OCR
Oxford Cambridge and RSA

Monday 9 June 2025 – Morning

GCSE (9–1) Biology A (Gateway Science)

J247/02 (Foundation Tier)

Time allowed: 1 hour 45 minutes

You must have:
- a ruler (cm/mm)

You can use:
- a scientific or graphical calculator
- an HB pencil

F

J247702

1917911

Please write clearly in black ink. **Do not write in the barcodes.**

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

First name(s) _____

Last name _____

INSTRUCTIONS
- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.

INFORMATION
- The total mark for this paper is **90**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **32** pages.

ADVICE
- Read each question carefully before you start your answer.

Section A

You should spend a **maximum** of **30 minutes** on this section.

Write your answer to each question in the box provided.

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

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

Your answer ☐ **[1]**

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]**

3 Which type of microorganism causes AIDS?

A Bacterium

B Fungus

C Protist

D Virus

Your answer ☐ **[1]**

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

A Carrying oxygen

B Clotting

C Maintaining body temperature

D Producing antibodies

Your answer ☐ **[1]**

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

A Darwin

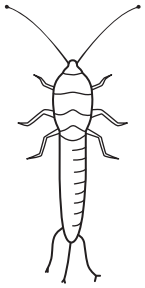
B Darwin and Wallace

C Mendel

D Mendel and Wallace

Your answer ☐ **[1]**

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]**

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]**

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]**

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]**

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]**

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]**

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]**

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]**

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.

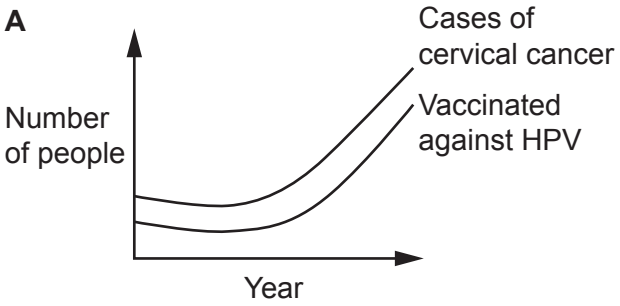
D The modal shoe size is 7.

Your answer ☐ **[1]**

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?

A



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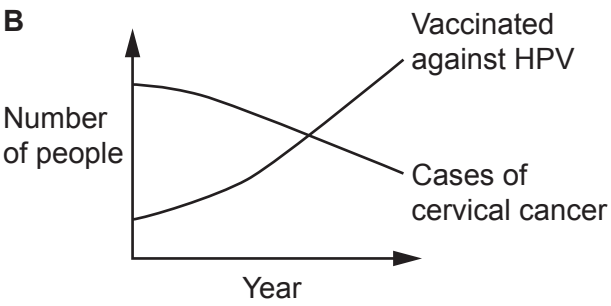
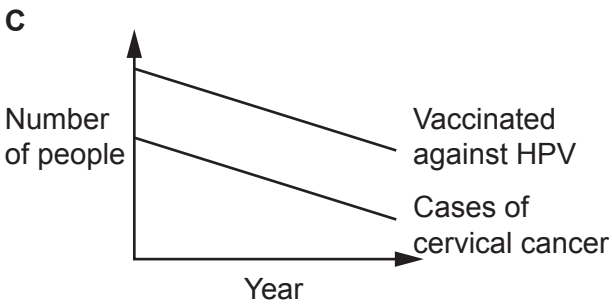
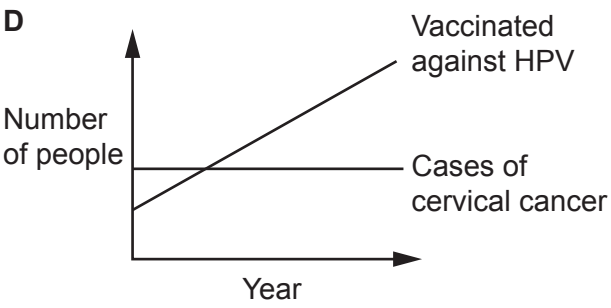


C



D



Your answer ☐ **[1]**

Section B

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

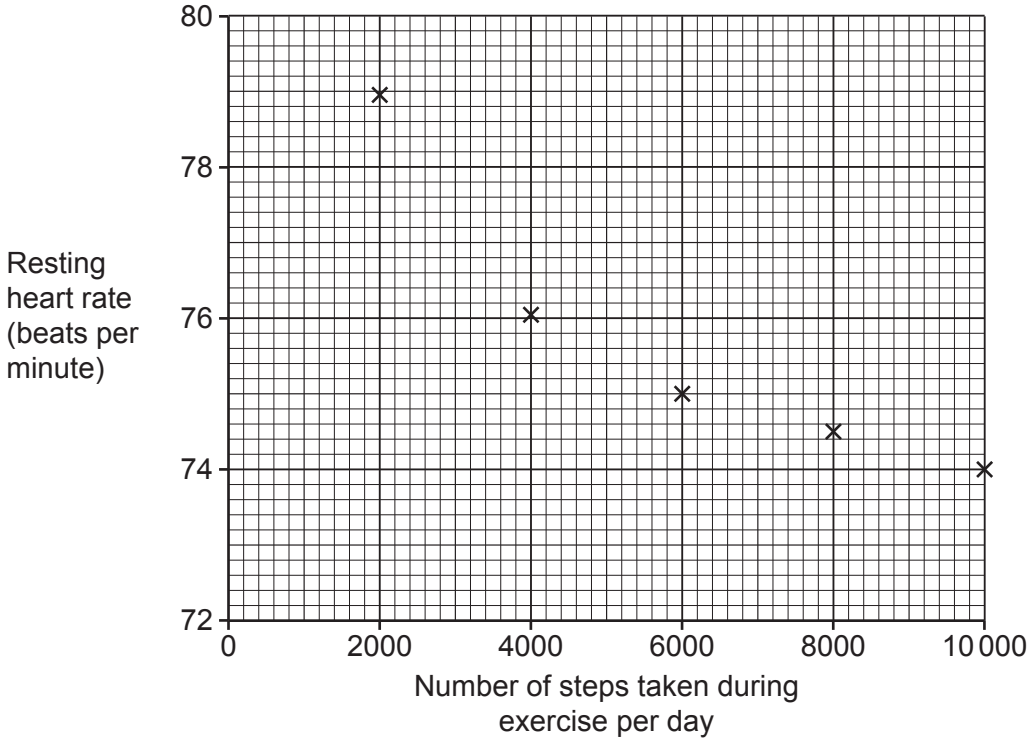
[2]

(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]**

(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]**

(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]**

(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]

(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

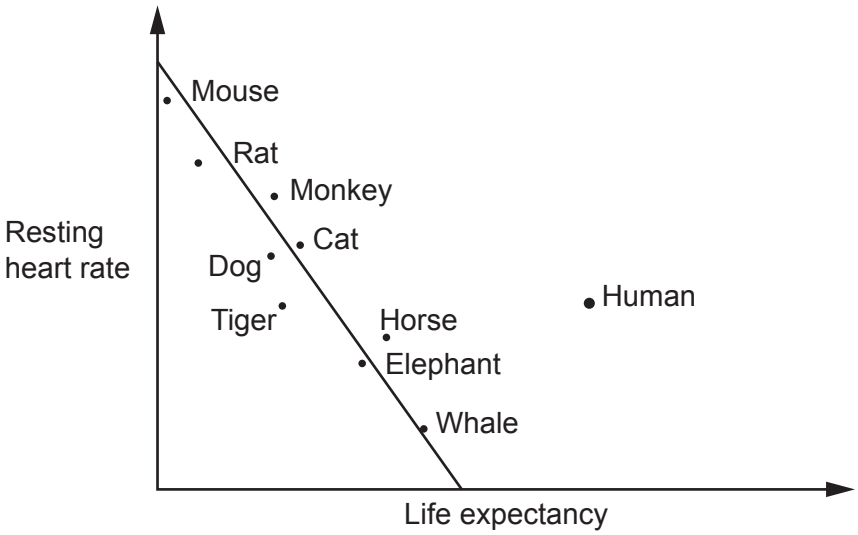
more ..... .

[2]

(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]**

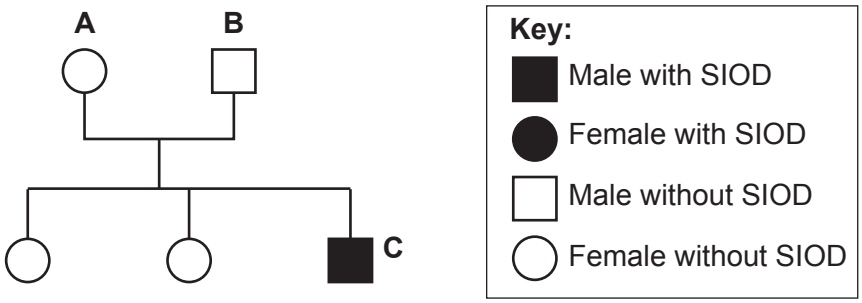
(ii) Suggest a reason for this difference.

.....

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

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]

(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]

(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]**

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.

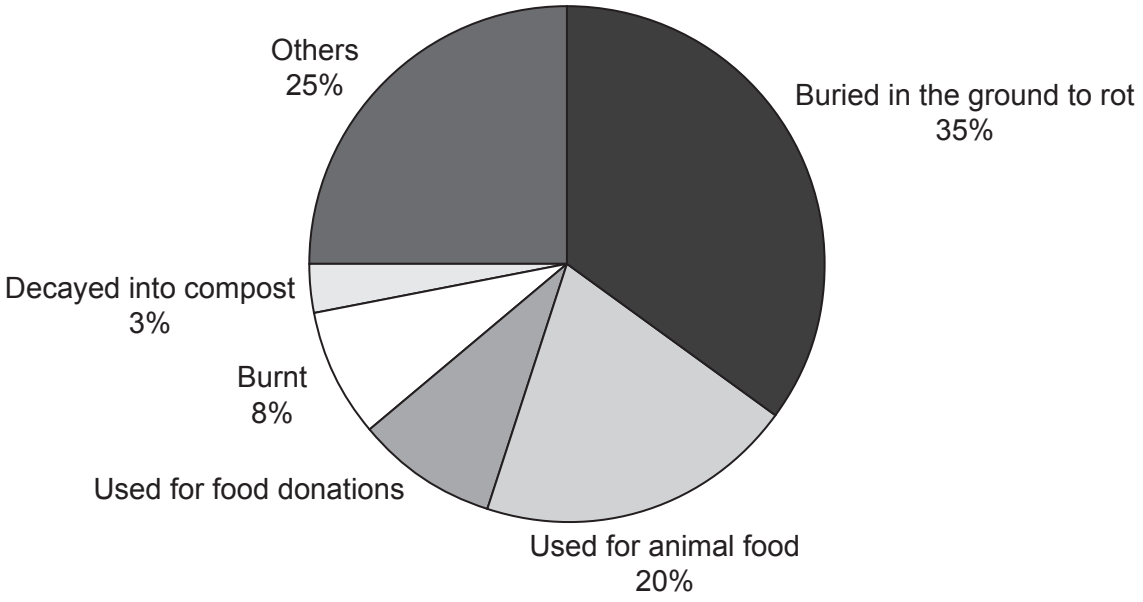
This is called ..... .

[4]

(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]**

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

Identify these **two** methods.

..... and .....

[2]

(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]

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

Burnt surplus food = ... million tonnes **[2]**

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

.....

.....

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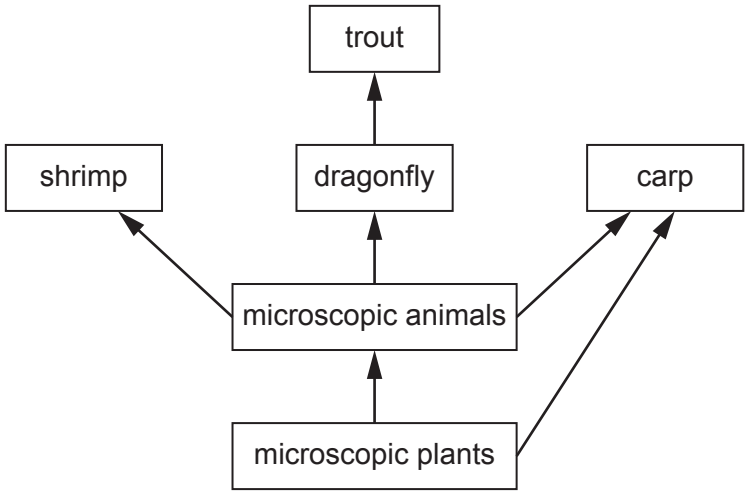
..... **[2]**

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



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

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

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

Tick (✓) **two** boxes.

Primary consumer ☐

Secondary consumer ☐

Tertiary consumer ☐

[1]

(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]

(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.

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..... **[6]**

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.

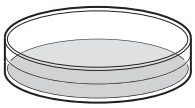
.....

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

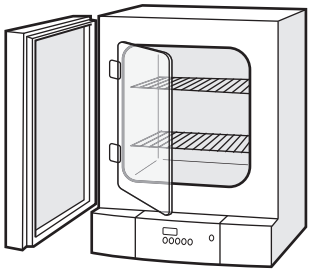
(b) Scientists have been studying the bacteria found in different farm animals.

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

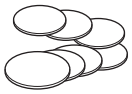
(i) Describe how you would use this equipment to test if bacteria are killed by an antibiotic.



Petri dish with bacteria growing on nutrient agar



Laboratory incubator



Filter paper discs

Antibiotic

.....

.....

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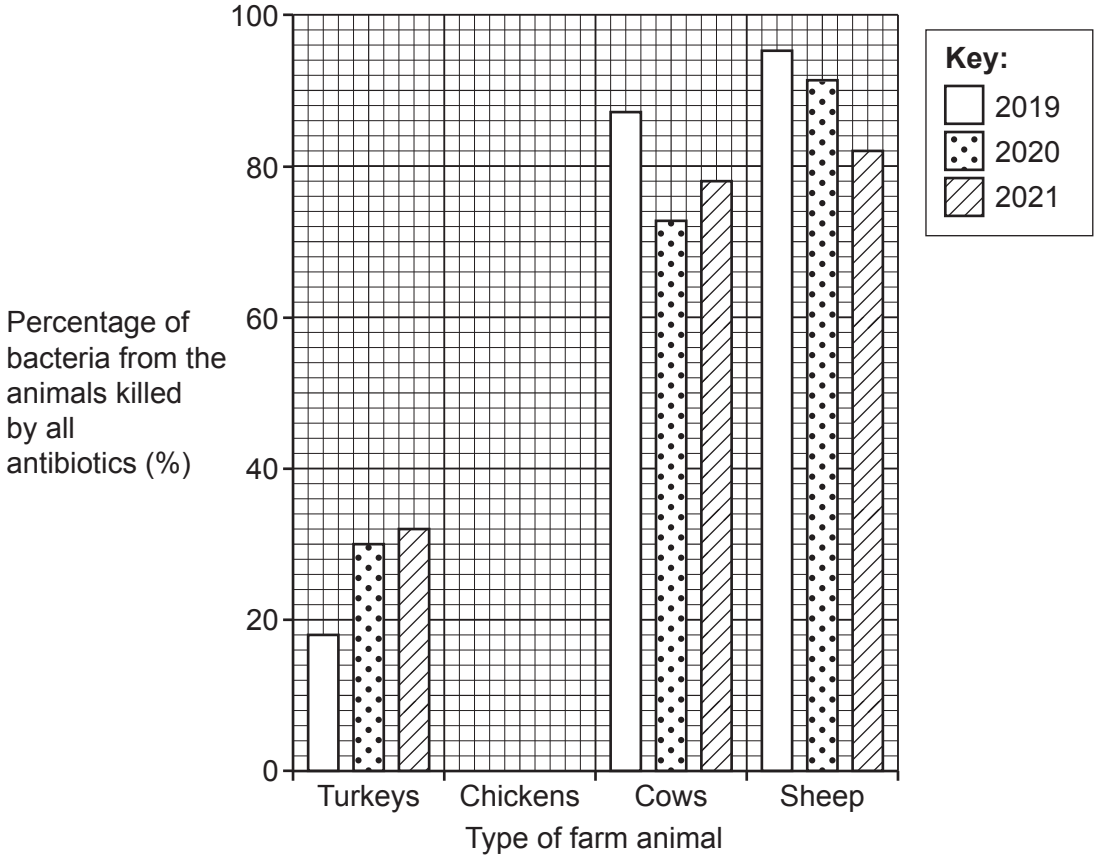
.....

.....

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

(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]**

(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]**

(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]

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

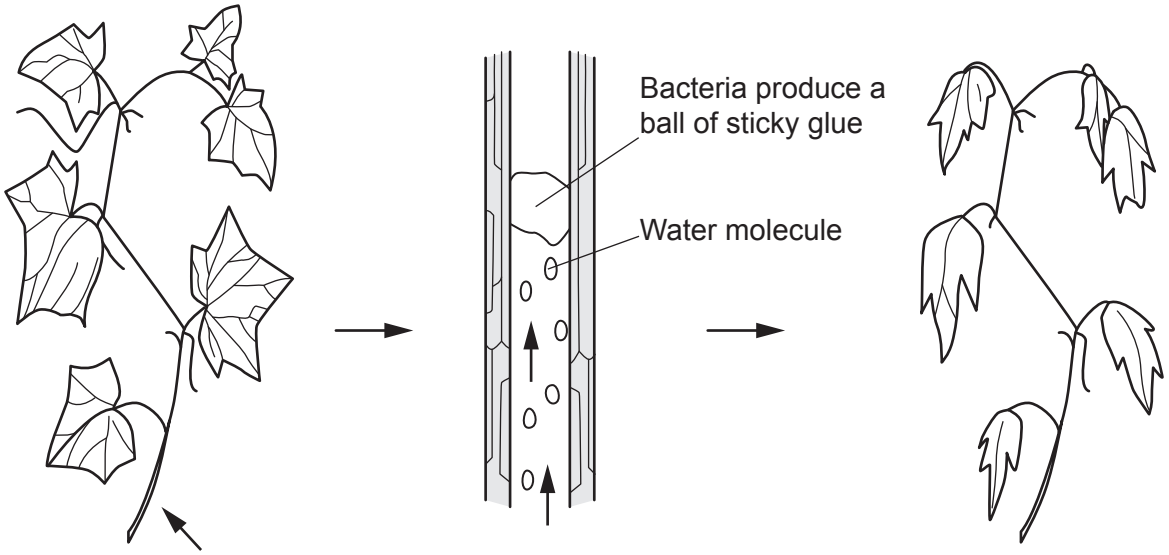
(a) Put a (ring) around the communicable disease in this list that is also caused by bacteria.

barley mildew **crown gall disease** **tobacco mosaic disease**

[1]

(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]**

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

.....

.....

.....

.....

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

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

.....

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

(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]

22 Many different bacteria can cause disease.

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

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

(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]

(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.

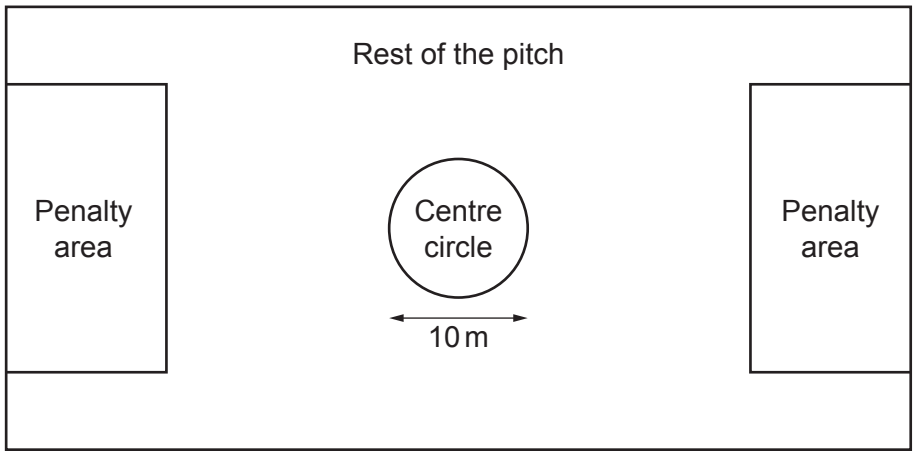
Change .....

Reason .....

.....

[2]

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]**

(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 π = 3.14

Write your answers in the table.

[3]

(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]

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

.....

.....

.....

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

END OF QUESTION PAPER

EXTRA ANSWER SPACE

If you need extra space use these lined pages. You must write the question numbers clearly in the margin.