OCR
Oxford Cambridge and RSA

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GCSE (9–1)

Combined Science (Biology) A (Gateway Science)

J250/01: Paper 1 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for November 2020

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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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

Annotation	Meaning
	Correct response
	Incorrect response
	Omission mark
	Benefit of doubt given
	Contradiction
	Rounding error
	Error in number of significant figures
	Error carried forward
	Level 1
	Level 2
	Level 3
	Benefit of doubt not given
	Noted but no credit given
	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			D✓	1	2.2	
2			D✓	1	1.1	
3			B✓	1	2.1	
4			C✓	1	1.1	
5			C✓	1	1.1	
6			A✓	1	1.1	
7			C✓	1	1.1	
8			A✓	1	1.1	
9			C✓	1	2.2	
10			D✓	1	2.2	

BLANK PAGES MUST BE ANNOTATED TO SHOW THEY HAVE BEEN SEEN

Question			Answer	Marks	AO element	Guidance
11	(a)		biconcave✓ nucleus✓ plasma✓	3	3 x 1.1	
	(b)		(**X**) thick(er) (muscle) wall / thick(er) muscle layer / thicker tunica media ✓ small(er) lumen ✓ folded lining / endothelium ✓	2	2 x 2.1	**IF ANSWER IS Y THEN ZERO MARKS** **ALLOW** description of lumen e.g. small(er) passage / hole / centre / space **IGNORE** references to valves / elastic tissues
	(c)	(i)	centre of **X** should be in the space between the left and right ventricle ✓	1	2.1	
	(c)	(ii)	idea of oxygenated and deoxygenated blood mixing ✓ less oxygen transported in the blood (to body) ✓	2	2 x 2.1	

Question			Answer	Marks	AO element	Guidance
12	(a)		**Any two from:** size plant ✓ age plant ✓ type plant ✓ volume of water ✓ length of time ✓	2	2 x 2.2	**IGNORE** size of pot as not specified in method **IGNORE** reference to plastic bag **ALLOW** amount of water **ALLOW** left for 24 hours
	(b)		repeat to find the mean ✓	1	3.1b	
	(c)	(i)	(**dark**) idea that values are closer together ✓	1	3.2a	**IF ANSWER IS LIGHT THEN ZERO MARKS**
	(c)	(ii)	**FIRST CHECK ANSWER ON THE ANSWER LINE** **If answer = 30.7 (g) award 3 marks** 24+32+36 = 92 ✓ 92 ÷ 3 ✓ = 30.7 (1 decimal place) ✓	3	3 x 1.2	**ALLOW** 30.6/30.66667 for 2 marks
	(c)	(ii)	transpiration rate is faster in the light / ora ✓	1	3.2b	
	(d)		use of fan/hair dryer to change air movement ✓	1	3.3a	**IGNORE** put plants outside / in the wind / by window

Question			Answer	Marks	AO element	Guidance
13	(a)	(i)	has a nucleus ✓ has chloroplasts ✓	2	2.1	 **IGNORE** has chlorophyll **ALLOW** reference to membrane bound organelles for one mark if no named organelle stated
	(a)	(ii)	 carbon dioxide ✓ water ✓	2	2 x 1.1	I**GNORE** incorrect formula if correct compound stated **DO NOT ALLOW** incorrect formula if no compound stated
	(b)		increased rate of photosynthesis (in summer) ✓ (due to) higher temperatures ✓ (due to) more hours of light / greater light intensity ✓	3	3 x 2.1	 **ALLOW** warmer **ALLOW** more light

Question			Answer	Marks	AO element	Guidance
14	(a)		**independent**: pH ✓ **dependent**: time (for starch to be digested) ✓	2	2 x 2.2	 **ALLOW** number of seconds before indictor solution stays orange
	(b)	(i)	iodine (solution) ✓	1	1.2	
	(b)	(ii)	blue – black ✓	1	1.2	**Mark independently of (b) (i)** **ALLOW** black-blue / blue/black / black ✓ **IGNORE** blue
	(c)		**MAX 2 marks from improvements** **MAX 2 marks from reasons – reason must be linked to valid improvement for mark to be awarded** **improvement:** use different syringe for each solution ✓ **reason:** prevent contamination ✓ **improvement:** idea of using smaller time intervals ✓ **reason:** obtain more accurate end time ✓ **improvement:** use colorimeter/computer to measure end point ✓ **reason:** obtain more precise results ✓ **improvement:** idea of using pH buffers between 5-9 ✓ **reason:** obtain more accurate results ✓	4	3.3b	**IGNORE** repeat each pH / identify anomalies / reduce error **IGNORE** references to extending pH range

Question	Answer	Marks	AO element	Guidance
*(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 explanation of pattern seen in data, to include ideas about denaturing of enzymes at pH 5 and pH 9. *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)** Attempts an explanation of pattern seen in data. **AND** Shows some knowledge or understanding of enzymes. *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)** Identifies at least one pattern in the results without explanation. **OR** Shows some knowledge or understanding of enzymes. *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**	**3 x 1.1** **3 x 3.1a**	**AO1.1 Demonstrates knowledge and understanding of scientific ideas about enzymes** • idea that amylase denatures above/below pH 7 • idea that active site (of amylase) changes shape above/below pH 7 • optimum pH (for amylase) is (around) pH 7 **AO3.1a Analyse information and ideas to interpret the pattern in the data** • idea that amylase digests starch quickest / works best at (around) pH 7 • idea that amylase slows down in low/high pH • idea that amylase stops digesting starch at pH 3/pH 7 • idea that at pH 5/pH 9 only some of the amylase had denatured

Question			Answer	Marks	AO element	Guidance
15	(a)	(i)	meristem ✓	1	1.1	**IGNORE** shoot tip
	(a)	(ii)	embryonic stem cells can become any cell type in the body / adult stem cells can only become a few different cell types in the body ✓	1	1.1	**ALLOW** embryonic cells can differentiate into any or many cells (adult cannot) **ALLOW** embryonic stem cells are pluripotent / totipotent / adult stem cells are (only) multipotent **IGNORE** references to ethics / lasting longer / more efficient
	(b)	(i)	**FIRST CHECK ANSWER ON THE ANSWER LINE** **If answer = 74 award 3 marks** 11 + 18 = 29 ✓ 254 x 29 ÷100 or 73.66 ✓ = 74 (rounded to nearest whole number) ✓	3 	 2.2 2.2 1.2	 **M1** addition of 11 and 18 or value 29 **M2** answer from M1 x 254 ÷100 **ALLOW** for M2 ecf e.g. 18x254÷100 **M3** answer from M2 rounded to nearest whole number Include ecf e.g. two marks if clear working 18x254÷100=45.72=46 **BUT** 46 with no working = zero **ALLOW** 73 for 2 marks

Question			Answer	Marks	AO element	Guidance
	(b)	(ii)	**Any two from:** human embryos may be destroyed ✓ unknown long-term effects ✓ idea of rejection in patient ✓ ethical reasons / religious reasons ✓	**2**	**2 x 2.1**	 **ALLOW** idea that embryo is a living human **ALLOW** may cause viral infection / stem cells may mutate / stem cells may turn cancerous / possible side effects **IGNORE** might be dangerous **ALLOW** examples of ethical issues 'designer babies' / imbalance of sex of child **IGNORE** 'playing god'

Question			Answer	Marks	AO element	Guidance
16	(a)		messenger ✓ endocrine ✓	2	2 x 1.1	**ALLOW** signal **ALLOW** any named endocrine gland
	(b)	(i)	idea that uterus wall builds up/thickens as oestrogen levels rise / idea that progesterone stays high to maintain thickness of uterus wall / when progesterone levels fall uterus lining will break down/get thinner ✓ correct use of data that links either hormone to its level or affect on the uterus wall ✓	2	2 x 2.1	e.g. oestrogen levels rise/thickens (uterus wall) from day 6/7/8/9 progesterone levels stays high/rises/maintains thickness (uterus wall) from day 14- 25 (**ALLOW** any value in range 14-25) progesterone levels fall from day 23/24/25 or progesterone levels allow (uterus) wall to breaks down from day 23/24/25
	(b)	(ii)	causes the egg to mature / stimulates the production of oestrogen ✓	1	1.1	**ALLOW** causes the ovum to mature **IGNORE** references to follicle/progesterone **IGNORE** produces the egg **DO NOT ALLOW** causes ovule to mature

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