OCR GCSE (J277)

Module B: Memory and storage

Workbooklet · 8 parts · 163 marks

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MODULE B MEMORY AND STORAGE · B1

Primary storage, RAM and ROM

Original practice questions · ~25 minutes · 20 marks · OCR J277 spec 1.2.1

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. The total for this worksheet is **20 marks**.

1

Total: 3 marks

A hotel has a self check-in terminal in its lobby. A guest types their booking reference on a touch screen, the terminal shows their booking and then prints a room key card. The terminal has RAM and ROM.

(a) State what is meant by primary storage. **[1]**

(b) Explain why the check-in terminal needs primary storage. **[2]**

2

Total: 4 marks

Tick (✓) **one** box in each row to show whether each statement describes RAM, ROM or both. **[4]**

Statement	RAM	ROM	Both
Its contents are lost when the power is switched off.			
It holds the start-up (boot) instructions.			
It is directly accessed by the CPU.			
The CPU can write new data to it while a program runs.			

3 **Total: 4 marks**

A guest is checking in at the terminal. Their booking is shown on the screen.

(a) State **two** things that will be stored in the terminal's RAM at this moment. **[2]**

1

2

(b) State what is stored in the terminal's ROM **and** give one reason why it is stored in ROM. **[2]**

What is stored

Reason

4 **Total: 2 marks**

Give **two** differences between RAM and ROM. **[2]**

1

2

5 **Total: 3 marks**

The terminal's CPU also has cache.

(a) Describe the purpose of cache. **[2]**

(b) State why cache is described as primary storage. **[1]**

6 **Total: 4 marks**

While a guest is part-way through checking in, the lobby has a power cut. A few minutes later the power comes back on.

Explain what happens to the contents of the terminal's RAM and ROM during the power cut, and how the terminal starts up again when the power returns. **[4]**

Total for this worksheet: 20 marks

MODULE B MEMORY AND STORAGE · B2

Virtual memory

Original practice questions · ~25 minutes · 20 marks · OCR J277 spec 1.2.1

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. The total for this worksheet is **20 marks**.

1

Total: 6 marks

An architect's office has a desktop computer with 8 GB of RAM. The architect often has a 3D design program, an email program, a web browser and a spreadsheet open at the same time.

(a) State what is meant by virtual memory. **[2]**

(b) Explain why the architect's computer may need virtual memory. **[3]**

(c) Tick (✓) **one** box to show which item is most likely to be moved into virtual memory. **[1]**

Item	Tick (✓)
The drawing the architect is editing right now in the 3D design program	
Data for the spreadsheet, which has not been used for two hours	
The project files saved in the architect's documents folder	

2 Total: 4 marks

RAM on the architect's computer is full. The architect opens a photo editing program.

Describe how virtual memory is used so that the photo editing program can run. **[4]**

3 Total: 4 marks

Tick (✓) **one** box in each row to show whether each statement about virtual memory is true or false. **[4]**

Statement	True	False
Virtual memory is used to keep files when the computer is switched off.		
Data in virtual memory is moved back into RAM when it is needed.		
Virtual memory is a part of the CPU.		
Virtual memory is slower to access than RAM.		

4 Total: 4 marks

The architect says the computer becomes very slow when many programs are open.

(a) Explain why using virtual memory can make the computer run slowly. **[2]**

(b) Explain how adding more RAM could make the computer run faster. **[2]**

5 **Total: 2 marks**

A car park barrier has an embedded system. It runs one small program that reads a ticket and opens the barrier. The program and its data always fit in the system's RAM.

The car park's technician suggests setting up virtual memory on the barrier "just in case". Explain whether this would improve the barrier's performance. **[2]**

Total for this worksheet: 20 marks

MODULE B MEMORY AND STORAGE · B3

Why computers need secondary storage

Original practice questions · ~25 minutes · 20 marks · OCR J277 spec 1.2.2

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. The total for this worksheet is **20 marks**.

1

Total: 5 marks

A parcel delivery company gives each driver a handheld tablet. The tablet shows the day's route, records signatures and stores photos of delivered parcels.

(a) Define the term **secondary storage**. **[1]**

(b) Tick (✓) **one** box in each row to show whether each item is primary storage or secondary storage. **[4]**

Item	Primary storage	Secondary storage
RAM		
Solid state drive		
ROM		
USB flash drive		

2 **Total: 4 marks**

The tablet has 4 GB of RAM and 64 GB of secondary storage.

(a) State **two** items that would be stored on the tablet's secondary storage. **[2]**

1

2

(b) Explain why the tablet needs secondary storage. **[2]**

3 **Total: 4 marks**

Tick (✓) **one** box in each row to show whether each statement about secondary storage is true or false. **[4]**

Statement	True	False
Secondary storage is only used when RAM is full.		
Secondary storage is non-volatile.		
Secondary storage is only needed to make backups.		
Secondary storage usually has a larger capacity than RAM.		

4 **Total: 3 marks**

An architect saves a building plan on her desktop computer in the morning. In the afternoon she adds three new rooms to the plan, but a power cut switches the computer off before she saves again.

Explain what will happen to the plan when the computer is switched back on. Refer to RAM and secondary storage in your answer. **[3]**

5 **Total: 4 marks**

A computer has both primary storage (RAM) and secondary storage.

Explain why the computer cannot use RAM alone to store all of its programs and files. **[4]**

Total for this worksheet: 20 marks

MODULE B MEMORY AND STORAGE · B4

Magnetic, optical and solid state storage

Original practice questions · ~25 minutes · 20 marks · OCR J277 spec 1.2.2

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. The total for this worksheet is **20 marks**.

1

Total: 5 marks

A film archive keeps its collection on several kinds of secondary storage.

Tick (✓) **one** box in each row to show the type of storage each device or medium is. **[5]**

Device / medium	Magnetic	Optical	Solid state
Blu-ray disc			
Hard disk drive			
SD card			
Magnetic tape			
USB memory stick			

2

Total: 4 marks

Tick (✓) **one** box in each row to show whether each statement is true or false. **[4]**

Statement	True	False
Solid state storage has no moving parts.		
An optical disc usually has a larger capacity than a hard disk drive.		
A hard disk drive is usually cheaper per gigabyte than a solid state drive.		
Solid state storage can be written to an unlimited number of times.		

3 **Total: 4 marks**

(a) State what is meant by the **capacity** of a storage device. **[1]**

(b) State what is meant by the **durability** of a storage device. **[1]**

(c) Explain why solid state storage is usually more durable than a hard disk drive. **[2]**

4 **Total: 3 marks**

A charity makes a 40-minute training film. It posts a copy of the film on a DVD to each of its 60 regional offices.

(a) Give **two** advantages of using DVDs for this. **[2]**

1 .....

2 .....

(b) Give **one** disadvantage of using DVDs for this. **[1]**

5 **Total: 4 marks**

A design studio is choosing between a magnetic hard disk drive and a solid state drive for its new desktop computers.

Describe **two** differences between a hard disk drive and a solid state drive. **[4]**

Difference 1

Difference 2

Total for this worksheet: 20 marks

MODULE B MEMORY AND STORAGE · B5

Choosing storage

Original practice questions · ~25 minutes · 21 marks · J277 spec 1.2.2

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. The total for this worksheet is **21 marks**.

1

Total: 5 marks

Storage devices can be compared using six characteristics: capacity, speed, portability, durability, reliability and cost.

(a) Tick (✓) one box in each row to show which characteristic is being described. **[4]**

Description	Capacity	Speed	Portability	Reliability	Cost
How quickly data can be read from and written to the device					
How easy the device is to carry from place to place					
The amount of data the device can hold					
How consistently the device stores and returns data correctly over time					

(b) State what is meant by the **durability** of a storage device. **[1]**

2 **Total: 4 marks**

A lighting technician works for a touring theatre company. She carries a laptop between theatres every week in a backpack, and uses it to open large lighting plans quickly during rehearsals.

(a) Identify the most suitable type of secondary storage for the laptop. Justify your choice. **[4]**

3 **Total: 4 marks**

A county records office scans old maps and letters. It needs to keep many terabytes of scans on a server that stays in one room and is never moved. Its budget is small.

(a) Identify the most suitable type of secondary storage for the server. Justify your choice. **[4]**

4 Total: 4 marks

A folk band records an album. They want to sell copies of it at their concerts, and post copies to people who order online. They plan to put the album on optical discs.

(a) Explain **one** advantage of using optical discs for the band's album. **[2]**

(b) Explain **one** disadvantage of using optical discs for the band's album. **[2]**

5 Total: 4 marks

(a) Tick (✓) one box in each row to show whether each statement is true or false. **[4]**

Statement	True	False
Solid state storage lasts forever because it has no moving parts.		
Solid state storage usually reads and writes data faster than magnetic storage.		
Magnetic storage is usually cheaper per gigabyte than solid state storage.		
Optical discs usually have a higher capacity than magnetic hard disk drives.		

Total for this worksheet: 21 marks

MODULE B MEMORY AND STORAGE · B6

Cloud storage

Original practice questions · 20 marks · ~25 minutes · OCR J277 spec 1.3.1

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. The total for this worksheet is **20 marks**.

1

Total: 5 marks

(a) State what is meant by **the Cloud**. **[2]**

A firm of surveyors uses three services from the Cloud.

(b) Tick (✓) **one** box in each row to show which type of service is being provided remotely. **[3]**

Service	Storage	Software	Processing
Survey photos are saved on a provider's servers so all staff can open them			
Staff write reports in a word processor that runs in a web browser, with nothing installed on their laptops			
A large 3D model of a building is sent to powerful remote servers, which do the calculations and send back the result			

2

Total: 4 marks

(a) Tick (✓) **one** box in each row to show whether each statement about cloud storage is true or false. **[4]**

Statement	True	False
Files stored in the Cloud are kept on physical servers and storage devices		
Files stored in the Cloud can only be opened on the device that uploaded them		
Files stored in the Cloud can be reached with any internet connection, including mobile data		
When files are stored in the Cloud, the user does not control how they are kept secure		

3 **Total: 8 marks**

An architecture practice has offices in three cities. Its architects also visit building sites. At the moment, each office keeps its drawings on a hard disk drive in that office. The practice is thinking about storing all its drawings in the Cloud instead.

(a) Explain **two** advantages to the practice of storing its drawings in the Cloud. **[4]**

1

2

(b) Explain **two** disadvantages to the practice of storing its drawings in the Cloud. **[4]**

1

2

4 **Total: 3 marks**

A freelance video editor uses an editing program that runs in the Cloud. When a video is finished, the editor sends it to remote servers, which process it into the final file.

(a) Give **one** benefit to the editor of using software that runs in the Cloud, instead of software installed on their own computer. **[1]**

(b) Explain why the editor might use remote servers to process the video, instead of processing it on their own computer. **[2]**

Total for this worksheet: 20 marks

MODULE B MEMORY AND STORAGE · B7

Units of data storage

Original practice questions · 21 marks · ~25 minutes · OCR J277 spec 1.2.3

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. No calculator. Use 1 kilobyte (KB) = 1,000 bytes. The marks for each part are shown in brackets [ ]. The total for this worksheet is **21 marks**.

1

Total: 6 marks

(a) State how many bits there are in a nibble. **[1]**

(b) Tick (✓) **one** box to show which of these is the **largest** amount of data. **[1]**

Amount of data	Tick (✓) one
3,000 KB	
2 MB	
0.5 GB	
4,000,000 bytes	

(c) Complete the table by writing the name of the unit in each gap. **[4]**

Amount	Is equal to
8 bits	1 .....
1,000 KB	1 .....
1,000 GB	1 .....
1,000 TB	1 .....

2

Total: 2 marks

(a) Write these units in order from **smallest** to **largest**. **[2]**

petabyte · nibble · gigabyte · byte · kilobyte · terabyte

Smallest

Largest

3 **Total: 6 marks**

A wildlife charity records data from cameras and sensors in a nature reserve.

(a) A temperature sensor sends a message that is 32,000 bits long. Calculate the size of the message in kilobytes (KB). Show your working. **[2]**

Answer: ..... KB

(b) The charity's archive holds 2.5 TB of video. Convert 2.5 TB into gigabytes (GB). **[1]**

Answer: ..... GB

(c) One day of camera footage is 750 MB. Convert 750 MB into gigabytes (GB). **[1]**

Answer: ..... GB

(d) A map of the reserve is 6 MB. Calculate the size of the map in bytes. Show your working. **[2]**

Answer: ..... bytes

4 **Total: 1 mark**

Storage devices are made with different fixed capacities. The charity needs one external drive to hold a backup of 1.5 TB.

(a) Tick (✓) **one** box to show the **smallest** capacity that will hold the whole backup. **[1]**

Drive capacity	Tick (✓) one
128 GB	
500 GB	
1 TB	
2 TB	

5 **Total: 2 marks**

(a) Explain why data must be stored in binary format in a computer. **[2]**

6 **Total: 4 marks**

(a) Tick (✓) **one** box in each row to show whether each statement is true or false. **[4]**

Statement	True	False
One byte is the same as two nibbles		
1 petabyte is 1,000 gigabytes		
A kilobyte is larger than a megabyte		
1 GB is 1,000,000 KB		

Total for this worksheet: 21 marks

MODULE B MEMORY AND STORAGE · B8

Calculating file sizes

Original practice questions · 21 marks · ~25 minutes · OCR J277 spec 1.2.3

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. Do not use a calculator. Show your working. 1 kilobyte (KB) = 1,000 bytes; 1 megabyte (MB) = 1,000 KB; 1 gigabyte (GB) = 1,000 MB. The marks for each part are shown in brackets [ ]. The total for this worksheet is **21 marks**.

1

Total: 4 marks

(a) Complete the table to give the formula used to calculate the size of each type of file. **[3]**

Type of file	File size =
Image	
Sound	
Text	

(b) State the unit that each formula in part (a) gives its answer in. **[1]**

2

Total: 4 marks

A railway station has an information screen. One image on the screen is 500 pixels wide and 400 pixels high, with a colour depth of 4 bits.

(a) Calculate the file size of the image in kilobytes. Show your working. **[3]**

Answer: ..... KB

(b) The image is saved again with a colour depth of 8 bits. The width and height stay the same. State the new file size in kilobytes. **[1]**

Answer: ..... KB

3 **Total: 3 marks**

A smart doorbell records a voice message from a visitor. The message lasts 25 seconds. It is recorded with a sample rate of 16,000 Hz and a bit depth of 8 bits.

(a) Calculate the file size of the message in kilobytes. Show your working. **[3]**

Answer: ..... KB

4 **Total: 3 marks**

A hotel booking system saves notes about each booking as a text file. One file contains 2,500 characters. Each character is stored using 16 bits.

(a) Calculate the file size in kilobytes. Show your working. **[3]**

Answer: ..... KB

5 **Total: 3 marks**

A garden centre website shows a row of 10 small icons. Each icon is 40 pixels wide and 50 pixels high, with a colour depth of 8 bits.

(a) Calculate the total file size of all 10 icons in kilobytes. Show your working. **[3]**

Answer: ..... KB

6 **Total: 4 marks**

A wildlife camera saves photos onto a 2 GB memory card. Each photo is 5 MB.

(a) Calculate how many photos the memory card can store. Show your working. **[2]**

Answer: ..... photos

(b) The camera also stores metadata with each photo. Explain how this affects the number of photos that fit on the card. **[2]**

Total for this worksheet: 21 marks