OCR
Oxford Cambridge and RSA

Higher

GCSE

Combined Science B Twenty First Century Science

J260/07: Physics (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 2022

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.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

© OCR 2022

MARKING INSTRUCTIONS

PREPARATION FOR MARKING

RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM 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 available in RM Assessor.
3. Log-in to RM Assessor and mark the **required number** of practice responses ("scripts") and the **required number** of standardisation responses.

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 RM Assessor 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 RM Assessor messaging system.

5. **Crossed Out Responses**
Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

Rubric Error Responses – Optional Questions
Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM assessor, which will select the highest mark from those awarded. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

Multiple Choice Question Responses
When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).
When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses
When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only **one mark per response**)
Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth **two or more marks**)
If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response)
Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

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. Award No Response (NR) if:
   - there is nothing written in the answer space.

   Award Zero '0' if:
   - anything is written in the answer space and is not worthy of credit (this includes text and symbols).

   Team Leaders must confirm the correct use of the NR button with their markers before live marking commences and should check this when reviewing scripts.

8. The RM Assessor **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 RM Assessor 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.

Level of response question on this paper is 1d

11. 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

12. 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

13. **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 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)		Transmitting power at higher voltages is more efficient ✓	1	2.1	tick in 4th box
	(b)		The walls transfer energy / heat (at a) slower (rate) ✓	1	2.1	**ALLOW** Less energy transferred over a specific time
	(c)		Idea that Renewable resources are replaced all the time (so they will not be used up) **OR** non-renewable resources (are being used faster than they are formed) eventually (they) will all be used up. ✓	1	1.1	**ALLOW** non-renewable resources are finite/will run out ORA **ALLOW** renewables can be replaced / made again **ALLOW** non-renewables take a very long time to replace **IGNORE** renewables can be re-used / used again ORA

Question			Answer	Marks	AO element	Guidance
1	(d)*		Please refer to the marking instructions on page 5 of this mark scheme for guidance on how to mark this question. **Level 3 (5–6 marks)** Detailed explanation of how energy resource use has changed, using numerical data from the graph linked to at least two resources *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)** Basic explanation of how energy resource use has changed with some reference to the graph, explanation may contain some errors. *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)** Basic description of how energy resource use changed **OR** Basic isolated facts about resources *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**	**2 x 2.1** **4 x 3.1a**	**AO3.1a Analyse information and ideas to interpret.** • Wind and Solar increased • Coal decreased (overall) • Natural gas stayed about the same overall / only increased slightly • Much greater increase in wind and solar in later years • Natural gas increased from 1998 to 2008, then decreased to 2012 (then increased again) • Coal remained constant until 2008, then increased, before decreasing in 2012 **AO2.1 Apply knowledge and understanding of scientific ideas.** • Wind and solar do not release greenhouse gases • Increased use of wind and solar / decreased use of coal and gas reduces greenhouse gas emissions • Government drive to combat climate change • More gas used after 2012 to meet demand from reduced use of coal • Wind and solar are renewable resources • Fossil fuels cause acid rain • Coal and gas are fossil fuels and will eventually run out

Question			Answer	Marks	AO element	Guidance
2	(a)		(C) B E G F D A B before E E before G G before F F before D D before A ✓✓✓	3	1.2	Before means anywhere to the left All 5 correct = 3 marks 4 correct = 2 marks 2 correct = 1 mark
	(b)		**Any two from:** Draw around the glass block (to ensure it doesn't move) ✓ Mark multiple crosses/points along the ray of light✓ Make sure the room is dark / reduce external light / use brighter lamp✓ Use a thin ray of light✓ Use large protractor✓ Use sharp pencil / draw a thin line✓ Use a ruler to draw ray lines✓	2	3.3a	**IGNORE** repeats
	(c)	(i)	Points plotted correctly ✓ ✓	2	1.2	**ALLOW** range (± 1 small square) All points correct = 2 marks Three points correct = 1 mark
		(ii)	(50, 41) circled on the graph ✓	1	3.1a	**ALLOW** ECF for incorrect plotting of point 50, 41
		(iii)	Curve drawn through points ✓	1	2.2	**DO NOT ALLOW** straight line. **ALLOW** straight line for first three points followed by a curve
		(iv)	Positive correlation ✓	1	3.2b	**ALLOW** as angle of incidence increases, angle of refraction increases **ALLOW** as one increases the other increases **DO NOT ALLOW** proportional

Question			Answer	Marks	AO element	Guidance
3	(a)		The amplitude of the wave is **X**. ✓ The wave travels but the water does not. ✓	2	1.1	tick in 1st and 3rd boxes If 3 ticks - 1 mark can be scored for 2 correct ticks If 4 or 5 ticks no marks
	(b)		**Any two from:** Water has a different (optical) density compared to air / water has a higher (optical) density than air ✓ speed of light is different in air and water / speed faster in air / slower in water ✓ wavelength changes/wavelength increased in air/wavelength decreased in water (because frequency constant) ✓	2	1.1	**IGNORE** different medium Maximum of 1 mark for reference to change in frequency ECF for incorrect change in density/speed followed by correct consequential change in speed/wavelength Eg – speed slower in air so wavelength decreases = 1 mark

Question			Answer	Marks	AO element	Guidance
4	(a)		1.2 W ✓ (The power transferred is) the amount of energy transferred per second /in 1 second **OR** Power = Energy (transferred) ÷ time ✓	**2**	**1.1**	
	(b)		Ammeter connected in series ✓ Voltmeter connected across the resistor / battery ✓	**2**	**1.2**	Candidates must have correct symbols for each device and complete circuit **IGNORE** other extra symbols / minor gaps **DO NOT ALLOW** continuous line through voltmeter
	(c)	(i)	The current through **Y** is 0.9 A (compared to 0.1 A through **X**) ✓✓ the potential difference (across both resistors) is the same ✓	**3**	**2.1**	**ALLOW** The current through **Y** is larger (than through **X**) for 1 mark **IGNORE** faster flow of current **ALLOW** use of $R = V/I$ to show smaller R with larger I ORA **ALLOW** R_y=13.3Ω and R_x=120Ω for 3 marks
		(ii)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 13 Ω award 5 marks** Calculate current 1.0 - 0.1 = 0.9 (A) ✓ substitute: 12 = 0.9 × resistance ✓ R = 13.33 ✓ R = 13 ✓ Ω / ohms ✓	**5**	**2.1 x 3** **1.2** **1.1**	**ALLOW** substitution mark for incorrect current substituted into correct equation Any number of sf >1 Answer given to 2sf - allow this mark for an incorrect numerical answer to 2sf.

Question			Answer	Marks	AO element	Guidance
	(d)		Current through X is (directly) proportional to total current ✓ **OR** Description of use of y-axis to determine total current ✓	1	3.3a	**ALLOW** related by a constant **ALLOW** linear relationship **ALLOW** multiply scale reading by 10 **ALLOW** 2 or more values from graph used to compare

Question			Answer	Marks	AO element	Guidance
5			All objects emit radiation/the bar emits radiation when it is cold (but it is not in the visible range) ✓ The wavelengths emitted depend on the temperature (not the time) / higher temperature will emit shorter wavelength ORA ✓	2	1.1	**ALLOW** It emits visible radiation when it gets hotter **ALLOW** explanations in terms of frequency **IGNORE** wavelength emitted not dependent on time **ALLOW** Red wavelengths are still emitted (at higher temperatures) but higher intensity (orange and yellow) wavelengths are emitted (at higher temperatures) AW/the distribution of wavelengths changes when temperature changes = 2 marks

Question			Answer	Marks	AO element	Guidance
6	(a)		 Arrow vertically downward by eye labelled weight ✓ Arrow vertically upward by eye labelled tension ✓ Vertical arrows equal in length by eye and in opposite direction ✓	3	2.2	**ALLOW** for weight: gravitational force, *W, mg, Mg*, mass × gravitational field strength **ALLOW** for tension**:** *T***,** force from rope/helicopter, pull from rope **NOT** e.g. upthrust, reaction, air resistance, drag, lift **IGNORE** horizontal forces / arrows Maximum of 2 marks if at least one arrow does not originate at the dot Eg – both arrows labelled correctly and equal in length but disconnected from dot = 2 marks
	(b)	(i)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 9 660 000 000 (N) award 4 marks** Substitute: 1000 = mass ÷ 966 000 ✓ Rearrange: mass = 966 000 × 1000 (= 966 000 000 kg) ✓ Use of: weight = mass × gravitational field strength (Weight = 966 000 000 × 10) ✓ Evaluate: weight= = 9 660 000 000 (N) ✓	4	**2.1 x 2** **1.2** **2.1**	mass = 966 000 000 (kg) **ALLOW** use of w = mg using incorrect mass **ALLOW** 9.66×10^9 (N) Or 9.7×10^9 (N) or any other correct powers of 10 e.g. 966×10^7 (N) **DO NOT ALLOW** any other incorrect powers of 10

Question			Answer	Marks	AO element	Guidance
		(ii)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 1.7×10^9 (J) award 3 marks** Substitute: Work done = 9 660 000 000 × 4.1 ✓ by one pump = (9 660 000 000 × 4.1) ÷ 23 ✓ Work done by one pump = 1 722 000 000 (J) ✓	3	2.1	**ALLOW ECF** from **(bi)** 3.9606×10^{10} **ALLOW** answers with 2 or more significant figures **ALLOW** 1.722 to any power of 10 for 2 marks

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>7</td><td>(a)</td><td></td><td>Alpha stopped by paper, thin aluminium and thick lead ✓</td><td>1</td><td>1.1</td><td>IGNORE extra ticks on other rows
<table><tr><td>✓</td><td>✓</td><td>✓</td></tr><tr><td></td><td>(✓)</td><td>(✓)</td></tr><tr><td></td><td></td><td>(✓)</td></tr></table></td></tr>
<tr><td></td><td>(b)</td><td></td><td>beta and gamma ✓

no alpha because radiation is not reduced by paper
OR
Both beta and gamma will pass through paper (so no reduction in count rate)
✓

Beta emitted because thin aluminium reduces the radiation
OR
Gamma emitted because thick lead reduces radiation
✓

thin aluminium reduces the radiation / count rate because (most) beta is absorbed but gamma passes through ✓</td><td>4</td><td>3.1b

3.2a x 3</td><td>IGNORE alpha for this mark

ALLOW not alpha as alpha absorbed by paper</td></tr>
</table>

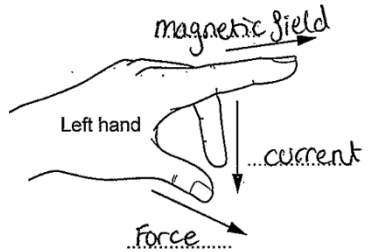
Question			Answer	Marks	AO element	Guidance
8	(a)		they move faster/kinetic energy increases/ momentum increases ✓ they collide more often (with the walls / with each other) ✓	2	1.1	**DO NOT ALLOW** vibrate more **IGNORE** increased movement **ALLOW** more frequent collisions/increased rate of collisions **IGNORE** more collisions unless given with reference to time
	(b)		(pressure) increases ✓ greater (change in) momentum (per molecule) ✓ increased rate of change of momentum (when molecules hit walls of container more often) ✓ (these cause a) greater force on (the wall of) the container ✓	4	1.1	 **ALLOW** explanation of F = (mv-mu)/t for 3rd and 4th marking point
	(c)	(i)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 9.1 (kg) award 4 marks** Change in temperature = 20 - [-183] = 203 ✓ 1.7 MJ = 1 700 000 J ✓ Select and apply: change in internal energy = mass × SHC × change in temperature 1 700 000 = mass × 920 × 203 ✓ mass = 9.1 (kg) ✓	4	 2.1 1.2 2.1 x 2	 **ALLOW** correct conversion seen at any point **ALLOW** this mark if an incorrect temperature change is calculated - but not if 20 or (-)183 substituted **ALLOW** this mark with 1.7 to any power of 10 **ALLOW** answers to more than 2sf that round to 9.1 (kg) **ALLOW** 9.1 to any other power of 10 = 3 marks **ALLOW** ECF for incorrect temperature change used

Question			Answer	Marks	AO element	Guidance
		(ii)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer rounds to 1 900 000 (J) or 1900 kJ award 3 marks** 213 kJ/kg = 213 000 J/kg ✓ Select and apply: change in internal energy = mass × SLH = 9.1 × 213000 ✓ change in energy = 1 900 000 (J) ✓	**3**	**1.2** **2.1 x 2**	**ALLOW ECF** for mass from **(c)(i)** **ALLOW** mass to 2sf or more from **(c)(i)** **ALLOW** if 213 000 seen **ALLOW** select and apply mark with 213 to any power of 10 **ALLOW** 1.9 to any power of 10 = 2 marks **ALLOW** answers to more than 2sf that round to these values.

Question			Answer	Marks	AO element	Guidance
9	(a)		(nuclei with) same proton number/number of protons same atomic number ✓ (nuclei with) different mass number /number of neutrons✓	2	1.1	**IGNORE** electrons
	(b)		Mass number (top) = 230 **AND** Proton number (bottom) = 90 ✓ Correct symbol for alpha particle: $^{4}_{2}\mathrm{He}$ ✓	2	2.2 1.1	**ALLOW ECF** for incorrect alpha particle **ALLOW** symbol α
	(c)		**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 2.45 (±0.05) × 10^5 (years) OR** **245 000 (±5 000) (years) award 3 marks** Evidence of 6400 divided by 2, 4 or 8 used on graph or in text ✓ Evidence of time for 1, 2 or 3 half-lives on graph or in text ✓ half-life = 2.45 (±0.05) × 10^5 (years) **OR** 245 000 (±5 000) (years) ✓	3	2.2	**ALLOW** ± half a small square e.g horizontal line on graph or count rate of 3 200, 1,600 or 800 used (± 0.5 square). **ALLOW** evidence of different starting count rate divided by 2, 4 or 8 e.g – horizontal line at 5000 and another horizontal line at 2500 e.g. vertical line or time of 2.45, 4.9 or 7.35 (± 0.5 square) **ALLOW** 2.45 = 2 marks (omission of power on axis)
	(d)	(i)	Idea that all the uranium has decayed	1	3.1a	

Question			Answer	Marks	AO element	Guidance
			(so no way of telling how much more time has passed) **OR** (after 10 half-lives) radiation from U234 is too small/similar to/below background levels (so difficult to measure) **OR** (after 10 half-lives) the change in count rate will be small (over time) ✓			**ALLOW** count rate zero / close to zero
		(ii)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 4.9 (±0.1) × 10^5 (years) OR 490 000(±10 000) (years) award 3 marks** (75% decayed = 25% left) so 2 half-lives have passed ✓ 2 half-lives = 2 × 2.45 × 10^5 (years) **OR** 2 × 245 000 (years) ✓ Time = 4.9 × 10^5 (years) **OR** 490 000 (years) ✓ **OR** Use of initial value of count rate on graph = 6400 to calculate 6400 - 75% of 6400 = 1600 counts/s ✓ Time when count rate = 1600 counts/s = 4.9 (× 10^5 years) ✓ Time = 4.9 × 10^5 (years) **OR** 490 000 (years) ✓	**3**	**2.1**	**ALLOW ECF** for use of half-life calculated in **(c)** **ALLOW** 2 half-lives read from graph with ± 0.5 square (e.g. 4.9 ± 1.0 × 10^5 years when count rate 1600 counts/s) A**LLOW** 4.9 = 2 marks (omission of power on axis) unless ECF from **(c)**

Question			Answer	Marks	AO element	Guidance
10	(a)		**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 0.41 (kg m/s^2) award 4 marks**	**4**		**ALLOW** any number of s.f > or = 2 for intermediate calculations throughout
			Recall momentum = mass × velocity ✓		**1.2**	
			Substitute: mom^m = 0.82 × 1.9 (= 1.558) ✓		**2.1 x 3**	
			Subst: rate of change of mom^m = $\frac{[1.558 - 0]}{3.8}$ ✓			**ALLOW** change in momentum = 1.558 (i.e. no 0)
			rate of change of mom^m = 0.41 (kg m/s^2) ✓			**ALLOW** any s.f. > OR = 2 **ALLOW** 0.42 caused by rounding using 1.6
	(b)		**FIRST CHECK THE ANSWERS ON ANSWER LINE** **If answer Force = 0.41 (N) award 3 marks**	**3**		**ALLOW ECF from (a)** only if clearly using F = $\Delta p/\Delta t$
			Recall: Force = mass x acceleration ✓		**1.2**	
			Substitute: force = 0.82 × 0.5 ✓		**2.1 x 2**	
			force = 0.41 (N) ✓			
	(c)		(the same)	**1**	**1.1**	no mark for 'the same' - mark is for explanation
			because force = rate of change of momentum ✓			

Question			Answer	Marks	AO element	Guidance
11	(a)		thumb labelled force/motion/movement forefinger/index finger labelled (magnetic) field Middle finger labelled current ✓✓	2	1.1	All 3 correct = 2 marks 1 or 2 correct = 1 mark **ALLOW** *F* if no ambiguity with field e.g field *B* **ALLOW** *B* **IGNORE** *F* **ALLOW** *I* **IGNORE** *C* 
	(b)	(i)	Y moves in the same direction increased ✓✓	2	1.1	Correct letters/words ringed **ALLOW** other clear indication 3 correct = 2 marks 1 or 2 correct = 1 mark
		(ii)	The conductor may vibrate about its rest position or appear not to move. ✓	1	2.1	Tick in 1st box.
	(c)		A current inside a magnetic field experiences a force ✓ The force is in opposite directions on the two/opposite sides of the coil (because the current is in opposite directions) ✓	2	1.1	**ALLOW** arrows in opposite directions labelled force/F on diagram
	(d)		chemical kinetic thermal current ✓✓✓	3	1.1	4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark **NOT** potential difference

Need to get in touch?

If you ever have any questions about OCR qualifications or services (including administration, logistics and teaching) please feel free to get in touch with our customer support centre.

Call us on

01223 553998

Alternatively, you can email us on

support@ocr.org.uk

For more information visit

ocr.org.uk/qualifications/resource-finder

ocr.org.uk

Twitter/ocrexams

/ocrexams

/company/ocr

/ocrexams

CAMBRIDGE
UNIVERSITY PRESS & ASSESSMENT

OCR is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored. © OCR 2022 Oxford Cambridge and RSA Examinations is a Company Limited by Guarantee. Registered in England. Registered office The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA.

Registered company number 3484466. OCR is an exempt charity.

OCR operates academic and vocational qualifications regulated by Ofqual, Qualifications Wales and CCEA as listed in their qualifications registers including A Levels, GCSEs, Cambridge Technicals and Cambridge Nationals.

OCR provides resources to help you deliver our qualifications. These resources do not represent any particular teaching method we expect you to use. We update our resources regularly and aim to make sure content is accurate but please check the OCR website so that you have the most up-to-date version. OCR cannot be held responsible for any errors or omissions in these resources.

Though we make every effort to check our resources, there may be contradictions between published support and the specification, so it is important that you always use information in the latest specification. We indicate any specification changes within the document itself, change the version number and provide a summary of the changes. If you do notice a discrepancy between the specification and a resource, please contact us.

Whether you already offer OCR qualifications, are new to OCR or are thinking about switching, you can request more information using our Expression of Interest form.

Please get in touch if you want to discuss the accessibility of resources we offer to support you in delivering our qualifications.