



Cambridge International AS & A Level

INFORMATION TECHNOLOGY

9626/32

Paper 3 Advanced Theory

February/March 2022

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 February/March 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **9** 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	<i>Command word: Contrast: identify/comment on differences.</i> Six from: LAN covers a smaller geographical area/valid examples than WAN LAN has higher data transfer speed/greater bandwidth than WAN LAN uses Ethernet/Token Ring technologies whereas WAN uses ATM/Frame relay/different protocols/technologies used LANs (usually) connect together into bigger LANs using fibre optic/wireless technologies whereas WANs connect together with public telecommunication systems to create larger WAN LANs are (usually) owned by one organisation whereas WANs are (usually/often) owned by a number/collective ownership LANs have fewer data transmission errors than WANs LANs have fewer network congestion problems than WANs LANs use Layer 1 or 2 devices/switches/bridges/hubs/repeaters whereas WANs use Layer 3 devices/Routers/Multi-layer Switches.	6

Question	Answer	Marks
2(a)	Two from: Social media sites/networking allow creation of groups/‘echo chambers’ of/for like-thinking individuals Social network can limit/exclude exposure to/expression of alternative viewpoints Information is/viewpoints are selective in content Users’ viewpoints can be reinforced by repetition/re-visiting sites/groups/chat/network Users’ views can be manipulated by others Social networking can create groups of geographically remote but like-minded individuals.	2
2(b)	Two from: Social networking can subject individuals to intense scrutiny/surveillance Comments can be seen by extremely large numbers of readers Comments that are never/would not be made face-to-face can be made Intent in the comment is irrelevant when making social media posts as only the comment, not the context, is seen by reader/jokes may not appear to be joking/sarcasm is lost Individuals may conform to stereotypes demanded by social media to ‘fit in’ with peers.	2

Question	Answer	Marks
2(c)	<i>Command word: Justify: support a case with evidence/argument.</i> Six from, for example: Information shared through social networks reaches customers quickly so can be used to keep customers up to date about products Social networks have a wide audience so businesses can reach many customers Businesses can have closed/selected groups on social networks so can target specific audiences Businesses can create groups/communities on specific topics so can create a customer 'fan base'/build relationship with customer groups leading to brand loyalty Social networks allow discussion of topics/posts so can increase customer feedback opportunities Businesses can create 'conversations' which allow interaction between businesses and customers Use of audience targeting techniques/algorithms to reach specific groups with advertising can enhance sales Businesses can collect/buy data to allow targeting of customers with specific requirements to enhance sales Businesses can collect/buy data to allow analysis of trends in marketplaces/customer profiles/requirements Social networks allow insertion of advertisements in customer timelines/discussions/web pages to increase awareness of products Using social networking is cheaper/more accessible than using traditional advertising Adverts on social media can link directly to an online shop from which customers can buy an advertised product.	6

Question	Answer	Marks
3	<i>Command word: Analyse: examine in detail to show meaning, identify elements and the relationship between them.</i> Max two from: Resolution is measured/described as pixels per inch/ppi Low resolution images have few pixels while high resolutions have many High resolution mages have higher quality/look clearer/crisper/sharper Max eight from: Resolution needs to be high/600ppi for (high-end/professional) printing to produce high quality images on paper/hardcopy/for magazines/publications Photographic images in magazines should be at least 300ppi for acceptable quality Poster images on advertising boards/bill boards can be as low as 150ppi even if large format as they are viewed from a distance Images designed for viewing on screen have resolutions that relate to the monitor in use Images designed to go on web pages are/were (usually) low resolution for speed of loading... ...but need to be of high enough quality for viewing so a compromise has to be made Images designed for use in presentations should have a resolution suitable for projectors/large TV screens so images of, for example, 1024x768 with 72ppi are required The most common resolution for web pages is 72ppi but modern screens/monitors/retina screens are now (far) in excess of 100ppi so images for web pages need to be higher resolution Web images use pixel dimensions rather than resolution so images can have differing resolutions but display at same size and look the same.	8

Question	Answer	Marks
4	<i>Command word: Evaluate: judge or calculate the quality, importance, amount, or value of something.</i> Eight from: Encrypting all data during transmission enhances the security of data Encryption of data during transmission protects the privacy of the user Hiding/changing the user IP address allows users to browse/use the internet anonymously Anonymous use of the internet prevents tracking of activity by ISP/other entities VPNs can be configured to block advertisements so the user experience is enhanced/bandwidth/data allowance is not used for adverts VPNs can be used to bypass geo-restrictions to allow access to material from other countries, for example by journalists/individuals looking for news/videos that are geo-restricted/to bypass censorship restrictions/can bypass copyright restrictions VPNs can bypass ISP bandwidth throttling to allow higher quality/smooth video when streaming video VPNs can be configured to allow an extranet to be set allowing remote access to a private network Use of a VPN may be illegal in some countries and lead to prosecution of the user Use of a VPN can reduce performance and lead to slower access to websites/services VPN provider may monitor use and collect data that may be passed along to third parties VPNs can be difficult to set up, resulting in higher costs/delays/reduced access Outdated/legacy/not updated OS may not be able to use VPN technology Some content providers can block VPN use and close/disable accounts of users if detected. Must be a proper evaluation for full marks. Max 6 marks if bullets/list of points.	8

Question	Answer	Marks
5	Eight from: The form should be straightforward/easy/simple to fill in/complete by the user to reduce simple misunderstanding of what is required The form should be consistent/focus the user's attention on what is required/use icons or inverse video or blinking cursors to focus attention The form should be simple to use/should use obvious navigation methods to move to correct next screens/questions The form should have a clear design with enough space/large enough boxes for writing/entering text/data (Clear) instructions for filling/completing the form should be included The form should include interactive help/bubbles to assist the user when completing the form Keep necessary keystrokes to a minimum to reduce time taken/effort/mistakes in typing The form should include validation routines to check entries for unreasonable data The form should use input controls/drop boxes/radio buttons to force user entries to comply with what is required The form should provide immediate feedback if a user makes an error Important fields should be included so important data is not overlooked/missed out There should be appropriate use of white space/fill screen so the screen is not cluttered/is easy to read/it is easier to check for errors/omissions	8

Question	Answer	Marks
6(a)	Three from: Uses wireless technology/beam of radio/electromagnetic waves Uses line-of sight between antennae/send and receive antennae Uses frequencies in the range 300 MHz to 300 GHz (wavelength 10 cm to 1 mm) Uses parabolic dishes with (horn) antennae to provide 'spot' beams Uses multiple antennae to send/receive signals (if sending/receiving simultaneously/duplex/handshaking) Data is modulated onto carrier wave using orthogonal frequency-division multiplexing (OFDM)/ Orthogonal frequency-division multiple access (OFDMA)/using a range of frequencies/polarisations Pulsed transmission of waves/polarised with matching of antennas at both ends in horizontal/vertical form	3
6(b)	Four from: Used by mobile phones systems in 3G/4G/5G communications Used by WiFi systems to link devices into a LAN Used for communications between base stations and satellites/uplink and downlinks with satellites Used in television/radio industry to transmit programmes from outside studio to studio/outside broadcasts (instead of expensive satellite links) Used to carry cellular/mobile phone systems data between masts/stations/to provide backbone carrier system Used for short-range indoor communications between devices Use to link remote/regional telephone exchanges to main exchanges without the use of copper/optical fibre cabling	4

Question	Answer	Marks
7(a)	Four from: (Appropriate) variables are declared/used to store values Prompt() box pops up on screen Can display default entry/sample data entry required in the input box The user is required to input a value/text/string before being allowed to move on/creates a modal window The user is required to click/press/choose (either) OK or CANCEL/Escape key/close button If the user chooses OK then user input/value/string is returned to variable(s) If the user does not enter a value/string/text/input and then chooses OK, then NULL is returned to variable(s) If the user chooses CANCEL/close button/Escape then NULL value is returned to variable(s)	4
7(b)	Two from: Position of the dialog box cannot be specified by the programmer/is determined by the browser so may not be in the 'best' position for the user The appearance of the dialog box is determined by the browser/cannot be modified by the programmer so may not be as desired by the programmer The script is paused until the user interacts with the dialog box/creates a modal window so the user cannot access the rest of page until the box is closed Additional code is required to validate the entered data Some browsers/versions of browsers require a default value to be supplied by the programmer to make the dialog box appear correctly/may not appear/function properly in all browsers unless a default is supplied.	2

Question	Answer	Marks
8	Five from: Use of recorded tutorials showing screenshots/videos of topics presenting expert ideas/views Can include a narration to explain the topics as the images are displayed Tutorial can be designed to create a conversation/dialogue between the student and the teacher Tutorials can be interactive with navigable pages of content so student can choose which route to take The route through is decided by answers to questions/following links to different topics Topics should flow from generalised ideas to specific as the tutorial progress The tutorial's structure should manage the flow of the topic to allow the student to work through the topic Tutorials can be used to create/impart factual knowledge as the basis for advanced learning Tutorials can be used instead of lectures/classes to free up classroom time/space for other studies Tutorials can allow students to learn at their own pace/in their own time. Tutorials can be used to reinforce class learning/for revision Tutorials can be used to provide interactive testing/to give immediate feedback to students Online tutorials can allow for note taking, including adding notes to certain parts of the tutorial	5

Question	Answer	Marks
9	<i>Command word: Compare: identify/comment on similarities and/or differences.</i> Six from: RGB is Red, Green, Blue <u>and</u> CMYK is Cyan, Magenta, Yellow, Key/Black <i>Similarities:</i> Both are colour codes for defining colours Both can produce a range of colours from white through to black Both are supported by most graphic editing packages Both are affected by differences in the display media/require monitor and paper adjustments to produce the best quality output <i>Differences:</i> RGB uses additive colours to create the range of colours whereas CMYK uses subtractive colours Adding all three colours in RGB produces white Adding all colours in CMYK produces black Black has to be added in CMYK because CMY produces a 'muddy' brown/black/not true black ...a black cartridge is required in most inkjet printers to produce pure black on paper RGB is used for computer/screen/TV display screen whereas CMYK is used for printing Must be at least one similarity and one difference for full marks.	6

Question	Answer	Marks
10	Six from: Determine if the new application runs/operates efficiently by saving time/resources compared to the old application Determine if the new application is easy to use/can be understood by users with little extra training Compare with requirements specification to check that all requirements have been addressed/go through requirements one-by-one Determine if the new application actually meets the needs of the company Gather feedback from users of the application using questionnaires/interviews/observation techniques Check that users like the application /find the application easier to use/check whether users can suggest improvements Limitations/problem/issues of the new application are identified System/application development cycle is started again to correct/redesign/test and implement improvements	6