

Markscheme

November 2020








Integrated Sciences








On-screen examination

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The following are the annotations available to use when marking responses.

Annotation	Explanation
	Correct point, place at the point in the response where it is clear that the candidate deserves the mark. For use in analytically marked questions only.
	Omission, incomplete
CON	Contradiction
	Valid part (to be used when more than one element is required to gain the mark)
	Error carried forward
	Dynamic annotation, it can be expanded to surround work
	Horizontal wavy line that can be expanded
	Highlight tool that can be expanded to mark an area of a response

Annotation	Explanation
	Not good enough
	The candidate has given a response but it is not worthy of any marks
	Text box used for additional marking comments
	Seen; must be stamped on all blank response areas and on duplicate pages of concatenated responses
	Vertical wavy line that can be expanded
	Words to that effect
	Award 1, 2, 3, 4 marks. For use in holistically marked questions only

Marking instructions

- 1 Mark positively. Give candidates credit for what they have achieved and what is correct. Do not deduct marks for incorrect responses.
- 2 Follow the markscheme provided and award only whole marks.
- 3 Each marking point appears on a separate line.
- 4 The maximum mark for each subpart is indicated in the “Total” column.
- 5 Where a mark is awarded a tick should be placed in the text at the precise point where it is clear the candidate deserves the mark.
- 6 Each marking point in a question part should be awarded separately unless there is an instruction to the contrary in the Notes column.
- 7 A question subpart may have more marking points than the total allows. This will be indicated by the word “**max**” in the Answer column. Further guidance may be given in the Notes column.
- 8 Additional instructions on how to interpret the markscheme are in bold italic text in the Answer column.
- 9 Alternative wording may be indicated in the Answer column by a slash (/). Either alternative is equally acceptable but the candidate cannot be rewarded for both as they are associated with the same marking point.
- 10 Alternative answers are indicated in the Answer column by “**or**”. Either alternative is equally acceptable but the candidate cannot be rewarded for both as they are associated with the same marking point.
- 11 If two related points are required to award a mark, this is indicated by “**and**” in the answer column.
- 12 Words in brackets () in the Answer column are not necessary to gain the mark.
- 13 Words that are underlined are essential for the mark.
- 14 In some questions a reverse argument is also acceptable. This is indicated by the abbreviation *ORA (or reverse argument)* in the Notes column. Candidates should not be rewarded for reverse arguments unless *ORA* is given in the Notes column.
- 15 If the candidate’s response has the same meaning or is clearly equivalent to the expected answer the mark should be awarded. In some questions this is emphasized by the abbreviation *WTTE (or words to that effect)* in the Notes column.
- 16 When incorrect answers are used correctly in subsequent question parts the follow through rule applies. Award the mark and add ECF (error carried forward) to the candidate response.
- 17 The order of marking points does not have to be the same as in the Answer column unless stated otherwise.
- 18 Marks should not be awarded where there is a contradiction in an answer. Add CON to the candidate response at the point where the contradiction is made.
- 19 Do not penalize candidates for errors in units or significant figures unless there is specific guidance in the Notes column.
- 20 Questions with higher mark allocations will generally be assessed using a level response method using task specific clarifications developed with reference to the criteria level descriptors. A candidate’s work should be reviewed to determine holistically the mark for each row of the holistic grid and a mark awarded for each row.

Question		Answers	Notes	Total	Crit
1	a	Tension		1	A
	b	Acceleration = $4 \text{ (ms}^{-1}) / 2 \text{ (s)}$	<i>Seen or implied</i>	3	A
		$2 \text{ (ms}^{-2})$ ms^{-2}	<i>Accept m/s²</i>		
	c	She will not move (because) the resultant / net / total force is zero	<i>WTTE</i>	2	A
d	C The car is moving at constant speed and in the same direction.	<i>WTTE</i>	2	A	
2	a	<p>Glucose + Oxygen ➔ Carbon dioxide + Water + Energy</p> <p>All correct</p>		1	A
	b	<p>Input: chemical (potential)</p> <p>Useful: kinetic</p> <p>Waste: thermal / heat or sound</p>		3	A
	c	<p>Evidence of correct calculation: 290598 (cm) or 2905.98 (m) or 2.90598 (km)</p> <p>2.90598 or 2.91 (km)</p> <p>Answer expressed to 3 sig figs: 2.91 (km)</p>	<p><i>Second marking point is for converting to km</i></p> <p><i>ECF from first marking point, award this mark for any correct distance to 3 sig figs</i></p> <p><i>Award 3 marks if only 2.91 (km) is seen.</i></p>	3	A A D

	d	A calculation of distance divided by time 2.91/0.5 5.82 (kmh ⁻¹)	<i>ECF from part (c)</i> <i>Award 1 mark for 0.097 kmmin⁻¹. Unit must be included to award this mark.</i>	2	A
3	a	109 (kmh ⁻¹)		1	A
	b	A		1	A
	c	Between 10 and 30 seconds or for 20 seconds the car was moving at a constant velocity/speed of <u>20ms⁻¹</u>	<i>Do not accept constant motion</i>	3	A
	d	Half base x height 400 <u>m</u>	<i>Seen or implied</i> <i>Unit must be included</i>	2	A
	e	B		1	A
4	a	Transition metals		1	A
	b	Strong or stable or malleable	<i>Do not accept electrical conductor, thermal conductor</i>	1	A
	c	How does the (size/amount /value of) current affect the mass/grams (/amount of nickel coating/covering) the coin	<i>WTTE</i> <i>Max 1 for correct research statement linking IV and DV but not phrased as a question</i>	2	B
	d	IV: (Size/amount of) current DV: mass (of nickel)		2	B
	e	Time: Mass will be less than expected (because) there is less time for ions to coat the coin Temperature: Mass will be more than expected (because) the ions will move more quickly to coat the coin	<i>WTTE</i>	4	B

5	a	$\text{average} = \frac{(m_1 + m_2 + m_3)}{3} \text{ or } 6.4333333$ <p>Correctly expressed to two significant figures as 6.4</p>	<p><i>Please check table and response box for correct answer</i></p> <p><i>Award 2 marks for correct answer alone</i></p>	2	C
	b	<p>Current on x axis and (average) mass on y axis</p> <p>Units correct for current and mass</p> <p>Evenly spaced increments on both axes</p> <p>Two points correctly plotted (± 0.1)</p> <p>All points correctly plotted (± 0.1)</p>	<p><i>Award independently</i></p> <p><i>Axes can be swapped for the third mark</i></p> <p><i>Award max 1 for plotting if all points are correctly plotted on swapped axes</i></p>	5	C
	c	<p>Trial 2 at 8.00A</p> <p>Accept any reasonable suggestion, for example</p> <ul style="list-style-type: none"> • the coin was wet so the increase in mass was due to water and nickel • the coin was left in the solution for too long so the mass was higher than expected • the temperature was too high so the mass was higher than expected • there was an error in using the balance 		2	C
	d	<p>As the current increases the mass of nickel coating the coin increases</p> <p>In a proportional relationship</p> <p>or</p> <p>the line of best fit would be a straight line <u>passing through (0,0)</u></p> <p>since more ions will travel to the copper coin</p>	<p><i>WTTE</i></p>	3	C

	<p>e Invalid</p> <p>(because) the graph shows a proportional relationship or the graph is not inversely proportional</p> <p>Evidence of use of at least two data points to prove proportionality</p>		3	C																																				
6	<table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>1. V (Variables)</td> <td>Concentration or mass implied as variables but not identified</td> <td>Concentration as IV or mass as DV and one CV identified</td> <td>Concentration as IV and mass as DV and one CV identified</td> <td>Concentration as IV and mass as DV and two CV identified</td> </tr> <tr> <td>2. H (Hypothesis)</td> <td>Simple statement</td> <td>Incomplete hypothesis linked to IV and DV no explanation</td> <td>Incomplete hypothesis correctly linked to IV and DV no explanation</td> <td>Testable hypothesis correctly linked to IV and DV correct explanation</td> </tr> <tr> <td>3. D (Data)</td> <td>Reference to different trials</td> <td>At least three trials</td> <td>At least three trials and calculates mean</td> <td></td> </tr> <tr> <td>4. E (Additional equipment)</td> <td>Equipment suggested to measure volume or mass</td> <td>Equipment suggested to measure volume and mass</td> <td></td> <td></td> </tr> <tr> <td>5. M (Method)</td> <td>Attempt at method but may be not relevant</td> <td>Attempt at method, insufficient detail and not likely to give relevant data</td> <td>Method described, could be followed, will produce relevant data</td> <td>Complete method fully explained and could be replicated</td> </tr> <tr> <td>6. S (Safety)</td> <td>A relevant safety precaution linked to electrical hazard</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				1	2	3	4	1. V (Variables)	Concentration or mass implied as variables but not identified	Concentration as IV or mass as DV and one CV identified	Concentration as IV and mass as DV and one CV identified	Concentration as IV and mass as DV and two CV identified	2. H (Hypothesis)	Simple statement	Incomplete hypothesis linked to IV and DV no explanation	Incomplete hypothesis correctly linked to IV and DV no explanation	Testable hypothesis correctly linked to IV and DV correct explanation	3. D (Data)	Reference to different trials	At least three trials	At least three trials and calculates mean		4. E (Additional equipment)	Equipment suggested to measure volume or mass	Equipment suggested to measure volume and mass			5. M (Method)	Attempt at method but may be not relevant	Attempt at method, insufficient detail and not likely to give relevant data	Method described, could be followed, will produce relevant data	Complete method fully explained and could be replicated	6. S (Safety)	A relevant safety precaution linked to electrical hazard				18	B
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7	a	Potassium	<i>Do not accept K, the name is required</i>	1	C
	b	Copper This is the least reactive metal	<i>Do not award the second mark unless the first mark is awarded</i>	2	C
	c	The suggestion is invalid or magnesium is not suitable or zinc is a better metal (because) magnesium is more reactive than nickel	WTTE ORA	2	C
	d	Potassium is very reactive or has the highest reactivity so it will react / combine other elements or compounds		2	C
8	a	Three from the following four responses [max 3] <ul style="list-style-type: none"> • Strong • Flexible • Lightweight • Water resistant 		1	D
	b	Accept any reasonable points, for example [max 2] <ul style="list-style-type: none"> • plastic manufacture creates employment • workers are needed to transport finished plastic items • plastic is cheaper than glass • generates income from export 	<i>Do not accept information repeated from video with no further information or context provided</i>	2	D

8	c		1	2	3	4	15	D
		1. P (Plastic pollution)	A statement about plastic pollution	A statement about plastic pollution and one example	A statement about plastic pollution and more than one example or a statement about plastic pollution with one example that has scientific justification	A statement about plastic pollution and more than one example and one with scientific justification		
		2. A (Advantages to environment)	Attempt at an advantage of microorganisms	A relevant advantage of microorganisms	More than one relevant advantage of microorganisms			
		3. D (Disadvantages to environment)	Attempt at a disadvantage of microorganisms	A relevant disadvantage of microorganisms	More than one relevant disadvantage of microorganisms			
		4. E (Economic considerations)	Statement of one economic consideration	Statements of more than one economic consideration or one statement of an economic consideration with justification	Statements of more than one economic consideration with justification for at least one consideration			
		5. C (Concluding appraisal)	A concluding appraisal giving their opinion	A concluding appraisal giving their opinion compared with burning				

9						
			1	2	3	4
	1.A (Advantages)	A statement of an advantage	A statement of two or more advantages or a statement of one advantage with further details	A statement of two or more advantages with further detail for at least one		
	2. D (Disadvantages)	A statement of a disadvantage	A statement of two or more disadvantages or a statement of one disadvantage with further details	A statement of two or more disadvantages with further detail for at least one		
	3. C (Conclusion)	A simple conclusion				
						7
						D