

1 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		
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[4]

2 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]

3(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]

4 Layla is an artist. She draws images by hand. The image is then scanned and stored on a computer.

Layla stores her images on a secondary storage device.

i. Each image has a fixed size of 1 MB. The storage device has a capacity of 3 GB.

Calculate how many images can be saved on the storage device. Show your working.

_____ images

[2]

ii. Layla uses the images to make videos. These videos are stored on her computer’s internal storage device.

Identify the most appropriate type of storage device for Layla to use in her computer. Justify your choice.

Type of storage device

Justification

[3]

iii. The videos include sound. The table has **four** statements about the storage of sound in a computer.


Tick (✓) **one** box in each row to identify if the statement is true or false

	True	False
The sample rate is the number of times the amplitude is recorded per second		
The smaller the bit depth the smaller the range of sounds recorded		
The larger the sample rate the larger the bit depth		
The frequency and pitch of the sound wave are measured		
Sound is stored using pixels		

[3]

END OF QUESTION PAPER


Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
1		i	<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>
		ii	<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	<div>1 mark for each row.</div> <table><tr><th>Statement</th><th>True (✓)</th><th>False – rewrite the statement to make it true</th></tr><tr><td>A section of primary storage is partitioned to act as virtual memory</td><td></td><td>A section of secondary storage is partitioned to act as virtual memory</td></tr><tr><td>Data from ROM is transferred into VM</td><td></td><td>Data from RAM is transferred into VM</td></tr><tr><td>VM is needed when RAM is full, or nearly full</td><td>✓</td><td></td></tr><tr><td>Data from VM is transferred back to secondary storage when needed</td><td></td><td>Data from VM is transferred back to RAM when needed</td></tr></table>	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	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																		
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Data from ROM is transferred into VM		Data from RAM is transferred into VM																		
VM is needed when RAM is full, or nearly full	✓																			
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			Total	8																

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
2		i	<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="display: flex; align-items: center; margin-top: 20px;">  <div> <p>Misconception</p> <p>A common misunderstanding was that it is needed as a backup for when the television fails.</p> </div> </div>

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
3	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	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance																		
4		i	1 mark for working, 1 mark for answer 1000*3 = 3000 images	2																			
		ii	1 mark for suitable type i.e. solid state // magnetic 1 mark per bullet to justification to max 2 solid state e.g.: • Large enough capacity • Can move computer without damaging storage • Faster access speeds magnetic e.g.: • Largest capacity • Do not need to move computer so moving parts do not matter • More reliable long-term	3																			
		iii	1 mark for 2 correct ticks 2 marks for all 3 or 4 correct ticks 3 marks for all correct <table border="1"><thead><tr><th></th><th>True</th><th>False</th></tr></thead><tbody><tr><td>The sample rate is the number of times the amplitude is recorded per second</td><td>✓</td><td></td></tr><tr><td>The smaller the bit depth the smaller the range of sounds recorded</td><td>✓</td><td></td></tr><tr><td>The larger the sample rate the larger the bit depth</td><td></td><td>✓</td></tr><tr><td>The frequency and pitch of the sound wave are measured</td><td></td><td>✓</td></tr><tr><td>Sound is stored using pixels</td><td></td><td>✓</td></tr></tbody></table>		True	False	The sample rate is the number of times the amplitude is recorded per second	✓		The smaller the bit depth the smaller the range of sounds recorded	✓		The larger the sample rate the larger the bit depth		✓	The frequency and pitch of the sound wave are measured		✓	Sound is stored using pixels		✓	3	2 ticks in 1 row is incorrect
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