OCR
Oxford Cambridge and RSA

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GCSE (9–1)

Combined Science A (Gateway Science)

J250/02: Paper 2 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2019

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

Annotations available in RM Assessor

Annotation	Meaning
	Correct response
	Incorrect response
	Omission mark
BOD	Benefit of doubt given
CON	Contradiction
RE	Rounding error
SF	Error in number of significant figures
ECF	Error carried forward
L1	Level 1
L2	Level 2
L3	Level 3
NBOD	Benefit of doubt not given
SEEN	Noted but no credit given
I	Ignore

Abbreviations, annotations and conventions used in the detailed Mark Scheme (to include abbreviations and subject-specific conventions).

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
✓	Separates marking points
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

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:

	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.

For answers to Section A if an answer box is blank ALLOW correct indication of answer e.g. circled or underlined.

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

Question			Answer	Mark	AO element	Guidance
11	(a)	(i)	length of pea pod ✓	1	2.2	
11	(a)	(ii)	**Any two from:** variety/type/species of pea plant ✓ time of year that the peas/pods are selected / age of pea pod ✓ same conditions/environment the pea plants are grown in ✓	2	2.2	**IGNORE** time unqualified **ALLOW** named example of a condition e.g. light/water/minerals/temperature etc. **IGNORE** same weather
11	(b)	(i)	5 ✓	1	1.2	
11	(b)	(ii)	**FIRST CHECK ANSWER ON ANSWER LINE** **If answer = 10 (mm) award 2 marks** 50 ÷ 5 ✓ =10 (mm) ✓	2	1.2	**ALLOW ECF** from 11(b)(i)
11	(c)		longer/bigger the pod the more seeds / ORA ✓ longer/bigger the pod, the longer the length of pod per seed / ORA ✓	2	3.2b	**ALLOW ECF** from 11(b)(ii) **ALLOW** longer the pod more distance seed has to grow / in larger pods the seeds are more spaced out
11	(d)		have a larger sample ✓	1	2.2	**ALLOW** collect/select pods at random **IGNORE** repeat unqualified

Question			Answer	Mark	AO element	Guidance
11	(e)	(i)	**Any two from:** (sun)light ✓ water / rain ✓ minerals ✓ temperature ✓ carbon dioxide ✓ pH of soil ✓	2	2.1	**IGNORE** sun / sunshine **IGNORE** nutrients / fertility **ALLOW** heat **ALLOW** pollution qualified eg acid rain **IGNORE** biotic factors eg disease / predation / competition **IGNORE** humidity / weather
11	(e)	(ii)	multiple genes involved in skin colour ✓	1	1.1	**ALLOW** references to the environmental effects of sunlight **IGNORE** different climates

Question			Answer	Mark	AO element	Guidance
12	(a)		nucleus ✓	1	2.1	
12	(b)	(i)	prevents the replication of HIV ✓	1	2.1	**ALLOW** references to prevention of new viruses being made **ALLOW** prevents (HIV) genes being copied
12	(b)	(ii)	morally wrong / ethical concerns ✓ might cause changes to human genes ✓	2	2.1	**ALLOW** idea of religious reasons / religious belief / unethical **IGNORE** 'playing God' / unnatural **IGNORE** cause unforeseen issues unless qualified **ALLOW** cause cancer / cause mutations
12	(c)	(i)	the entire genetic material of an organism / complete set of DNA of an organism / all of an organisms genes ✓	1	1.1	**ALLOW** all of the information needed to build and maintain that organism **IGNORE** DNA make-up **ALLOW** species instead of organism
12	(c)	(ii)	**Any two from:** identify if a person has the gene(s) (that are affected by HIV) ✓ identify which gene needs to be deleted/altered ✓ allows treatments/drugs to be developed/produced ✓	2	2.1	 **IGNORE** just identify the gene **ALLOW** idea that the correct drugs/treatments can be chosen/developed **IGNORE** just help with the treatment

Question			Answer	Mark	AO element	Guidance
*12	(d)		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)** Detailed description of how HIV is spread. **AND** Provides a detailed suggestion of how a centre can contribute to reducing the spread. *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)** Description of how HIV is spread. **AND** Provides a suggestion of how a centre can contribute to reducing the spread. *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)** Description of how HIV is spread. **OR** Provides a suggestion of how a centre can contribute to reducing the spread. *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**	**4x 1.1** **2 x 3.1a**	**AO1.1 Demonstrates knowledge and understanding of scientific ideas about how HIV is transmitted** • HIV is virus • transmitted through body fluids • sexual contact / blood to blood transmission / sharing needles / across the placenta **AO3.1a Analyse information and ideas to interpret and evaluate how the centre may reduce the spread of HIV** • identify individuals with HIV and so identify those at risk of passing it on • education of individuals about the cause of HIV / how it is passed on / how to avoid spread • provide free condoms / sterile needles • idea that centre can give treatment to reduce viral load so that it cannot be passed on

Question			Answer	Mark	AO element	Guidance
12	(e)		**Any two from:** make antibodies ✓ engulf the bacteria/pathogens/virus ✓ digests the bacteria/pathogens/virus ✓ produce antitoxins ✓	2	1.1	mark any named type of WBC as just generic WBC eg lymphocytes digest bacteria = 1 mark **ALLOW** phagocytosis **IGNORE** engulf the disease **IGNORE** eats/fights/destroys/kills the pathogen **ALLOW** breakdown the bacteria/pathogens/virus

Question			Answer	Mark	AO element	Guidance
13	(a)		genetic variation/genes/alleles/DNA✓	1	2.1	**IGNORE** idea of environment factors eg diet / physical damage **ALLOW** chromosomes / genotype **DO NOT ALLOW** idea that phenotype determines the characteristic
13	(b)		mutation causes some (male) butterflies to be resistant✓ idea that surviving (male) butterflies mate✓ resistant (male) butterflies can pass on gene/allele for resistance✓ over many generations the number of resistant (male) butterflies will increase ✓	4	1.1 2.1 1.1 2.1	 **ALLOW** reference to the 1% as the surviving butterflies
13	(c)		new discoveries / new evidence is found / increased knowledge ✓ due to new technologies/equipment being developed ✓	2	1.1	**ALLOW** comparison of DNA / detailed cell structure / similarities in DNA/proteins / finding new fossils **ALLOW** developments in microscopy / DNA testing ✓ **IGNORE** methods are improved

Question			Answer	Mark	AO element	Guidance
14	(a)		insulin is being produced / Type 1 doesn't produce insulin ✓ blood glucose is taking a long time to be reduced ✓	2	2.1 3.1a	**ALLOW** insulin level increases **ALLOW** body is resistant to insulin / body is not responding to insulin blood glucose is not being controlled even though insulin is made = 2 marks
14	(b)	(i)	increased body mass or weight / obesity / being overweight ✓	1	3.1a	**ALLOW** being fat
14	(b)	(ii)	go on a diet / reduce sugar/fat in diet / exercise / be more active ✓	1	2.1	**IGNORE** eat healthy food / healthy diet **ALLOW** eat less

Question			Answer	Mark	AO element	Guidance
15	(a)		(sun)light (intensity) / air movement / temperature / rain ✓	1	1.1	**ALLOW** windy conditions **ALLOW** salt concentration/water content of soil **ALLOW** humidity / heat / moisture **IGNORE** Sun / climate change / root length **IGNORE** soil pH / soil type **DO NOT ALLOW** rate of photosynthesis
15	(b)	(i)	photosynthesis ✓	1	1.1	
15	(b)	(ii)	decomposition ✓	1	1.1	
15	(c)	(i)	**For** **Any one from:** idea that there is a rise over the last 20 000 years/recently ✓ levels now are the highest ever (in last 160 000 years) ✓ **Against** **Any one from:** but there have been (big) fluctuations ✓ idea that levels have decreased before ✓ similar levels 120 000 years ago ✓	2	3.1b	**ALLOW** any number in range 0 to 40 000 for 'recently' **ALLOW** comparison that uses correct data e.g. present day there is 345(ppm) 160 000 years ago (only) 200(ppm) **ALLOW** before present day levels were (much) lower **ALLOW** has increased before and decreased **ALLOW** shown variation in past / hasn't increased consistently

Question			Answer	Mark	AO element	Guidance
15	(c)	(ii)	increase in/more carbon/carbon dioxide released/produced (into the atmosphere) ✓ decrease in/less carbon/carbon dioxide removed (from atmosphere) ✓ **BUT** carbon/carbon dioxide is being released/produced (into the atmosphere) faster than it is removed ✓✓	**2**	**3.2a**	**must be comparative, IGNORE** just 'large amounts' / 'lots' **IGNORE** just 'levels of carbon/carbon dioxide have increased' **BUT ALLOW** 'levels of carbon/carbon dioxide going into the atmosphere have increased' **IGNORE** references to ozone **ALLOW** there is more carbon/carbon dioxide being released/produced (into the atmosphere) than removed✓✓
15	(c)	(iii)	**Max. one from:** increased use/burning fossil fuels (releasing CO_2)✓ deforestation / removing plants/trees ✓ **Max. two from:** reduction of biodiversity ✓ species may become extinct/die out✓ due to loss/destruction of habitats ✓	**3**	**1 x 2.1** **2 x 3.1a**	**ALLOW** named fossil fuel **IGNORE** unqualified examples e.g. more cars **ALLOW** species disappear **IGNORE** just 'animals and plants die' **ALLOW** examples of habitat destruction e.g. less Arctic ice
15	(d)		breed the shiny leaved plants that give the highest yields ✓ **OR** breed shiny leaved plants with plants that give high yield ✓ **THEN** choose/grow/clone offspring that have the shiniest leaves and highest yield ✓	**2**	**2.1**	

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