End of topic quiz - Topic 1.2 Memory and storage

1. Random access memory **(**RAM) and read only memory (ROM) are different types of memory found in computers.

a. What are two items that are stored in RAM? (2 marks)

b. What is the main difference between RAM and ROM? (2 marks)

c. Place a tick (✓) to indicate whether each statement refers to RAM or ROM (6 marks)

	RAM	**ROM**
Data is not permanently written to this type of memory		
Holds the instructions for booting-up the computer		
The computer needs to be on to retain data		
It is a type of volatile memory		
Data is pre-written and comes with the computer		
Data is permanently written		

2. Virtual memory doesn't physically exist on a memory chip but is an optimisation technique that is implemented by the operating system.

a. What is virtual memory? (1 mark)

b. Why is virtual memory needed? (1 mark)

c. How does virtual memory work? (1 mark)

3. Flash memory is sold state media.

a. What does solid state media mean? (1 mark)

b. What are three storage devices that use flash memory? (1 mark)

c. What are the advantages and problems with using flash memory? (2 marks)

4. One type of storage is secondary.

a. What is secondary storage? (1 mark)

b. Why is secondary storage needed on a computer? (1 mark)

c. What are **two** advantages of using secondary storage? (2 marks)

5. Storage devices can be internal or external.

a. What is **one** external secondary storage device? (1 mark)

b. What is **one** internal secondary storage device? (1 mark)

6. What are **three** types of secondary storage device? What is an **advantage** for each? (6 marks)

1.

2.

3.

7. The entertainment industry uses secondary storage to distribute digital material.

a. Which type of secondary storage is most suitable for distributing a movie? (1 mark)

b. What is the most suitable storage device for distributing a movie? (1 mark)

c. What is the most suitable secondary storage **device** for distributing sound files? (1 mark)

d. What are **two** reasons you chose the device you did for distributing sound files? (2 marks)

8. What is a secondary storage device that could be used for transferring text files from a school computer to a PC at home? (1 mark)

9. What is **one** disadvantage of using magnetic tape to store data? (1 mark)

10. How many bytes are in 3MB of data? You **must** show your working. (1 mark)

11. What are **two** factors that should be considered when deciding on how data is stored? (2 marks)

12. Fill in the table below by placing **hard disk, DVD, CD** against its most appropriate capacity. Use each device only once. (3 marks)

Capacity	**Storage type**
Up to 4.7Gb	
Up to 800Mb	
200Gb to 1Tb	

13. Secondary storage devices have a number of characteristics.

a. What is meant by the **'capacity'** of a storage device? (1 mark)

b. What is meant by the **'portability'** of a storage device? (1 mark)

c. What is meant by the **'durability'** of a storage device? (1 mark)

d. What is meant by the **'reliability'** of a storage device? (1 mark)

14. Numeric data within a computer is stored in binary.

a. What is meant by a bit? (1 mark)

b. What is the highest value that can be represented by a nibble? (1 mark)

c. How many bits are there in a byte? (1 mark)

d. How many bytes do 24 bits make? (1 mark)

e. How many megabytes are there in 3 gigabytes? (1 mark)

15. What are the following 8-bit binary values in denary (base 10)? You **must** show your working.

a. 00110111 (1 mark)

b. 10101111 (1 mark)

c. 11010110 (1 mark)

16. What is the 8-bit binary value of these denary (base 10) numbers? You **must** show your working.

a. 31 (1 mark)

b. 104 (1 mark)

c. 210 (1 mark)

17. What is the result when the following two 8-bit binary values are added?

a.

```
  1 0 1 0 0 1 1 0
+ 1 1 0 0 0 1 0 1
-----------------
```

b. (1 mark)

```
  1 0 0 0 1 1 0 1
+ 0 0 1 1 0 1 1 0
-----------------
```

(1 mark)

c. An overflow error can occur when adding two 8-bit binary values. What is an overflow error? (1 mark)

18. Another operation that can be used on a binary number is a shift.

a. A logical shift instruction moves each bit in the binary value left or right. What is the new value of **00101100** when a logic shift right by two is performed? (1 mark)

b. What is the new value of **00011100** when a logic shift left by three is performed? (1 mark)

c. What is the denary value of the binary number in part b? (1 mark)

19. Binary data that is stored in a computer is sometimes represented as hexadecimal.

a. The number 84 could be represented as either a denary value or a hexadecimal value.

If 84 is represented as a hexadecimal, what is its denary value? (1 mark)

b. If 84 is represented as a denary, what is its hexadecimal value? (1 mark)

c. Why do people use hexadecimal values to represent numbers stored in computers? (1 mark)

d. What is the hexadecimal for the following binary values?

i. 00111100 (1 mark)

ii. 10100101 (1 mark)

iii. 11101111 (1 mark)

e. What is the binary value for the following hexadecimal values?

i. 98 (1 mark)

ii. E7 (1 mark)

iii. BE (1 mark)

20. Text data is also stored on a computer in binary using character sets.

a. What is meant by the term **character set**? (1 mark)

b. What does ASCII stand for? (1 mark)

c. Why would Unicode be used? (1 mark)

d. What is meant by Unicode? (1 mark)

21. Images are stored on a computer using binary data.

a. What is a Pixel? (1 mark)

b. How many colours can be represented in an image with 8 bits? You **must** show your working. (1 mark)

c. Why is metadata included in a file? (1 mark)

d. How does the resolution of an image affect the size of the file? (1 mark)

22. Sounds are stored on a computer using binary data.

a. Sampling intervals and other factors affect the size of a sound file and the quality of its playback. What is meant by a bit rate? (1 mark)

b. How can sound be sampled and stored in digital form? (1 mark)

23. Compression is often used to reduce the size of files before sending them electronically.

a. What is **one** advantage for compressing files in this way? (1 mark)

b. What is meant by lossy compression? (1 mark)

c. What is meant by lossless compression? (1 mark)

/85

Answers

1. Random access memory **(**RAM) and read only memory (ROM) are different types of memory found in computers.

a. What are two items that are stored in RAM?

Programs currently in use.
Data currently in use.
OS currently in use

b. What is the main difference between RAM and ROM?

ROM is non-volatile and RAM is Volatile
RAM loses memory when computer switched off, ROM doesn't.

c. Place a tick (✓) to indicate whether each statement refers to RAM or ROM

	RAM	**ROM**
Data is not permanently written to this type of memory	✓	
Holds the instructions for booting-up the computer		✓
The computer needs to be on to retain data	✓	
It is a type of volatile memory	✓	
Data is pre-written and comes with the computer		✓
Data is permanently written		✓

2. Virtual memory doesn't physically exist on a memory chip but is an optimisation technique that is implemented by the operating system.

a. What is virtual memory?

It is simulated memory that is written to a file on the hard drive / memory that appears to exist as RAM but is in secondary storage.

b. Why is virtual memory needed?

When you need to run more/larger applications on the computer than its physical memory (RAM) can support.
It lets more memory be used than there is in the system.

c. How is virtual memory implemented?

Operating system will set up virtual memory using the virtual memory manager (VMM).
VMM creates a file on the hard disk large enough for the extra memory needed.
OS can then address memory as if it were real memory stored in RAM.
Maps memory addresses used by a program into physical addresses in computer memory.
Swapping or paging is a process used by the operating system to move data between RAM and virtual memory.
Operating system moves data when some processes are not needed immediately out of the RAM to store them in virtual memory (on the hard disk).
Copies the data back into RAM when the process is needed again.
Transfer between the two being made automatically as required.

3. Flash memory is sold state media.

a. What does solid state media mean?

Storage media with no moving parts
Refers to removable storage with no moving parts
Device that uses flash memory

b. What are three storage devices that use flash memory?

USB drives
Memory cards (such as in a camera)
Solid-state drives
Any reasonable example

c. What are the advantages and problems associated with using flash memory?

Advantages

- Flash is durable will not break if dropped or exposed to heat.
- Very reliable as no moving parts.
- Very compact but can store lot of data in a small space.
- Very fast access time compared to a hard disk or a DVD.
- Low cost and reliable.
- Light weight so easily portable.

Problems

- Can get lost easily.
- Can wear out over a long time period.
- More expensive than CD or DVD.
- The metal part that is inserted into the USB port can become bent or damaged.

4. One type of storage is secondary.

a. What is secondary storage?

Where devices are not constantly connected to the computer.
Devices not directly accessible by the computer's CPU.

b. Why is secondary storage needed on a computer?

Used to back up data stored in main memory/primary storage.
Stores programs/data and other files that would otherwise be lost when the power is switched off/RAM is volatile/cannot store data permanently.
Need for larger storage capacity.

c. What are **two** advantages for using secondary storage?

Memory is non-volatile.
Data is not lost when the computer is switched off.
Stores larger amount of data.

5. Storage devices can be internal or external.

a. What is **one** external secondary storage device?

- CDs
- Memory card
- DVD
- Blu-ray disc
- Flash drive
- USB memory stick
- (External) hard disk drive
- (External) solid state drive

b. What is **one** internal secondary storage device?

- Hard disk drive (HDD)
- Solid state drive (SSD)

6. What are **three** types of secondary storage device? What is an **advantage** for each?

Optical
Inexpensive/reliable/robust/relatively large capacity

Magnetic
Store large capacity/commonly used making it possible to share compatibility/can be used to store operating system and other files and programs/reliable/cost-effective.

Solid state
Flexible/Inexpensive/faster access to data/Can be used for portable devices/generally smaller in size/robust/easy to use/no setup requirements.

7. The entertainment industry uses secondary storage to distribute digital material.

a. Which type of secondary storage is most suitable for distributing a movie?

Optical

b. What is the most suitable storage device for distributing a movie?

DVD/Blu Ray

c. What is the most suitable secondary storage **device** for distributing sound files?

CD

d. What are **two** reasons you chose the device you did for distributing sound files?

- Cheap to produce.
- Easily portable.
- Enough capacity for the music tracks.
- Can be read by other devices.
- Read only/can't be over written.

8. What is a secondary storage device that could be used for transferring text files from a school computer to a PC at home?

USB stick/pen/flash memory
CD

9. What is **one** disadvantage of using magnetic tape to store data?

- Slow to write to and read from memory.
- All data has to be read before reading the data you want.
- Data could be corrupted if close enough to a magnetic field.
- Additional equipment needed to read data from tape.

10. How many bytes are in 3MB of data? You **must** show your working.

3 * 1 000 000
3 000 000/3m/3 million

11. What are **two** factors that should be considered when deciding on how data is stored?

- Capacity
- Speed
- Portability
- Durability
- Reliability
- Cost

12. Fill in the table below by placing **hard disk, DVD, CD** against its most appropriate capacity.

Capacity	**Storage type**
Up to 4.7Gb	DVD
Up to 800Mb	CD
200Gb to 1Tb	Hard disk

13. Secondary storage devices have a number of characteristics.

a. What is meant by the '**capacity'** of a storage device?

Size of data/file.

b. What is meant by the **'portability'** of a storage device?

Refers to whether the data needs to be moved from one device to another.

c. What is meant by the '**durability'** of a storage device?

Ability of the device to resist damage / Length of time expected for data to last.

d. What is meant by the **'reliability'** of a storage device?

Refers to whether the data will be saved as expected.
Data is not affected when saved.
No changes to file formatting.

14. Numeric data within a computer is stored in binary.

a. What is meant by a bit?

The smallest representation of data consisting of either a 1 or 0**.** A single binary digit.

b. What is the highest value that can be represented by a nibble?

15

c. How many bits are there in a byte?

8 bits

d. How many bytes do 24 bits make?

3

e. How many megabytes are there in 3 gigabytes?

3072 Megabytes or 3000Mb is acceptable.

15. What are the following 8-bit binary values in denary (base 10)? You **must** show your working.

a. 00110111

55

b. 10101111

175

c. 11010110

214

16. What is the 8-bit binary value of these denary (base 10) numbers. You **must** show your working out.

a. 31

00011111

b. 104

01101000

c. 210

11010010

17. What is the result when the following two 8-bit binary values are added?

a.

```
  1 0 1 0 0 1 1 0
+ 1 1 0 0 0 1 0 1
-----------------
(1) 0 1 1 0 1 0 1 1
-----------------
```

b.

```
  1 0 0 0 1 1 0 1
+ 0 0 1 1 0 1 1 0
-----------------
  1 1 0 0 0 0 1 1
-----------------
```

c. An overflow error can occur when adding two 8-bit binary values. What is an overflow error?

There is an extra carry/bit
The result exceeds 8 bits
The result is more than 255/11111111

18. Another operation that can be used on a binary number is a shift.

a. A logical shift instruction moves each bit in the binary value left or right. What is the new value of **00101100** when a logic shift right by two is performed?

00001011

b. What is the new value of **00011100** when a logic shift left by three is performed?

11100000

c. What is the denary value of the binary number in part b?

224

19. Binary data that is stored in a computer is sometimes represented as hexadecimal.

a. The number 84 could be represented as either a denary value or a hexadecimal value. If 84 is represented as a hexadecimal, what is its denary value?

132 reward for showing working out i.e. 1000 0100/128 + 4 = 132.

b. If 84 is represented as a denary, what is its hexadecimal value?

54 reward showing working out i.e. 64+16+4 = 84 = 0101 0100.

c. Why do people use hexadecimal values to represent numbers stored in computers?

Hexadecimal values are shorter than binary**.**
Hexadecimal values are easier to work with than binary**.**
Hexadecimal values are easily converted**.**
Hexadecimal values are less susceptible to errors.

d. What is the hexadecimal for the following binary values?

i. 00111100

3C

ii. 10100101

A5

iii. 11101111

EF

e. What is the binary value for the following hexadecimal values?

i. 98

10011000

Ii E7

11100111

Iii BE

10111110

20. Text data is also stored on a computer in binary using character sets.

a. What is meant by the term **character set**?

The range of numbers, letters and symbols that can be represented by a computer, each character having its own binary value

b. What does ASCII stand for?

American Standard Code for Information Interchange.
7-bit character system used to code the character set the computer uses**.**
A system that uses code to represent characters, symbols and numbers.

c. Why would Unicode be used?

To use other special characters found in different languages.

d. What is meant by Unicode?

Normally 16 bits (2 bytes) but up to 32 bits (4 bytes) used to encode set characters.

21. Images are stored on a computer using binary data.

a. What is a Pixel?

Smallest element that makes up an image

A **pict**ure/image **el**ement.

b. How many colours can be represented in an image with 8 bits? You **must** show your working.

$2^8 = 256$.

c. Why is metadata included in a file?

A computer needs to know the size of the image in terms of height, width and colour depth in bits per pixel (bpp)
this allows the computer to recreate the image from binary.

d. How does the resolution of an image affect the size of the file?

The more pixels the more data need to be stored meaning the larger the file size.

22. Sounds are stored on a computer using binary data.

a. Sampling intervals and other factors affect the size of a sound file and the quality of its playback. What is meant by a bit rate?

The rate at which bits are transferred from one location to another.

Number of bits that can be transferred per second.

Number of bits processed over a certain amount of time.

b. How can sound be sampled and stored in digital form?

Sound is continuously changing values (in analogue).

The frequency is read at set intervals.

Set values are saved and replayed.

The sample rate affects the quality of the sound/ a high sample rate (or sampling sound at shorter intervals) improves the quality of the sound.

23. Compression is often used to reduce the size of files before sending them electronically.

a. What is **one** advantage for compressing files in this way?

Reduce download size.
Reduce download time when transferring a file**.**
Reduce storage requirement.

b. What is meant by lossy compression?

Removing data from a file (commonly images and sound) to reduce its size.
Data is lost when file is uncompressed which means that the image cannot be restored to its original condition.

c. What is meant by lossless compression?

Compressing a file without losing any information.
No bits are lost after the image has been restored.
All data is restored after file has been uncompressed.