7 A banker stores personal data on their work computer.

(a) The banker needs to transfer confidential data across the internet.

Identify and describe **one** method of restricting the risks posed by an unauthorised person intercepting the data whilst it is being transferred across the internet.

Method .....

Description .....

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[3]

(b) The banker receives confidential data across the internet. The data includes a digital signature.

Explain how a digital signature can make sure the data has **not** been changed during transmission.

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(c) The data that is transferred can also be verified using a checksum.

Explain how data can be verified using a checksum.

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5 A bank allows customers to access their accounts using an application that they can download onto a device such as a smartphone.

(a) The system that allows customers to access their accounts using the application is a client-server model.

Describe the roles of the different devices in this model.

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(b) The bank wants to protect the integrity of its data while transferring the data to other banks. Parity check is one example of data verification.

Complete the description of parity check when Computer A is transmitting data to Computer B.

Computer A and Computer B agree on whether to use ..... parity. Computer A divides the data into groups of ..... . The number of 1s in each group is counted. If the agreed parity is ..... and the group has an even number of 1s, a parity bit of 1 is appended, otherwise a parity bit of 0 is appended.

In a parity ..... check the bytes are grouped together, for example in a grid. The number of 1s in each column (bit position) is counted. A bit is assigned to each column to make the column match the parity. These parity bits are transmitted with the data as a parity ..... .

[5]

(c) The bank also needs to keep its customers' data private and secure.

(i) The bank's network has a firewall.

Explain how a firewall can help protect the customers' data.

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(ii) Customers need to use biometric authentication to access their accounts.
One biometric authentication method is facial recognition.

Facial recognition uses Artificial Intelligence (AI).

Describe how AI is used in facial recognition.

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3 An assessment board scans exam papers and stores the digitised papers on a server. Exam markers download the digitised papers to mark. The exam markers then upload the mark for each paper.

(a) The assessment board needs to make sure the data stored on the server is secure.

(i) Authentication methods can help to protect the server against hackers.

Identify **one other** security measure that helps to protect the server from hackers.

Describe how the security measure works.

Security measure .....

Description .....

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[3]

(ii) Identify **one** security measure that helps to protect the data when it is being transmitted to its destination. Describe how the security measure works.

Security measure .....

Description .....

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[3]

(b) The exam markers use software that operates as a thin-client to mark the exam papers.

Complete the table by identifying **two** characteristics of a thin-client.

Describe how each characteristic will be used in this software.

	Thin-client characteristic	**Description of use in this software**
1	.....	.....
	.....	.....
	.....	.....
	.....	.....
2	.....	.....
	.....	.....
	.....	.....
	.....	.....

[4]

(c) Data transmitted on the internet passes through multiple different systems.

(i) Describe the role of routers in the transmission of data through the internet.

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(ii) Describe the role of the PSTN (Public Switched Telephone Network) in the transmission of data through the internet.

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