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

F

J250/02 Paper 2 (Foundation Tier)

Sample Question Paper

Date – Morning/Afternoon

Version 2.1

Time allowed: 1 hour 10 minutes

You may use:
- a scientific or graphical calculator
- a ruler

First name									
Last name									
Centre number						Candidate number				

INSTRUCTIONS
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION
- The total mark for this paper is **60**.
- The marks for each question are shown in brackets **[ ]**
- Quality of extended responses will be assessed in questions marked with an asterisk (*).
- This document consists of **24** pages.

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SECTION A

Answer **all** the questions.

You should spend a maximum of 20 minutes on this section.

1 Communities within an ecosystem are affected by **biotic factors**.

Which of the following is a biotic factor?

A Disease

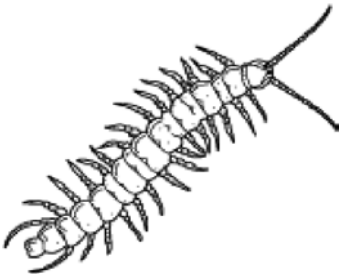
B Light intensity

C Rainfall

D Wind speed

Your answer ☐ **[1]**

2 The picture shows an animal which lives in soil.



Which apparatus could **not** be used to collect this animal?

A Net

B Pitfall trap

C Pooter

D Quadrat

Your answer ☐ **[1]**

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3 A racehorse owner wants a horse that can run fast.

He mates his fastest male horse with his fastest female horse.

He hopes that the offspring will be as fast as their parents.

What process is this an example of?

A Genetic engineering

B Mitosis

C Natural selection

D Selective breeding

Your answer ☐ **[1]**

4 The picture shows the leaf of a potato plant.

The leaf is infected with a fungus.



The fungus reproduces by releasing spores into the air.

Suggest which method best describes how the fungus spreads.

A Blown by the wind

B Direct contact

C Spraying the potatoes with fungicide

D Tissue fluids from the plant

Your answer ☐ **[1]**

5 The moisture content of four different soils is investigated.

The same amount of all four soil samples is needed.

Which apparatus should be used?

A Balance

B Beaker

C Measuring cylinder

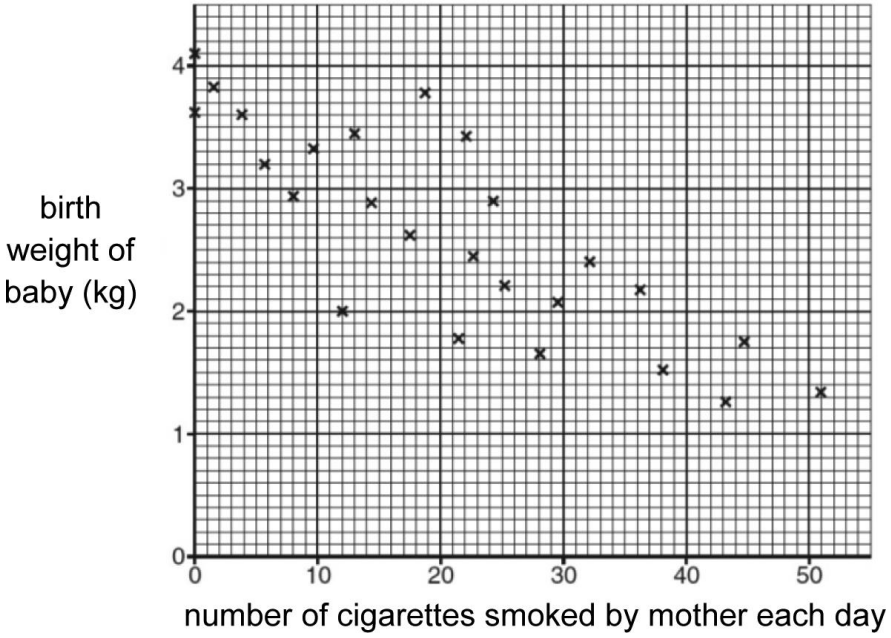
D Syringe

Your answer ☐ **[1]**

6 Scientists recorded the birth weights of some babies.

They also recorded how many cigarettes each baby's mother smoked each day.

The results are shown on the graph.



Which statement is true?

A All mothers who smoke 12 cigarettes a day will have babies that weigh 2 kg.

B Birth weight increases as the number of cigarettes smoked increases.

C The data only represents a small percentage of births per year.

D The trend in the data shows a positive correlation.

Your answer ☐ **[1]**

7 A student investigates the number of daisy plants growing on the school playing field.

She uses a quadrat to count the number of daisy plants growing in different areas of the field.

The table shows her results.

Quadrat	Number of daisy plants
1	8
2	2
3	7
4	5

- Each quadrat has an area of 0.25 m^2.
- The school playing field has an area of 15 000 m^2.

Estimate the population of daisy plants growing on the school field.

A 682

B 82 500

C 330 000

D 1 320 000

Your answer ☐ **[1]**

8 Cystic fibrosis is an inherited disorder caused by a recessive allele.

Sundip and Ben are both **heterozygous** for cystic fibrosis.

What is the percentage chance that they will have a baby with cystic fibrosis?

A 25%

B 50%

C 75%

D 100%

Your answer ☐ **[1]**

9 There are different levels of organisation within an ecosystem.

What is the correct order of these levels?

A Community, individual, ecosystem, population

B Individual, community, population, ecosystem

C Individual, population, community, ecosystem

D Population, community, ecosystem, individual

Your answer ☐ **[1]**

10 Doctors often talk about **communicable disease**.

Which statement describes a communicable disease?

A A disease that can be treated using only antibiotics.

B A disease that damages the immune system.

C A disease that is a direct result of lifestyle choices.

D A disease that is transmitted from one individual to another.

Your answer ☐ **[1]**

SECTION B

Answer **all** the questions.

11 Scientists have mapped the human genome.

(a) Describe what is meant by the term genome.

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

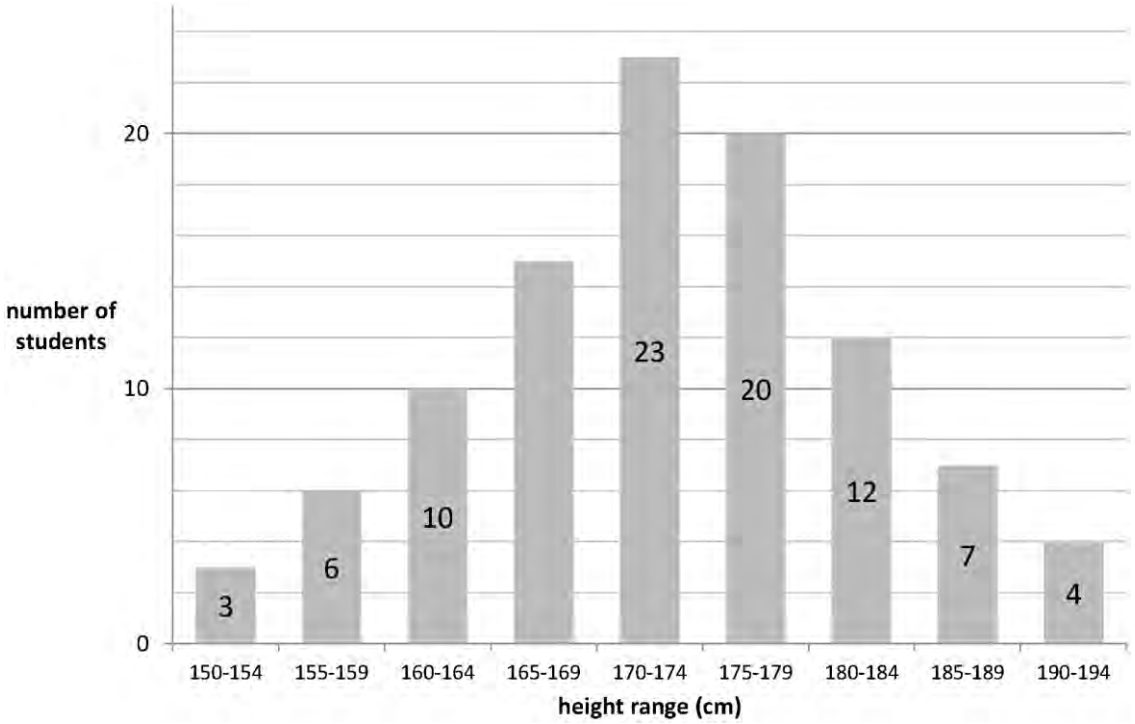
(b) The human genome could be used to predict if someone is likely to get heart disease.

Suggest **one** reason why some people may object to this use of the human genome.

.....

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

(c) Variation within organisms is linked to their genome and the environment. The graph shows the variation in height of a group of students.



(i) How many students were in the height range of 165–169 cm?

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

(ii) Show that the median is in the height range 170–174.

.....

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

(d) Describe how the genome and the environment could affect the height of an individual.

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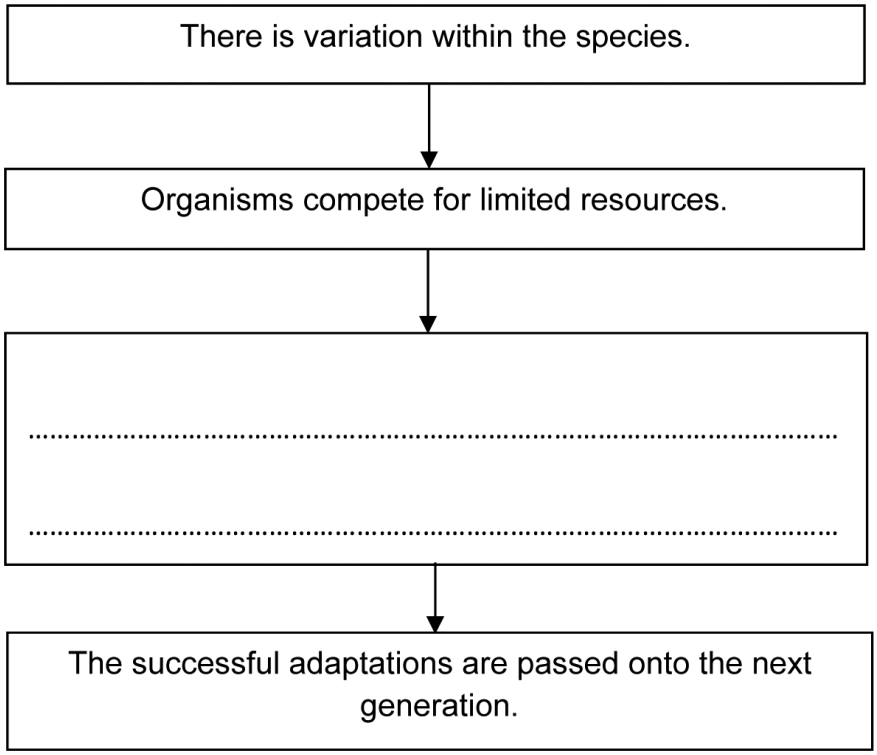
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(e) The flow chart shows some of the stages in the theory of evolution by natural selection.

Complete the missing step in the flow chart.



[1]

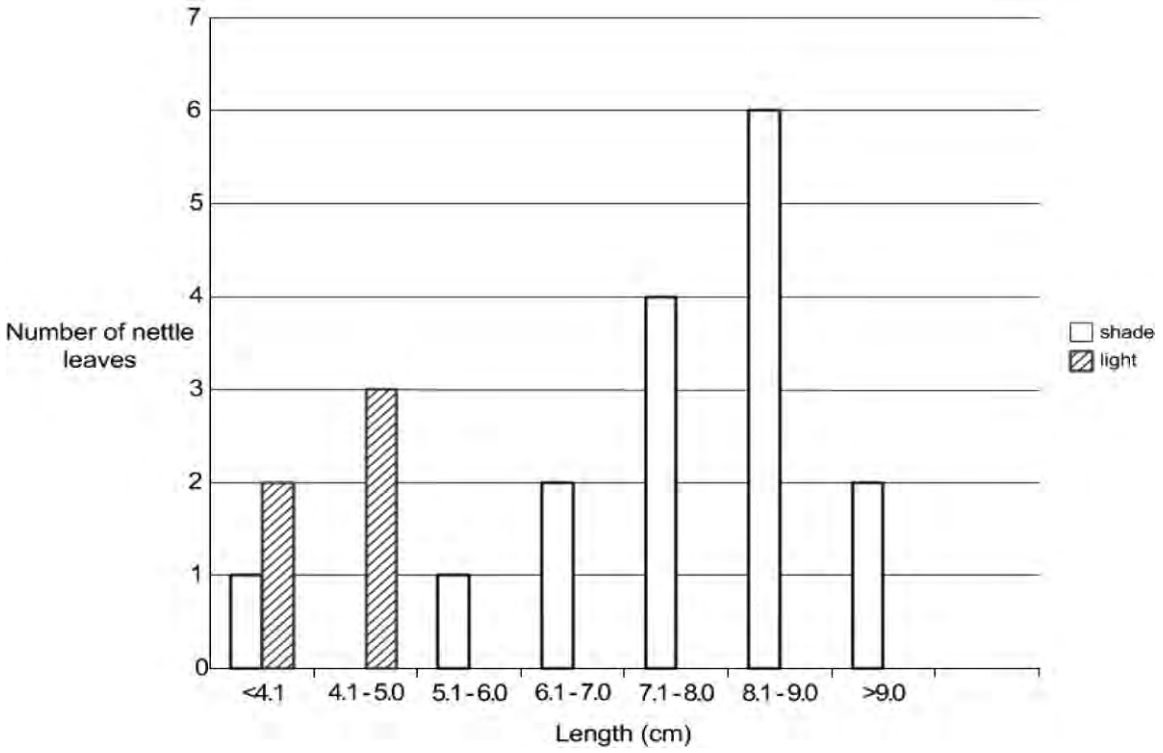
12 Two students investigate the effect of light on plant growth.

- They collect leaves from nettle plants growing in an area of shade and in an area of light.
- They then measure the length of each leaf.

The tally chart shows their results.

	Nettle leaves	
Length (cm)	**Shade**	**Light**
< 4.1	/	//
4.1–5.0		///
5.1–6.0	/	~~////~~ /
6.1–7.0	//	/
7.1–8.0	////	
8.1–9.0	~~////~~ /	
>9.0	//	

(a) The students draw a bar chart of their results.



(i) Complete the bar chart. **[1]**

(ii) Compare the **mode** for the nettle leaves in light and shade.

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

(iii) Suggest reasons for the differences in the mode.

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

(b) One student suggests that they measure the length of more nettle leaves in each area.

Why will taking more measurements improve their results?

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

(c) The other student suggests that soil pH may be a variable in their investigation.

Explain how they can compare the pH of soil in **both** areas tested.

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

13 A student investigates the animals living in a pond.

(a) The student wants to find out which animals live on the surface of the pond and which live at the bottom of the pond.

Explain the method the student should use to collect the animals.

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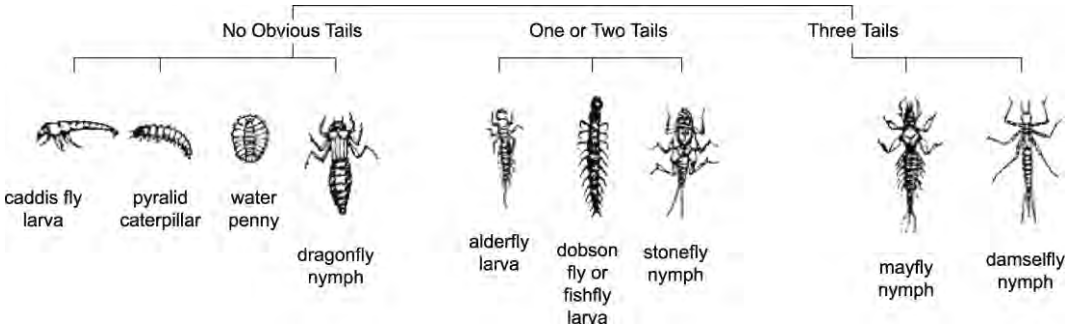
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(b) The student uses a key to identify some of the animals found in the pond.

The diagram shows part of the key they used.



(i) Which animals have no wings and three tails?

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

(ii) The student catches the animal shown below.



Use the key to name and describe the animal.

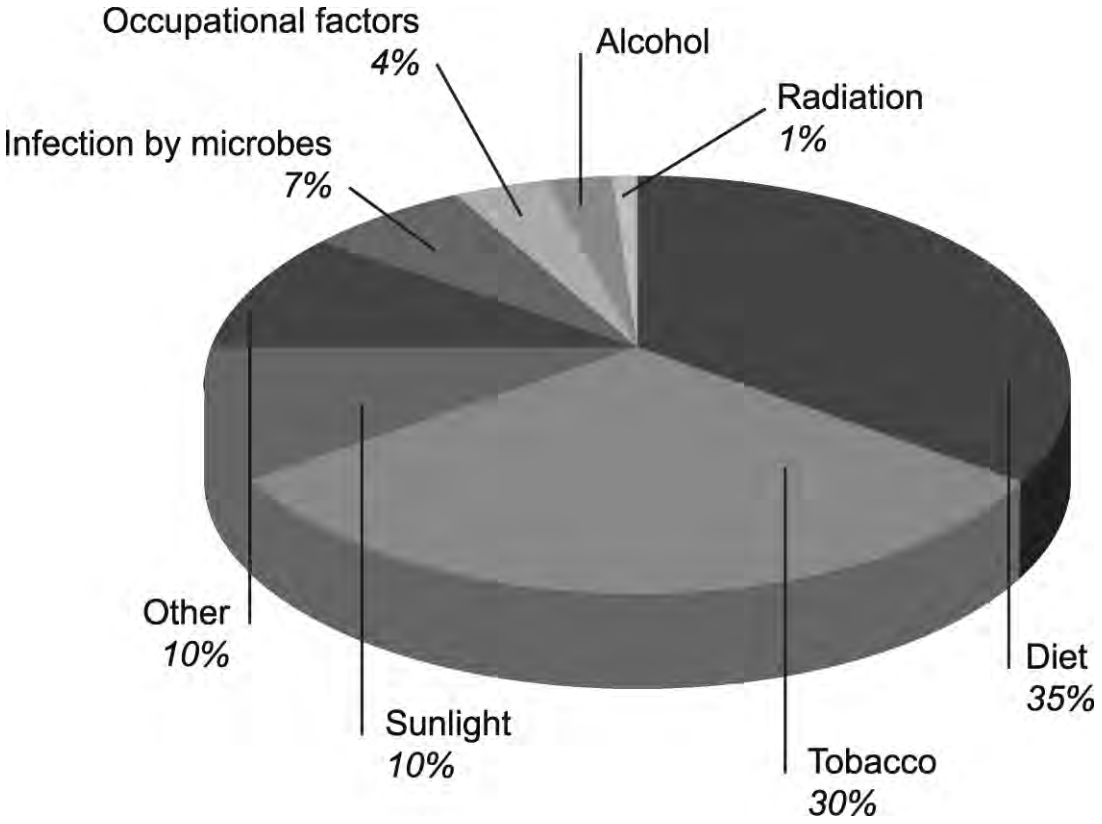
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..... **[3]**

14 The pie chart shows some of the main causes of cancer.



(a) (i) Calculate the percentage of cancer cases caused by alcohol.

Answer = ……% **[1]**

(ii) 150 people with cancer are sampled.

Estimate the number of people in this sample whose cancer was caused by infection from microbes?

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

(b) Identify and explain the **two** biggest lifestyle changes people could make to reduce their risk of cancer.

Use the data in your answer.

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..... **[4]**

(c) Explain the link between mitosis and cancer.

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

15* Read the facts about mistletoe.

> Mistletoe is a small evergreen shrub that grows on trees.
>
> Instead of growing roots into the ground, mistletoe sends out root-like structures into tree branches.

Mistletoe is known as a semi-parasite.

Would you agree with this statement and why?

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

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TURN OVER FOR THE NEXT QUESTION

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16 **(a)** White blood cells produce antibodies.

Describe the role of white blood cells and antibodies in the defence against pathogens.

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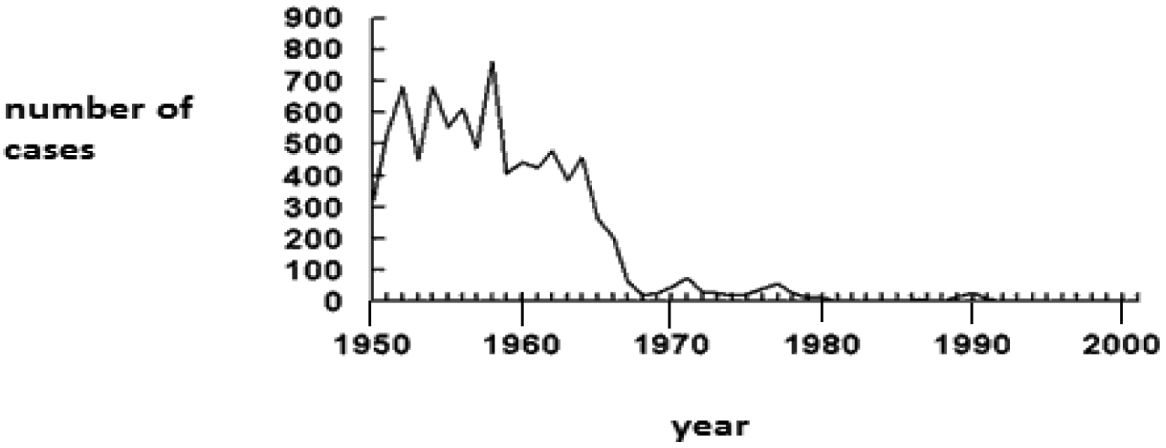
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..... **[3]**

(b) Measles is a disease caused by a pathogen.

The graph shows the number of measles cases in one country between 1950 and 2001.



Suggest which year a measles vaccination was introduced to the country.

Explain your answer.

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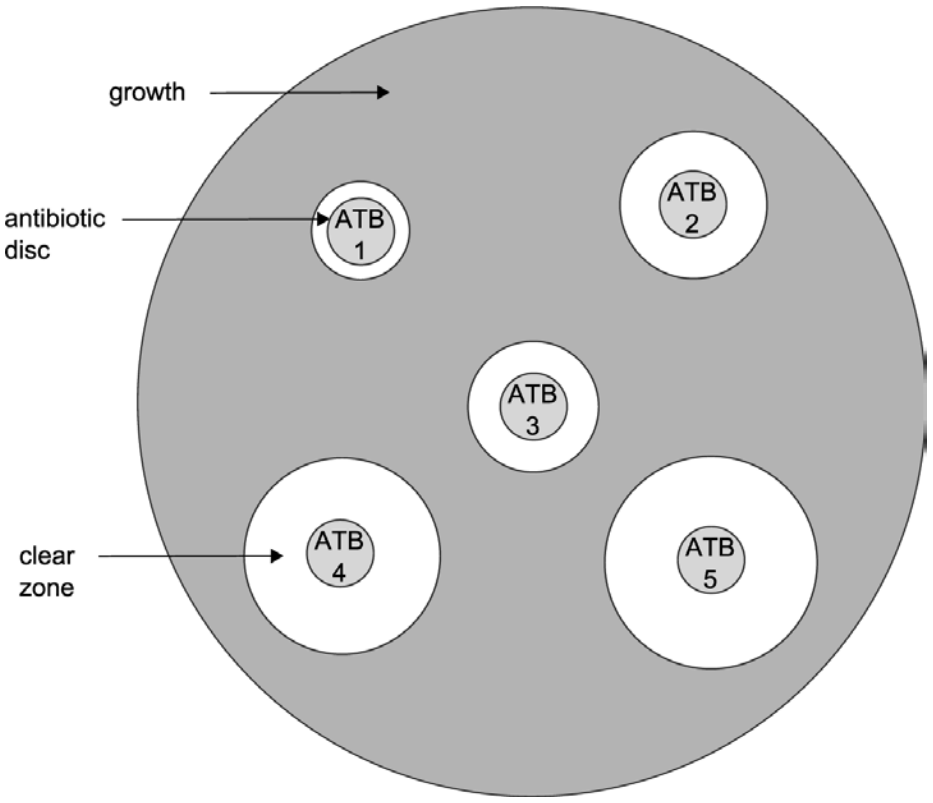
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..... **[2]**

(c) A student investigates different antibiotics.

- He puts antibiotic (ATB) discs onto agar containing bacteria.
- The bacteria are left to grow.
- The diagram shows his results.

The larger the clear zone around the antibiotic disc the more effective the antibiotic.



The table shows the cross-sectional areas for the antibiotic discs tested.

Antibiotic	Cross-sectional area (mm^2)
ATB1	79
ATB2	154
ATB3	122
ATB4	
ATB5	314

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(i) Calculate the cross sectional area of the clear zone for ATB 4.

Show your working.

Answer = ... mm^2 **[3]**

(ii) A student concludes that ATB5 is the best antibiotic for treating bacterial infections.

Evaluate his conclusion.

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

END OF QUESTION PAPER

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