Cambridge International AS & A Level

INFORMATION TECHNOLOGY **9626/33**

Paper 3 Advanced Theory **May/June 2025**

MARK SCHEME

Maximum Mark: 70

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2025 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

This document consists of **12** printed pages.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptions for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1: Marks must be awarded in line with: • the specific content of the mark scheme or the generic level descriptors for the question • the specific skills defined in the mark scheme or in the generic level descriptors for the question • the standard of response required by a candidate as exemplified by the standardisation scripts.
GENERIC MARKING PRINCIPLE 2: Marks awarded are always **whole marks** (not half marks, or other fractions).
GENERIC MARKING PRINCIPLE 3: Marks must be awarded **positively**: • marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate • marks are awarded when candidates clearly demonstrate what they know and can do • marks are not deducted for errors • marks are not deducted for omissions • answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.
GENERIC MARKING PRINCIPLE 4: Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.
GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
BOD	Benefit of the doubt
λ	To indicate where a key word/phrase is missing
✖	Incorrect
∿	Indicate a point in an answer
ISW	Ignore subsequent work
LNK	Statement/points are linked
MAX	Maximum number of marks that can be awarded
NAQ	Not answered question
Off-page comment	Allows comments to be entered at the bottom of the RM marking window and then displayed when the associated question item is navigated to.
REP	To indicate a point that has already been made or was given in the question
SEEN	Indicates that work/page has been seen including blank answer spaces and blank pages.
✔	Correct
TV	Too vague
⟩	Indicate a point in an answer

Mark scheme abbreviations:

/	separates alternative words / phrases within a marking point
//	separates alternative answers within a marking point
Underline	actual word given must be used by candidate (grammatical variants accepted)
max	indicates the maximum number of marks that can be awarded
( )	the word / phrase in brackets is not required, but sets the context

Note: No marks are awarded for using brand names of software packages or hardware.

Question	Answer	Marks
1(a)	**TWO** from: • create connection between (virtual) terminal and remote host • can allow unrestricted access to system • for network diagnosis / valid example of Telnet use	**2**
1(b)	**THREE** from: • create a connection allowing packets from one network to travel across another / different (protocol) network • connects to another network without packets being examined / altered / recognised in any way • connect two IP LANs that use different protocols • support VPNs for a data connection / link between devices • used to overcome restrictions on networks / use of forbidden protocol / wrap packets inside packets of allowed protocols so they can travel on the network	**3**
1(c)	**THREE** from: • send packets by connection-less method • used where error-checking of packets is not necessary / not done • used by DHCP clients / servers to exchange network details • Used for streaming services • Used by routers exchanging routing data – the simple network management protocol (SNMP) • used by using the domain name system (DNS) when looking up IP addresses / domain names	**3**

Question	Answer	Marks
2(a)	**THREE** from: • The objectives are identified • The required resources are identified / documented • The success criteria are determined / agreed / quantified • The stakeholders are identified / agreed • Needs of stakeholders established • The project scope is determined / carried out / scoped • Determining milestones • Determining deliverables • Determining required resources • Developing high-level schedules	3

2(b)	**FOUR** from:
	• To check that building / final product has been created / delivered to client
	• To check that nothing has been overlooked / that project is complete
	• To check against acceptance criteria / success criteria
	• To check product / building is in satisfactory condition
	• To check / ensure that project has ended / is finished (1st)
	   – all client / parties / stakeholders agree (1)
	   – so that no more amendments / additions / changes can be made (1)
		4

Question	Answer	Marks
3	**SIX** from: • Describes the new system • Describes how it meets the user requirements • Defines the features / functions of the new system • Specifies how new system interfaces with old / remaining systems • Defines the behaviour of the new system • Describes the data to be used by the system • Specifies how the new system resolves / attempts to resolve any problems found in the old system • Defines / describes the operating system to be used / required for the new system • Specifies the hardware to be used / required for the new system • Specifies the software requirements for the new system • Specifies the maintenance / upgrades required • Describes the types of end-users of the new system • Specifies the access rights of each type of end-user • Used as a basis of the design specification	6

Question	Answer	Marks
4	*Command word: Justify - support a case with evidence / argument.* **SIX** from, e.g.: • Saves time when creating large numbers of multiple personised documents • Only need to create one master document • Only need to create / keep / maintain one data source • Letters / emails and addresses automatically compiled and sent • Only need to edit / update the master / source documents • Less documents to (error) check / proofread • Documents are personised (to individual customers) • Reduces risk of errors / typos / incorrect information / missing information • Reduces possibility of personal details going to other / wrong customers • Ensures use of company style on all documents sent out • Consistent layout / format of document	**6**

Question	Answer	Marks
5(a)	**ONE** from: • a cryptographic hash of the previous block • a timestamp • (all the) transaction data	**1**
5(b)	**TWO** from, e.g.: • (As a distributed ledger) in cryptocurrency • Smart contracts • Storing medical records	**2**

Question	Answer	Marks
6(a)	**TWO** from: • The data is in a different original format to that required (by the software used for analysis) • The data structure of the data is different to that required (by the software used for analysis) • The data type of the data is different to that required (by the software used for analysis) • To make the data compatible with other data (that is being analysed) • To anonymise data / remove data that can identify individuals • To add other data e.g. timestamps to it • To allow it to be moved to another system	2
6(b)	**FOUR** from: • Use of both specialist / manual methods of checking the data • Anomalies / outliers are identified / removed • Inaccuracies are corrected • Duplicate data is removed • Irrelevant data is removed • Out-dated data is removed • Inconsistencies are removed / reconciled e.g. names are spelled the same throughout • Contradictions are removed • Ensure that the same unit of measurements are used throughout • Correct structural errors • Deal with missing data	4

Question	Answer	Marks

7	*Command word: Evaluate: judge or calculate the quality, importance, amount, or value of something.*
	EIGHT from:
	All types of compression:
	• (All) compressed images have a lower bit rate / number of bits (than the original uncompressed image)
	• (So, there are fewer bits) to transfer in a set unit of time / one second / (complete) image is transferred in a shorter time
	• Fewer bits to store (on HDD / SSD / storage medium)
	• Less storage space is needed / more storage space available for other images / files
	• (Compression) reduces the file size
	• (Can be) loss / detail of information about the image
	• Can / may remove image metadata
	Lossless:
	• Lossless compression removes unnecessary / repeated data (1st)
	    ○ has little / no effect on visual appearance of image / original image can be (perfectly) restored / no loss of quality (1)
	• Lossless compression can / may store extra image data / index of image data (1st)
	    ○ so, reduction in size may not be as much as expected / may not be worthwhile (1)
	Lossy:
	• Lossy compression permanently removes data (1st)
	    ○ data cannot be restored (1)
	    ○ original image cannot be (perfectly) restored (1)
	• Loss of resolution of detail / reduction of the number of colours / reduction colour depth (1st)
	    ○ quality of image is reduced / less vibrant / less detailed / 'blocky' / pixelated (1)
	    ○ and have a significant visual impact on an image (1)
	• Repeated use of lossy compression / opening / saving during editing results in degraded image (1st)
	    – compression artefacts can be introduced (1)
	    – valid example e.g. halos, banding, striping (1)
	    – unrealistic appearance of photographic images / unusable images (1)
	
	Conclusion:
	• One mark for a reasoned conclusion
		8

Question	Answer	Marks
8	**SIX** from: Max **FIVE** from: *Advantages:* • No need to carry cash (1st) – so, risk of loss / theft of money is reduced (1) – security is higher (1) • (mobile) app can hold all required information (1st) – so easily / quickly used when mobile / in a hurry (1) • Money transfer is (usually) faster than when using back transfers / credit cards / cheques • Recipient gets payment quicker / transactions completed faster • Not tracked by banking system / regulators • No need to exchange currencies / visit money exchange • Avoid additional bank / exchange charges • Automatically calculates into home currency Max **FIVE** from: *Disadvantages:* • If error in transaction / money sent to wrong recipient refunds / reversal of transaction not possible • Requires regular checking of balance to ensure sufficient funds stored • Needs regular top-ups to allow payments / avoid refusal of transaction • Some transactions can take several days to appear / funds made available • Banks cannot monitor transactions • Can be used for illegal transactions • Need an internet connection to reconcile payments	6

Question	Answer	Marks
9	**SIX** from: • Security of bank / customer data is not under direct control of bank • Privacy of customer details not under direct control of bank • Privacy / security is dependent on the cloud provider • Bank has less control over infra-structure (1st) – limited flexibility over functions (1) – no control over where data is stored (1) – may have to comply with data regulations of several countries (1) • Locked in to / tied to third-party supplier (1st) – difficult to change suppliers / move services to another supplier (1) – if supplier fails / goes out of business (1) – can lose bank's data (1) • More vulnerable to cyber-attacks than office-based / non-internet connected services	6

Question	Answer	Marks

10	*Command word: Justify: support a case with evidence / argument.*
	 SIX from:
	 VPNs can:
	 • use encryption
	 • to provide security of data
	 • increased privacy
	 • Provide protection against data analysis (1st)
	      ○ by service providers (1)
	      ○ valid example analysis of e.g.: email, web browsing (1)
	 • Provide protection against adjustment of bandwidth / throttling of data streams / video streams (1st)
	      ○ by service providers / network administrators
	 • Can connect geographically distant company LANs
	 • Less expensive than owning / renting / leasing connections / own network
	 • No need for IT specialists to maintain own **external** network
	 • (Can be used to) circumvent / defeat / avoid local geographical restrictions (1st)
	      – on content e.g. video streams / live sporting events (1)
	      – on services e.g. social media sites / services / news services (1)
		6

Question	Answer	Marks

11(a)	**FIVE** from:
	e.g.:
	• Reduced / little waste of raw materials so fewer scarce resources used
	• Can make use of eco-friendly plastic / corn-based plastics
	   – to reduce long-term pollution / persistence of materials
	• Fewer components in objects
	• Ability to make hollow / odd-shaped parts
	• Can use less energy / raw materials used in making parts
	• Can create scarce spare parts (1st)
	   – so products / appliances can last longer (1)
	• Products can be printed / manufactured on demand / no need to make / store huge inventory
	• Products can be manufactured where required reducing transportation costs / fuel use
		5

11(b)	**THREE** from:
	e.g.:
	• Can require a lot of energy to produce / print items
	• large carbon footprint (1st)
	   – adds to global warming (1)
	• Uses plastic materials (to print) (1st)
	   – adds to amount of durable / non-degradable / pollution by plastic in environment (1)
	• Plastics made from oil / fossil fuels
	• Increased greenhouse gases
	• Produces fumes with toxic by-products / airborne particles (1st)
	   – irritating to the eyes / nose / cause injury to organs (1)
	   – Increased (micro-)plastic in body (1)
		3