



Cambridge International AS & A Level

INFORMATION TECHNOLOGY

9626/11

Paper 1 Theory

May/June 2023

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.

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This document consists of **10** 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 descriptors 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.

| Question | Answer | Marks |
|----------|--|----------|
| 1(a) | <p>One from:</p> <ul style="list-style-type: none"> Data is scrambled/jumbled up (1) Converting information so that it is impossible to interpret/understand (1) | 1 |
| 1(b) | <p>Up to THREE marks:</p> <p>e.g.</p> <ul style="list-style-type: none"> Can be used for identity theft (1) plus one example (1) Can be used for identity fraud (1) plus one example (1) Company secrets could be sold by hackers to rival companies (1) National secrets could be used by rival powers (1) Secrets/personal data could be used for blackmail purposes (1) Private details could be used to pass (bank) security tests (1st) <ul style="list-style-type: none"> Accept any suitable extension for passing security tests (1) <ul style="list-style-type: none"> e.g. <ul style="list-style-type: none"> And so access (e.g.) bank accounts (1) | 3 |

| Question | Answer | Marks |
|----------|--|----------|
| 2 | <p>Four from:</p> <ul style="list-style-type: none"> Aspects of the home are controlled from Smartphone/Voice control device/computer system/remotely (1) Devices/appliances in the home are connected (1) TWO types of devices (in the home) that can be controlled: <ul style="list-style-type: none"> e.g. <ul style="list-style-type: none"> lighting, heating air conditioning (accept “temperature” once only) television kettle plugs (1) Controlled by issuing (voice) commands/setting up routines (1) The commands can be given by voice/sound/ remote control/ tablet/ smartphone (1) Uses Wi-fi/home network (1) Uses internet to access devices when outside the home (1) | 4 |

| Question | Answer | Marks |
|----------|---|-------|
| 3 | <p>Three from:</p> <ul style="list-style-type: none"> • A compiled program will only run (on a computer with) the same operating system (1st) as it was originally translated on (1) • The (other) computer system it is transferred to may not have the same operating system (1) • Cross compilers can be used but the compiled program will no longer run on the host computer/computer the program was written on (1) • Cross compiler produces more errors and mistakes than a native compiler (1) • The cross compiled code can run slower than if it had been originally compiled on the target machine (1) | 3 |

| Question | Answer | Marks |
|----------|---|-------|
| 4(a) | <p>Three from:</p> <ul style="list-style-type: none"> • The quality of connection to the Internet may vary (1) • Speed of access to the Internet may vary (1) • Some countries may not have a well-developed broadband (infrastructure)/rely on dialup connections (1) • Lack of incentive to invest in the country/nation (as a whole) (1) • In less developed countries they might have less infrastructure (may exemplify) (1) • Not all countries are able to keep up with the constant changes in technology (1) | 3 |
| 4(b) | <p>Three from:</p> <ul style="list-style-type: none"> • The digital divide gets wider (1) <p>Award ANY three implications of a digital divide:</p> <p>For example</p> <ul style="list-style-type: none"> • higher/lower quality on education (1st) • higher/lower quality on health (1st) • higher/lower quality on access to resources (1st) • higher/lower quality on lifestyle (1st) • higher/lower quality on opportunities (1st) • higher/lower quality on work/employment opportunities (1st) • higher/lower quality on trade (1st) • reduced access to social media (1st) • higher/lower access to information (1st) <p>A further mark can be awarded for an explanation of the impact (1)</p> <p>A final mark may be given for the alternative comment – such as MP3 in the example below. Note: can ONLY be given as a 3rd mark.</p> <p>E.g., reduced access to education (1) means lower skill level (1) whilst those in industrial societies have better access (1)</p> | 3 |

| Question | Answer | Marks |
|----------|---|-------|
| 5(a) | Validation and sorting (1) | 1 |
| 5(b) | <p>Eight from:</p> <ul style="list-style-type: none"> • First record//2210 in the transaction file (1) • First record in the master file/1965 is read/checked (1) • These (previously identified) two records are compared (ALLOW FT if attempt at identifying both records) (1) (Award 'the' instead of 'these' where MP1 AND MP2 given) • Records don't match (1st) <ul style="list-style-type: none"> – computer writes master file record to new master file (1) • Next record of master file/2210 in the master file is read/checked (1) • Transaction file record/2210 is compared with this record (1) • It matches so the Numbersold is subtracted from NumberinStock (1) • Using NumberinStock of 12000 from master file (1) • Using Numbersold of 6500 from transaction file (1) • NumberinStock is now 5500 (1) • Processed record/NumberinStock is written to new master file (1) • Next record/3356 in the transaction file is read/checked (1) • Next record/2976 in the master file is read/checked (1) | 8 |

| Question | Answer | Marks |
|----------|--|-------|
| 6(a) | <p>Five from:</p> <ul style="list-style-type: none"> • Manager checks the space on the target drive/location (1st) <ul style="list-style-type: none"> – to make sure there is sufficient space for the data (that will be moved) (1) • Manager selects the time they want the back-up to take place (1st) <ul style="list-style-type: none"> – manager can select to carry out the back up immediately... (1) – BECAUSE the back-up takes place at a time convenient to the manager/when the system is quiet (may explain why timing is convenient) (1) • Manager selects type of back-up (1st) <ul style="list-style-type: none"> – backing up only the specified data/files (1) – BECAUSE may want to back up whole device OR new files (1) • Manager selects how regularly the back-up is to take place (1st) <ul style="list-style-type: none"> – BECAUSE to minimise data loss (1) • Manager will decide where back-up is to be stored (1st) <ul style="list-style-type: none"> – BECAUSE to make sure back-up will be secure (1) • Manager selects whether to verify the back-up or not (1st) <ul style="list-style-type: none"> – BECAUSE to make sure the backup has been completed correctly (1) • Manager chooses whether or not to encrypt the back-up (1st) <ul style="list-style-type: none"> – BECAUSE adds an extra level of security (1) <p>Must have at least TWO reasons to obtain full marks</p> | 5 |

| Question | Answer | Marks |
|----------|---|----------|
| 6(b) | <p>MAX three from:</p> <ul style="list-style-type: none">• Can be either lossy or lossless. (1)• Lossless compression reduces number of bits (1st)<ul style="list-style-type: none">– ...by identifying repeated patterns of data. (1)• No information is lost in <u>lossless</u> compression. (1)• <u>Lossy compression</u> reduces number of bits (1st)<ul style="list-style-type: none">– ...by identifying unnecessary information. (1) <p>Effects max three:</p> <ul style="list-style-type: none">• Quality of audio is the same when using <u>lossless compression</u> (1)• Quality of audio is lower when using <u>lossy compression</u> (1)• File size is smaller for lossy than lossless (accept converse) (1) | 4 |

| Question | Answer | Marks |
|----------|--|-------|
| 7 | <p>Six from:</p> <p>Collection</p> <ul style="list-style-type: none"> • Sensor(s) are used to gather data (DO NOT ACCEPT ‘COLLECT’) (1) • Naming of TWO physical values that would be gathered: <ul style="list-style-type: none"> – temperature – pH – CO₂ – O₂ – Gas (BOD) – <u>UV</u> light – infrared (1) <p>Note: where candidate states (e.g.) temperature sensor, this may be taken as identification of a physical variable.</p> <p>Processing</p> <ul style="list-style-type: none"> • (Collected) data is sent to ADC (1) • Analogue data is converted into digital (data) (1) • Digital(ised) data is sent to microprocessor/computer/CPU • Computer stores readings in a table/database/file/spreadsheet (1) • Naming of TWO results being calculated. E.g. <ul style="list-style-type: none"> – Max temperature – Min temperature – Average temperature (1) • ONE mark for any description of how one result has been calculated. (1) <p>Display</p> <ul style="list-style-type: none"> • Computer plots graphs showing trend of pollution variables ... (1st) <ul style="list-style-type: none"> – ...over a period of time (1) • Computer plots graphs automatically (1) • Computer outputs the results/graphs on screen/printer (1) • Results may (also) be shown on a website (1) | 6 |

| Question | Answer | Marks |
|----------|---|-------|
| 8 | <pre> graph TD Start([Start]) --> Init[OT ← 0 ET ← 0 count ← 0] Init --> LoopStart(()) LoopStart --> CountInc[count ← count + 1] CountInc --> InputN[/Input N/] InputN --> XCalc[X ← N / 2] XCalc --> IsInt{Is/If X = INT(X)?} IsInt -- Yes --> ETInc[ET ← ET + N] IsInt -- No --> OTInc[OT ← OT + N] ETInc --> Count10{count = 10?} OTInc --> Count10 Count10 -- Yes --> Print[/Print OT, ET/] Print --> Stop([Stop]) Count10 -- No --> LoopStart </pre> | 8 |

| Question | Answer | Marks |
|----------|--|-------|
| 9 | <p>MAX five from:</p> <ul style="list-style-type: none"> • Call back/phone the number (1) • Do not call back on the same number (1) • Do not call back on the same phone (1) • Ask to speak to the SAME person as just spoke to you (1) • TWO FROM: <ul style="list-style-type: none"> – Never give out PIN – Never give out password – Never give out Login ID (1) • Never share security question AND answer (1) • Do not answer calls from unknown callers//hang up calls from unknown caller//set phone to only accept calls from numbers in contact list (1) • Use number checking//suspected spam checking software (1st) <ul style="list-style-type: none"> – to block suspected vishing numbers (1) • (Customers) block numbers suspected of being vishing (1) • Keep blocking software updated regularly (1) <p>Any generic evaluative comment on methods as a whole (1) e.g. These could also block genuine numbers.</p> <p>MAX five from ANY evaluative comment as an extension to any point from above.</p> <p>e.g. ...to check that the call was a genuine call from the bank (1) ...so that vishing calls can't be placed/reduce the chance of you accidentally answering the call (1) ...so that list of numbers is up to date (1)</p> <p>MAX six marks if a list of bullet points</p> | 8 |

| Question | Answer | Marks |
|----------|---|----------|
| 10 | <p>Five from:</p> <ul style="list-style-type: none"> • Sampling resolution is the number of bits (1st) <ul style="list-style-type: none"> – per sound sample (1) • The higher the sampling resolution (1st) <ul style="list-style-type: none"> – the more accurately the (final) outcome (of the process) will represent the sound made (accept converse argument for whole answer) (1) • The higher the sampling resolution/the greater the resolution the greater the size of the file (accept converse) (1) • Modern day digital audio is normally found in 16 bit/24 bit resolutions • 8-bit resolution can take one of 256 different values (1st) <ul style="list-style-type: none"> – which is not generally considered enough resolution to accurately represent music audio (1) • 16-bit resolution can have one of 65 536 different values (1) • 24-bit stores 16 777 216 different values (1) • the difference between 24 and 32- bit cannot be discerned by human hearing (1) • These values are all per channel (1) | 5 |

| Question | Answer | Marks |
|----------|--|----------|
| 11 | <p>Eight from:</p> <ul style="list-style-type: none"> • Any correct definition of direct data sources, such as: <ul style="list-style-type: none"> – Direct sources are where Isabella asks people in person//primary source of data (must be an attempt to define) (1) • Can gain/gather qualitative AND quantitative data (1) • Data gathered is more up to date/recent (1) • Data is (guaranteed to be) relevant to the study/question (1) • Interviewer can base further questions on answer given (1) • Interviewer can ask a more in-depth/follow up questions (1) • Can interpret body language (1st) <ul style="list-style-type: none"> – such as (e.g.) facial expressions//nervous movement of hands (1) • Interviews tend to be taken seriously by people (1st) <ul style="list-style-type: none"> – whereas questionnaires may be ignored (1) • It ensures the data is relevant to the study//you get a better view of what is going on//get a better understanding (1st) <ul style="list-style-type: none"> – whereas indirect sources are not specific to the study (1) • You are in control of the sample size//can be as big/small as needed (1st) <ul style="list-style-type: none"> – whereas Isabella has no control over the amount of data collected from an indirect source (1) • The source of the data is known exactly (1st) <ul style="list-style-type: none"> – making it easier to judge its reliability (1) • Isabella could sell/pass/share the data on (to interested companies) (1st) <ul style="list-style-type: none"> – indirect data is not hers to sell/pass/share (1) <p>MAX 6 marks for a bulleted list</p> | 8 |