OCR
Oxford Cambridge and RSA

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…day June 20XX – Morning/Afternoon

GCSE (9–1) Physics B (Twenty First Century Science)
J259/01 Breadth in physics (Foundation Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 45 minutes

MAXIMUM MARK 90

This document consists of 20 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. **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

11. **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.

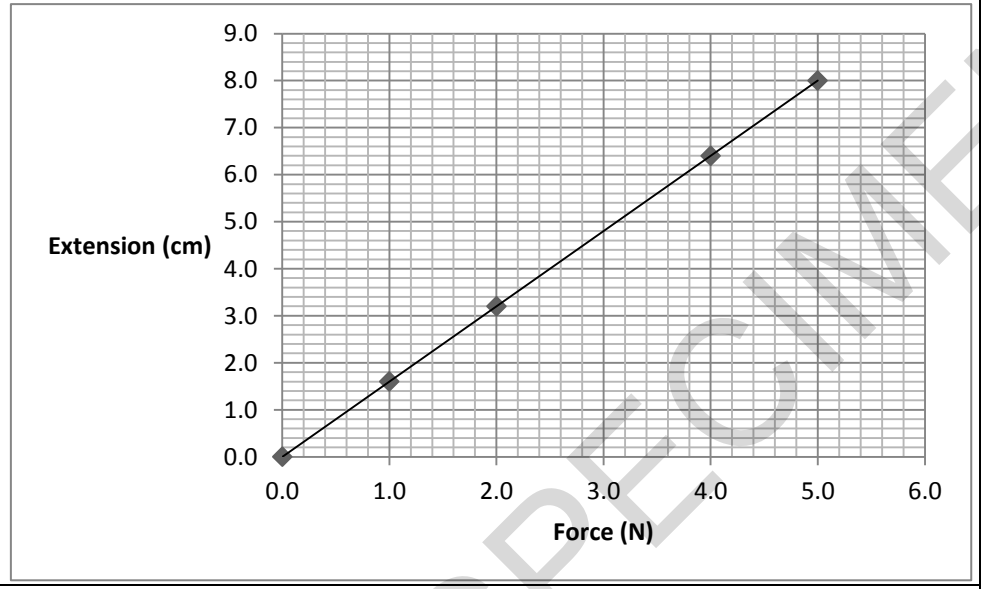
You should ensure that you have copies of these materials.

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 Physics B:

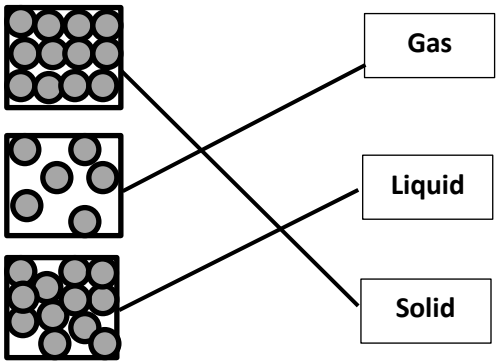
	Assessment Objective
AO1	**Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.**
AO1.1	Demonstrate knowledge and understanding of scientific ideas.
AO1.2	Demonstrate knowledge and understanding of scientific techniques and procedures.
AO2	**Apply knowledge 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.

Question			Answer	Marks	AO element	Guidance
1	(a)		Not to hang too much weight so not to break spring / careful with dropping masses ✓	1	3.3a	**ALLOW** any sensible suggestion for safety precaution
	(b)		6.0 (cm) circled ✓	1	3.1a	
	(c)		Marks correctly plotted ✓✓ Correct best fit line ✓  	3	2 x 2.2 1.2	If outlier plotted give 2 marks only. **ALLOW** ECF from (b)
	(d)		**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 62.5 (N/m) award 4 marks** Re-arrange equation to give spring constant = force ÷ extension ✓ Use the table to find extension at 4N = 6.4 cm ✓ Convert cm into m = 0.064m ✓ 4N ÷ 0.064 m = 62.5 (N/m) ✓	4	 1.2 2.1 1.2 2.1	**ALLOW** any other pair of numbers from table / graph that gives same answer

Question			Answer	Marks	AO element	Guidance
2	(a)		Its power rating ✓ How long it is used ✓	2	2.1	
	(b)	(i)	Bulb B produces 10 J by heating for every 100 J of energy transferred by the electric current ✓ Both bulbs transfer more energy by lighting than heating ✓	2	3.1a	
		(ii)	**FIRST CHECK THE ANSWER ON ANSWER LINE.** **If answer = 85(%) award 3 marks** Recall: efficiency = useful energy transferred ÷ total energy transferred ✓ 170 J / 200 J = 0.85 ✓ = 85(%) ✓	3 1 1 1	 1.1 2.1 2.1	correct substitution gains first 2 marks (if equation is missing)

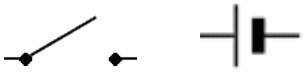
Question			Answer	Marks	AO element	Guidance
3	(a)	(i)	B ✓	1	1.1	
		(ii)	A ✓	1	1.1	
	(b)	(i)	14 ✓	1	2.2	
		(ii)	Student A's data is more repeatable / shows less scatter ✓ Data is more accurate / precise as lighter paper clips used ✓	2	3.1b 3.2b	**ORA** **DO NOT ALLOW** 'less range'; **ALLOW** 'repeats show less range'. **ORA**

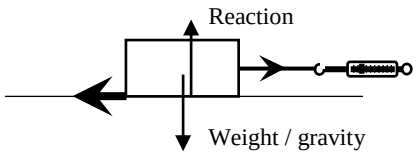
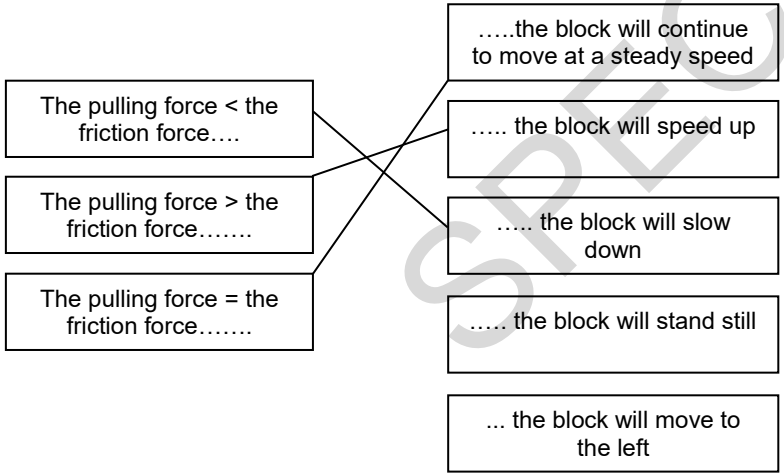
Question			Answer	Marks	AO element	Guidance
4	(a)	(i)	Sound ✓	1	1.1	
		(ii)	X-rays ✓	1	1.1	

Question			Answer	Marks	AO element	Guidance
5	(a)		Distance from A to C ✓ Time taken for sound to reach C (between flash and sound being picked up) ✓	2	1.1	Unqualified 'distance' and 'time' = 1 mark only
	(b)		Light travels faster than sound	1	1.1	**ALLOW** reverse argument
	(c)	(i)		2	1.1	1 correct 1 mark 2/3 correct 2 marks
		(ii)	In water (liquids) the particles are closer together…..✓ ….makes it easier for vibrations to be transmitted ✓	2	1.2	Must be comparative e.g. less separation Must be comparative e.g. more easily

Question			Answer	Marks	AO element	Guidance
6	(a)	(i)	Nucleus ✓ Protons/neutrons ✓ Neutrons/protons ✓ Positive ✓	4	1.1	**DO NOT ALLOW** PROTON or NEUTRONS written twice
	(b)		Different (nuclear) mass / Different number of neutrons ✓	1	1.1	**ALLOW** 'different mass number'
	(c)		**FIRST CHECK THE ANSWER ON ANSWER LINE.** **If answer = 3000 award 2 marks** 600 000 x (5 ÷ 1000) ✓ = 3000 ✓	2	2.2	

Question			Answer	Marks	AO element	Guidance
7	(a)		A renewable energy resource will not run out / is not finite ✓	1	1.1	**ORA** **DO NOT ALLOW** 'can be used again'
	(b)		2.7 (kW) ✓	1	3.1a	**ALLOW** answers between 2.6 and 2.8
	(c)	(i)	230 v ✓ 50 Hz ✓	2	1.1	Mark voltage and frequency responses independently
		(ii)	Transformer ✓	1	1.1	**IGNORE** references to step up / down
	(d)		(Choice clearly stated.) Comparative comments made regarding: Efficiency ✓ Cost ✓ Environmental ✓ Consistent with the choice made.	3	3.1b	Answers must only be based on the information in the table Answers where no clear choice is made but the candidate has made a valid comparative comment can score a maximum of 1 mark The environmental mark can be awarded if the candidate has either acknowledged concerns regarding the environmental problem or suggested a means for mitigating the environmental problem e.g. careful management of nuclear waste etc. **ALLOW** gas has 38% efficiency to imply most efficient **ALLOW** nuclear costs 2 to 2.5 p per kWh to imply cheapest
	(e)		Wind / water / wave / hydroelectric / tidal / solar / geothermal ✓	1	1.1	**DO NOT ALLOW** nuclear or biomass. **ALLOW** gas turbine

Question			Answer	Marks	AO element	Guidance
8	(a)	(i)	Correct symbols for battery/single cell **and** switch. ✓ 	1	1.2	At least one of them must be correctly labelled
		(ii)	**FIRST CHECK THE ANSWER ON ANSWER LINE.** **If answer = 15 (C) award 3 marks** Recall: Charge = current x time; ✓ = 0.5 mins = 30 secs ✓ = 0.5 x 30 = 15 (C) ✓	3	 1.1 2.1 2.1	Correct substitution gains first 2 marks (if equation is missing)
		(iii)	**FIRST CHECK THE ANSWER ON ANSWER LINE.** **If answer = 2.4 (Ω) award 3 marks** Recall: Resistance = voltage ÷ current ✓ = 1.20 ÷ 0.50 ✓ = 2.4 (Ω) ✓	3	 1.1 2.1 2.1	Correct substitution gains first 2 marks (if equation is missing)

Question			Answer	Marks	AO element	Guidance
9	(a)	(i)	Downward arrow drawn and labelled; ✓  Upward arrow of **same length** drawn and labelled ✓	**2**	**1.2**	'Length' judged by eye 'Start point' for arrows can be anywhere near *central area* of the block (otherwise 1 mark max)
		(ii)	**FIRST CHECK THE ANSWER ON ANSWER LINE.** **If answer = 1.2 (J) award 3 marks** Convert cm into m 30 cm = 0.30 m✓ Work done = 4 N x 0.30 m ✓ =1.2 J ✓	**3**	**2.1**	
		(iii)	 	**3**	**1.1**	1 mark per correct line drawn

Question			Answer	Marks	AO element	Guidance
10	(a)		**FIRST CHECK ANSWER ON ANSWER LINE. If answer = A and C award 2 marks** A and C ✓ Calculations applying equation: ✓ work done = force x distance shown A = 20 J B = 30 J C = 20 J D = 14 J	**2**	**3.2b** **2.1**	
	(b)		Q wastes 40 J and R wastes 80 J ✓ Q is 95% efficient and R is 96% efficient ✓	**2**	**3.1b** **2.1**	**ALLOW** R is 1% more efficient (1)
	(c)		**FIRST CHECK ANSWER ON ANSWER LINE. If answer = 4 W award 3 marks** Use of: power = energy / time: Input power = 2000/20 = 100 W ✓ Output power = 1920/20 = 96 W ✓ Difference: 100 – 96 = 4W ✓	**3**	 **2.1** **2.1** **1.2**	

Question			Answer	Marks	AO element	Guidance
11	(a)	(i)	Density = mass ÷ volume ✓	1	1.1	
		(ii)	**FIRST CHECK ANSWER ON ANSWER LINE.** **If answer = 1.3 (kg / m^3) award 2 marks.** 3.9 ÷ 3.0 ✓ = 1.3 (kg / m^3) ✓	2	2.1	
	(b)		She is correct: Density of solid > density of liquid → solid sinks ✓ Quotes data from the table in support of claim ✓	2	1.1 3.2b	(No mark for just stating Georgina is correct) **ALLOW** Rubber greater density than both liquids so does not float **ORA** **ALLOW** wood density 0.85 floats in maple syrup > density of 1.37 but sinks in baby oil < density of 0.80.
	(c)		D ✓	1	1.1	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>12</td><td>(a)</td><td></td><td>
<table>
<tr><th></th><th>True</th><th>False</th></tr>
<tr><td>It is a vector quantity</td><td>✓</td><td></td></tr>
<tr><td>The force acts in the same direction as the ball…..</td><td></td><td>✓</td></tr>
<tr><td>The force equals 1000 N</td><td>✓</td><td></td></tr>
<tr><td>The force depends upon the weight of the ball</td><td></td><td>✓</td></tr>
</table>
</td><td>2</td><td>2.2</td><td>4 correct = 2 marks
2 or 3 correct = 1 mark
1 or 0 correct = 0 marks</td></tr>
<tr><td></td><td>(b)</td><td></td><td>FIRST CHECK THE ANSWER ON ANSWER LINE.
If answer = 78.03 (J) award 3 marks

Recall: Kinetic Energy: 0.5 x mass x velocity^2 ✓

= 0.5 x 0.06 x 51^2 ✓

= 78.03 (J) ✓</td><td>3</td><td>

1.1

2.1

2.1</td><td>Correct substitution gains first 2 marks (if equation is missing)

ALLOW 78 (J) for 3 marks</td></tr>
<tr><td></td><td>(c)</td><td></td><td>FIRST CHECK THE ANSWER ON ANSWER LINE.
If answer = 0.6 (N) award 3 marks

Recall: Weight (N) = mass (kg) x gravitational field strength (N / kg) ✓
= 0.06 kg x 10 N / kg ✓
= 0.6 (N) ✓</td><td>3</td><td>

1.1
2.1
2.1</td><td>Correct substitution gains first 2 marks (if equation is missing)</td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
13	(a)	(i)	B ✓	1	3.2a	
		(ii)	C ✓	1	3.2a	
	(b)		**FIRST CHECK THE ANSWER ON ANSWER LINE.** **If answer = 1.88 (m/s) award 3 marks** Converts cm into m = 150 cm = 1.5 m ✓ 1.5 m ÷ 0.8 s ✓ = 1.88 (m/s) ✓	3	1.1 2.1 2.1	
	(c)		The speed of an object does not give indication of a direction. ✓ The velocity of an object at a given moment is its speed, together with an indication of its direction. ✓ Velocity is a vector and speed is a scalar ✓	3	1.1	

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