

Examiners' report

GCSE

GATEWAY SCIENCE BIOLOGY A

**OCR Level 1/Level 2 GCSE (9-1) in Biology A
(Gateway Science)**

J247

For first teaching in 2016

J247/02 Summer 2025 series

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Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. A selection of candidate responses is also provided. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

A full copy of the question paper and the mark scheme can be downloaded from [Teach Cambridge](#).

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Paper 2 series overview

J247/02 is the second Foundation tier paper in the J247 GCSE Biology A (Gateway Science) suite. J247/02 assesses content from specification topics B4-B6 and B7. Therefore, to perform well on this paper, candidates need to have a sound knowledge of the theory covered in topics B4-B6 and be able to apply the skills and understanding that they have developed in the practical activities covered in topic B7. There are also, questions involving the assessment of key mathematical requirements from Appendix 5f of the specification. Questions 14 and 15 on the multiple-choice, and Questions 22 and 23 overlapped with the Higher tier paper.

In this series, candidates seemed more confident when selecting responses from a list, and frequently performed better on these than the questions that involved free writing. The omit rate was low for most questions.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
- showed an understanding of why immunosuppressant drugs are needed after transplants (Question 17 (b) (i) and (b) (ii)) - showed a good understanding of food webs and trophic levels (Question 19 (a), (b) and (c)) - showed a good understanding of why light and minerals are needed for plant growth (Question 19 (d)) - could describe the steps to test if bacteria are killed by an antibiotic (Question 20 (b) (i)) - knew the steps involved in bacteria developing antibiotic resistance (Question 20 (c)) - knew the roles of antibiotics, antibodies, antigens and white blood cells (Question 22 (b) (i)).	- performed less well on answering the multiple-choice questions - could not match the disease to the organ it affected (Question 16 (a)) - were unable to draw conclusions from data (Question 16 (b) (iii) and Question 16 (c) (i)) - were unsure of which numbers to use in the mathematical questions (Question 18 (b) (iv), Question 23 (b)) - were unsure about trophic levels and couldn't identify them from a diagram (Question 19 (b)) - found suggesting a method using a quadrat to find the number of dandelions challenging (Question 23 (a)).

Section A overview

Section A contains multiple-choice questions. This section of the paper is worth 15 marks and covers AO1 and AO2 content. Questions 14 and 15 overlapped with the Higher tier paper. Candidates performed particularly well this series on the multiple-choice section of this paper. Questions 6, 7, 12 and 14 were usually answered correctly. Question 13 proved to be quite a challenging question in this section, with only some candidates recognising that cystic fibrosis is caused by a recessive allele.

Where candidates decide to change their answer, they should be encouraged to cross out their original answer. They should then write the correct answer next to the box, rather than try to write one letter on top of another.

Question 1

1 Which row gives the features of a **white** blood cell?

	Contains haemoglobin	Has a nucleus
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

Your answer

[1]

Just under half of all candidates answered this correctly. The most commonly seen incorrect answer was B, suggesting that candidates were confusing the features of white blood cells with those of red blood cells.

Question 2

- 2** A farmer wants to grow strawberry plants that produce strawberries early in the summer.

The farmer chooses the plants that make strawberries the earliest and reproduces only these plants.

What is the name of the process that the farmer is using?

- A** Gene modification
- B** Genetic engineering
- C** Natural selection
- D** Selective breeding

Your answer

[1]

Around two-thirds of candidates answered this correctly. The most commonly seen incorrect response was C.

Question 3

3 Which type of microorganism causes AIDS?

- A Bacterium
- B Fungus
- C Protist
- D Virus

Your answer

[1]

Around half of the candidates correctly selected virus. Where candidates got this wrong, the answers were mixed.

Question 4

4 What is the function of **platelets** in blood?

- A Carrying oxygen
- B Clotting
- C Maintaining body temperature
- D Producing antibodies

Your answer

[1]

Around two-thirds of the candidates correctly selected B. The most seen incorrect response was A.

Question 5

5 Who developed a theory about how characteristics are inherited in pea plants?

- A** Darwin
- B** Darwin and Wallace
- C** Mendel
- D** Mendel and Wallace

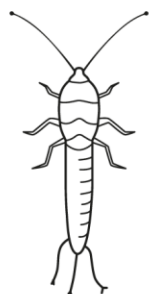
Your answer

[1]

Around half of the candidates were able to correctly identify Mendel. The most commonly seen incorrect response was D.

Question 6

6 Some students want to identify an insect that they found.



They use this key to identify the insect.

1.	Does it have wings?	Yes – go to 2 No – go to 3
2.	Does it have two pairs of wings?	Yes – shield bug No – lacewing
3.	Does it have three projections from the end of its body?	Yes – silverfish No – springtail

What is the name of the insect that the students found?

- A Lacewing
- B Shield bug
- C Silverfish
- D Springtail

Your answer

[1]

This question was answered correctly by most candidates.

Question 7

7 Ecotourism can be useful in helping to protect ecosystems.

What is a possible **disadvantage** of ecotourism?

- A More money is made available for conservation projects.
- B More people visiting the area will produce more rubbish.
- C More people will be made aware of the importance of conservation.
- D There will be more jobs for local people.

Your answer

[1]

Most candidates answered this question correctly.

Question 8

8 A horse has 64 chromosomes in a muscle cell.

How many chromosomes are in a horse **sperm cell**?

- A 16
- B 32
- C 64
- D 128

Your answer

[1]

This was answered correctly by approximately two-thirds of candidates. The most seen incorrect answer was C.

Question 9

- 9 Tomato plants are attacked by insects.
The plants have features that help protect them from the insects.

Which of these features is a **chemical defence**?

- A A waxy cuticle on the leaves to form a barrier
- B Hairs on the stem which stop the insects reaching the stem
- C Releasing a substance that the insects find unpleasant
- D Thick cell walls which are hard to penetrate

Your answer

[1]

Three-quarters of candidates answered this correctly. The most seen incorrect response was A.

Question 10

- 10 Which description is **correct** for human egg cells?

- A They contain an X and a Y chromosome.
- B They contain one X chromosome.
- C They contain one Y chromosome.
- D They contain two X chromosomes.

Your answer

[1]

This question proved to be quite challenging, with only about a quarter of candidates correctly selecting B. The most seen incorrect answer was A.

Question 11

11 Greenfly are small insects that can reproduce sexually or asexually.

A population of greenfly live in a constant environment and are well adapted.

Which statement explains why these greenflies will reproduce **asexually**?

- A** Many offspring can be produced quickly to take advantage of a plentiful food supply.
- B** The offspring have variation, so can adapt to any changing conditions.
- C** There are a lot of greenflies around, so it is easy to find a mate.
- D** When offspring are produced asexually, the offspring cannot reproduce.

Your answer

[1]

Over half of the candidates correctly identified A as the explanation. The most seen incorrect response was D.

Question 12

12 New medicines are often tested on animals before being given to humans.

What is a reason for testing human medicines on animals?

- A** Animals do not get the same diseases as humans.
- B** Animals will need the same dose of the drug.
- C** Many processes in animal and human cells are the same.
- D** The response of animals and humans to the drug will be different.

Your answer

[1]

The majority of candidates were able to correctly select C.

Question 13

- 13** Cystic fibrosis is a genetic disorder. It is caused by a recessive allele **f**.

A female who has the genotype **Ff** is expecting a baby.
The father has the genotype **FF**.

What is the probability that the baby will have cystic fibrosis?

- A** 0%
- B** 25%
- C** 75%
- D** 100%

Your answer

[1]

This was another challenging question for most candidates. The most seen incorrect response was B. Candidates were able to draw genetic cross diagrams to work out the probability, however the majority did not notice the fact that cystic fibrosis is recessive.

Question 14

- 14** A student is investigating variation by collecting data on shoe sizes.
These are the shoe sizes of six members of their family.

10	5	6	7	8	6
----	---	---	---	---	---

Which of these statements about the data is **correct**?

- A** The mean shoe size and the modal shoe size are the same.
- B** The mean shoe size is 6.
- C** The mean shoe size is larger than the modal shoe size.
- D** The modal shoe size is 7.

Your answer

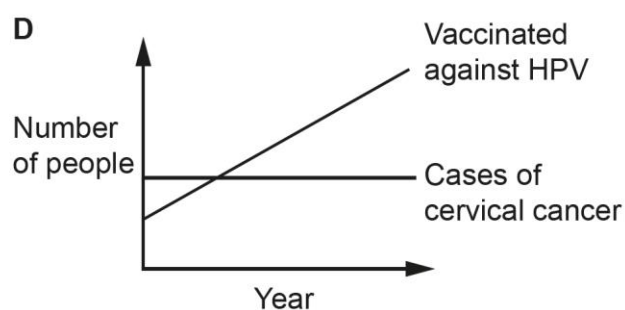
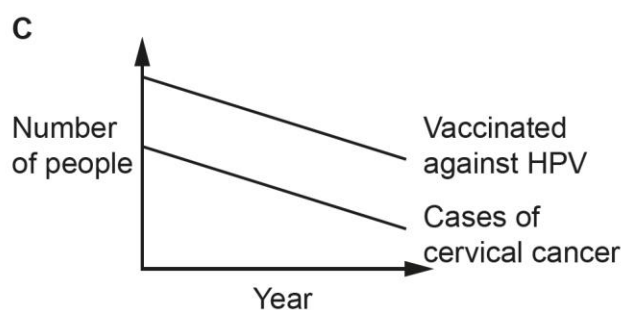
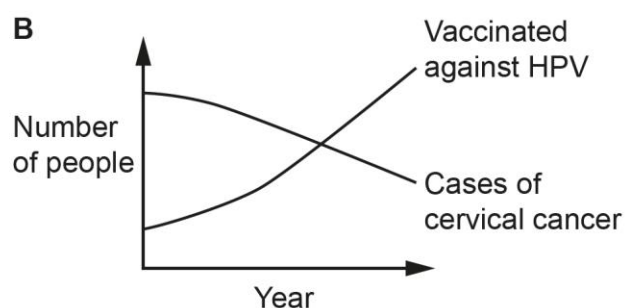
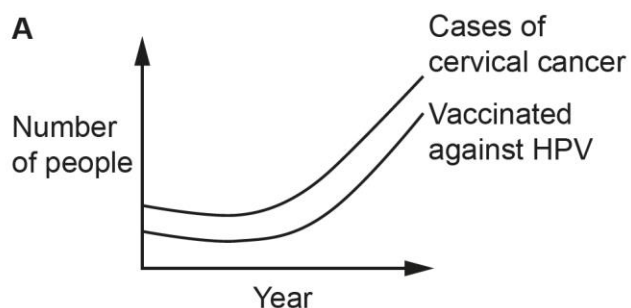
[1]

Generally answered well by candidates, indicating that students knew the difference between mean and modal. The most seen incorrect response was A.

Question 15

15 People can be vaccinated against HPV.

Which graph shows the **correct** link between the number of people vaccinated and the number of people with cervical cancer?



Your answer

[1]

Around two-thirds of candidates recognised that as vaccinations increased, the number of cases of cervical cancer would decrease. D was the most seen incorrect response.

Section B overview

Section B consisted of structured questions ranging from 1 to 6 marks. This section includes short (1 mark) questions as well as questions requiring longer answers, and one Level of Response question. Questions 22 and 23 were overlap questions with the Foundation tier paper. The majority of candidates attempted the Level of Response question, and where they had understood the question usually gained at least Level 2.

Almost all candidates attempted all questions and there was no evidence that candidates ran out of time. There did not appear to be any specific questions that were attempted by very few candidates. Many candidates showed the mathematical skills required for this paper, as most candidates answered these questions well. However, many candidates frequently omitted to show working for calculations, which meant where they had made an error and gave an incorrect answer response on the answer line, they could not gain any credit or error carried forward for the working.

In questions involving practical skills, the responses were mixed. It was evident where candidates had more experience of practical work as their responses tended to be more detailed than others.

Question 16 (a)

16 Some diseases are the result of damage to an organ.

(a) Draw three lines to connect each **disease** to the **organ** whose damage has resulted in the disease.

Disease	Organ
bronchitis	liver
cirrhosis	lungs
type 1 diabetes	pancreas

[2]

This question was answered well, with most candidates gaining 2 marks.

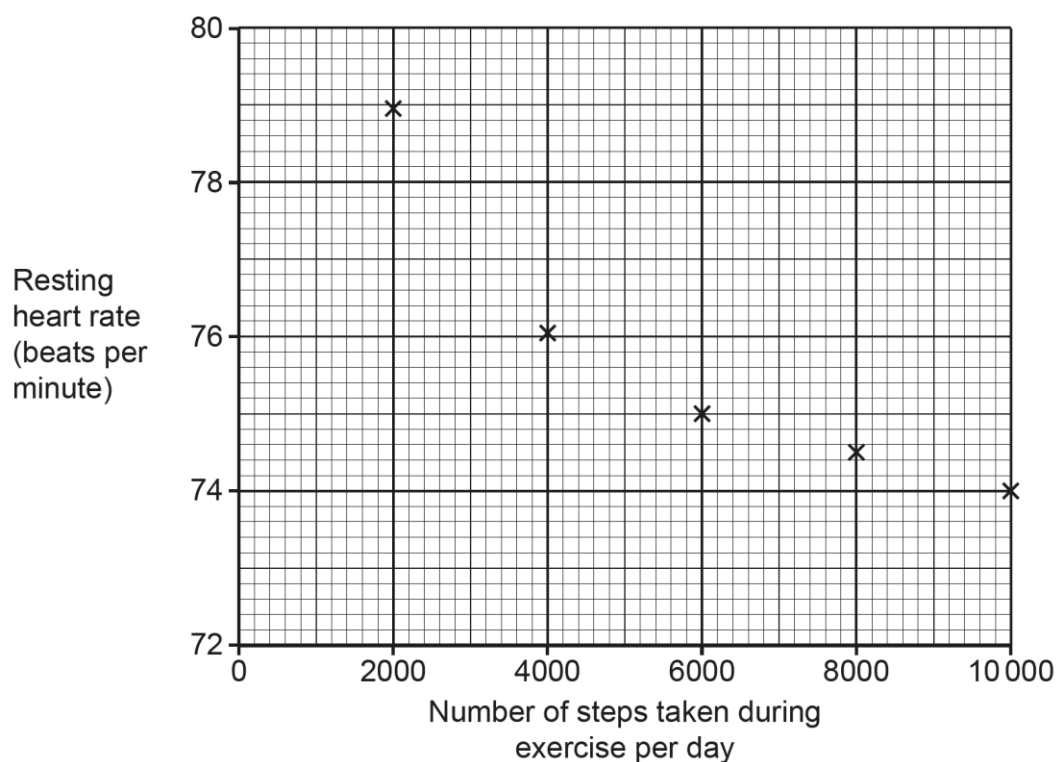
Question 16 (b) (i)

(b) The risk of getting cardiovascular disease (CVD) can be changed by different factors.

One of these factors is exercise.

Fig. 16.1 shows the effect on a person's resting heart rate when they do different amounts of exercise per day.

Fig. 16.1



(i) Draw a curve of best fit.

[1]

Around half of the candidates were given a mark for their curve of best fit. The reasons for candidates not scoring were usually for one of the following reasons: line was too far away from some of the points, the curve was drawn point to point, the line was too thick or feathery in places, the line had noticeable wiggles or breaks in it.

Question 16 (b) (ii)

(ii) Estimate the resting heart rate of a person who takes 3000 steps per day.

Use **Fig. 16.1**.

Resting heart rate = beats per minute **[1]**

Where candidates had drawn a line of best fit, they were usually given this mark as well. The most frequently seen error was candidate is giving the value for 5000 steps rather than 3000.

Question 16 (b) (iii)

(iii) Scientists think that resting heart rate can show how much exercise a person does.

What relationship shown in the graph supports this idea?

.....
..... **[1]**

Most candidates could identify and state the relationship in the graph.

Question 16 (c) (i)

- (c) Doctors want to see if there is a link between the resting heart rate of a person and the chance of them developing cardiovascular disease (CVD).

The doctors select the same number of males and females and measure their resting heart rate.

They then monitor the people for 15 years to see if they develop CVD.

The table shows the doctors' results.

Resting heart rate (beats per minute)	Number of males who developed CVD	Number of females who developed CVD
<60	107	55
60–69	106	75
70–80	102	64
>80	216	70

- (i) Suggest **two** conclusions the doctors could make from their results.

1

.....

2

.....

[2]

Over two-thirds of candidates were given 1 mark on this question. Very few were given both marks. The most common correct response was for the idea that more males develop CVD than females. Some candidates also identified that a resting heart over 80 increased the risk but did not link that to only occurring in males.

Question 16 (c) (ii)

(ii) The doctors are planning an improved study.

They will make sure that the females and males in the new study are all non-smokers.

Complete the two sentences about why this will improve the study.

Use words from each list.

has no effect on

increases the risk of

prevents

Smoking usually the development of CVD.

anomalous

precise

valid

Therefore, having both groups as non-smokers will make sure that the results are

more

[2]

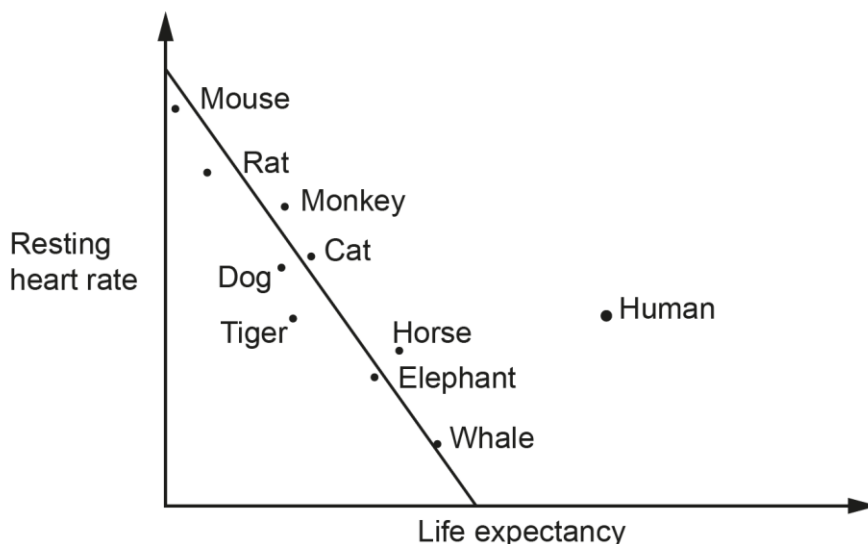
Most candidates were given at least 1 mark on this question, usually for identifying that smoking increases the risk of CVD. There was a lot of confusion over precision and validity on the second part of the question, with only about a quarter of candidates correctly selecting valid.

Question 16 (d) (i)

(d) Different animals have different resting heart rates.

Fig. 16.2 shows the resting heart rates of different animals and how long they usually live for (life expectancy).

Fig. 16.2



(i) What is unusual about the life expectancy of humans compared to the other animals shown in **Fig. 16.2**?

.....
 [1]

This question proved to be quite challenging for most candidates. While a lot of candidates identified that humans live longer, they did not link this to the line on the graph, so did not identify that it was that they live longer than expected. A significant number of students gave vague statements about humans being an anomaly.

Question 16 (d) (ii)

(ii) Suggest a reason for this difference.

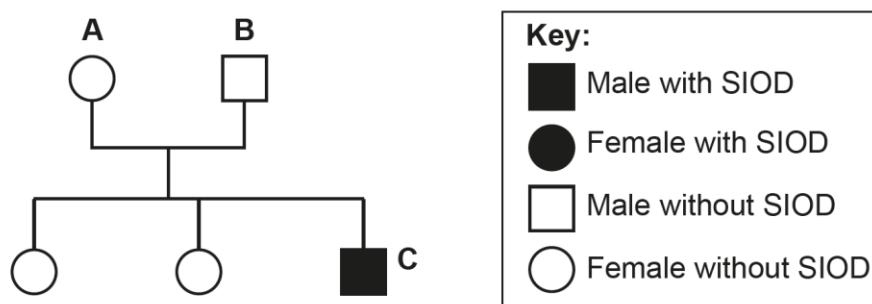
.....
 [1]

Only one-third of candidates were able to suggest that the difference is because humans have healthcare. There were a lot of vague answers about it being because we live longer. A commonly seen incorrect response was lack of predators.

Question 17 (a)

17 SIOD is an inherited genetic disorder.

The diagram shows a family tree with a person who has SIOD.



(a) Complete the sentences about the family tree.

Use words from the list.

dominant	female with SIOD	heterozygous
homozygous	male with SIOD	recessive

The phenotype of person **C** is

Persons **A** and **B** are for the SIOD gene.

The allele for SIOD must be because neither person **A** nor person **B** have the disorder.

[3]

Most candidates were given at least 1 mark on here, with a significant number given 2 or more marks. Of those gaining 1 mark, it was typically for identifying that the phenotype of person C is male with SIOD. The second and third answers were frequently seen the wrong way round i.e. recessive, heterozygous.

Question 17 (b) (i)

(b) One of the symptoms of SIOD is kidney failure.
People with the disorder often need a kidney transplant.

(i) After a kidney transplant the person needs to take drugs to make their immune system **less active**.

Tick (✓) **two** boxes which explain why this is necessary.

Antiseptic used on the patient would damage the kidney donor.

☐

The foreign kidney may contain bacteria.

☐

The kidney will contain foreign cells.

☐

The patient will make antibodies against the kidney.

☐

White blood cells from the donor kidney will attack the patient.

☐

[2]

Most candidates were given at least 1 mark on this question. Where only 1 mark was given, it was usually for identifying that 'the patient will make antibodies against the kidney'.

Question 17 (b) (ii)

(ii) In 2023, a patient with SIOD received stem cell treatment before a transplant.

Six weeks before their transplant, the patient received stem cells from the kidney donor.

This meant that the patient did **not** need to take drugs to make their immune system less active.

Explain why this will be a benefit to the patient.

.....

.....

.....

..... [2]

This question was quite challenging for many candidates. Where 1 mark was given, it was either for the idea that the patient was less likely to get sick or would not reject the kidney.

Question 18 (a)

18 Human populations need large amounts of food to survive.

(a) Complete these sentences about the supply of food.

Being able to get enough food to feed a population is called food

Biotic factors such as can prevent this happening.

Sometimes soil is not suitable to grow crops.

If soil lacks minerals, then can be added.

Another option if soil is not suitable involves growing crops without soil but with the roots in water.

This is called

[4]

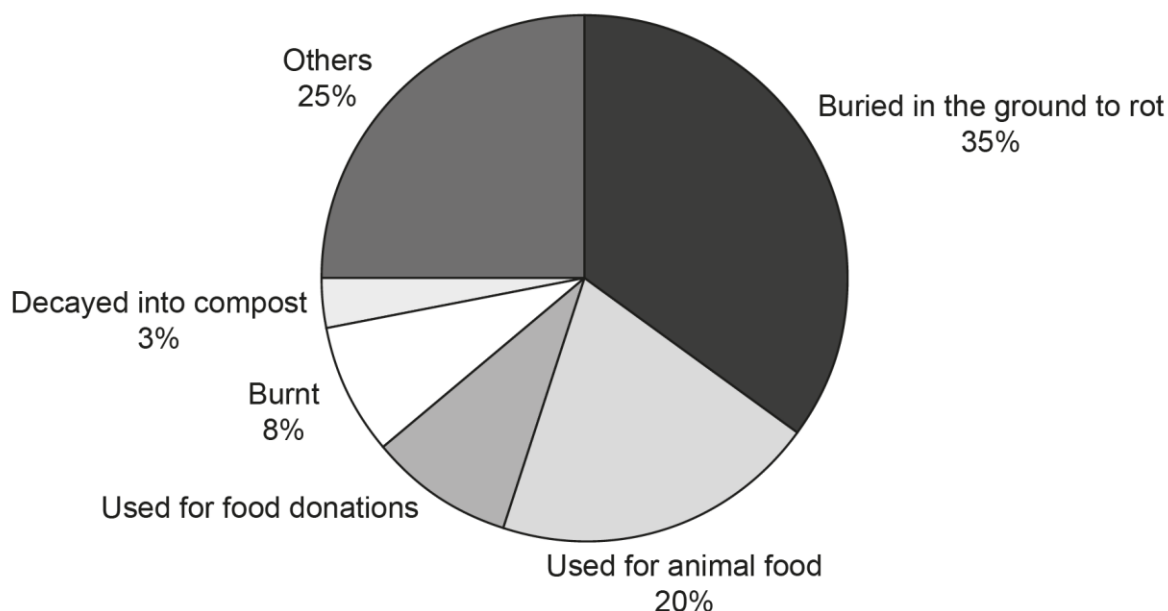
This question proved to be quite challenging with nearly half of all candidates being given no marks on it. Where one or more marks were given, marking points 2 and 3 were the most seen correct responses.

Question 18 (b) (i)

(b) In some countries, more food is made and bought than is eaten.

This results in a food surplus with some food being wasted.

The pie chart shows how this surplus food is reused or disposed of in America.



(i) What percentage of surplus food in America is used for food donations?

Answer = % [1]

This question required candidates to add up the other percentages and subtract them from 100 to get the answer. Most candidates were able to do this correctly.

Question 18 (b) (ii)

(ii) Two of the methods of food disposal named in the pie chart use microorganisms.

Identify these **two** methods.

..... and [2]

Candidates well answered this question.

Question 18 (b) (iii)

(iii) The total mass of surplus food in America is sixty million tonnes a year.

Put a **ring** around this mass correctly expressed in standard form.

6×10^5 tonnes

6×10^7 tonnes

60×10^5 tonnes

60×10^7 tonnes

[1]

About two-thirds of candidates were able to correctly express the mass in standard form.

Question 18 (b) (iv)

(iv) Calculate how many millions of tonnes of surplus food are **burnt** in America each year.

Burnt surplus food = million tonnes [2]

Candidates were expected to use the information provided to calculate 8% of 60 million. Just under half of all candidates were able to gain a mark on this question. Where only 1 mark was given, it was for a partial calculation to give an answer of 4 800 000.

Question 18 (b) (v)

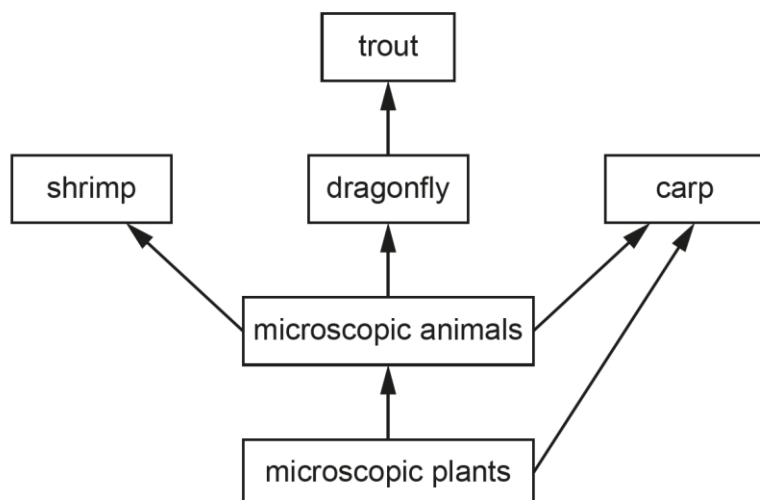
(v) Describe **one** way that burning large amounts of surplus food can damage ecosystems.

.....
.....
.....
..... [2]

About two-thirds of all candidates were able to state that burning the fuel would cause smoke or carbon dioxide to be produced, thereby given 1 mark. Very few went on to link that to a consequence (e.g. global warming) to be given the 2nd mark.

Question 19 (a)

19 The diagram shows a food web from a lake in America.



(a) Name the **producer** in this food web.

..... [1]

This question was answered well by most candidates.

Question 19 (b)

(b) At which two trophic levels are the carp feeding?

Tick (✓) **two** boxes.

Primary consumer

☐

Secondary consumer

☐

Tertiary consumer

☐

[1]

Over half of the candidates correctly selected the top two boxes. Several candidates did not follow the instruction to tick two boxes.

Question 19 (c)

- (c) Carp are large fish that have been introduced into America from Asia. Their numbers in lakes are rapidly increasing.

Which reason explains why the number of carp are increasing so rapidly?

Use the food web.

Tick (✓) **one** box.

They can act as parasites.

☐

They can prey on large animals.

☐

They have no predators.

☐

[1]

Most candidates well answered this question.

Question 19 (d)*

- (d)* Carp feed at the bottom of the lakes.

This has two main effects:

- mud is stirred up making the water cloudy
- minerals are released into the water from the mud.

Explain why these two effects might increase or decrease the numbers of microscopic plants in the lakes.

.....

.....

.....

.....

.....

.....

.....

[6]

About two-thirds of candidates were given at least 1 mark on this question. Of those that were not given any marks, a significant minority of those didn't attempt the question.

Candidates were expected to identify that the water being cloudy would decrease light levels, which would decrease the rate of photosynthesis, which could decrease the number of plants. More minerals in the water would lead to more growth as the plants use the minerals to make different molecules, e.g. proteins.

There were a lot of answers where the candidates thought the cloudy water would hide/camouflage the plants thereby protecting them from predators. A number of candidates thought that the microscopic plants were anchored in the soil and would therefore have fewer minerals available if they were now in the water.

Where candidates made the links between reduced light and less photosynthesis, and more minerals used for growth, they generally did well. Very few candidates were able to explain why minerals help plants grow.

Exemplar 1

Mud being stirred up can decrease the numbers of microscopic plants in the ~~the~~ lakes because it creates water cloudy which blocks the light coming into the bottom of the lake. This decreases the rate of photosynthesis because to make glucose and oxygen they need high level of light and high CO_2 levels and water.

However minerals that are released into the water from the mud can increase the rate of microscopic plants because the plants can take in their minerals ~~from~~ the xylem vessels which will help the [6]
into plants grow and survive to be able to increase the numbers.

This candidate was given Level 3 and 5 marks for this response. They have a good description of why cloudy water would reduce the number of plants – they have identified that there would be less light which would reduce photosynthesis and therefore decrease the number of plants. They have also identified that the minerals would help the plants to grow. To improve this answer, they would need a statement about how the plants use the minerals, e.g. to make amino acids/proteins for growth.

Question 20 (a)

20 Farmers sometimes give farm animals antibiotics, even if the animals are **not** ill.

The farm animals have bacteria in their bodies that use some of their food.

(a) Suggest why farmers are trying to kill these bacteria with the antibiotics.

.....
..... [1]

Most candidates found this question challenging. Many did not appear to have read the statement about the animals **not** being ill. Frequently seen incorrect responses referred to the meat from the animals being free from disease and therefore safer to eat.

Question 20 (b) (i)

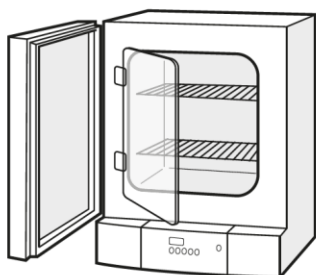
(b) Scientists have been studying the bacteria found in different farm animals.

They took samples from different farm animals and tested to see if bacteria in the samples were killed by the antibiotics.

(i) Describe how you would use this equipment to test if bacteria are killed by an antibiotic.



Petri dish with
bacteria growing
on nutrient agar



Laboratory incubator



Filter paper discs



Antibiotic

.....
.....
.....
.....
.....
..... [3]

Most candidates were given at least 1 mark on this question, usually for the idea of placing the petri dish in the incubator. Where marks were lost, it was often because candidates stated that you would put the antibiotic directly onto the agar plate, as opposed to soaking the filter paper disc in antibiotic.

OCR support

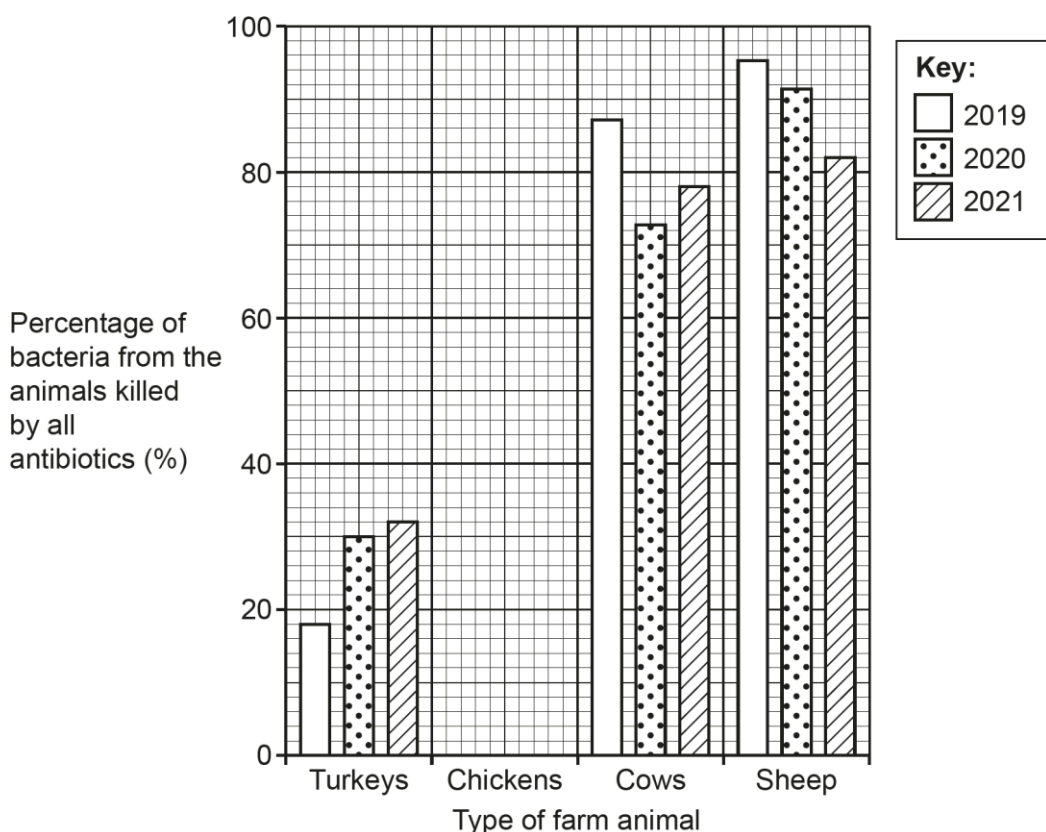


Our [Practical support guide](#) has a variety of videos, activities and simulations that can be shared with candidates. These link to the Practical Activity Groups, and the apparatus and skills candidates must be aware of. Some of the practicals shown are in a different context than what may be carried out in the classroom, giving candidates further practice for examinations.

Question 20 (b) (ii)

(ii) The scientists' tests were done in 2019, 2020 and 2021 on four types of farm animals.

The bar chart shows the percentage of bacteria from the animals that were killed by all the antibiotics that they tested.



The results for chickens were:

- 77% in 2019
- 72% in 2020
- 74% in 2021.

Complete the bar chart by drawing three bars for the chicken results.

[2]

Candidates answered well in this question, although a significant number drew the bars freehand rather than with a ruler.

Question 20 (b) (iii)

- (iii) Many people say that giving antibiotics to farm animals produces populations of antibiotic resistant bacteria.

Farmers have therefore agreed to use less antibiotics.

Explain if the data for **sheep** support the idea that farmers are using less antibiotics.

.....

.....

.....

..... [2]

This proved to be a challenging question for a significant number of candidates. Where 1 mark was given, it was usually for the idea that the number of bacteria being killed by antibiotics had decreased. The majority then went on to say that because fewer were killed it must mean that less antibiotics are being used. Better responses identified that if fewer were killed it must mean that the bacteria are becoming resistant so therefore antibiotic use isn't decreasing.

Question 20 (c)

- (c) Complete the sentences about how bacterial populations can develop antibiotic resistance.

Use words from the list.

change	die	gene technology	mitosis
mutation	natural selection	survive	

Some bacteria have a gene for antibiotic resistance which has been produced by

.....

This gene allows bacteria to and reproduce.

This means that the bacterial population can become resistant to antibiotics.

This process is an example of

[3]

Generally answered well with most candidates being given at least 1 mark. Where only 1 mark was given, it was usually for the second marking point 'survive'.

Question 21 (a)

21 Cucumber wilt is a communicable disease of plants caused by a type of bacteria.

(a) Put a ring around the communicable disease in this list that is also caused by bacteria.

barley mildew

crown gall disease

tobacco mosaic disease

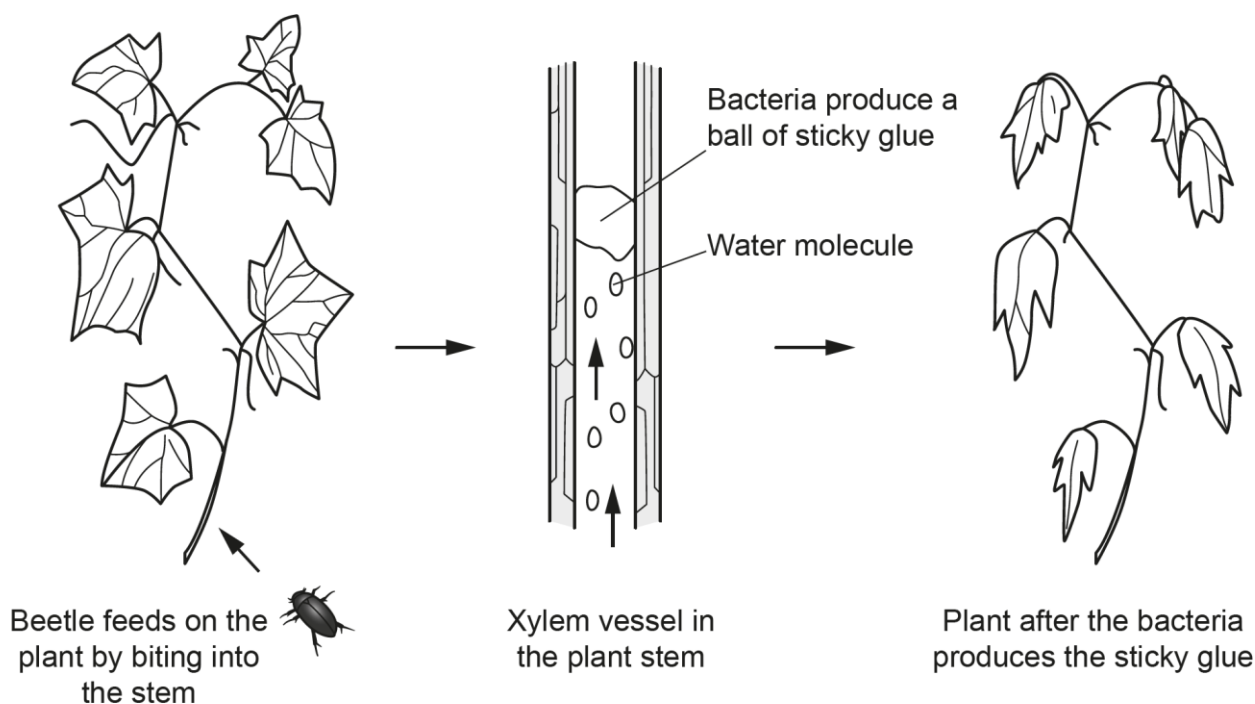
[1]

Less than one-third of candidates were able to identify the bacterial disease in the list.

Question 21 (b) (i)

(b) The bacteria that cause cucumber wilt are found on the mouthparts of small insects called beetles.

The diagram shows the effects of cucumber wilt on the plant.



(i) How does cucumber wilt spread from plant to plant?

.....

..... **[1]**

This question was challenging to answer for a significant number of candidates. The stem of the question told candidates that the beetle feeds by biting on the plant, however only around one-third of candidates realised that the bacteria were spreading the disease when they fed. Commonly seen incorrect responses included it spreading through the roots or through water.

Question 21 (b) (ii)

- (ii) Explain how infection with the bacteria causes the appearance of the plant to change.

.....

.....

.....

.....

..... [3]

Around half of all candidates were given at least 1 mark on this question. Where only 1 mark was given, it was usually for the idea of the plant wilts or droops.

Question 21 (b) (iii)

- (iii) Explain why spraying cucumber plants with chemical pesticide can prevent the spread of the disease.

.....

..... [1]

This question was challenging for candidates. The most commonly seen incorrect answer was the idea that the pesticide would repel the beetle and stop it from feeding. Some candidates thought that the pesticide would kill the bacteria.

Question 21 (b) (iv)

- (iv) Scientists are trying to find another way of controlling the disease.
They plan to use a living organism to kill the bacteria.

What is the name of this type of control method?

Tick (✓) **one** box.

Biological control

☐

Genetic control

☐

Physical control

☐

Vector control

☐

[1]

Around half of all candidates recognised this as biological control. Genetic control and vector control were commonly selected incorrect responses.

Question 22 (a)

22 Many different bacteria can cause disease.

(a) State the name given to any organism that causes disease.

..... [1]

This question was challenging for most candidates. Commonly seen incorrect responses were usually names of pathogens, e.g. virus. A significant number did not attempt a response.

Question 22 (b) (i)

- (b) A patient in hospital has a bacterial disease.
A doctor tells the patient:

'Some time ago, bacteria entered your body.
Your body detected chemicals on the surface of the bacteria.
This made your body produce protein molecules to help kill the bacteria.
I will give you a tablet containing a medicine that will also kill the bacteria.
You should not get this disease again because cells in your body will now provide you with immunity.'

- (i) The boxes contain descriptions used by the doctor and some biological terms.

Draw **four** lines to connect each **description** to its correct **biological term**.

Description	Biological term
	antibiotics
chemicals on the surface of the bacteria	antibodies
proteins produced by the body	antigens
medicine given by the doctor to kill the bacteria	antiseptics
cells that provide immunity	white blood cells

[4]

Most candidates were given at least 1 mark on this question, with around a third gaining full marks. Where 1 mark was given, it was usually for linking medicine given to antibiotics. A number of candidates would appear to think that antibodies are cells that provide immunity.

Question 22 (b) (ii)

- (ii) The doctor would change the type of medicine given to the patient if the disease was caused by a virus.

State the change the doctor would make.

Give a reason for your answer.

Change

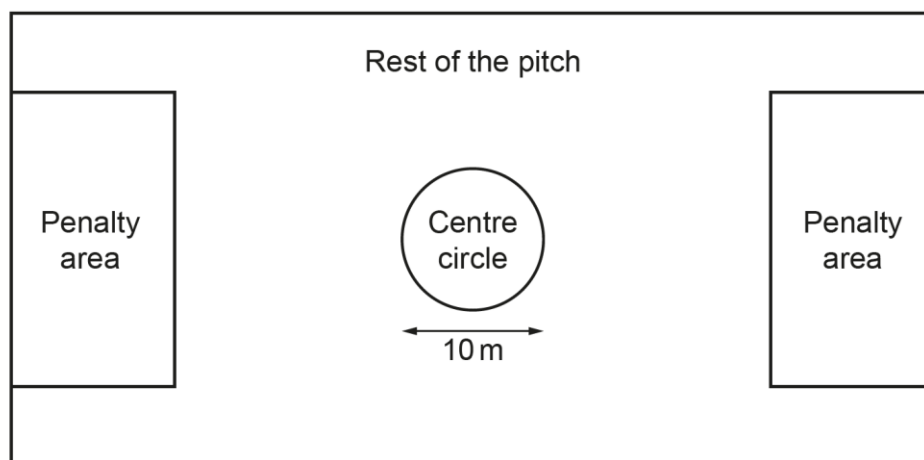
Reason

..... [2]

This was a challenging question for many candidates. Where 1 mark was given it was usually for marking point 1 – idea of not giving antibiotics/giving antivirals instead. There were a lot of vague responses for marking point 2 with candidates using phrases like “viruses aren’t affected by antibiotics”.

Question 23 (a)

- 23** Some students investigate the number of dandelion plants growing in three different parts of a football pitch.



- (a)** The students sample the pitch to find the mean number of dandelion plants per m^2 in each part.

Explain how the students use a quadrat to find the mean number of dandelion plants per m^2 in a part of the pitch.

.....

.....

.....

.....

.....

..... [3]

Around half of all candidates were given at least one mark on this question. The first three marking points were most seen with candidates recognising that the quadrat would need to be randomly placed, or that you count the dandelions within the quadrat, or that you would need to repeat. Very few candidates could explain how to calculate the mean number of dandelions or gave a vague explanation of calculating the mean without linking it to the question, e.g. "add them up and divide by the total number".

Exemplar 2

firstly they would measure the pitch and place the quadrat in ~~openly~~ randomly selected areas
 this increases validity
 next they would count dandelions per m^2 in each quadrat
 then they would add the total of each together and divide that by the number of sections to get the mean. [3]

This response highlights the comment made above. This candidate has been given 2 marks from the first section of the marking points. However, they do not get the mark for calculating mean, as although they know that they must add the dandelions together, they are unclear about what they are dividing it by.

Question 23 (b)

(b) The table shows some of the students' results.

Part of the pitch	Area (m^2)	Mean number of dandelions per m^2	Total number of dandelions
Both penalty areas	1300	4.0	5200
Centre circle		3.0	
Rest of the pitch	5500	2.0	11 000

Calculate the area of the centre circle and the total number of dandelions in the centre circle.

Use the equation: area of a circle = πr^2

Use $\pi = 3.14$

Write your answers in the table.

[3]

Where candidates understood how to do the calculation, they generally gained full marks. It is important that candidates understand the importance of showing their working as some candidates were given 2 marks for partial calculations, even if their final answer was wrong.

OCR support



The [Mathematical Skills Handbook](#): Science would be useful to share with candidates or incorporate into lessons to practise calculating areas, among other mathematical skills.

Question 23 (c)

(c) The students write a conclusion for their experiment.

Complete the students' conclusion.

Use words from the list.

community	compete	differently	efficiently	equally
habitat	mutate	population	respire	

The football pitch contains a of different plant species, mainly grass and dandelions.

The part of the pitch that has the most players running on it has the most dandelions.

This is because it is more difficult for plants to grow there.

The dandelions successfully with the grass in these areas.

We can only make this conclusion if abiotic factors affect each area

[3]

Most candidates were given at least 1 mark on this question, with over half gaining 2 or 3 marks. Where only 1 mark was given, it was frequently for the last sentence.

Question 23 (d)

(d) Describe how the pupils could extend their experiment to show that soil pH was the same in each part of the pitch.

.....

.....

.....

..... [2]

This question was challenging for many candidates. Many did not recognise that you would have to take samples of soil and gave vague answers about testing at different parts of the pitch. Many candidates gave incomplete responses about testing the pH without suggesting a way of testing the pH.

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