

1 A student is creating a presentation containing images and sound.

The student wants to use a secondary storage device to move their files to their home computer.

Identify whether the student should use an optical or solid-state type of secondary storage device. Justify your choice.

Optical or solid-state

Justification -----

[4]

2 A musician uses a computer to make and record music.

The musician has run out of storage space on their secondary storage device and needs to buy a replacement.

i. Identify whether the musician should buy a magnetic secondary storage device or a solid state secondary storage device for their computer.

Justify your choice.

Type -----

Justification -----

[4]

ii. Identify **one other** type of secondary storage.

[1]

iii. Tick (✓) **one** box to identify the smallest secondary storage capacity.

2.1 GB

300 MB

200 000 KB

0.0021 TB

[1]

iv. The musician's recordings have an average (mean) file size of 3 MB. The musician has 1000 recordings.

Calculate an estimate of the storage space in GB that the 1000 files will require, assuming they are each 3 MB in size. Show your working out.

Working space:

Answer: GB

[2]

3 An artist has a computer that they use to create images.

Their computer has both hardware and software.

The hardware includes primary and secondary storage.

- i. Explain why a computer needs both primary **and** secondary storage.

[2]

- ii. Give **one** example of a secondary storage device that the artist’s computer will have **and** an example of the data that will be stored on it.

Secondary storage device -----

Example data -----

[2]

- iii. The computer has Virtual Memory (VM).

The table has four statements about VM. Not all of the statements are correct.

Tick (✓) the **True** column for the statements that are correct.

Re-write any statement that is incorrect in the **False** column by changing the statement to make it true.

Statement	True (✓)	False – rewrite the statement to make it true
A section of primary storage is partitioned to act as virtual memory		
Data from ROM is transferred into VM		
VM is needed when RAM is full, or nearly full		
Data from VM is transferred back to secondary storage when needed		

[4]

4 A smart television has secondary storage.

i. State, using an example, why the smart television needs secondary storage.

[2]

ii. Identify **one** appropriate type of secondary storage for the smart television. Justify your choice.

Secondary storage type -----

Justification -----

[4]

5(a) Charlie has purchased a new tablet computer. The tablet has an internal secondary storage device.

Describe what the internal secondary storage device will store.

[2]

(b) The storage device is a solid state device.

i. Give **three** benefits of the tablet having a solid state device instead of a magnetic device.

1 _____

2 _____

3 _____

[3]

ii. Give **two** drawbacks of the tablet having a solid state device instead of a magnetic device.

1 _____

2 _____

[2]

6 A computer system has a 2.5 GHz processor and 5 GB of RAM.

Complete the paragraph about memory by writing the missing terms in the spaces, using the words provided.

cache	data	hard drive	instructions	changed	closing
operator	primary	random	read	secondary	start-up
translator	memory stick	virtual	write		

ROM stands for only memory. This stores the

instructions for a computer and cannot be

RAM stands for access memory. This stores the instructions and

..... that are currently being used. If the computer does not have enough

RAM to run a process it can make use of memory.

RAM and ROM are both examples of memory. Memory located close

to the processor that allows faster access than from RAM is called

memory.

[8]

7(a) Nina wants to transfer photos from a digital camera to an external secondary storage device.

Define what is meant by 'secondary storage'.

----- [1]

(b) Identify the **three** common types of storage Nina can choose from.

1 -----
2 -----
3 -----

[3]

(c) State **four** characteristics of secondary storage devices that Nina should consider when choosing a device.

1 -----
2 -----
3 -----
4 -----

[4]

8(a) Vicky has been on holiday and has taken lots of photos. The memory in her camera is now full and she needs to transfer her photos to an external secondary storage device.

Define what is meant by 'secondary storage'.

[1]

(b) Identify the **three** common storage technologies Vicky can choose from.

[3]

(c) State **four** characteristics of secondary storage devices that Vicky should consider when choosing a device.

[4]

9 A restaurant has a computer-based ordering system which is running slowly. A technician has said that the hard disc drive is fragmented.

Explain how defragmentation software could overcome the issue of the slow computer system.

[3]

10(a) A law firm currently use a Local Area Network (LAN) linked to a Wide Area Network (WAN). They want to upgrade their system to utilise cloud storage.

Explain **two** disadvantages to the law firm of storing their data in the cloud.

[4]

(b) Explain **two** advantages to the law firm of storing their data in the cloud.

[4]

END OF QUESTION PAPER

Mark Scheme

Question	Answer/Indicative content	Marks	Guidance
1	<p>No mark for choice 1 mark per bullet to max 4 for matching justification</p> <p>Solid-state choice e.g.</p> <ul style="list-style-type: none"> • Durable/robust // Less likely to be damaged/break • ... no moving parts // because it does not get scratched like a disk • Larger capacity (than optical) // store more data • ... needed because the files could be very large // there could be many files to transfer // store large number of files • Portable • ... small in (physical) size // lightweight • Fast to read/write/access data • More compatible • ... no additional device/drive is needed <p>Optical choice e.g.</p> <ul style="list-style-type: none"> • Large (enough) capacity // store sufficient data // BOD larger capacity • ... needed because the files could be very large // there could be many files to transfer // store large number of files • Portable • ... small in (physical) size // lightweight • Cost per unit is less // Cost for the same amount of storage is less • The fast access/read/write speed is not required • ... files are being copied not run direct from the storage 	4	<p>Accept type by example.</p> <p>No choice – check justification for clearly stated choice and then award justification. No clear choice then 0 marks.</p> <p>Allow justification marks for using one, or not using the other.</p> <p>SS – BOD faster to transfer the data for read/write/access SS – BOD more 'efficient' to read/write/access. SS – accept optical may only be able to be written to once.</p> <p>Do not accept longevity/reliability.</p> <p><u>Examiner's Comments</u></p> <p>Candidates were often able to justify the type of storage that they selected.</p> <p>Solid-state was most commonly selected, with responses identifying the small size, durability, portability and large capacity. Some candidates stated that it was faster than optical, without referencing what it is faster at, i.e. reading/writing data.</p> <p>Some candidates accurately justified solid-state, by identifying that it had sufficient capacity for the files and that it was portable.</p> <p>The stronger responses justified the choices for the given scenario, identifying that images could have large file sizes so the solid-state would be more likely to hold all of the required files, or that the need to transport that device might damage an optical disk by scratching it.</p>
	Total	4	
2	<p>i</p> <p>No mark for type. Accept the type by example e.g. HDD for magnetic.</p> <p>1 mark each for each point matching to type given to max 4</p> <p>Magnetic e.g.</p> <ul style="list-style-type: none"> • (Usually) cheaper cost to purchase per unit of data • Sufficient/good durability for what is 	4	<p>MP1 needs to be cost per unit e.g. it costs less per GB than other storage types. Not just 'it is cheap to buy'.</p> <p>Allow reverse argument for each e.g. for magnetic, why they have not chosen solid state. For example: 'magnetic is not as robust but the computer will not be moved' gets 1 mark for the not moving, and 1 mark for solid</p>

Mark Scheme

Question	Answer/Indicative content	Marks	Guidance
	<p>needed</p> <ul style="list-style-type: none"> • ... computer unlikely to move (regularly) // by example • Sufficient/fast speed of access • ... no significant delays in storing/reading data • (Long-term) reliable // longevity • ... unlikely to need to purchase another //unlikely to break from over-use • High capacity • ... e.g. file size of sound files can be large // allows the musician to store files with higher bit depth <p>Solid state e.g.</p> <ul style="list-style-type: none"> • Cost often equates to magnetic per quantity // not expensive per unit of data • Durable // robust // no moving parts • ... so computer can be moved without risk of losing data • Fast speed of access of data • ... no significant delays in storing/reading data // musician does not have to wait for files to load/store • High capacity // (nearly the) same/higher capacity than magnetic • ... file size of sound can be large • Small in physical size • ... device is portable // can fit in a smaller type of computer • Produces less sound when running • ... so the musician distracted • Requires little/less power (compared to others) • ... so running costs are reduced • Drives do not get fragmented files • ... drives do not need to be defragged // constant access time 		<p>state's robustness is not required.</p> <p>If there is no type give on line 1. Read the answer to look for a type and then award justification.</p> <p>If there is not type identified anywhere in the answer, 0 marks.</p> <p><u>Examiner's Comments</u></p> <p>This question required candidates to identify which of the two choices they would make and to justify their choice. Either choice was appropriate and candidates were given marks for explaining why they had made the choice they did.</p> <p>There was no common choice with both often being selected.</p> <p>Choices were often suitably justified. Common points included the amount of data that could be stored with some candidates also linking this to the need for sound files to have a high capacity. Candidates often identified that solid state has a faster access speed than magnetic, although some responses just stated that it was faster without identifying what it was faster at.</p> <p>When justifying solid state candidates often identified the robustness of the device and linked this to the musician possibly needing to move the device.</p> <p>Magnetic justifications often identified that although they had slower access speed than solid state this would still be sufficient. They also identified that it does have moving parts, but if the device is not being moved then the durability of solid state is also not required.</p> <p style="text-align: center;"> Misconception</p> <p>A misconception is that solid state devices have more longevity than magnetic, that they have an unlimited life span and will outlast magnetic.</p>

Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
	ii	1 mark for Optical	1	<p>BOD optic. Do not award an example of optical storage</p> <p><u>Examiner's Comments</u></p> <p>Some candidates found this question challenging and were not able to give a different type of secondary storage, often repeating magnetic or solid state from the question. Candidates quite often did not provide a response to this question.</p>
	iii	1 mark for 200 000 KB	1	<p>2+ ticks = 0 marks</p> <p><u>Examiner's Comments</u></p> <p>Some candidates were able to correctly identify the smallest capacity of 200 000KB. 300MB was often inaccurately selected.</p>
	iv	<p>1 mark for the answer 3 GB</p> <p>1 for working e.g.</p> <ul style="list-style-type: none"> • $3 * 1000 / 1000$ • $3 * 1000$ • $3000 / 1000$ • $3 / 1000$ • $0.003 * 1000$ 	2	<p>Allow 2.9296875 (or approximated) for division by 1024.</p> <p>Allow addition of metadata e.g. 10% added. This can be awarded for both working and answer.</p> <p>Not all of the working needs to be correct to get the working mark.</p> <p>Ignore mention of MB/GB in the working.</p> <p><u>Examiner's Comments</u></p> <p>Candidates were often able to gain a mark for partial working, for example by multiplying 3 and 1000 even if other parts of the working then performed incorrect calculations.</p>
		Total	8	

Mark Scheme

Question	Answer/Indicative content	Marks	Guidance
3	<p>i</p> <p>1 mark each</p> <p>Primary</p> <ul style="list-style-type: none"> • to store (active) data/instructions/software/OS that the processor needs to access // without primary the computer won't be able to start up/work // (ROM) so the start-up instructions are not deleted when the computer turns off // (RAM) to store the currently running data/software/instructions // (Cache) to store frequently used data/instructions <p>Secondary</p> <ul style="list-style-type: none"> • to store data/files long-term/permanently // without secondary the user's files will not be stored when the power is turned off // store data not currently being used 	2	<p>Question is not what they store, but why they are needed.</p> <p>Secondary NBOD 'to backup data' without reference to the long-term/permanence</p> <p><u>Examiner's Comments</u></p> <p>Some candidates found this question challenging and often gave examples of each type of storage instead of answering why both are required. Some candidates were able to accurately describe the purpose of primary storage as storing currently running data and software.</p> <div style="text-align: center;">  <p>Misconception</p> </div> <p>A common misconception was that secondary storage is used when primary storage is full, or that it is only used as a backup.</p>
	<p>ii</p> <p>1 mark for device, 1 mark for data</p> <ul style="list-style-type: none"> • Hard drive // SSD // USB (memory) stick // Flash memory card // CD // DVD etc. • E.g. Images created // documents // software // files // data moved from RAM to virtual memory 	2	<p>Allow any secondary device. BOD 'optical disc'</p> <p>Question asks for device not type of device e.g. magnetic/optical/solid state is NE.</p> <p>Award example even if incorrect secondary storage.</p> <p>USB on its own is NE</p> <p><u>Examiner's Comments</u></p> <p>Candidates were required to identify a secondary storage device. Some responses identified a type of storage media (for example magnetic) instead of identifying a device (for example hard drive). Some responses gave RAM or ROM as a secondary storage device. These responses were incorrect.</p> <p>The example data varied but many responses were able to identify the storage of files, the images or software.</p>

Mark Scheme

Question		Answer/Indicative content			Marks	Guidance
	iii	1 mark for each row.			4	<p>Allow a description of the error in column 2, e.g. in row 1: 'primary should be secondary'</p> <p>Accept HDD/SSD for secondary storage for the 1st row.</p> <p>Do not accept primary for RAM (rows 2 and 4).</p> <p><u>Examiner's Comments</u></p> <p>In this question candidates needed to consider each statement, identify whether it was true or false and if it was false re-write the statement about virtual memory to make it true.</p> <p>Candidates commonly identified the third statement as being true.</p> <p>The first statement was often correctly altered to identify that secondary storage was used. The second statement was sometimes changed correctly to RAM, but at other times was changed to secondary storage.</p> <p>The final statement was often changed to primary storage, which was not enough because primary storage would include ROM and cache, therefore not being precise enough to describe how VM works.</p>
		Statement	True (✓)	False – rewrite the statement to make it true		
		A section of primary storage is partitioned to act as virtual memory		A section of secondary storage is partitioned to act as virtual memory		
		Data from ROM is transferred into VM		Data from RAM is transferred into VM		
		VM is needed when RAM is full, or nearly full	✓			
		Data from VM is transferred back to secondary storage when needed		Data from VM is transferred back to RAM when needed		
		Total			8	

Mark Scheme

Question	Answer/Indicative content	Marks	Guidance
4	<p>i</p> <p>1 mark for example e.g. the OS, web browser software, recorded show, user preferences</p> <p>1 mark for</p> <ul style="list-style-type: none"> • To store data once the computer is turned off / permanently // for non-volatile storage 	2	<p>Allow 2 marks by example, e.g.</p> <p>“To install software that will not be lost when the TV is turned off” gets 1 mark for software and 1 mark for not being lost when turned off.</p> <p>Do not award brand names without exemplification.</p> <p><u>Examiner’s Comments</u></p> <p>This question was answered well by many candidates.</p> <p>Many candidates correctly identified an example, most commonly downloaded videos, the operating system, or applications. Fewer were able to expand this as to why, for example stating that it was needed for the computer to work.</p> <div style="text-align: center;">  <p>Misconception</p> </div> <p>A common misunderstanding was that it is needed as a backup for when the television fails.</p>

Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
	ii	<p>1 mark for choice either magnetic or solid state</p> <p>1 mark per bullet to max 3 for justification e.g. Magnetic:</p> <ul style="list-style-type: none"> • Large storage capacity • ... for storing software/videos/HD • Television unlikely to be moved • ... therefore durability/portability not required • Cost to purchase is low • ... so the TV will be cheaper to manufacture/purchase • Device will fit in a tv // device is small • Longevity // reliable <p>Solid state:</p> <ul style="list-style-type: none"> • Large storage capacity • ... for storing software/videos/HD • Television may be moved • ... therefore durable/robust/portable • Fast data access • ... television will be more responsive • Cost to purchase is low • ... so the TV is not too expensive to manufacture/purchase • Run quieter • Produce less heat • Use less energy • Compact // lightweight • ... so tv can be made smaller / lighter 	4	<p>Do not award specific device, e.g. hard disk. Question asks for type. But then FT for justification to max 3. If device and type given award, e.g. solid state drive, SSD, magnetic hard disk drive.</p> <p>Mark first secondary storage type given.</p> <p>No secondary storage type, read justification for a type. Do not award this but mark justification (Max 3).</p> <p>Justification must match choice.</p> <p>If type is inappropriate e.g. optical, do not award.</p> <p><u>Examiner's Comments</u></p> <p>Many candidates were able to correctly justify their choice of secondary storage.</p> <p>A few candidates gave a type of storage, instead giving a specific device such as a hard drive.</p> <p>There were some good examples of application in responses. For example, expanding the feature of high capacity to the need to download high-definition movies which can take up large amounts of storage. Another application commonly given was the need for a responsive television which was provided by the fast data access speeds.</p>
		Total	6	

Mark Scheme

Question		Answer/Indicative content	Marks	Guidance	
5	a	1 mark per bullet to max 2 <ul style="list-style-type: none"> • Software / applications / programs • ...including OS • files 	2	Allow each by example such as text files/images. Data is NE Instructions is NE	
	b	i	1 mark per bullet to max 3 <ul style="list-style-type: none"> • faster access/read/write speed • Smaller in physical size // more compact // weighs less • More durable/robust • Uses less power • Runs cooler • Quieter when running 	3	Portable is NE no moving parts is NE on its own
		ii	1 mark per bullet to max 2 <ul style="list-style-type: none"> • limited number of read/write times • more expensive (per byte) • (usually) smaller capacity 	2	
		Total	7		
6		1 mark for each completed space ROM stands for read only memory. This stores the start-up instructions for a computer and cannot be changed . RAM stands for random access memory. This stores the instructions and data that are currently being used. If the computer does not have enough RAM to run a process it can makes use of virtual memory. RAM and ROM are both examples of primary memory. Memory located close to the processor that allows faster access than from RAM is called cache memory.	8	read start-up changed random data virtual primary cache	
		Total	8		

Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
7	a	<ul style="list-style-type: none"> • Long term/non-volatile storage of data/files • External/auxiliary storage of data 	1 (AO1 1a)	1 mark only to be awarded for a correct definition.
	b	<ul style="list-style-type: none"> • Optical • Magnetic • Solid state 	3 (AO1 1a)	1 mark only to be awarded for each correct definition.
	c	<p>Four characteristics from:</p> <ul style="list-style-type: none"> • Capacity/size • Speed • Portability • Durability • Reliability • Cost 	4 (AO1 1b)	1 mark to be awarded for each correct characteristic to a maximum of 4 marks.
		Total	8	
8	a	<ul style="list-style-type: none"> • Long term/non-volatile storage of data/files • External/auxiliary storage of data 	1	1 mark only to be awarded for a correct definition.
	b	<ul style="list-style-type: none"> • Optical • Magnetic • Solid state 	3	1 mark only to be awarded for each correct definition.
	c	<p>Four characteristics from:</p> <ul style="list-style-type: none"> • Capacity/size • Speed • Portability • Durability • Reliability • Cost 	4	1 mark is to be awarded for each correct characteristic to a maximum of 4 marks.
		Total	8	
9		<ul style="list-style-type: none"> • Files on the hard disc drive are moved (1) • Empty spaces collected together (1) • Files are moved to be stored together (1) • Fewer disc accesses are needed (1) 	3	Up to a maximum of 3 marks.
		Total	3	

Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
10	a	<p>Two disadvantages from:</p> <ul style="list-style-type: none"> • You need a constant internet connection (1) which lawyers who travel a lot may not always have (1) • Reliant on third party to carry out security procedures (1) but the firm are still legally responsible if things go wrong (1) • Reliant on third party for back up connection (1) • Data stored in the cloud will be vulnerable to hacking and other threats (1) which the firm have no control over (1) • Issues regarding data ownership (1) • Implications of Data Protection Act (1) <p>Each disadvantage need to be contextualised to gain 2 marks</p>	4	<p>1 mark is to be awarded for each correct disadvantage with a mark for a discussion of the disadvantage related to the law firm. To a maximum of 2 disadvantages.</p> <p>The total number of marks to be awarded for this task is 4 marks.</p> <p>Responses which are not contextualised will gain a maximum of 1 mark per disadvantage (to a maximum of 2 disadvantages)</p>
	b	<p>Two advantages from:</p> <ul style="list-style-type: none"> • It would offer additional storage (1) so the firm can take on more cases (1) • It is a very efficient method of backing up data (1) and so saves the firm time and money (1) • It would allow their employees to work from anywhere (1) so they can take cases from other countries (1) • It is environmentally friendly (1) • Easy to increase availability of storage (1) • You don't need specialist network skills (1) so the firm don't need to employ more staff (1) • The third party provides security (1) so the firm saves money on staff and software/hardware (1) • The third party provides backup (1) so the firm saves money on staff and software/hardware (1) • Cheaper as don't need own infrastructure (1) <p>Each advantage needs to be contextualised to gain 2 marks.</p>	4	<p>1 mark is to be awarded for each correct advantage, with a mark for a discussion of the advantage related to the law firm. To a maximum of 2 advantages.</p> <p>The total number of marks to be awarded for this task is 4 marks.</p> <p>Responses which are not contextualised will gain a maximum of 1 mark per advantage (to a maximum of 2 advantages)</p>
		Total	8	