Cambridge International AS & A Level

INFORMATION TECHNOLOGY	**9626/32**
Paper 3 Advanced Theory	**March 2020**
MARK SCHEME	
Maximum Mark: 90	

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 March 2020 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	*Six from:* Define scope of project Create groups of activities e.g. conception/planning Create list of milestones Create list of activities between/to achieve milestones/sequence of activities Create start and finish dates/lengths of activities Create lists of dependencies/dependency map of activities/milestones Carry out critical path analysis to discover shortest/longest time of project Allows regular updates of project activities/timings Create charts/Gannt/PERT charts to show project schedule visually Use of online calendars to organise meetings/workflow/reminders.	**6**

Question	Answer	Marks
2(a)	*Three from e.g.:* Check that data has been entered into the field/box Check that the data is within pre-set ranges e.g. dates of bookings Check that the data is in the required format e.g. email address/postal code Check the data against pre-set values/lookup table of values e.g. title of customer Check that the data entered is of the required type.	**3**

Question	Answer	Marks
2(b)	*Eight from:* *Four controls from, max two marks per control:* Buttons that can be clicked to activate a task/action Submit button that sends the form to the dataset/company Reset button to clear the form so that the customer can start again Hidden buttons that are not shown/rendered by web browser/are not visible to users Carry/send/submit information that is not stored/set by HTML objects/would be lost when page submitted to server Checkboxes/on-off switches/toggle boxes (sharing the same name (e.g. choices of seating/food)) but allow multiple choices to be made …when checked attribute set the switch is 'on …only the 'on' state is submitted with form Radio buttons are mutually exclusive switches (sharing the same name) but allow only one choice to be made Radio buttons used to choose/make a choice of e.g. male/female, adult/child Text input via single line input for e.g. name Multi-line input for e.g. comments/additional requirements Authors may create two types of controls that allow users to input text. The INPUT element creates a single-line input control and the element creates a multi-line input control. In both cases, the input text becomes the control's current value Menus provides (users with) a pre-set list of options from which to choose Menus used to choose e.g. destination/departure File select allows the user to select files to submit with a form Files uploaded e.g. photograph for inclusion on ticket/booking/pass Controls use the HTML INPUT element to capture user choices/input HTML SELECT/OPTGROUP/OPTION element creates a menu/TEXTAREA creates a text input box.	8
2(c)	*Six from e.g.:* Brevity/concise display/provision of information/instructions with no more data than is necessary Simple sentence structure/complete words/affirmative sentences …no jargon/slang Consistent format for display of information so user knows where to find/look for information Labels should be right-justified and to the left of the input field Labels should be e.g. capitalised/use a colon to indicate data field Compatibility with other input screens so that user does not have to recode/re-enter data Information/input requests should be in a logical order Information/input requests should not be repeated.	6

Question	Answer	Marks
2(d)	*Four from:* Defines/focuses on/ensures the task/requirements are met Acts as a guide to/set of instructions for testing the booking screen Allows management of any changes that are needed during development of the booking screen Defines the tests that should be carried out on the booking screen Records the results of the tests for later analysis/amendment of booking screen.	**4**

Question	Answer	Marks
3(a)	*Four from:* Project/model/product is broken into several/many sub projects/models/products Model/product is partly built/built on previous iterations Top priority/essential requirements are produced first and completed Testing occurs at each iteration/incremental stage As soon as a requirement is produced/testing is complete, its development is stopped/goes no further.	**4**
3(b)	*Eight from:* *Advantages:* Each stage is an identifiable milestone to track progress Testing is carried out at each incremental stage, allowing faults/problems to be identified/rectified quickly/before final completion Testing is easier/quicker because changes are usually small at each iteration of product Client/user can see/use new features and review these for any further changes Product delivery/completion of early/working versions is faster than other methods of development Risks can be managed better since risks are identified and handled during each iteration/incremental stage Product delivery/completion of early/working versions can cost less than other methods of development *Disadvantages:* Incremental/additional changes may affect functionality of earlier versions in an unexpected manner May raise problems at the end because all requirements are not produced/created/identified in product at start Overall cost of many versions/increments can become exorbitant/excessive. *Must be at least 1 advantage and 1 disadvantage for full marks.* *1 mark available for a reasoned conclusion.*	**8**

Question	Answer	Marks
4	*Six from:* Can create/print/manufacture 'hard-to-build' objects/objects with complex geometry for space vehicles/craft/satellites (e.g. rocket nozzles, antennae) …saves weight/increases strength/rigidity of objects when printed as one part Can make designs simpler as no need to take into account the cutting tools/design create cutting tools …objects can be created with less bulk, reducing launch costs Used to create/print/manufacture replacement parts to order Used to create/print/manufacture specialist tools/medical instruments when needed No need to carry a collection of spare parts/tools so saving weight/space Low volume/one off objects can be created at low cost so reducing costs of materials and manufacturing, lowering the cost of space vehicles Models of new designs for space vehicles/parts can be quickly created Can create lattice structures instead of solid. These have reduced weight Delicate items can be printed in space to avoid stress of launch Items can be created and tested as 3D objects with no joins/welds that might be unsafe/problematic in space.	**6**

Question	Answer	Marks
5(a)	*One from:* Used as outline fonts to describe printable characters/glyphs Used as scalable graphics/svg in HTML5 on web pages Used by pen plotters to draw shapes on paper.	**1**
5(b)	*Six from:* Vector images use mathematical descriptions/expressions of shapes to create images Shapes include lines/polygons/curves/ellipses Points defined with x-y axes and direction of path Shapes and positions are recalculated every time the image is resized so quality is retained Bitmap images consist of a set number of pixels When the bitmap is resized, pixels are added/removed/the number of pixels changes so the quality is altered Lines in vector images do not get thinner/thicker proportionately when resized but those in bitmaps do so quality of bitmaps changes.	**6**

Question	Answer	Marks
6	*Eight from:* Changeover takes place in stages by replacing one part/area then another Parts of the old system are used alongside/with newly installed parts Costs of implementation can be spread over time as all hardware/software is not installed at once New systems can be used alongside old ones/form of parallel running with same stock control system to check suitability/functionality If (one/individual) new POS system does not work properly old ones can be used to avoid customer dissatisfaction at sales points Staff/user training can be carried out in stages by rotating staff around departments/areas …with trained staff assisting those being trained Staff/users can be familiarised slowly/gradually with new system and see how it works while using old one If new POS system fails at checkout there is no backup/alternative available other than to move to an old POS system at another checkout with accompanying customer dissatisfaction Complete changeover of all POS systems will take much longer than e.g. direct changeover of all POS systems Disruption to checkouts will be longer/more intensive than e.g. direct changeover of all POS systems.	8

Question	Answer	Marks
7	*Six from:* Multiple servers/source computers can be/are used without a central server BitTorrent client required on internet-connected computer to implement BitTorrent protocol Protocol works well/effectively over low-bandwidth connections BitTorrent descriptor file is used to describe file being distributed BitTorrent node set up with use of descriptor file and file to be distributed Node becomes seed for download Files made available to others for download by connection to seed/other peers File being distributed is divided into small segments/pieces Segment/piece becomes available to other peers as it is downloaded …original seed/source is relieved of load Every segment/piece is encrypted/protected by a cryptographic hash that can be used to detect changes to ensure file integrity Segments/pieces downloaded in random order/non-sequentially and re-ordered by BitTorrent client.	6

Question	Answer	Marks
8	*Eight from e.g.:* Enables distribution of internet/network traffic/television and radio signals around home Allows (remote) control of devices/TVs/devices without the need for wired connections Allows use of multiple wireless handsets to use one wired landline so no need for extra lines/connections to landline Allows use of wireless doorbells without damage to infrastructure of building/doors Allows communication without disruption/unsightliness of wires so can be used in historic buildings Allows multiple devices to connect to central points/internet access points so no need for additional internet connections/ISPs Allows easy sharing of devices/printers/scanners between computers so no need for complex configuration/setup routines/installations Allows devices to be moved around/mobility of devices while in use so user can work anywhere Allows use of (discrete) hearing aids connected to e.g. TV sets so no need for embarrassment of user/high sound volumes that disturb others Allows use of remote control/monitoring of household appliances when away from home Allows remote placement of security devices/cameras to avoid tampering/revealing placement position Can be subject to interference from electronic devices/microwave ovens/fridges so can prove unreliable Can create security issues if not set up properly so users' personal information can be at risk. *Must be at least 1 advantage and 1 disadvantage for full marks.* *One mark available for reasoned opinion/conclusion.*	8

Question	Answer	Marks
9(a)	*Six from:* If statement specifies block of code that is executed if a condition is TRUE Line 4 if statement compares 'age' with condition <10 if TRUE 'You are not old enough…'is stored in variable 'statement' if FALSE execution is passed to line 6 Else-if statement specifies a new condition to be checked if the first condition is FALSE Line 6 else if statement compares 'age' with condition <18 if TRUE 'You can go to this school' is stored in variable 'statement' if FALSE execution is passed to line 8 and "You are too old to go to this school" is stored in variable 'statement' Else statement specifies the code to be executed if condition is FALSE.	6

Question	Answer	Marks
9(b)	*Four from:* The order of Case/conditions checks in code must be logically correct/perfect …for correct /expected comparisons to be made (Switch) syntax does not follow the usual rules/colons not semi-colons so code is difficult/confusing to write/read Code can be lengthy as each condition has to be individually stated …this is repetitive and prone to error 'break' has to be manually inserted after every 'case' ….debugging problems/difficulties with 'nested' conditions 'default' condition should be included to catch/trap unexpected conditions.	**4**

Question	Answer	Marks
10	*Six from e.g.:* Adding visual special effects/computer-generated imagery (CGI) to video sequences allows for creation of images that cannot exist in reality/enhance the entertainment value Colourising monochrome/black and white film stock to increase acceptability to audiences/sales of old films Images can be improved/changed by altering colours/shades/hues to influence viewers Images can be altered to remove/include objects/people not in original scene to influence/mislead viewers Images of impossible objects/situations can be created Altering photographic images to enhance sales of products can mislead buyers Altering photographic images to people to enhance appearance can mislead fans. *Must be at least 1 of each for full marks.*	**6**