

Cambridge Technicals

Applied Science

Unit 22: Global scientific information

Level 3 Cambridge Technical in Applied Science
05874

Mark Scheme for June 2024

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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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MARKING INSTRUCTIONS

PREPARATION FOR MARKING

TRADITIONAL

Before the Standardisation meeting you must mark at least 10 scripts from several centres. For this preliminary marking you should use **pencil** and follow the **mark scheme**. Bring these **marked scripts** to the meeting.

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 traditional 40% 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 or by email.

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 questions 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 a 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 lined pages 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 an annotation 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. Assistant Examiners will email a brief report on the performance of candidates to your Team Leader (Supervisor) by the end of the marking period. Your report should contain notes on particular strength displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

Annotations available in RM Assessor

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

9. 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
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
<u>—</u>	Underlined words must be present in answer to score a mark
ECF	Error carried forward
AW	Alternative wording
ORA	Or reverse argument

Question			Answer	Marks	Guidance
1	(a)		A ✓ E ✓ B ✓ D ✓ C ✓	5 5x1.1	
	(b)		G ✓ A ✓ E ✓ D ✓	4 4x1.2	ALLOW G
			Total	9	

Question			Answer	Marks	Guidance
2			<p>[Level 3] Candidate shows a high level of understanding and identifies scientific information from BOTH Source A and B and links the information to each of their relevant benefits.</p> <p style="text-align: right;">(5 – 6 marks)</p> <p>[Level 2] Candidate shows an understanding and identifies scientific information from Source A AND/OR B and links the information to a relevant benefit.</p> <p style="text-align: right;">(3 – 4 marks)</p> <p>[Level 1] Candidate identifies scientific information from the EITHER Source A OR B and a benefit of transmission which may not be linked.</p> <p style="text-align: right;">(1 – 2 marks)</p> <p>[Level 0] Candidate includes fewer than two valid points.</p>	6 <	

Question			Answer	Marks	Guidance
3	(a)		C ✓ B ✓ A ✓ D ✓ D ✓ A ✓	6 6x2.1.1 - 8	
	(b)	(i)	reduction in GPS error from 10m to 10cm ✓ enables self-driving tractors that can follow a route with less overlap OR idea that fuel/fertiliser/seed/time is used more efficiently ✓	2 2x2.3.1a	ALLOW 100 times more accurate ALLOW error / inaccuracy, was 10m or is now 10 cm IGNORE just to enable tractors to self-drive / drive with more precision ALLOW less expensive as AW for more efficient
		(ii)	RTG / software / a (computer) program ✓ (enables more) accurate GPS navigation or (enables) GPS data to be used in agriculture / on a global scale ✓	2 2x2.3.1b	ALLOW both marks may be awarded if the candidate quotes the relevant passage from source A ALLOW AW for agricultural use: yield mapping / mass flow / moisture content IGNORE references to resource allocation
		(iii)	Any two from: <ul style="list-style-type: none"> carbon equivalent emission / CE emission (reduction) agricultural sustainability spatially precise input tractor guidance technology gossypium hirsutum / Glycine max ✓✓	2 2x2.3.1c	DO NOT ALLOW quotations of whole sentences where it is unclear if the candidate has identified the scientific phrase IGNORE just CE / carbon / carbon emission / carbon equivalent IGNORE environment(al) / economic

Question			Answer	Marks	Guidance
		(iv)	Any one from: <ul style="list-style-type: none"> the terminology will be understood by a specialist/scientist does not need to be explained to a scientist/engineer they/terms have a precise scientific/technical meaning ✓	1	
		(c)	No (no mark for this) because it is based on software/code ✓ not a unique method (of turning tractor around) / method already exists (manually) ✓ OR Yes (no mark for this) because it is novel software ✓ that is used with (specialist) equipment ✓	max 2 2x3.1.1f	ALLOW 'yes because it is (novel) software that has a technical effect' for 2 marks ALLOW if no other mark, no and it is not original OR yes and it is original
			Total	15	

Question			Answer	Marks	Guidance																											
4	(a)	(i)	persons ✓ disabilities ✓	2 3.2.3	ALLOW people																											
		(ii)	Any two from: information ✓ communication ✓ services including the internet ✓	2 3.2.4	IGNORE data / personal data ALLOW services / internet																											
	(b)		Three correct ticks in software column ✓✓✓ Three correct ticks in hardware column ✓✓✓	6 3.2.3	Mark each column independently 4 ticks -1, 5 ticks -2 etc (i.e. each additional tick is CON) <table><tr><th>Feature</th><th>Software application ...</th><th>Hardware application ...</th></tr><tr><td>Adapted mouse or trackball</td><td></td><td>✓</td></tr><tr><td>Audio description</td><td>✓</td><td></td></tr><tr><td>Backup to cloud storage</td><td></td><td></td></tr><tr><td>Eye tracking</td><td></td><td>✓</td></tr><tr><td>Touch screen</td><td></td><td>✓</td></tr><tr><td>Voice recognition</td><td>✓</td><td></td></tr><tr><td>Wireless keyboard</td><td></td><td></td></tr><tr><td>Word prediction</td><td>✓</td><td></td></tr></table>	Feature	Software application ...	Hardware application ...	Adapted mouse or trackball		✓	Audio description	✓		Backup to cloud storage			Eye tracking		✓	Touch screen		✓	Voice recognition	✓		Wireless keyboard			Word prediction	✓	
Feature	Software application ...	Hardware application ...																														
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Eye tracking		✓																														
Touch screen		✓																														
Voice recognition	✓																															
Wireless keyboard																																
Word prediction	✓																															
			Total	10																												

Question			Answer	Marks	Guidance
5	(a)	(i)	Any three from: <ul style="list-style-type: none"> • (data is) up to date • accurate • complete / includes all necessary measurements • fit for purpose / informs (good) decisions • consistent / uses agreed formats / complies with regulations • (regularly) backed-up / easily recoverable data (in case of loss or data corruption) • in-built error detection mechanisms / audit log / user traceability / user accountability • protected against unauthorised access / alteration / or use of permissions to access/modify data at different levels <p style="text-align: right;">✓✓✓</p>	3 3x4.1	ALLOW (data is) regularly updated IGNORE regular updates to software ALLOW correct / true / reliable / valid as AW for accurate ALLOW e.g. access by password authentication IGNORE just, data is secure
		(ii)	confidentiality ✓ IT security ✓ availability ✓ instant connectivity ✓	4 4x4.1	ALLOW accessibility / access
	(b)	(i)	2 ✓	1 1x2.3.2c	ALLOW 3
		(ii)	1 and 5 ✓	1 1x2.3.2b	
		(iii)	3 ✓	1 1x2.3.3c	
	(c)	(i)	Information Commissioner's Office / ICO ✓	1 3.1.1e	ALLOW Information Commissioner

Question			Answer	Marks	Guidance
		(ii)	Any three from: <ul style="list-style-type: none"> • issue codes of practice • hold a register of organisations that process personal data • registration body for data controllers • handling concerns e.g. enquiries and complaints • international cooperation with other organisations • provide a forum for consultations / offers advice / offers guidance / assists with investigations • legal action / prosecutions / enforcement notices / (imposes) financial penalties • monitoring (companies for) compliance with data legislation • monitor / make rulings relating to FOI requests • training / education / learning resources / conferences • AVP ✓ ✓ ✓ 	3 3.1.1e	ALLOW e.g. monitoring and enforcing compliance with data protection legislation = 2 marks IGNORE refs to qualifications
			Total	14	

Question			Answer	Marks	Guidance
6	(a)		Any one from: <ul style="list-style-type: none"> unauthorised / unintended access accidental loss intentional tampering 	1 1x4.2.1	ALLOW hacking / leaking / theft as AW for unauthorised access ALLOW loss of data / deletion of data IGNORE intentional release
	(b)		Any three from: <ul style="list-style-type: none"> system maintenance / technical support / servicing software licences software development hardware supply / (data) storage / hardware (e.g. server) leasing / cloud services information security services 	3 3x4.2.2	
	(c)		Any one from: reference to mathematical formula reference to conversion of letters (to other symbols) reference to cipher text AND Any one from: keys add randomness (to the conversion) keys are used to decrypt / decode / turn cipher text back to plain text	2 2x4.2.3	IGNORE algorithms encrypt (stem) IGNORE inverse algorithm MP2 must refer to keys. ALLOW unlock / translate as AW for decode IGNORE keys encrypt (stem)
			Total	6	

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