason why.

[1 mark]



0 5 . 4

Suggest **two** ways the scientists could have improved their investigation so that they could make a valid conclusion.

[2 marks]

1

2

Question 5 continues on the next page

Turn over ►

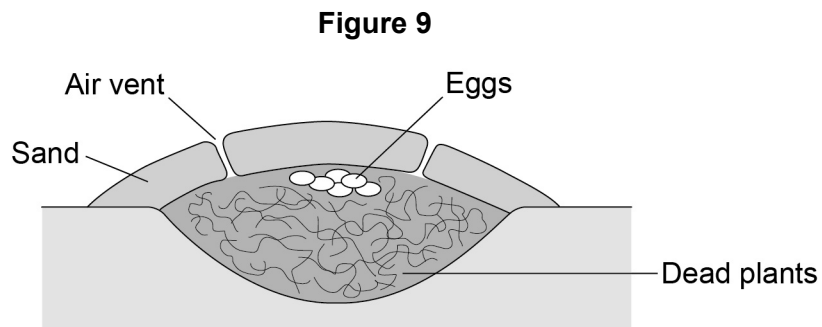
The sex of the offspring of some birds depends on the temperature of the eggs in the nest.

These birds build nests in the ground.

This is how the bird builds a nest:

- dig a large hole in sand
- fill the hole with dead plants
- lay eggs on top of the dead plants
- cover the nest with a thick layer of sand.

Figure 9 shows the nest.



The dead plants in the nest decay.

0 5 . 5

Explain how the decay process helps to keep the eggs warm for many weeks.

[3 marks]



0 5 . 6

A parent bird opens and closes the air vents of the nest at different times of the day.

Suggest advantages of:

- opening the air vents
- closing the air vents.

[3 marks]

13

Turn over for the next question

Turn over ►



0 6 Body temperature is one condition that is controlled by homeostasis in humans.

0 6 . 1 Name **two** other internal conditions that are controlled in the body. **[2 marks]**

1 _____

2 _____

0 6 . 2 The brain monitors core body temperature.
Name the centre in the brain that monitors core body temperature. **[1 mark]**

0 6 . 3 Explain how core body temperature is controlled.
You should include what happens if the core body temperature is:
• too low
• too high. **[6 marks]**



Metabolism is the name given to all chemical reactions in the body.

0 6 . 4 Name the chemical reaction in the body that releases energy.

[1 mark]

Metabolic rate can be measured by the volume of oxygen taken in per gram of body mass per hour.

Table 5 shows information about two animals.

Table 5

Animal	Surface area (SA) in m ²	Volume (V) in m ³	SA : V ratio	Metabolic rate in mm ³ /g hour
Elephant	20.0	6	3.3 : 1	75.0
Mouse	7.86×10^{-3}	1.40×10^{-5}		890

0 6 . 5 Calculate the surface area to volume ratio for the mouse.

Give your answer to three significant figures.

[3 marks]

SA : V = _____ : 1

0 6 . 6 The mouse has a larger surface area to volume ratio than the elephant.

Explain why the elephant has a lower metabolic rate than the mouse.

Use information from **Table 5**.

[2 marks]

15

Turn over ►



0 7 . 3

Bacteria can become resistant to antibiotics.

Explain how a population of antibiotic-resistant bacteria can develop.

[4 marks]

Question 7 continues on the next page

Turn over ►



Scientists are looking for alternative ways to kill antibiotic-resistant bacteria.

One type of antibiotic-resistant bacteria is MRSA.

MRSA is present in the noses of many people.

Another species of bacteria, species **B**, may also be present in the nose.

Scientists have discovered a gene in species **B** which codes for a chemical that might kill MRSA.

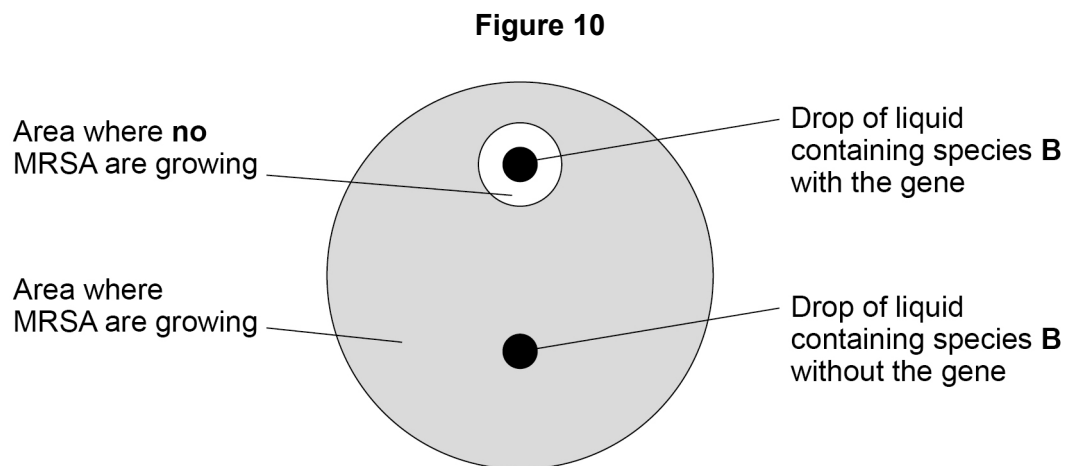
The scientists can remove this gene from species **B** bacteria.

The scientists investigated the effect of species **B** on MRSA.

The scientists:

- grew MRSA on an agar plate
- added a drop of liquid containing species **B** with the gene
- added a drop of liquid containing species **B** without the gene.

Figure 10 shows the results.



07 . **4** Explain the results shown in **Figure 10**.

[2 marks]



In a second investigation the scientists inserted mixtures of MRSA and species **B** into the noses of two groups of rats:

Group 1: 50% MRSA and 50% of species **B** with the gene

Group 2: 50% MRSA and 50% of species **B** without the gene

The scientists left the rats for 48 hours. After this time, the scientists worked out the percentages of MRSA and species **B** in each group.

0 7 . 5 Predict the results of the investigation.

[2 marks]

0 7 . 6 Explain why the numbers of MRSA and species **B** in Group 1 changed during the investigation.

[3 marks]

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END OF QUESTIONS



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