CAMBRIDGE IGCSE (0478)

Module B: Memory and storage

Workbooklet · 8 parts · 161 marks

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	Total	**161**

MODULE B MEMORY AND STORAGE · B1

Primary storage, RAM and ROM

Original practice questions · ~25 minutes · 20 marks · Cambridge 0478 syllabus 3.3.1

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: 3 marks

A museum lends visitors a handheld audio guide. A visitor types an exhibit number on its keypad and the guide plays a spoken description of that exhibit. The guide contains a processor, primary storage and secondary storage.

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

(b) Give **two** examples of primary storage. **[2]**

1

2

2

Total: 4 marks

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

Statement	True (✓)	False (✓)
ROM is volatile.		
RAM stores the data that is currently in use.		
The contents of ROM are normally changed every time a program runs.		
Both RAM and ROM can be directly accessed by the CPU.		

3 **Total: 4 marks**

Complete the sentences about the audio guide's memory. Use terms from the list. Not all terms are used. **[4]**

read only · volatile · non-volatile · start-up instructions · secondary · read and write · parity

ROM stores the ..... that the guide needs when it is switched on. ROM is ..... , so its contents are kept when the battery runs out. RAM is ..... , so the exhibit number typed in is lost when the guide is switched off. The processor can change the contents of RAM because RAM is ..... memory.

4 **Total: 3 marks**

The audio guide's battery runs out while a visitor is using it. The battery is then replaced and the guide is switched on again. Describe what happens to the contents of the guide's RAM and ROM. **[3]**

5 **Total: 4 marks**

Explain why the audio guide needs **both** RAM and ROM. **[4]**

6 **Total: 2 marks**

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

1

2

Total for this worksheet: 20 marks

MODULE B MEMORY AND STORAGE · B2

Virtual memory

Original practice questions · ~25 minutes · 20 marks · Cambridge 0478 syllabus 3.3.4

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: 4 marks

A video production company uses a computer with 16 GiB of RAM to edit films. Editors often run several large programs at the same time.

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

(b) Explain how virtual memory is created on the company's computer. **[2]**

2 **Total: 5 marks**

Complete the paragraph about how virtual memory is used. Use terms from the list. Not all terms are used. **[5]**

pages · RAM · ROM · full · empty · secondary storage · cache · needed · deleted

When RAM is ..... , part of ..... is used as virtual memory. Data that is not currently in use is transferred out of RAM in blocks called ..... . When this data is ..... again, it is transferred back into ..... so the CPU can use it.

3 **Total: 3 marks**

Explain why virtual memory is necessary on the company's computer. **[3]**

4 **Total: 4 marks**

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

Statement	True	False
Virtual memory is created on a ROM chip.		
The CPU can only process data once it is in RAM.		
Virtual memory is used to store files permanently.		
Pages of data can be transferred from RAM to virtual memory.		

5 **Total: 4 marks**

An editor notices the computer becomes very slow when many films and programs are open at once.

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

(b) Suggest how the company could reduce the need for virtual memory. Give a reason for your answer. **[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 · Cambridge 0478 syllabus 3.3.2

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: 4 marks

A town library has a self-service kiosk. Members scan their card and books to borrow them. The kiosk stores its software and a log of every loan.

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

Item	Primary storage	Secondary storage
Hard disk drive (HDD)		
Random access memory (RAM)		
Solid state drive (SSD)		
Read only memory (ROM)		

2 **Total: 4 marks**

Complete the sentences about secondary storage. **[4]**

Secondary storage is not ..... accessed by the CPU. Data and programs must first be loaded into ..... before the CPU can use them. Secondary storage is ..... , so data is not lost when the power is turned off. This means it is necessary for the more ..... storage of data.

3 **Total: 5 marks**

The library kiosk is switched off every night and switched on every morning.

(a) Explain why the kiosk needs secondary storage. **[2]**

(b) Describe how the kiosk's loans software gets from secondary storage to being run by the CPU when the kiosk is switched on. **[3]**

4 **Total: 4 marks**

Describe **two** differences between primary storage and secondary storage. **[4]**

1

2

5 **Total: 3 marks**

A sound engineer is editing a recording on a laptop. The laptop battery runs out before the engineer saves the latest edits. A version saved an hour earlier is on the laptop's solid state drive.

Explain which version of the recording will be available when the laptop is restarted. **[3]**

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 · Cambridge 0478 syllabus 3.3.3

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: 4 marks

A surveying company uses several storage devices and media.

Tick (✓) **one** box in each row to show whether each one is magnetic, optical or solid-state storage. **[4]**

Device / medium	Magnetic	Optical	Solid-state
Solid-state drive (SSD)			
DVD			
Hard disk drive (HDD)			
USB flash drive			

2

Total: 4 marks

The company's office server stores its records on a hard disk drive (HDD).

Describe how a hard disk drive stores and reads data. **[4]**

3 **Total: 4 marks**

The company sends finished site maps to clients on recordable Blu-ray discs.

Complete the sentences about how optical storage works. **[4]**

To write data, a ..... burns ..... into the surface of the disc. The flat areas left between them are called ..... . To read the data, light is shone onto the spinning disc and the two kinds of area ..... the light differently.

4 **Total: 4 marks**

Each surveyor's tablet stores data in solid-state (flash) memory.

Describe how solid-state storage stores data. **[4]**

5 **Total: 4 marks**

(a) Give **two** examples of solid-state storage, other than a solid-state drive (SSD). **[2]**

1 .....

2 .....

(b) Explain why a solid-state drive can access data faster than a hard disk drive. **[2]**

Total for this worksheet: 20 marks

MODULE B MEMORY AND STORAGE · B5

Choosing storage

Original practice questions · ~25 minutes · 21 marks · 0478 syllabus 3.3.3

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

Secondary storage can be magnetic, optical or solid state (flash memory).

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

Device	Magnetic	Optical	Solid state
Hard disk drive (HDD)			
SD card			
Blu-ray disc			
USB flash drive			
DVD			

2

Total: 4 marks

A parcel delivery company gives each driver a handheld device to record deliveries. The devices are often dropped and are used in vans all day.

(a) State the most suitable type of secondary storage for the handheld devices. **[1]**

(b) Explain why this type of storage is suitable for the handheld devices. Refer to how this type of storage works in your answer. **[3]**

3 **Total: 5 marks**

A museum keeps a very large archive of high-resolution photographs on a hard disk drive in its office. The drive is never moved.

(a) Describe how data is stored on a hard disk drive. **[3]**

(b) Give **two** reasons why magnetic storage is suitable for the museum's archive. **[2]**

1

2

4 **Total: 5 marks**

A film studio sends a copy of its new film to each of 200 reviewers on a Blu-ray disc.

(a) Complete the sentences about how optical storage works. **[3]**

Optical storage uses a _____ to read and write data. The data is stored on the surface of the disc as _____ and _____.

(b) Give **two** reasons why optical storage is suitable for sending the film to the reviewers. **[2]**

1

2

5 **Total: 2 marks**

A video editor says that files open faster from the solid-state drive in her computer than from her hard disk drive.

(a) Explain why data can be accessed faster from solid-state storage than from magnetic storage. **[2]**

Total for this worksheet: 21 marks

MODULE B MEMORY AND STORAGE · B6

Cloud storage

Original practice questions · 20 marks · ~25 minutes · Cambridge 0478 syllabus 3.3.5, 3.3.6

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) Describe what is meant by **cloud storage**. **[2]**

(b) A shop owner says: "Data in the cloud is not stored on any hardware." State why this is incorrect. **[1]**

2

Total: 4 marks

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

Statement	True	False
Data in cloud storage can be accessed remotely using the internet		
Data stored locally needs an internet connection to be opened		
The company providing cloud storage is usually responsible for maintaining its servers		
Cloud storage can only be accessed using a Wi-Fi connection		

3 **Total: 8 marks**

A small travel company has eight staff. Some work in the office and some work from home. The company stores its customer bookings on a hard disk drive in a computer in the office. The manager is thinking about moving the bookings to cloud storage.

(a) Explain **two** advantages to the company of storing the bookings in cloud storage instead of locally. **[4]**

1

2

(b) Explain **two** disadvantages to the company of storing the bookings in cloud storage instead of locally. **[4]**

1

2

4 **Total: 5 marks**

A geologist spends three months at a remote mountain camp. There is no internet connection at the camp. The geologist collects large amounts of data each day on a laptop.

(a) State whether the geologist should store the data in cloud storage or locally. Explain your answer. **[3]**

Choice

(b) Give **two** other advantages of storing data locally compared with storing it in cloud storage. **[2]**

1

2

Total for this worksheet: 20 marks

MODULE B MEMORY AND STORAGE · B7

Units of data storage

Original practice questions · 20 marks · ~25 minutes · Cambridge 0478 syllabus 1.3.1

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. No calculator. Give each answer in the units asked for in the question. The marks for each part are shown in brackets [ ]. The total for this worksheet is **20 marks**.

1

Total: 6 marks

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

(b) State the name of the unit that is equal to 1024 pebibytes (PiB). **[1]**

(c) Complete the table. **[4]**

Unit	Is equal to
1 nibble	..... bits
1 byte	..... nibbles
1 mebibyte (MiB)	..... kibibytes (KiB)
1 tebibyte (TiB)	1024 .....

2

Total: 3 marks

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

Amount of data	Tick (✓) one
2048 KiB	
3 MiB	
0.5 GiB	
4 194 304 bytes	

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

exbibyte · nibble · mebibyte · byte · tebibyte · kibibyte

Smallest

Largest

3 **Total: 6 marks**

A weather station stores readings and photographs on its computer.

(a) One set of readings is 16 384 bits. Calculate the size of the set of readings in kibibytes (KiB). Show all your working. **[2]**

Working space

Answer: ..... KiB

(b) The station's storage drive has 3 GiB of free space. State the free space in mebibytes (MiB). **[1]**

Answer: ..... MiB

(c) A photograph is 5 MiB. Calculate the size of the photograph in bytes. Show all your working. **[2]**

Working space

Answer: ..... bytes

(d) A week of photographs is 2560 MiB. State the size of a week of photographs in gibibytes (GiB). **[1]**

Answer: ..... GiB

4 **Total: 2 marks**

A technician at the weather station writes: "1 KiB is 1000 bytes."

(a) Explain why the technician is wrong. **[2]**

5 **Total: 3 marks**

(a) Tick (✓) **one** box in each row to show whether each statement is true or false. **[3]**

Statement	True (✓)	False (✓)
A tebibyte is larger than a pebibyte		
1 GiB is 1 048 576 KiB		
There are 8 nibbles in 4 bytes		

Total for this worksheet: 20 marks

MODULE B MEMORY AND STORAGE · B8

Calculating file sizes

Original practice questions · 20 marks · ~25 minutes · Cambridge 0478 syllabus 1.3.2

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. Do not use a calculator. Show all your working. 1 kibibyte (KiB) = 1024 bytes; 1 mebibyte (MiB) = 1024 KiB. Give each answer in the unit the question asks for. The marks for each part are shown in brackets [ ]. The total for this worksheet is **20 marks**.

1

Total: 3 marks

(a) State what is meant by the **resolution** of an image. **[1]**

(b) State what is meant by the **colour depth** of an image. **[1]**

(c) State what is meant by the **sample resolution** of a sound. **[1]**

2

Total: 3 marks

A museum shows a map of its galleries on a touch screen. The map image has a resolution of 512 × 256 pixels and a colour depth of 8 bits.

(a) Calculate the file size of the map image in kibibytes (KiB). Show all your working. **[3]**

Answer: ..... KiB

3 **Total: 3 marks**

An archive scans old photographs. One scan has a resolution of 1024 × 1024 pixels and a colour depth of 24 bits.

(a) Calculate the file size of the scan in mebibytes (MiB). Show all your working. **[3]**

Answer: ..... MiB

4 **Total: 4 marks**

A radio presenter records a jingle that is 128 seconds long. It is recorded with a sample rate of 8192 Hz and a sample resolution of 8 bits.

(a) Calculate the file size of the jingle in mebibytes (MiB). Show all your working. **[3]**

Answer: ..... MiB

(b) The jingle is recorded again with a sample resolution of 16 bits. The sample rate and length stay the same. State the new file size in MiB. **[1]**

Answer: ..... MiB

5 **Total: 3 marks**

A weather station stores a 30-second sound recording of the wind. The sample rate is 4096 Hz and the sample resolution is 16 bits.

(a) Calculate the file size of the recording in kibibytes (KiB). Show all your working. **[3]**

Answer: ..... KiB

6 **Total: 2 marks**

An engineer calculates the file size of an icon with a resolution of 64 × 64 pixels and a colour depth of 8 bits. This is the working:

64 × 64 × 8 = 32 768 bits
32 768 ÷ 8 = 4096 bytes
4096 ÷ 1000 = 4.096 KiB

(a) Identify the error in the working **and** give the correct file size in KiB. **[2]**

Error

Correct file size ..... KiB

7 **Total: 2 marks**

(a) A sound is recorded again with a lower sample rate. Explain the effect this has on the file size and on the accuracy of the recording. **[2]**

Total for this worksheet: 20 marks