

- 2 An employee of a company sells houses. He sends images of the houses to his company.
- (a) The employee compresses the image files using lossy compression before sending them. Lossy compression reduces the size of the image files.

Give **two** other reductions that lossy compression makes to the images.

- 1
- 2 [2]

- (b) The image data is broken down into packets to be sent across a network to the company.

The destination internet protocol (IP) address is read by a device in the network. The device uses the IP address to forward the packet towards its correct destination.

- (i) State the name of the device that reads the destination IP address.
..... [1]
- (ii) Identify the part of the packet where the destination IP address is found.
..... [1]

- (c) The IP address has an IPv6 format.

Give **three** characteristics of the IPv6 format.

- 1
.....
- 2
.....
- 3
..... [3]

- (d) An echo check is used to check for errors after the image has been transmitted.

Draw and annotate a diagram to show how the echo check would detect any errors.

- (e) The image data is encrypted using symmetric encryption.

- (i) Tick (✓) **one** box to show the correct statement about symmetric encryption.

- A Encrypted text is known as plain text. ☐
- B The most secure form of encryption. ☐
- C The encryption key is shared with any device receiving the encrypted data. ☐
- D Two different keys are used. ☐

[3]

[1]

- (ii) Give **one** other type of encryption that could be used.

..... [1]

1 The size of a file can be measured using different data storage units.

(a) Tick (✓) **one** box to show the smallest data storage unit.

- | | |
|-------------------------|--------------------------|
| A byte | ☐ |
| B gibibyte (GiB) | ☐ |
| C kibibyte (KiB) | ☐ |
| D nibble | ☐ |

[1]

(b) State how many tebibytes (TiB) are equal to 2 pebibytes (PiB).

..... [1]

Working space

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(c) The size of a file needs to be reduced.

(i) Give the name of the process that is used to reduce the size of a file.

..... [1]

(ii) One reason the size of a file may need reducing is so that it has a shorter transmission time.

Give **one** other reason why the size of a file may need reducing.

.....
 [1]

1 Data can be measured using different units of storage.

(a) Tick (✓) **one** box to show which of the following is the largest unit of data storage.

- | | |
|-------------------------|--------------------------|
| A tebibyte (TiB) | ☐ |
| B pebibyte (PiB) | ☐ |
| C mebibyte (MiB) | ☐ |
| D gibibyte (GiB) | ☐ |

[1]

(b) A computer has primary storage.

Give **one** example of primary storage.

Explain the purpose of your chosen example.

Example

Explanation

.....

[3]

(c) All data is converted to binary to be processed by a computer.

(i) Calculate the binary number for the denary number 175. Show all your working.

.....

 [2]

(ii) Give the binary number for the given hexadecimal numbers.

15

2D

091

[3]

Working space

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(d) Binary integers can be added together.

Add the **two** binary integers using binary addition. Show all your working. Give your answer in binary.

$$\begin{array}{r} 11100011 \\ + 11001100 \\ \hline \end{array}$$

[4]

(e) Calculate the denary number for the two's complement binary integer 10001110. Show all your working.

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..... [2]

2 An employee has a report that they need to email to their employer.

The employee compresses the report file before emailing it.

(a) State the effect the compression has on the report file.

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..... [1]

(b) Give **two** benefits of compressing the report file before emailing it.

1

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2

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[2]

(c) The employee decides to use lossless compression to compress the file.

Explain why lossy compression is **not** suitable.

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..... [3]

(d) When the employee enters the email address, the computer uses Unicode to convert the email address to binary.

(i) State what Unicode is an example of.

..... [1]

(ii) Give **two** advantages of the computer using Unicode instead of American standard code for information interchange (ASCII).

1

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2

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(iii) Give **one** disadvantage of the computer using Unicode instead of ASCII.

[1]

(e) The report is broken down into packets to be emailed.

(i) Circle **three** items of data that can be found in the packet header.

| trailer | originator's address | payload |

interrupt input operating system

destination address antivirus packet number

[3]

(ii) Each packet is sent along a different path from the employee's device to the employer's device.

Tick (✓) **one** box to show the name of this method of sending packets.

A packet networking

B packet circuiting

C	packet switching	
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D	packet transferring
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[1]

- (iii) A hardware device is used to control the path that each packet takes.

Give the name of this hardware device.

..... [1]

(f) The email data is checked for errors after it has been transmitted, using an echo check and a checksum.

(i) Explain how the echo check is used to check for errors in the email data.

⑦

[3]

(ii) In the checksum error detection method, two values are compared after transmission. If the values do **not** match, an error is detected.

Explain why the values **not** matching would show an error has occurred.

..... [2]

(g) The email data is encrypted using asymmetric encryption before it is sent.

(i) Give **one** reason why the email data is encrypted.

..... [1]

(ii) Give **one** similarity between symmetric encryption and asymmetric encryption.

..... [1]

(iii) Give **two** differences between symmetric encryption and asymmetric encryption.

1

2

[2]

1 The size of a file can be measured in different units.

(a) State how many bits there are in a byte.

..... [1]

(b) State how many kibibytes (KiB) there are in 2 mebibytes (MiB).

..... [1]

(c) Identify the unit of data that is equal to 4 bits.

..... [1]

- 2** A student has a sound file that is too large to be stored on their external secondary storage device. The student compresses the sound file to make the file size smaller.

The compression method used reduces the sample rate and the sample resolution of the sound file.

- (a)** State what is meant by the sample rate and sample resolution.

Sample rate

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Sample resolution

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[2]

- (b)** Identify which type of compression has been used to compress the sound file.

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..... [1]

- (c)** The student sends the sound file to a friend. The file is transmitted across a network that uses packet switching.

- (i)** Identify **two** pieces of data that would be included in the header of each packet.

1

2

[2]

- (ii)** Explain how the file is transmitted using packet switching.

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..... [5]

- 3** A new computer comes with primary and secondary storage.

- (a)** Data storage is measured using binary denominations.

Complete each conversion.

8 bytes = nibbles

512 kibibytes (KiB) = mebibytes (MiB)

4 gibibytes (GiB) = mebibytes (MiB)

1 exbibyte (EiB) = pebibytes (PiB)

[4]

Working space

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- (b)** Random access memory (RAM) is an example of primary storage.

Give **three** examples of data that is commonly stored in RAM.

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3

[3]

- (c)** Describe the purpose of secondary storage.

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..... [2]