OCR
Oxford Cambridge and RSA

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GCSE (9–1)

Combined Science A (Gateway Science)

J250/05: Paper 5 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for November 2020

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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.

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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.

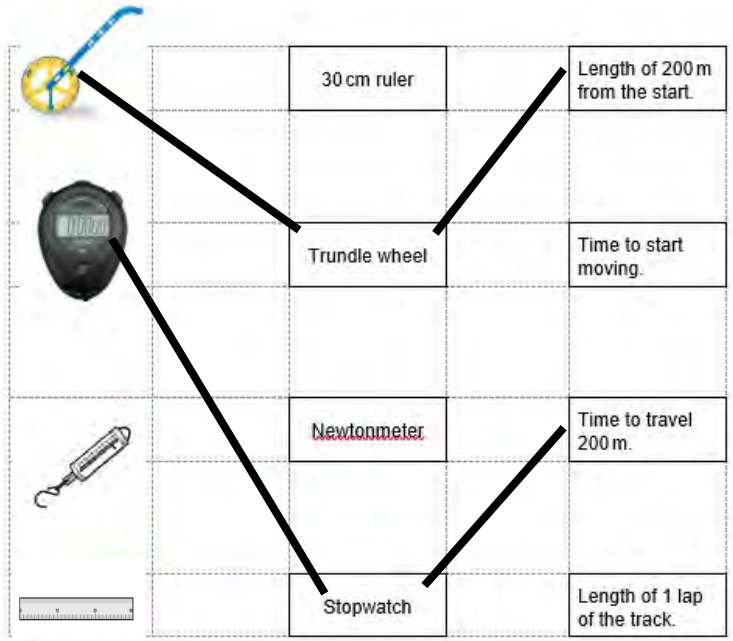
The breakdown of Assessment Objectives for GCSE (9-1) in Combined Science A:

	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	C	1	1.1	
2	C	1	2.1	
3	D	1	1.2	
4	C	1	2.1	
5	B	1	1.1	
6	A	1	1.2	
7	A	1	2.1	
8	B	1	2.1	
9	B	1	1.1	
10	B	1	1.1	

Question			Answer	Marks	AO element	Guidance
11			Faster ✓ Collide ✓ Pressure ✓	3	3 × 2.1	

Question			Answer	Marks	AO element	Guidance
12	(a)			3	3 × 1.2	4 lines correct = ✓✓✓ 3 lines correct = ✓✓ 2 lines correct = ✓ DO NOT ALLOW more than one line to or from a correct picture / name of apparatus / quantity IGNORE lines from or to newtonmeter / ruler
	(b)	(i)	Units omitted in try 3 / AW ✓	1	1.2	ALLOW in try 3 not put time in seconds/s / no s / what it/time is measured in IGNORE mention of decimal places/significant figures
		(ii)	First result should be to 1 dp / AW ✓	1	1.2	IGNORE mention of significant figures

		(iii)	(31 + 31.2) = 31.1 (s) ✓	1	1.2	IGNORE inclusion of try 3 (10.1) when calculating mean
		(iv)	Any one from: Discard anomaly / repeat time 3 ✓ Repeat the time measurements (until they are similar so results are repeatable) ✓ Use light gates / video camera ✓ Make sure stopwatch zeroed ✓	1	3.3b	 ALLOW idea of another person taking measurements / do more sets of readings/times ALLOW idea of controlled conditions e.g. weather conditions
	(c)		FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 5 (m/s) award 3 marks Rearrange equation: (s =) d / t ✓ (s =) 200 / 40 ✓ (s =) 5 (m/s) ✓	3	1.2 2 × 2.1	 ALLOW words or symbols v = s / t

Question			Answer	Marks	AO element	Guidance
13	(a)		A ✓	1	2.1	DO NOT ALLOW more than one box ticked
	(b)		42 (°C) ✓	1	2.2	
	(c)		B ✓	1	2.1	DO NOT ALLOW more than one box ticked
	(d)		Break ✓ Stays the same ✓ Stays the same ✓ Stays the same ✓	4	4 × 2.1	
	(e)	(i)	(20 ÷ 1000) = 0.02 (kg) ✓	1	1.2	
		(ii)	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 897 (J) award 2 marks Selection of (no mark): Thermal energy for a change in state = Mass × specific latent heat capacity (E =) 0.01 × 89700 ✓ (E =) 897 (J) ✓	2	2 × 2.1	

Question			Answer	Marks	AO element	Guidance
14	(a)		Using friction / rubbing (with a duster or cloth) / AW ✓	1	1.2	IGNORE any explanation e.g. mention of positive electrons / protons moving
	(b)		Electrons / negative charges move ✓ (Electrons move) <u>from</u> the rod ✓	2	1.1 2.2	ALLOW clear indication on the diagram that the minus signs leave the rod for two marks ALLOW electrons are lost (from the rod) ✓✓ DO NOT ALLOW any marks for an indication that protons/positive signs/positive electrons move or disappear
	(c)		Opposite charges attract ✓ 2nd rod must be negative / – ✓	2	2 × 1.2	ALLOW positive (charges) and negative (charges) attract / + and – attract ALLOW negative signs indicated on left rod

Question			Answer	Marks	AO element	Guidance
15	(a)		A_1 = 1(.0) (A) ✓ A_3 = 0.5 (A) ✓	2	2 × 2.2	ALLOW 1000 (A) and 500 (A) for one mark maximum (incorrect conversion of mA to A)
	(b)		FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 10 (C) award 2 marks (Q =) 0.5 × 20 ✓ (Q =) 10 (C) ✓	2	2 × 2.1	

Question			Answer	Marks	AO element	Guidance
16	*		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) Describes the properties of A and B using knowledge of elastic and plastic deformation. AND Describes the properties of A and B using knowledge of Hooke's Law. AND Describes how the graphs show different stiffness of A and B. *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) Describes the properties of A and B using knowledge of elastic and plastic deformation. AND Describes the properties of A and B using knowledge of Hooke's Law. OR Describes the properties of A and B using knowledge of elastic and plastic deformation. AND Describes how the graphs show different stiffness of A and B. OR	6	4 × 1.2 2 × 3.2b	AO3.2b Analyses information and ideas to draw conclusions about properties of each spring • A is stiffer / higher spring constant / doesn't extend/stretch as much (for the same force) • as more force needed for same extension • B is more flexible / less stiff / lower spring constant / extends/stretches more (for the same force) • as less force needed for same extension AO1.2 Demonstrates knowledge of linear and non-linear relationships between force and extension. • As force increases, extension increases • Linear relationship (between F and x) for A • F proportional to x for A • F proportional to x for B at the start / up to elastic limit / up to limit of proportionality • Non-linear relationship for B • A obeys Hooke's law • B obeys Hooke's law at the start / up to elastic limit / limit of proportionality • B doesn't obey Hooke's law at the end / after the elastic limit / after limit of proportionality AO1.2 Demonstrates knowledge of elastic and plastic deformation • A shows elastic behaviour • A has the same shape / not overstretched (when force removed) • B shows plastic behaviour • B has a different shape / overstretched (when force is removed)

Question			Answer	Marks	AO element	Guidance
			Describes the properties of A and B using knowledge of Hooke's Law. AND Describes how the graphs show different stiffness of A and B. *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) Describes the properties of A and B using knowledge of elastic and plastic deformation. OR Describes the properties of A and B using knowledge of Hooke's Law. OR Describes how the graphs show different stiffness of A and B. *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.*			

Question			Answer	Marks	AO element	Guidance
17	(a)		Any two from: Strength of field ✓ Magnitude of force ✓ Direction of field or force ✓ Position of poles ✓	2	2 × 1.1	ALLOW strongest close to magnet/poles / ORA IGNORE just north is strongest / just south is strongest ALLOW stronger forces where the field lines are closer / ORA ALLOW (field or force goes) north to south / (field or force) into south / (field or force) out of north / (field or force) starts from north ALLOW north at one end and south at other end / where (the position) of north and south are IGNORE references to opposites attract / same poles repel
	(b)		(idea that when tested using a permanent magnet) Permanent magnet as there is repulsion because like poles repel ✓ Copper as no attraction (or repulsion) because it is not magnetic ✓ Iron as attraction (only) because iron is magnetic ✓	3	3 × 3.3a	If no mark awarded ALLOW max 1 mark for correct description without explanations for all three blocks ALLOW copper as no attraction (or repulsion) because it is not affected by magnets Ignore induction / stick (for attract)

	(c)	(i)	As distance increases, dip angle decreases / ORA ✓ As the distance increases, dip angle decreases at an increasing rate / ORA✓	2	2 × 3.1a	ALLOW inverse relationship IGNORE negative correlation ALLOW not linear / not proportional / change is more gradual / slower near pole / ORA ALLOW comparison of two data points For 1 mark only ALLOW inversely proportional
		(ii)	72 (°) ✓	1	2.2	ALLOW 72 (°) + or - 2
		(iii)	Any one from: Not accurate AND value not (close enough to) 66° ✓ Accurate AND value close to 66° ✓	1	3.2a	ALLOW ecf from cii ALLOW description in form of a calculation e.g. 72 – 3 = 69 not 66 ALLOW Not accurate AND because it is too different/more than 3° different ALLOW Accurate AND only slightly different/less than 3° different
		(iv)	Earth's core is magnetic / the direction of Earth's magnetic field / the Earth has a magnetic field AW ✓	1	3.2b	ALLOW Earth has a magnetic force / has magnetic poles / Earth is magnetic
	(d)		Any two from: Both students or both statements are incorrect ✓ (As distance doubles,) field strength halves or is multiplied by 0.5 / ORA ✓ Use of values from graph showing inversely proportional relationship or showing field strength is not multiplied by 0.25 or 0.75 ✓	2	2 × 3.1b	 ALLOW inversely proportional ALLOW use of any 2 suitable values to show inversely proportional relationship or that field strength is not multiplied by 0.25 or 0.75, e.g. (0.01, 4) to (0.02,2) or (0.02,2) to (0.04,1) etc.

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