Cambridge Assessment International Education

Cambridge International AS & A Level

INFORMATION TECHNOLOGY **9626/32**

Paper 2 Advanced Theory **October/November 2021**

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 October/November 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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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	**Eight** from: Dimensions of rooms can be accurately/precisely determined using measurements/scales on palette Structure of room can be accurately plotted/drawn based on real measurements Pre-loaded/stored library of items/furniture can be used to display contents of rooms Sizes/shapes of items/furniture can be accurately/precisely customised to fit rooms Colours of items/furniture can be altered to suit design/try out combinations of colours Positions of items/furniture can be altered to try out designs Designs can be viewed in 2D to display a plan of the design 3D views can be generated to assist in visualisation of design for customer 3D view can be viewed from any angle/rotated to allow better understanding of the design/walkthrough for customer Design can be edited/amended/altered in real time to allow customer/designer to experiment with ideas/colours/positions of items/furniture Design can be printed/saved for customer/designer to refer to/come back to.	**8**

Question	Answer	Marks
2	**Five** from: A description of the test that was carried out/the purpose of the test A description of (any) special test environment that was created for the test A description of how the test was carried out A description of the expected results from the test A description of the actual results from the test A report on whether or not the software 'passes' the test/is ready for use Recommendations for retesting the software.	**5**

Question	Answer	Marks
3(a)	**Two** from: Creates cleaner/neater code Provides a single place to look for local variables Makes it easier to avoid unwanted (implied) global variables Reduces the possibility of unwanted re-declarations of variables.	**2**
3(b)	**Two** from: Avoids undefined values Creates concise code that is easier to follow/program Provides a single place to initialise variables.	**2**
3(c)	**One** from: Because it allows arbitrary/inserted code to be run It can create a security problem/issue when extra code is run.	**1**
3(d)	Local variables must be declared with the var keyword otherwise they will become global variables.	**1**

Question	Answer	Marks
4	**Seven** from: *Benefits:* It is cheap/free to use so there are no extra charges/already installed in many devices It uses less power than e.g. WiFi so no need to connect smartphone to chargers so often Easy to install/setup/pair devices/no need for lengthy passwords/connection keys Connections are 'remembered' so repeat usage is simple It is wireless so is convenient to use Can (usually) connect despite obstacles/without line of sight Has a greater range than infra-red connections/useful range for use on e.g. a desk It is short range so signals are not easy to intercept/pictures will not be stolen/copied during transmission *Drawbacks:* Connection can be 'hacked into' when devices are idle Only allows short range communication between devices Data transfer rates can be slow/variable/unpredictable for large images Has a low bandwidth compared to e.g. WiFi/cable connections Can only connect few devices at once Can lose connection due to interference/radio/opaque obstacles/other devices in vicinity Can receive cell/smart phone viruses. *Must be at least 1 of each for full marks.* *Max 5 marks if bullets/list of points.*	**7**

Question	Answer	Marks
5	**Seven** from e.g.: Use of robotic arms to move heavy/delicate parts into places where humans would have difficulties Use of robotic end effectors to carry out (repetitive) tasks e.g. fitting wheels/tightening bolts/nuts Used to install delicate/breakable items e.g. such as suction pads to install windshields/screens Used to weld/spot weld body panels with consistent accuracy/same orientation each time Used to remove unwanted materials/trim fittings consistently Used to paint areas following consistent path/using same amount of paint on each item Used to move dangerous/hot mouldings/materials such as pouring metal into engine blocks/moulds/removing items from injection moulds Use of force sensing technology when polishing surfaces Collaboration between robotic devices to carry out complex tasks e.g. placing object and then welding it. Use of robotic vision/cameras/lenses to inspect items/jobs/tasks Combining with artificial intelligence to inspect components during manufacture/assembly.	**7**

Question	Answer	Marks
6	**Eight** from: *Advantages e.g.:* Can have a physical keyboard which reduces typing errors/quicker to enter text than virtual/onscreen keyboards Have a larger storage capacity for documents/images/video Have a larger screen for viewing documents/images/videos so reduces eyestrain (May) have a CD/DVD/optical storage device built-in/no need to connect external optical device Software/applications have more features/compatible with college systems Wider range of connection ports for external devices/network connections Can be physically tethered so not easily stolen *Disadvantages e.g. :* Not so portable/bulkier than smartphone More easily damaged if e.g. dropped than smartphone Not so easy to set up reminders/not carried everywhere so reminders are missed Needs more frequent charging of battery/connection to external power supply as battery life is less than smartphone Does not make telephone calls Instant messaging is not so easy as with a smartphone. *Must be at least 2 of each for full marks.* *Must be a proper discussion for full marks.* *Max 6 marks if bullets/list of points.*	**8**

Question	Answer	Marks
7	**Eight** from: Log out of accounts/services when finished using them to stop others (following/observing) using the account Disable file-sharing to prevent unauthorised copying/access to folders/files Turn off WiFi/Bluetooth when not using it so prevent unauthorised use of connections/pairings Only use websites that use HTTPS to ensure encryption of data exchanges Use a (secure) virtual private network/VPN to ensure public connections are private/encrypted to prevent unauthorised users understanding the data/transmitted data Do not allow WiFi to auto-connect to networks/make device ‘forget’ connection after use to prevent devices making unwanted connections/connections to potential fraudulent/fake WAPs/devices Do not log into accounts via apps that hold sensitive information but use website of service and verify use of secure connection to prevent unauthorised collection/access to stored data Do not access websites that hold sensitive information/financial/healthcare accounts to prevent exchange of the data over open/unencrypted connections Do not log into WiFi/networks that are not password protected as these are usually unencrypted/may be fraudulent/fake/can be accessed by anyone.	**8**

Question	Answer	Marks
8	**Six** from: *Benefits:* Topics are very specific/restricted so focus is kept Updated to reflect real time activities/what is happening now Use short sentences/individual images so can engage users who don't have the patience to go through longer blog posts Can be impromptu/spontaneous comments/thoughts/no need to construct passages/post Takes less time that posting long structured thoughts/post on a (long form) blog Use video links rather than embedded video so viewer can choose to view/can use less powerful device to view microblog *Drawbacks*: Word count may be restricted/not much information included Microblogs may be difficult to retrieve after certain time/may not be long lived May overload viewer with information due to quickly unfolding events which may lead to crucial information being overlooked Pages are difficult/cannot be customised for use. **Must be at least 1 of each for full marks.** *Max 4 marks if bullets/list of points.*	**6**

Question	Answer	Marks
9	**Eight** from: *Advantages:* Images/graphics can be scaled without loss of quality for use on different devices/screen sizes Images/graphics support transparency Image/graphic file sizes can be/are much less than bitmap files sizes especially for large images so disk storage/server space is reduced Image/graphic file sizes can be/are much less than bitmap files size so downloading times are reduced No need for multiple versions of image/graphic at different resolutions/less pixelation Lines/edges of objects in Images/graphics are well-defined at all resolutions Can be modified/altered more easily that bitmap graphics *Disadvantages:* Image/graphic files are less easily used to store extremely complex images/photographs Image/graphic files are less easily used for images with colour gradients Image/graphic images can vary in appearance depending on application/browser used to display Image/graphic images have to be converted to raster/bitmap for display on computer screens. *Must be at least 2 of each for full marks.* *Must be a proper evaluation for full marks.* *Max 6 marks if bullets/list of points.*	**8**

Question	Answer	Marks
10	**Eight** from: *Benefits:* Complex designs can be easily customised/produced without expensive machine tooling/complex production systems Prototyping can be quick/repeated/amended without the need for expensive machine redesign Production can be cheaper than manual/conventional methods after the initial cost is covered Cost effective for small run/low volume production It reduces the need to store components as they can be 'printed' as required/on demand Reduction in conventional manufacturing machinery/machine tooling equipment/assembly lines/manufacturing space needed Increased employment of technicians to maintain printers/reduction in manual labour employees *Drawbacks:* Limited size of product that can be printed Limited range of raw materials that can be used Designs/blueprints/printing instructions can be stolen and used to make items by copyright violators/competitors Difficult to distinguish between real and fake items as blueprints/instructions and raw materials are the same Loss of manufacturing/production skills. *Must be at least 2 of each for full marks.* *Must be a proper discussion for full marks* *Max 6 marks if bullets/list of points.*	**8**

Question	Answer	Marks
11	**Eight** from: Provides (physical) connection/circuitry between computing device and transmission medium Each NIC/Ethernet card has unique (48 bit) address/media access control address/MAC address Supports high speed data transmission over network medium/cable/wireless Uses the OSI model to send signals at the physical layer, transmit data packets at the network layer and operate as an interface at the TCP/IP layer. Takes data provided by CPU and sends it to destination Translates data into form that can be transferred by medium/cable/wireless Translates data received from medium/cable/wireless into form useable by receiving computer/device Converted to/from parallel structure from/to linear structure Uses interrupts for signalling CPU that it ready to receive data for sending/has data that has been received Polled by CPU to determine if NIC has data for it to deal with CPU moves data to/from NIC to memory/uses programmed input/output of data Uses DMA to transfer data to/from main memory (via system bus) independent of CPU/controlled by device other than CPU Prepares data for transmission in form of frames/datagrams with IP address/details of destination/contents Processes bits received from the physical layer and passes to the next layer.	**8**

Question	Answer	Marks
12(a)	**Six** from: *Benefits:* Can pinpoint location of vehicle/destination with accuracy Relatively low cost/no extra cost once receiver is purchased Requires little training to use/user friendly/easy to operate No need to consult paper maps/look for directions when driving Can plot/plan routes/way points to maximise use of time/fuel efficiency Can be used to keep track of vehicle location/prove location of vehicle for deliveries *Drawbacks:* Local knowledge of locations/local terrain/roads is poor/can be inaccurate May have to purchase a separate/different version/map for large vehicles Can be a visual/auditory/manual distraction when driving Battery has limited use/must be connected to (12 V) power supply GPS is reliant on US satellite system so possibility of being interrupted at any time Can be used to track vehicles/drivers without their knowledge/consent/privacy issues. *Must be at least 1 of each for full marks.*	**6**

Question	Answer	Marks
12(b)	**Two** from e.g.: Obstacles/in tunnels obstruct/reduce strength of signal from satellite Weather degrades signals/reduces strength of/scatters signal from satellite Cannot 'see' (three) satellites with sufficient strength to gather data/gather enough data to carry out calculations Low battery power so receiver cannot function/not enough power to decode/receive signals/carry out calculations.	**2**
12(c)	**Three** from e.g.: (Amateur) astronomers for positional information when searching for astronomical bodies Cartographers/map makers for determining position of geographical landmarks/buildings/features Mobile/cell phone systems to synchronise clocks for e.g. handset handoff between cell towers when handsets move from tower to tower/cell to cell Tracking objects/goods/devices as they move Geotagging of objects to record their location Tour guide applications/websites to determine what local information to display to roaming tourists Recreational use e.g. geocaching/location-based mobile games/way marking Geologists for use in tectonics/earthquake monitoring.	**3**