OCR
Oxford Cambridge and RSA

Accredited

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

F

J250/02 Paper 2 (Foundation Tier)

Sample Question Paper

Date – Morning/Afternoon

Version 2

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.

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

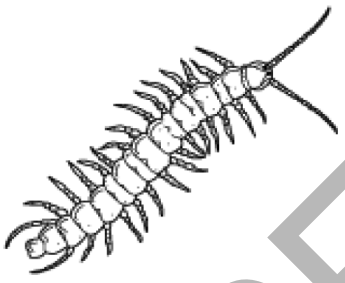
B Light intensity

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]**

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

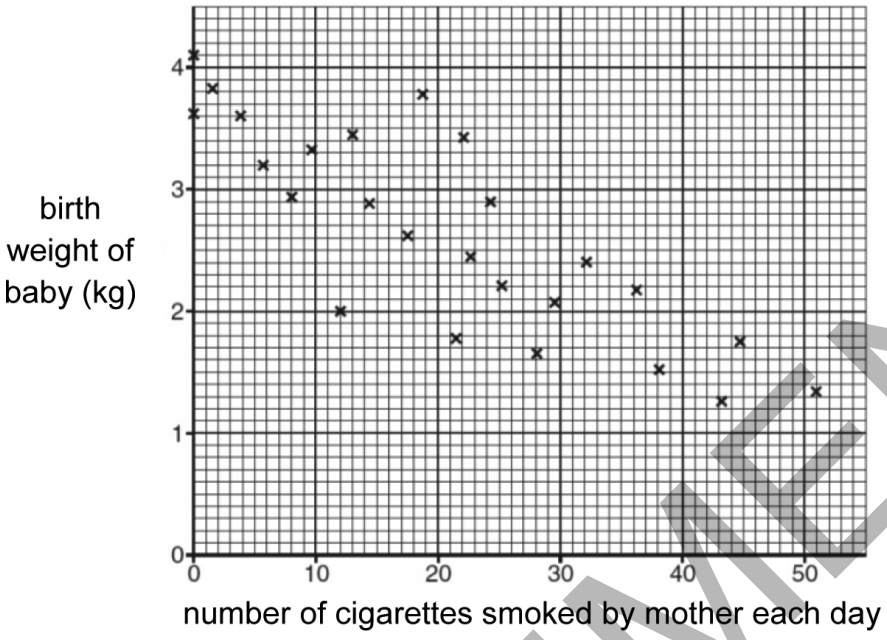
D Syringe

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.

.....

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

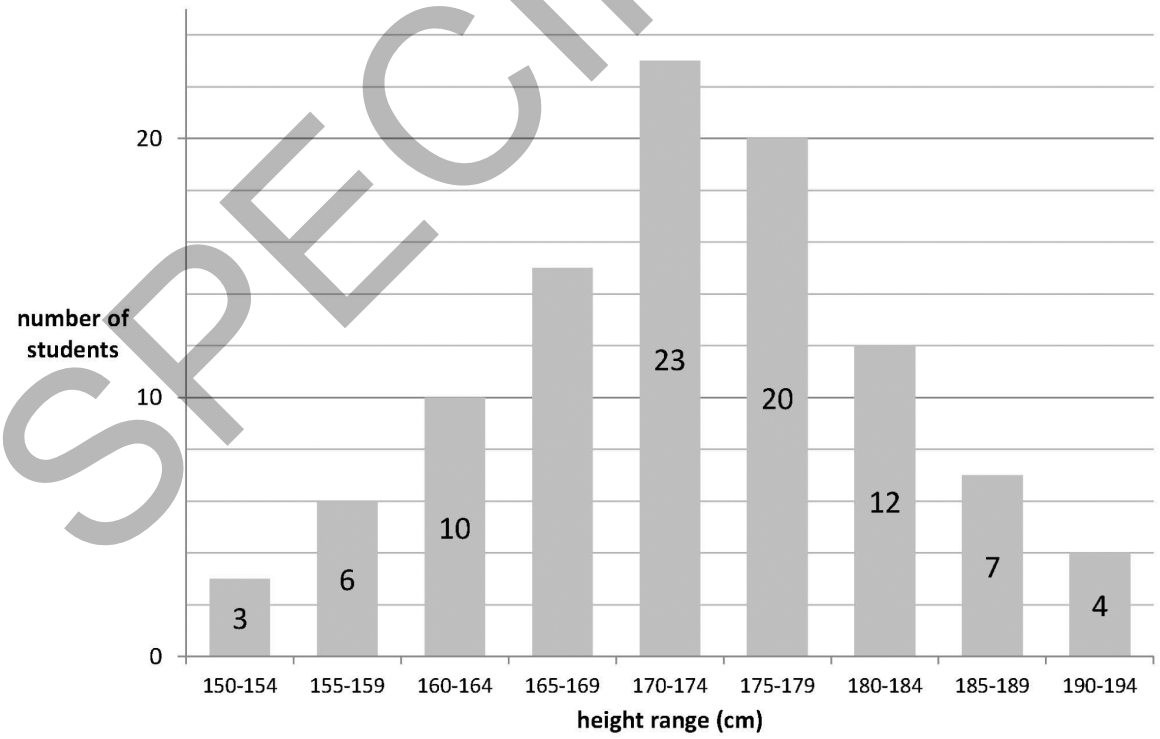
(b) The human genome could be used to predict if someone is likely to get heart disease.

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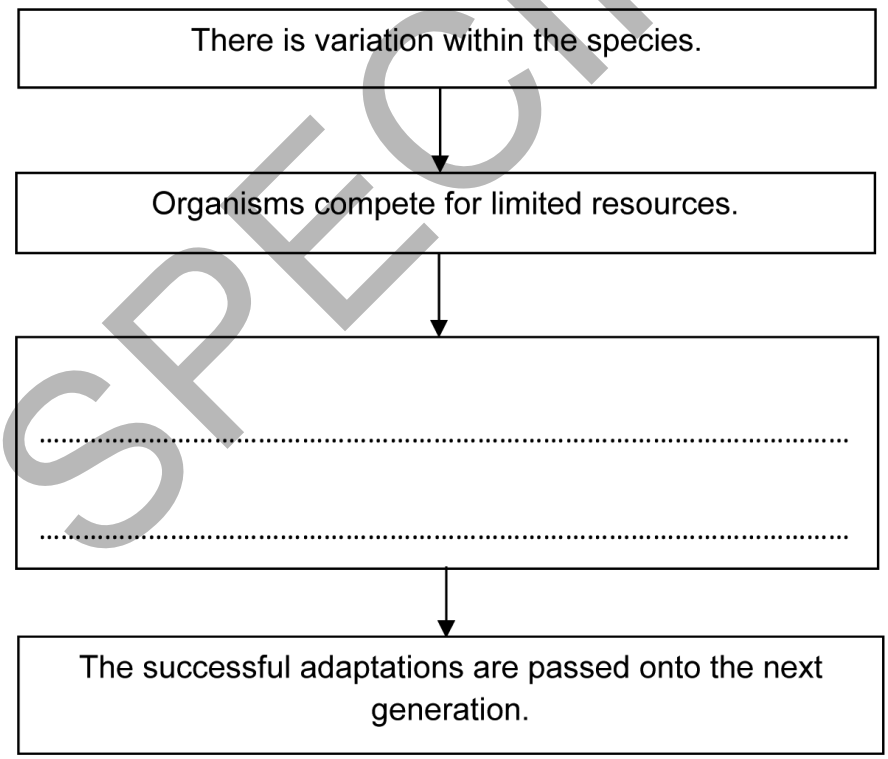
..... **[2]**

(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]

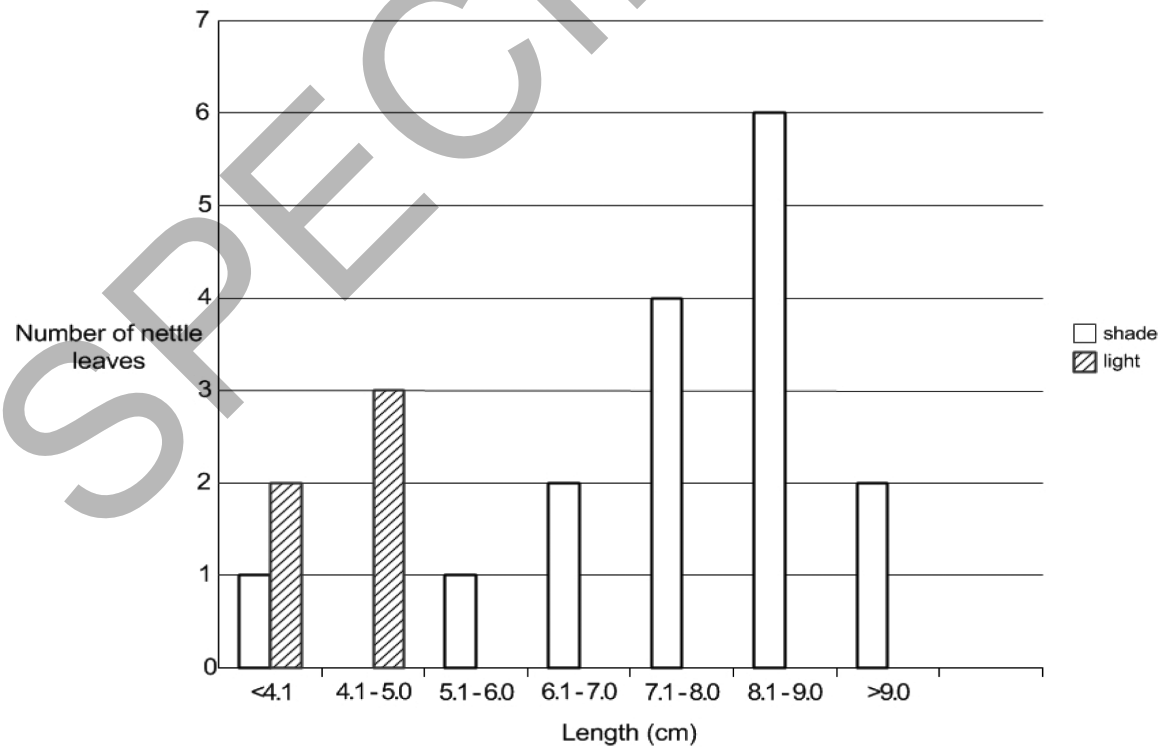
12 Two students investigate the effect of light on plant growth.

- 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.

.....

.....

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

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

.....

.....

..... **[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?

.....

..... **[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.

.....

.....

.....

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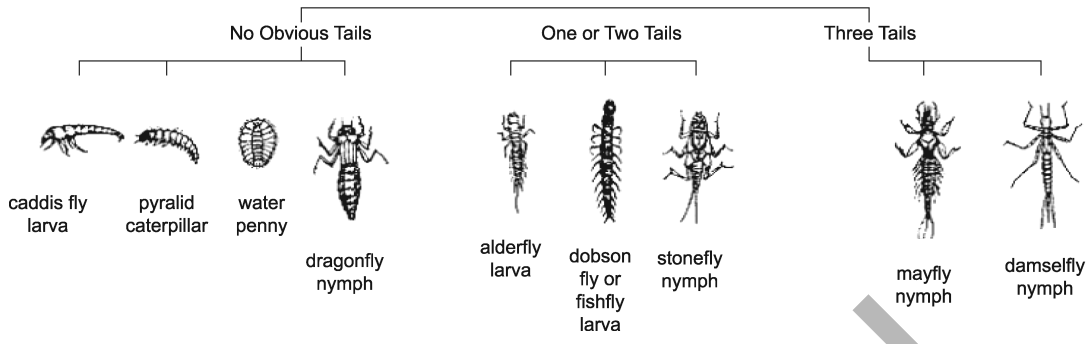
..... **[4]**

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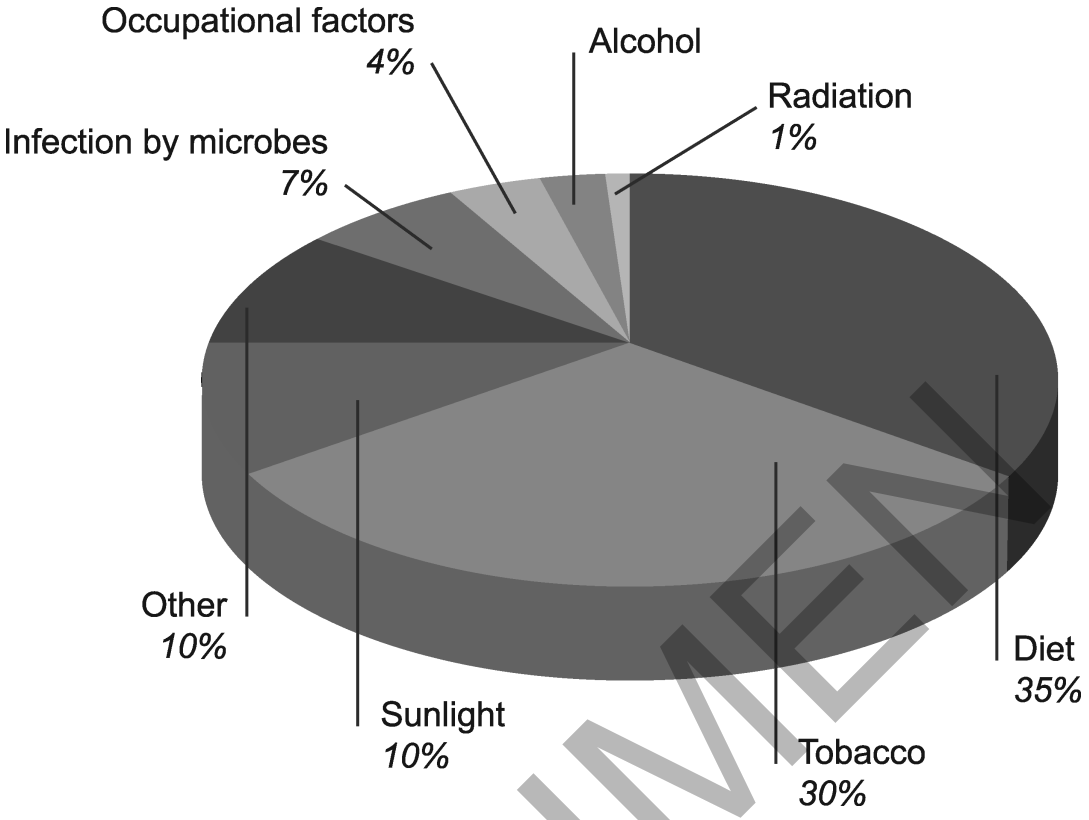
..... **[3]**

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

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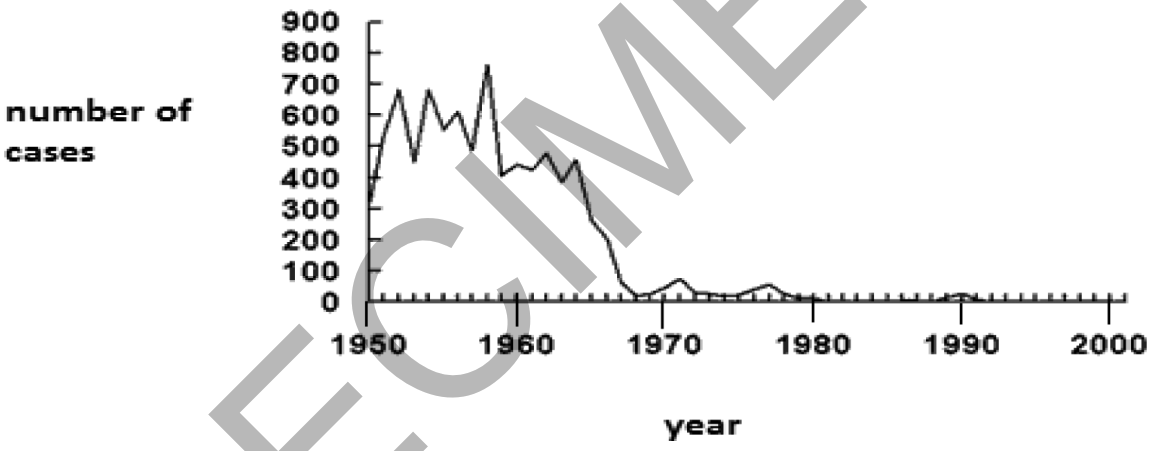
..... **[3]**

(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.

.....

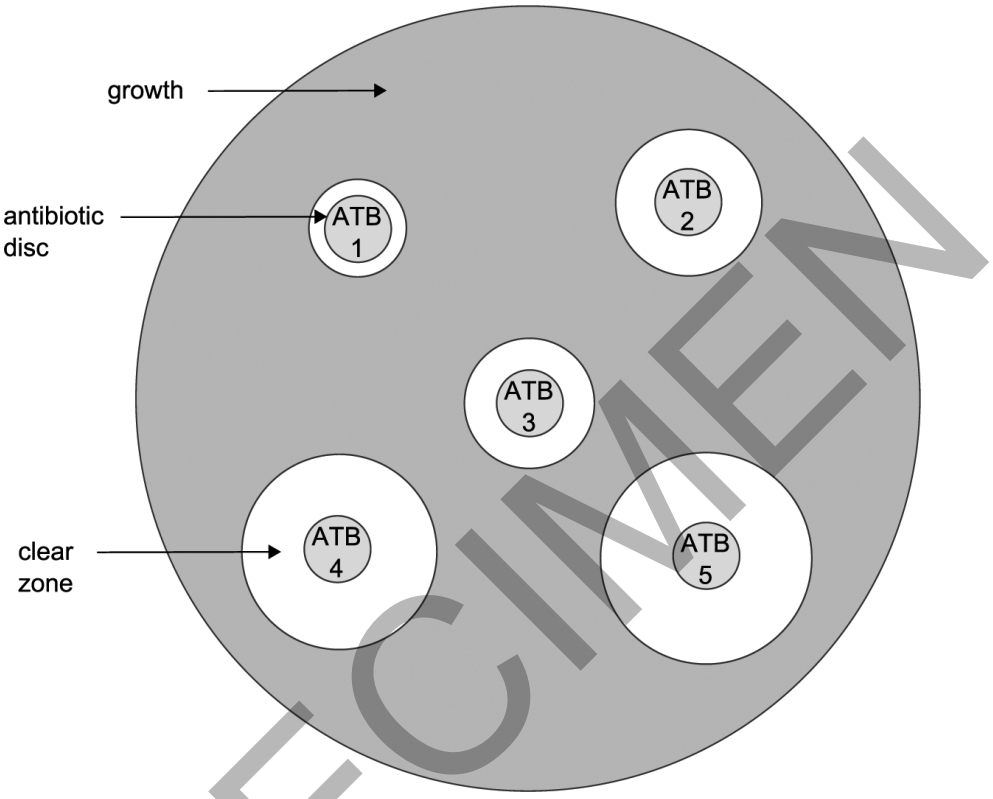
.....

..... **[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

(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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OCR
Oxford Cambridge and RSA

…day SAMs20XX – Morning/Afternoon

GCSE (9–1) Combined Science (Biology) A (Gateway Science)
J250/02 Paper 2 (Foundation Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 10 minutes

MAXIMUM MARK 60

This document consists of 16 pages

MARKING INSTRUCTIONS

PREPARATION FOR MARKING

SCORIS

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *scoris assessor Online Training*; *OCR Essential Guide to Marking*.

2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are posted on the RM Cambridge Assessment Support Portal http://www.rm.com/support/ca

3. Log-in to scoris and mark the **required number** of practice responses ("scripts") and the **required number** of standardisation responses.

   YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. The schedule of dates is very important. It is essential that you meet the scoris 50% and 100% (traditional 50% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.

4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone, email or via the scoris messaging system.

5. Work crossed out:
   a. where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks
   b. if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed out answer and award marks appropriately.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there then add a tick to confirm that the work has been seen.

7. There is a NR (No Response) option. Award NR (No Response)
   - if there is nothing written at all in the answer space
   - OR if there is a comment which does not in any way relate to the question (e.g. 'can't do', 'don't know')
   - OR if there is a mark (e.g. a dash, a question mark) which isn't an attempt at the question.

   Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).

8. The scoris **comments box** is used by your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**
   If you have any questions or comments for your Team Leader, use the phone, the scoris messaging system, or email.

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. For answers marked by levels of response:
Read through the whole answer from start to finish, using the Level descriptors to help you decide whether it is a strong or weak answer. The indicative scientific content in the Guidance column indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance. Using a 'best-fit' approach based on the skills and science content evidenced within the answer, first decide which set of level descriptors, Level 1, Level 2 or Level 3, best describes the overall quality of the answer. Once the level is located, award the higher or lower mark:

The higher mark should be awarded where the level descriptor has been evidenced and all aspects of the communication statement (in italics) have been met.
The lower mark should be awarded where the level descriptor has been evidenced but aspects of the communication statement (in italics) are missing.

In summary:

The skills and science content determines the level.
The communication statement determines the mark within a level.

11. **Annotations**

Annotation	Meaning
DO NOT ALLOW	Answers which are not worthy of credit
IGNORE	Statements which are irrelevant
ALLOW	Answers that can be accepted
( )	Words which are not essential to gain credit
__	Underlined words must be present in answer to score a mark
ECF	Error carried forward
AW	Alternative wording
ORA	Or reverse argument

12. **Subject-specific Marking Instructions**

INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

The breakdown of Assessment Objectives for GCSE (9–1) in Combined Science A (Gateway Science):

	Assessment Objective
AO1	**Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.**
AO1.1	Demonstrate knowledge and understanding of scientific ideas.
AO1.2	Demonstrate knowledge and understanding of scientific techniques and procedures.
AO2	**Apply knowledge and understanding of scientific ideas and scientific enquiry, techniques and procedures.**
AO2.1	Apply knowledge and understanding of scientific ideas.
AO2.2	Apply knowledge and understanding of scientific enquiry, techniques and procedures.
AO3	**Analyse information and ideas to interpret and evaluate, make judgements and draw conclusions and develop and improve experimental procedures.**
AO3.1	Analyse information and ideas to interpret and evaluate.
AO3.1a	Analyse information and ideas to interpret.
AO3.1b	Analyse information and ideas to evaluate.
AO3.2	Analyse information and ideas to make judgements and draw conclusions.
AO3.2a	Analyse information and ideas to make judgements.
AO3.2b	Analyse information and ideas to draw conclusions.
AO3.3	Analyse information and ideas to develop and improve experimental procedures.
AO3.3a	Analyse information and ideas to develop experimental procedures.
AO3.3b	Analyse information and ideas to improve experimental procedures.

SECTION A

Question	Answer	Marks	AO element	Guidance
1	A	1	1.1	
2	D	1	1.2	
3	D	1	2.1	
4	A	1	2.1	
5	A	1	1.2	
6	C	1	2.1	
7	A	1	2.2	
8	A	1	2.1	
9	C	1	1.1	
10	D	1	1.1	

Question			Answer	Marks	AO element	Guidance
11	(a)		the entire genetic material of an organism (1)	1	1.1	
	(b)		may not want to know / idea that it may be used against the individual (1)	1	2.1	e.g. insurance companies / stop them getting a job
	(c)	(i)	15 (1)	1	2.2	
		(ii)	100 ÷ 2 = 50 the 50th student occurs in the height range 170-174	1 1	3.2a	
	(d)		Genome – idea that they inherit height from parents or height is controlled by genes / DNA / different alleles (1) Environment – idea that diet or disease may affect height (1)	2	2.1	**IGNORE** just height is controlled by genome **IGNORE** just height is controlled by environment
	(e)		idea of survival of those best suited to their environment (1)	1	1.1	**ALLOW** survival of the fittest

Question			Answer	Marks	AO element	Guidance
12	(a)	(i)	bars drawn at 6 (5.1-6.0) and 1 (6.1-7.0) (1)	1	2.2	
	(a)	(ii)	mode for light is at 5.1-6.0 but 8.1-9.0 for shade (1) value of mode is the same / both modes are 6 (1)	2	1.2 2.2	
	(a)	(iii)	**Any one from:** (leaves in shade are larger) because there is *less* light to take in / absorb v (leaves in shade) need to be larger to absorb *more* light (1) **THEN** idea of needing to absorb enough light for photosynthesis (1)	2	3.1a 2.2	
	(b)		to check accuracy / larger sample will more accurately represent the total population (1)	1	3.3a	**ALLOW** so it is easier to identify anomalies
	(c)		collect soil samples from both areas (1) add Universal Indicator solution or paper / use pH paper / use pH probe (1) ideas of comparing values or colours (1)	3	1.2	

SECTION B

Question			Answer	Marks	AO element	Guidance
13	(a)		**Any four from:** use a (sweep) net (1) sweep the net so that it skims the surface of the water/pond (1) sweep the net so that it touches the bottom of the water/pond (1) idea of putting samples collected into different trays (1) sample surface and bottom in different areas of the pond (1)	**4**	**1.2**	
	(b)	**(i)**	matfly nymph **and** damselfly nymph (1)	**1**	**2.2**	Both needed for mark
	(b)	**(ii)**	dragonfly nymph (1) six legs (1) no tail (1)	**3**	**2.2**	

Question			Answer	Marks	AO element	Guidance
14	(a)	(i)	3 (%) (1)	1	2.2	
	(a)	(ii)	11 (1)	1	2.1	**ALLOW** 10 **IGNORE** 10.5
	(b)		eat healthy diet / change diet (1) not smoking (1) eat healthy diet this is the biggest cause of cancer / food we eat can affect the body / being overweight may cause cancer /some foods can protect us from cancer (1) not smoking chemicals or tar in cigarette smoke cause cancer (1)	4	3.1a 3.1a 2.1 2.1	 **IGNORE** references to nicotine
	(c)		Mitosis is cell division (1) Cancer is when cells divide and grow out of control (1)	2	1.1	 Idea that cancer is when mitosis is out of control (2)

Question			Answer	Marks	AO element	Guidance
15*			Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question. **Level 3** **(5–6 marks)** **Analyses the information and gives evidence for and against mistletoe being a parasite, drawing on their wider knowledge of biology (e.g. talking about photosynthesis and transpiration). Clearly understands the concept of parasitism.** *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2** **(3–4 marks)** **Analyses the information and gives evidence either for or against mistletoe being a parasite. Understands parasitism, includes ideas about how mistletoe gains its nutrition.** *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1** **(1–2 marks)** **Uses the information to make a simple statement about how mistletoe gains nutrients.** *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.* **0 marks** *No response or no response worthy of credit.*	**6**	**1 x 3.2a** **2 x 2.1** **3 x 1.1**	**AO3.2a: Judgement as to whether mistletoe is a parasitic or not** • A suitable judgement is made as to the parasitic nature of mistletoe which is backed up by a suitable scientific explanation • How mistletoe collects water from the xylem rather than the soil • This can harm/reduce fitness of the host plant • Mistletoe benefits at expense of host plant • How mistletoe makes its sugars • Has chlorophyll • Can photosynthesise • Mistletoe does not gain the majority of its sugars from the host plant/gets some sugars from the host • Via the phloem **AO2.1: Apply knowledge and understanding of parasitism and give a reason why mistletoe may be considered a parasite** • Takes minerals / water from host • Does not get water / minerals from soil • Removes available water/minerals for plant host • Reduces fitness of host/harms host

Question			Answer	Marks	AO element	Guidance
						• Mistletoe benefits from the association • 'roots' are attached to host • Penetration of host can cause disease **AO1.1: Demonstrate knowledge of parasitism** • A simple definition of parasitism • Harms host • Parasite benefits at expense of host • Reduces biological fitness of host • Adapted to live in host

Question			Answer	Marks	AO element	Guidance
16	(a)		antibodies attach to antigens (on pathogens) (1) idea that antibodies on pathogens help the white blood cells to identify the pathogens (1) white blood cells *engulf* the pathogens (1)	3	1.1	for extra marking points **ALLOW** idea that antibodies are specific to antigens **ALLOW** higher level ideas of white blood cells being memory cells / multiplying quickly
	(b)		1958 or 1965 (1) Big drop in the number of cases / initial drop followed by fewer cases over time (1)	1 1	3.1b 3.2a	**ALLOW** 1965
	(c)	(i)	415 (3)	3	1.1 2.2 2.1	if incorrect then **ALLOW**: πr^2 (1) or identifying radius as 11.5 (1) π x11.5x11.5 (2)
	(c)	(ii)	Correct in that it does have the largest area / clear zone (1) But only correct for the antibiotics tested (1) Idea that results are not valid as very close together or idea that results are not valid because he has only tested them once /not done any repeats (1)	3	3.2b 3.3a 3.3a	**ALLOW** comment on specific bacterial infections / don't know which bacteria were used in this test / may get different results for different bacteria

Summary of updates

Date	Version	Change
May 2018	2	We've reviewed the look and feel of our papers through text, tone, language, images and formatting. For more information please see our assessment principles in our "Exploring our question papers" brochures on our website