OCR GCSE (J277)

Module H: Software

Workbooklet mark scheme · 5 parts · 103 marks

H1, H6 and H7 are IGCSE (Cambridge) only and not on J277.

Contents

Part	Topic	Marks
H2	What an operating system does: mark scheme	21
H3	Memory management and multitasking: mark scheme	20
H4	Peripheral management, drivers and the user interface: mark scheme	20
H5	User management and file management: mark scheme	20
H8	Utility software: defragmentation, compression and encryption: mark scheme	22
	Total	**103**

MODULE H SOFTWARE · H2

What an operating system does: mark scheme

21 marks · OCR J277 spec 1.5.1: the purpose and functionality of operating systems (user interface; memory management and multitasking; peripheral management and drivers; user management; file management)

How to use. 1 mark per bullet up to the maximum shown. **/** separates alternative answers. Words in (brackets) are not needed for the mark. Credit any other valid answer that shows the same understanding. Paging and segmentation are not required and are not needed for any mark.

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) J277 1.5.1	To manage the computer's hardware / software / resources // to control the (whole) computer system To provide a user interface // to let the user communicate with / use the computer To allow (application) programs to run // to run the booking / email programs	**1**	1 mark for any bullet, max 1. Do not accept "to make the computer work" alone (NE). Do not accept "to book appointments / send emails" (that is application software).
1(b) J277 1.5.1	Windows Icons Menus Pointer / cursor (controlled by a mouse) Touch screen input / gestures (e.g. tap, swipe) Voice / speech input Typed commands // command line Buttons / dialogue boxes / messages to the user (e.g. error messages) Accessibility settings // text size / colours can be changed	**2**	1 mark per bullet, max 2. Mark the first two answers only. Accept GUI / graphical user interface as one feature. Accept "WIMP" as one feature only. Do not accept hardware alone (e.g. "keyboard", "monitor"). Credit any other valid feature.
2(a) J277 1.5.1	Memory management transfers instructions into RAM: True Multitasking is one program used by several users: False User management controls which files each user can open: True Peripheral management creates, names and moves folders: False	**4**	1 mark per correct row. 2 ticks in a row = 0 for that row.
3(a) J277 1.5.1	A device driver is software / a program ... that lets the operating system communicate with / control the printer It translates data / instructions from the OS into a form the printer understands Each printer (model) works differently, so the OS needs the driver for this printer Without the driver the printer would not work / the OS could not send data to it	**2**	1 mark per bullet, max 2. The second bullet can be awarded without the first. Do not accept "a driver is hardware / a cable". Do not accept "to connect the printer" alone (NE).

QUESTION	ANSWER	MARKS	GUIDANCE
3(b) J277 1.5.1	The printer works much more slowly than the processor ... so data must be sent at a rate the printer can handle // the processor can carry on with other tasks while it prints Several programs / users may send data to the printer at the same time ... ... so the print jobs must be queued / sent one at a time The printer needs data in its own format, so the OS uses the driver to send it correctly The printer sends signals / messages back (e.g. out of labels / paper jam) that the OS must deal with	**2**	1 mark per bullet, max 2. A "..." point follows from the one before it. Accept "buffer" / "spooling" for holding data until the printer is ready. Do not accept "so it prints faster" alone (NE).
4(a) J277 1.5.1	When each program is opened, the OS transfers its instructions / data from secondary storage into RAM The OS allocates each program its own area / space in RAM The OS keeps each program's area separate // stops one program overwriting another program's data The OS keeps track of which memory is in use and which is free All three programs are held in RAM at once, so the processor can switch between them // the OS shares processor time between them If RAM becomes full, the OS moves data that is not being used to virtual memory (on secondary storage)	**3**	1 mark per bullet, max 3. Do not accept "the whole program is stored in the processor / in ROM". Do not accept "more memory" alone (NE). Paging / segmentation not required.
4(b) J277 1.5.1	It frees / deallocates the memory // removes the music player from RAM ... so the memory can be allocated to other programs	**1**	Accept "frees / releases the memory" or "makes it available to other programs" alone. Do not accept "moves it to virtual memory" / "saves it" / "deletes the program".

QUESTION	ANSWER	MARKS	GUIDANCE
5(a) J277 1.5.1	**User management** Each vet and receptionist is given their own (user) account Each user logs in with a username and password, so the OS knows who is using the computer Access rights / permissions are set for each account / group of accounts Receptionists are given access to the appointment files but no access to the clinical notes Vets are given access to read / edit the clinical notes // a vet can be restricted to their own notes Accounts can be added / removed when staff join / leave // security, e.g. logs users off when they are away **File management** Files can be organised into (named) folders, e.g. a folder for clinical notes and one for appointments Files can be given clear / consistent names (e.g. by animal and date) so they are easy to find Files can be moved / copied into the correct folder Files can be saved / opened / deleted / renamed Access rights can be applied to a whole folder, so new notes saved there are protected too	**6**	1 mark per bullet, max 6. Max 4 if only one function is explained. Points must be applied to the practice for full marks: max 5 if no answer refers to the vets, receptionists, clinical notes or appointment files. Do not accept "more secure" / "organised" alone (NE). Do not credit encryption / defragmentation (utility software) as user or file management.

Total: 21 marks

MODULE H SOFTWARE · H3

Memory management and multitasking: mark scheme

20 marks · OCR J277 spec 1.5.1 (memory management and multitasking: the transfer of data between memory, the allocation of memory to applications, how it allows for multitasking) and 1.2.1 (virtual memory: why it may be needed, how it works)

How to use. One mark per bullet up to the maximum shown. **/** separates alternatives; **//** separates alternative statements for the same mark. Words in (brackets) are not needed for the mark. NE = not enough. Credit any other valid answer that shows the same understanding. Paging and segmentation are not required at GCSE: do not expect them, but do not penalise a correct use of "pages".

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) J277 1.5.1	More than one program / application / task running / open at the same time // (appearing to) run several programs at once	**1**	Do not accept "doing more than one thing" alone (NE): the answer must refer to programs / applications / tasks / processes. Accept "switching between programs so they appear to run at the same time".
1(b) J277 1.5.1	Transfers instructions and data into RAM: True Every program shares the same area: False Memory of a closed program can be allocated to another: True Processor finishes one program before the next: False	**4**	One mark per correct row. A row with both boxes ticked scores 0.
2(a) J277 1.5.1	(The program's instructions / data are) transferred / loaded / copied from secondary storage / the SSD / hard drive into RAM / main memory The OS allocates / reserves (an area / amount of free) RAM / memory for the program Checks there is enough free memory (for the program) Keeps track of which (part of) memory is used by the program // records which memory is in use / free Data / instructions are transferred between RAM and the processor / CPU (as the program runs) // the CPU fetches the program's instructions from RAM Data the program needs (e.g. a video file) is loaded into RAM // data is transferred from RAM to secondary storage when work is saved	**3**	Max 3. Accept "memory" / "main memory" for RAM. Do not accept "storage" or "ROM" for RAM. Do not accept "it opens the program" / "it manages the memory" alone (NE: repeats the question). The whole program does not have to be loaded at once: credit "the parts needed".

QUESTION	ANSWER	MARKS	GUIDANCE
2(b) J277 1.5.1	(Allocates) each program its own / a separate area of RAM / memory All the open programs (and the OS) are held in RAM at the same time Keeps the programs' areas separate // stops one program overwriting / corrupting / using another program's data / memory Keeps track of which memory is in use and which is free (so it can allocate it) Frees / deallocates memory when a program closes, so it can be reused (by another program) Uses virtual memory when RAM is full, so more programs can stay open So the processor can switch quickly between the programs // without reloading them from secondary storage	**3**	Max 3. Do not accept "the laptop has enough RAM" alone (NE). Do not credit points about sharing processor time here (they belong to Question 3), unless linked to the programs being held in memory.
2(c) J277 1.5.1	Frees / deallocates / releases it // marks it as free / available // so it can be allocated to another program (e.g. the video editing program)	**1**	Do not accept "deletes it" / "saves it" / "moves it to virtual memory". Accept "adds it to the free memory (making 1.5 GB free)".
3(a) J277 1.5.1	The processor / core can only carry out / execute (instructions from) one program at a time The OS shares (out) processor time between the programs // gives each program a (short) turn / time slice The OS switches between the programs very quickly / many times a second ... so (to the user) they appear to run at the same time / simultaneously The OS decides which program runs next / how long each gets // schedules the programs (e.g. by priority) All three programs are held in RAM // memory management allows it to switch without reloading them	**3**	Max 3. The word "scheduling" is not required. Do not accept "it runs them at the same time" or "it uses more cores" (the processor has one core). Do not accept "it is fast" alone (NE).
4(a) J277 1.2.1, 1.5.1	RAM is (nearly) full // there is not enough (free) RAM for the project // only 1 GB is free but 2 GB is needed Without it, the project could not be opened / the program could crash / freeze // the editor would have to close (other) programs It provides extra memory (on secondary storage) // lets the laptop use more memory than the RAM it has	**2**	Max 2. Accept "1 GB short / 1 GB more is needed" for the first point. Do not accept "to make the laptop faster".

QUESTION	ANSWER	MARKS	GUIDANCE
4(b) J277 1.2.1, 1.5.1	Part of secondary storage / the SSD / hard drive is used as (temporary) extra memory / RAM Data / programs (or parts of them) not currently in use (e.g. the music player / web browser) are moved / transferred from RAM to virtual memory / secondary storage This frees space in RAM for the project (data) When data in virtual memory is needed again it is transferred back into RAM // (other data is moved out to make room) The processor can only use data / instructions when they are in RAM (not directly in virtual memory)	**3**	Max 3. Do not accept ROM, cache or the cloud as the location of virtual memory. Do not accept "it moves data to secondary storage" without saying it is data from RAM / not currently in use (NE for the second point). Accept "pages" for data.

Total: 20 marks

MODULE H SOFTWARE · H4

Peripheral management, drivers and the user interface: mark scheme

20 marks · OCR J277 spec 1.5.1: the purpose and functionality of operating systems: user interface (features of a user interface); peripheral management and drivers (data is transferred between devices and the processor, and this process needs to be managed)

How to use. 1 mark per bullet up to the maximum shown. **/** separates alternative words; **//** separates alternative answers for the same mark. Words in (brackets) are not needed for the mark. NE = not enough. Credit any other valid answer that shows the same understanding.

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) J277 1.5.1	Data is transferred between the peripherals and the processor: True The transfer … does not need to be managed: False A device driver is a piece of hardware fitted inside the printer: False The printer and the graphics tablet each need their own device driver: True	**4**	1 mark per correct row. 2 ticks in a row = 0 for that row.
2(a) J277 1.5.1	1 mark per bullet, max 2: (It is) software / a program … that allows the operating system to communicate with / control a (specific) hardware device / peripheral // allows the peripheral to communicate with the processor … translates (general) instructions / data from the operating system into commands / a form that the (specific) device understands … it is written for one specific device / model (of printer)	**2**	The "software" bullet alone scores 1; a second mark needs what it does. "Lets the printer work" alone = NE. Do not accept "hardware" or "a cable".
2(b) J277 1.5.1	1 mark per bullet, max 2: A device driver is specific to one device / type / model of hardware The graphics tablet is different hardware // uses different commands / data / instructions from the printer The printer driver translates into commands for the printer only // would not translate the tablet's data correctly The tablet is an input device (sends data to the processor) but the printer is an output device (receives data from the processor)	**2**	"They are different devices" alone = NE; the answer needs to link to the driver being specific or to different commands. Accept "each device has its own driver" for the first bullet.
2(c) J277 1.5.1	1 mark for one of: To fix bugs / errors (in the old driver) To add new features / support new functions of the printer So the printer still works with / is compatible with an updated operating system To fix a security weakness / vulnerability To improve the performance / reliability of the printer	**1**	Mark the first answer only. "To make it better" alone = NE. "Faster" alone = NE; accept "prints faster" / "improves performance".

QUESTION	ANSWER	MARKS	GUIDANCE
3(a) J277 1.5.1	1 mark per bullet, max 3: The operating system transfers / sends the data for the poster from the processor / memory to the printer It uses the printer's device driver ... ... to translate the data / instructions into commands the printer understands It manages the order of print jobs // holds the data in a (print) queue / buffer until the printer is ready It receives data / signals back from the printer, e.g. that it is ready / busy / out of paper / has an error It reports the printer's status / errors to the user (through the user interface)	**3**	"It manages the printer" / "it controls the printer" alone = NE (repeats the question). "It prints the poster" alone = NE. Accept "spooling" for the queue bullet.
4(a) J277 1.5.1	1 mark per bullet, max 2: Allows the user to communicate / interact with the computer / hardware / software Receives / takes input (commands) from the user Displays / gives output / feedback to the user, e.g. error messages Hides the complexity of the hardware from the user // lets the user use the computer without knowing how the hardware works	**2**	"Lets the user use the computer" alone = NE. "Makes it easy to use" alone = NE.
4(b) J277 1.5.1	1 mark each, max 2: Windows Icons Menus Pointer / mouse pointer / cursor Buttons Dialogue boxes, e.g. an Open file box Folders shown graphically // a file browser / explorer window Search box / bar Double-click // drag and drop // touch / tap on screen	**2**	Mark the first two answers only. Two answers that are the same feature = 1 mark. Accept "WIMP" for 1 mark only. Do not accept hardware alone, e.g. "mouse", "keyboard", "monitor". Do not accept "command line".

QUESTION	ANSWER	MARKS	GUIDANCE
5(a) J277 1.5.1	1 mark per bullet, max 4: The operating system has detected the scanner (but) does not have the driver for it Without the driver the operating system cannot communicate with / control the scanner ... the operating system's instructions cannot be translated into commands the scanner understands // the scanner's data cannot be understood by the operating system ... so data cannot be transferred (managed) between the scanner and the processor The correct / matching device driver for this scanner must be installed (before it can be used) e.g. downloaded from the scanner manufacturer's website // installed from a disc / download supplied with the scanner // found / installed automatically by the operating system The driver may need to be compatible with the computer's operating system (version) The message is the user interface giving feedback to the user (about the device)	**4**	Max 3 if the answer does not say that the correct driver must be installed. "It needs a driver" alone = 1 mark (the installing bullet); a reason is needed for further marks. Do not accept "the scanner is broken" or "the scanner needs to be restarted".

Total: 20 marks

MODULE H SOFTWARE · H5

User management and file management: mark scheme

20 marks · OCR J277 spec 1.5.1: the purpose and functionality of operating systems: user management (e.g. allocation of an account, access rights, security) and file management (e.g. naming, allocating to folders, moving files, saving)

How to use. 1 mark per bullet up to the maximum shown. **/** separates alternative words; **//** separates alternative answers for the same mark. Words in (brackets) are not needed for the mark. **...** means the point builds on the one before. Credit any other valid answer that shows the same understanding.

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) J277 1.5.1	Username / user ID / login name Password Access rights / permissions (to files, folders or programs) Account type / level, e.g. standard user (Own) folder / storage area for the user's files (Own) settings / desktop / preferences	**2**	1 mark per bullet, max 2. Mark the first answer on each line. Credit any other valid account item. Do not accept "a login" / "an account" alone (repeats the question). Do not accept "security" alone (NE).
1(b) J277 1.5.1	Administrator / admin (account) // an account with the highest / full access rights // an account that is allowed to create / manage other users' accounts	**1**	Accept superuser / root. Do not accept "an account with more access" alone (NE). Do not accept "manager account" / "main account" (NE) or "standard user".
2(a) J277 1.5.1	Edit vs view only: True Record of where each file is stored: True Copying removes it from its folder: False Folder inside another folder: True	**4**	1 mark per correct row. 2 ticks in a row = 0 for that row.
3(a) J277 1.5.1	Stops someone (unauthorised) from trying / guessing lots of passwords (until one works) ... so they cannot log in to the account // cannot access / open / change / delete that user's files The locked account can only be used again after it is unlocked (e.g. by an administrator / after a set time) // the user / administrator can be alerted that someone tried to log in	**2**	1 mark per bullet, max 2. Do not accept "stops hackers" / "makes it more secure" alone (NE). Do not credit answers that say locking the account encrypts the files.
4(a) J277 1.5.1	Copy (and paste) // copying (the file)	**1**	Accept "duplicate". Do not accept move / cut / save / rename.
4(b) J277 1.5.1	Moving puts the file in the new folder / location and removes it from the original folder // after a move there is only one file Copying makes a second / duplicate file in the new folder / location and leaves the original where it was // after a copy there are two (identical) files	**2**	1 mark per bullet. One clear contrast that covers both sides (e.g. "moving takes the file out of the first folder but copying leaves it there") = 2 marks. Do not accept "copying makes it twice" without saying the original stays.

QUESTION	ANSWER	MARKS	GUIDANCE
4(c) J277 1.5.1	Gives the file its name (and file type / extension) Stores / writes the file (data) to secondary storage // places it in the chosen folder (Accounts) Records where the file is stored // updates the folder (structure) to include it ... so it can be found / opened later Checks the user has the access rights / permission to save in that folder Checks / warns if a file with the same name is already in that folder	**2**	1 mark per bullet, max 2. Do not accept "stores it in RAM" / "stores it in memory" for the second point. Do not accept "saves it" alone (repeats the question).
5(a) J277 1.5.1	Each member of staff has their own user account (with a username and password) ... so the operating system knows who is logged in // who is trying to open a file The manager uses an administrator account to set / change the access rights Access rights / permissions are set for each folder / file, for each user or group of users The bookkeeper is given read and write / edit access to Accounts The planners are given no access to Accounts // the OS refuses / blocks a planner who tries to open Accounts The planners are given read and write / edit access to Clients The bookkeeper is given read-only access to Clients The planners can be put in a group, so their access rights are set once for the whole group Passwords stop one member of staff logging in as another (to get round the access rights)	**6**	1 mark per bullet, max 6. Answers that only repeat the manager's four needs, without saying how the operating system controls access (user accounts / access rights / permissions / read-only), max 2. Accept "full access" for read and write; accept "view" for read. Do not credit encryption, firewalls or anti-malware (not user or file management). Do not accept "lock the folder" alone (NE).

Total: 20 marks

MODULE H SOFTWARE · H8

Utility software: mark scheme

~25 minutes · 22 marks · OCR J277 spec 1.5.2

How to use. 1 mark per bullet up to the maximum shown. **/** separates alternative answers; **//** separates alternative statements for the same mark. Words in (brackets) are not needed for the mark. **NE** = not enough. **BOD** = benefit of the doubt. Spec points covered (J277 1.5.2): the purpose and functionality of utility software; encryption software, defragmentation and data compression, and why each is required; computers often come with utility software that performs housekeeping tasks; utility software is needed for additional tasks that may not be carried out by an operating system. Q1 also uses OS functions from 1.5.1. This part is OCR only: Cambridge 0478 4.1.1 needs utility software only as a type of system software (tested in H1), and does not name defragmentation.

QUESTION	ANSWER	MARKS	GUIDANCE
1 J277 1.5.2, 1.5.1	Rearranges the hard disk so the parts of each file are together: utility software Decides how much RAM each running program is given: operating system Reduces the size of a large video file: utility software Gives each person their own account and login: operating system	**4**	1 mark per correct row. Two ticks in a row = 0 for that row. Rows 1 and 3 are defragmentation and compression (1.5.2); rows 2 and 4 are memory management and user management (1.5.1).
2(a) J277 1.5.2	The parts of each file are in consecutive blocks, in order (A1 A2 A3 together, B1 B2 B3 together, C1 C2 together) All four free blocks are grouped together in one place (e.g. blocks 9 to 12) Example answer: 1 2 3 4 5 6 7 8 9 10 11 12 A1 A2 A3 B1 B2 B3 C1 C2	**2**	1 mark per bullet. Accept the files in any order (e.g. C, then A, then B) and the free space at the start instead of the end, as long as the free space is one group. Do not award mark 1 if a block is missing or repeated, or if the parts of any file are split up or out of order. Mark 2 can be awarded even if mark 1 is not, if 8 blocks are filled and 4 free blocks are together.
2(b) J277 1.5.2	Before: the read/write head has to move to several different places on the disk (blocks 1, 4 and 8) to read File A After: the parts of File A are next to each other // in consecutive blocks, so the head reads them in one go / without jumping around The head makes fewer movements // moves a shorter distance ... so less time is spent moving the head // File A is read / opened faster	**2**	1 mark per bullet, max 2. The fourth bullet needs a point about head movement first. "The file is faster" / "the computer is faster" alone = NE. Do not award answers saying the head moves faster (it is the same head speed; it moves less), or that the file gets smaller.

QUESTION	ANSWER	MARKS	GUIDANCE
3 J277 1.5.2	Defragmentation makes each file smaller: False Encryption stops data from being intercepted: False A compressed file can usually be sent more quickly: True Defragmentation is not needed on a solid-state drive: True	**4**	1 mark per correct row. Two ticks in a row = 0 for that row. Row 1: defragmentation moves the parts of files; it does not change file size (that is compression). Row 2: encryption does not stop interception; it means intercepted data cannot be understood without the key. Row 4: a solid-state drive has no moving read/write head, so fragmented files do not slow access in the same way.
4(a) J277 1.5.2	Compression software reduces the (file) size of the folder / drawings ... so the folder can fit within / under the 25 MB attachment limit // so it can be sent by email (when it is 30 MB it cannot) The smaller file takes less time to upload / send / download // is transferred faster across the network / internet Uses less bandwidth / data when it is sent Takes up less storage space (in the email accounts / on the client's computer) The folder can be compressed into a single file // one attachment instead of many files	**3**	1 mark per bullet, max 3. "Makes it smaller" = BOD for bullet 1 if the context is the folder / files. "Faster" alone = NE: must say what is faster (sending / uploading / downloading). The second bullet needs the size reduction (bullet 1) to be stated or clearly implied. Do not award points about losing quality or "losing data": building drawings would not be sent with lossy compression. Credit any other valid point.
4(b) J277 1.5.2	The files take up less storage space (on the server) // more projects / files can be stored on the server // saves buying more storage	**1**	Any one. "Saves space" = BOD. "Faster to send" = 0 here (the files are being stored, not sent). "To keep them safe / secure" = 0 (that is not what compression does). Credit any other valid answer (e.g. backups of the server take less space / time).
5(a) J277 1.5.2, 1.3.2	Encryption software scrambles / encodes / changes the contract (using a key / an encryption algorithm) Anyone who intercepts it cannot understand it // it is meaningless ... without the (correct) key Only the client (who has the key) can decrypt it / turn it back into the original contract	**2**	1 mark per bullet, max 2. "Cannot be read / accessed / opened" alone = NE: intercepted data can still be read; it cannot be understood. Do not award "stops it being intercepted" / "stops hackers getting it": encryption does not stop interception. "Locks the file" = NE. Symmetric / asymmetric (public / private) keys are not needed for OCR; credit if correct but not required.

QUESTION	ANSWER	MARKS	GUIDANCE
5(b) J277 1.5.2, 1.3.2	The (correct / decryption) key	**1**	Accept "the key used to decrypt it" / "the private key". "A password" alone = NE. Do not accept "encryption software" alone or "the internet".
6 J277 1.5.2	Utility software carries out additional / housekeeping / maintenance tasks that the operating system may not carry out (itself) Without defragmentation, the hard disk becomes (more) fragmented (as files are saved, edited and deleted) ... so files / drawings take longer to open Without compression software, files such as the drawings take up more storage space // may be too large to email / take longer to send Without encryption software, contracts / client data that are intercepted or stolen could be understood	**3**	1 mark per bullet, max 3. Max 2 if no utility is linked to the practice's computer or files (the question asks for this). Naming a utility with no reason (e.g. "it needs defragmentation") = NE. Accept other utilities (e.g. anti-malware, backup, disk clean-up) if a valid housekeeping reason is given. "The OS cannot do everything" alone = BOD for bullet 1.

Total: 22 marks