MODULE B MEMORY AND STORAGE · B2

Virtual memory: mark scheme

Mark scheme · ~25 minutes · 20 marks · OCR J277 spec 1.2.1

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

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) J277 1.2.1	(An area / part of) secondary storage / the hard drive / SSD ... ... used as (if it were) (extra) RAM // used when RAM is full	**2**	Max 2. Do not accept "storage used when memory is full" without naming secondary storage (NE). Do not accept "extra RAM chips" / "part of the CPU".
1(b) J277 1.2.1	RAM is limited in size // 8 GB may not be enough RAM may become full with the (four) programs (and their data) open at once Virtual memory gives extra space so more programs / data can be open // so another program can be loaded Stops the computer crashing / refusing to open programs when RAM is full	**3**	1 mark per bullet, max 3. At least one point should be applied to the scenario (several large programs open). Do not accept "to store files" / "for backup".
1(c) J277 1.2.1	Data for the spreadsheet, which has not been used for two hours	**1**	2+ ticks = 0 marks. The saved project files are already on secondary storage: they are not virtual memory (a confusion noted in OCR examiners reports).
2 J277 1.2.1	(The operating system) uses / sets aside part of secondary storage as virtual memory Data / programs (in RAM) not currently in use are identified ... ... and moved / transferred from RAM to virtual memory This frees space in RAM The photo editing program is loaded into (the freed space in) RAM When the moved data is needed again it is moved back into RAM (and other data may be moved out)	**4**	1 mark per bullet, max 4. Paging is not required at GCSE: credit correct use but do not require it. Do not accept "the photo editor runs from virtual memory" / "the CPU uses data in virtual memory". Do not accept "primary storage" in place of RAM for the move back.
3 J277 1.2.1	Keep files when switched off: False Moved back into RAM when needed: True Part of the CPU: False Slower to access than RAM: True	**4**	1 mark per correct row. 2 ticks in a row = 0 for that row.

QUESTION	ANSWER	MARKS	GUIDANCE
4(a) J277 1.2.1	Virtual memory is on secondary storage, which is slower to access than RAM Data must be moved back into RAM before the CPU can use it Lots of data is swapped / moved back and forth between RAM and virtual memory, which takes time	**2**	1 mark per bullet, max 2. Do not accept "virtual memory is slower" without saying it is on secondary storage / slower to access than RAM (NE). Do not accept "it is further away" (NE).
4(b) J277 1.2.1	More programs / data can be held in RAM at once ... ... so less / no virtual memory is needed // less data is swapped to and from secondary storage ... so less time is spent transferring data // the CPU gets the data it needs from RAM (which is faster to access)	**2**	1 mark per bullet, max 2. Do not accept "RAM is faster" alone (NE).
5 J277 1.2.1	The program (and its data) always fits in RAM // RAM never becomes full ... ... so no data would ever need to be moved out of RAM // virtual memory would never be used It only runs one (small) program // never opens other programs So it would give no improvement // could only add cost / use storage for no benefit	**2**	1 mark per bullet, max 2. "No" / "it would not improve it" alone scores 0: the "no improvement" mark needs a reason (RAM never full / VM never used). Must be applied to the barrier system.

Total: 20 marks