

Past-paper walk-through

Networks including the internet ■ 2.1

eXercise

Questions in this set

- 9618/11 N25 Q7 ■ 14 marks
- 9618/12 N25 Q5 ■ 13 marks
- 9618/12 N25 Q8 ■ 10 marks
- 9618/13 N25 Q4 ■ 7 marks
- 9618/12 J25 Q6 ■ 19 marks
- 9618/13 N24 Q9 ■ 14 marks
- 9618/11 J24 Q8 ■ 8 marks

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 7

9618/11 N25 ■ Q7 ■ 14 marks

Web browsers use Internet Protocol (IP) addresses.

(a) Complete the table by describing the following types of IP address.

Type of IP address	Description
Static	
Public	

[2]

Question 7

Type of IP address	Description
Static	
Public	

[2]

Question 7

9618/11 N25 ■ Q7 ■ 14 marks

Web browsers use Internet Protocol (IP) addresses.

(b) Consider the following IP address:

256.0.0.A

Circle whether this IP address is IPv4, IPv6 or an invalid IP address.

IPv4

IPv6

Invalid

Justify your choice.

[2]

Question 7

9618/11 N25 ■ Q7 ■ 14 marks

Web browsers use Internet Protocol (IP) addresses.

(c) A user types a Uniform Resource Locator (URL) into the address bar of a web browser to access a web page.

Explain how the web browser uses the URL to access the web page.

[4]

Question 7

9618/11 N25 ■ Q7 ■ 14 marks

Web browsers use Internet Protocol (IP) addresses.

(d)(i) Calculate an estimate of the file size of the bitmap in kibibytes.

Show your working.

File size of bitmap kibibytes

[2]

(d)(ii) Explain why the actual file size may be larger than the one calculated in

(d)(i).

[2]

(d)(iii) Explain how a bitmap image is compressed using run-length encoding (RLE). **[2]**

Solution 7

(a) Mark scheme

- 1 mark for each correct description, max 2 marks
- Type of IP address
- Description
- Static
- IP address that does not change each time a device connects to the network
- Public
- IP address assigned to a device on a network to allow the device to be visible on the internet

Solution 7

(b)

Mark scheme

- 1 mark per bullet point for justification, max 2 marks
- Choice: Invalid (no mark for the choice)
- Justification:
 - ■ It is not IPv4 because the maximum denary value should be 255, this uses 256
 - ■ It is not IPv6 because it uses a full stop to separate sections and not colon
 - // It is not IPv6 because there are not enough groups

Solution 7

(c) Mark scheme

- 1 mark per bullet point, max 4 marks
- ■ The browser checks its cache for the URL
- ■ The browser parses the URL and splits it into its component parts
- ■ The browser finds the IP address for the domain name by querying a
- DNS server
- ■ The browser receives the matching IP address from the DNS server
- ■ The browser creates connection with the web server with the matching IP address

Solution 7

- ■ A request for the resource is sent to the web server with that IP address
- ■ The browser renders and displays the result
- ■ The IP address is stored in the browser cache for future use

Solution 7

(d)(i) Worked steps

File size is pixels times colour depth; the rest is unit conversion, and that is where the marks are.

- Pixels: $512 \times 2048 = 1\,048\,576$
- Bits: $1\,048\,576 \times 8$
- Bits to **bytes**: divide by 8 — which cancels the colour depth exactly, leaving 1 048 576 bytes.
- Bytes to **kibibytes**: divide by 1024.
- $\frac{1\,048\,576}{1024} = 1024 \text{ KiB}$

Solution 7

Two things earn the marks: showing the working, and using **1024**, not 1000. A kibibyte is 2^{10} bytes; a kilobyte is 10^3 . The question asks for kibibytes, so the powers of two are the point.

Solution 7

This estimate also ignores the file's header, which is why the question says “estimate”.

Mark scheme

- 1 mark for the working
- 1 mark for the correct answer
- Working:
 - $(512 * 2048 * 8) / (8 * 1024) // (512 * 2048) / 1024$
 - $// (29 * 2^{11} * 2^3) / (2^3 * 2^{10}) // (29 * 2^{11}) / 2^{10}$
 - Answer: 1024 kibibytes $//$ 210 kibibytes

Solution 7

(d)(ii)

Mark scheme

- 1 mark per bullet point, max 2 marks
- ■ The file will contain metadata
- ■ The file will have a header
- 2
- October/November
- 2025

Solution 7

(d)(iii)

Mark scheme

- 1 mark per bullet point, max 2 marks
- ■ Sequences of consecutive identical colours / pixels
- ■ ... are stored as the colour value and the number of times it occurs consecutively
- 2
- October/November
- 2025

Question 5

9618/12 N25 ■ Q5 ■ 13 marks

A local area network (LAN) has five computers, one switch and one server.

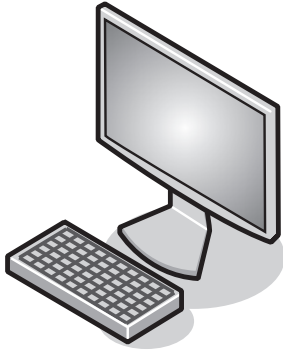
(a) Describe the characteristics of a LAN.

[2]

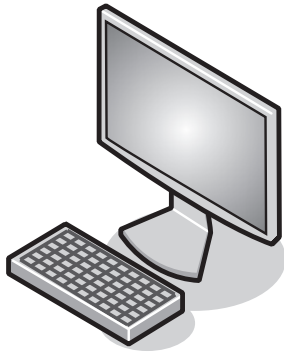
Question 5

[illegible]

Question 5



Question 5



Question 5

9618/12 N25 ■ Q5 ■ 13 marks

A local area network (LAN) has five computers, one switch and one server.

(b) Complete the following diagram to show how these devices are connected in a star topology. **[2]**

Question 5

9618/12 N25 ■ Q5 ■ 13 marks

A local area network (LAN) has five computers, one switch and one server.

(c) Describe how packets are transmitted between two hosts using a star topology. **[3]**

Question 5

9618/12 N25 ■ Q5 ■ 13 marks

A local area network (LAN) has five computers, one switch and one server.

(d) Another type of network is a bus network.

Ethernet is used to transmit and receive data between the devices on the bus network.

Describe how collisions are detected and managed on this network. **[3]**

Question 5

9618/12 N25 ■ Q5 ■ 13 marks

A local area network (LAN) has five computers, one switch and one server.

(e) Complete the table by identifying **one** threat to computer and data security posed by networks and the internet.

Describe the threat and give a method of prevention.

Threat	Description	Prevention

Question 5

[3]

Solution 5

(a)

Mark scheme

- 1 mark per bullet point, max 2 marks
- ■ Covers a small geographical area
- ■ Normally privately owned / dedicated infrastructure
- ■ Can use wired or wireless communication

Solution 5

(b)

Mark scheme

- 1 mark per bullet point, max 2 marks
- ■ All computers directly connected to switch and no other connections
- ■ Switch connected directly to server

Solution 5

(c)

Mark scheme

- 1 mark per bullet point, max 3 marks
- ■ The sending device sends the packets to the switch
- ■ The switch checks the destination address on each packet
- ■ ... and sends them only to the intended receiver

Solution 5

(d) Mark scheme

- 1 mark per bullet point, max 3 marks
- ■ The use of CSMA/CD // Carrier Sense Multiple Access with Collision
- Detection
- ■ The workstations listen to the communication channel
- ■ ... and send data only when there is no data being transmitted / the line is idle
- ■ If a collision is detected, transmission is aborted
- ■ ...and a jamming signal is sent
- ■ The workstation calculates a random wait time before trying to re-transmit

Solution 5

- ■ The random time is increased if there are multiple collisions
- 3
- October/November
- 2025

Solution 5

(e) Mark scheme

- 1 mark for correct threat
- 1 mark corresponding description
- 1 mark for correct method of prevention
- Threat
- Description
- Prevention
- Malware /
- Virus

Solution 5

- Malicious code that can alter/delete files
- Anti-virus // Anti- malware // Firewall
- Spyware
- Records keystrokes which are sent to third party
- Anti-spyware //
- Firewall // Anti- malware
- Hacking
- Gaining unauthorised access to a computer network / device
- Authentication //
- Firewall

Solution 5

- Phishing
 - Emails supposedly from reputable companies are sent to trick people into revealing personal information
 - Use a spam filter //
 - Do not open emails from unknown sources
- Pharming
 - Users are directed to a bogus website that looks legitimate to obtain personal information
 - Use a VPN // Anti- malware// Do not open links or download attachments

Question 8

9618/12 N25 ■ Q8 ■ 10 marks

A restaurant accesses software and stores data using cloud computing.

(a)(i) Give **two** benefits of storing data using cloud computing.

1. 2.

[2]

(a)(ii) Give **two** drawbacks of using cloud computing.

1. 2.

[2]

(b)(i) Explain how a touchscreen converts the point of touch to a selection from the menu.

[4]

(b)(ii) The image files that are displayed on the touchscreen have been corrupted. Identify **two** examples of utility software that could be used to recover the images.

1. 2.

[2]

Solution 8

(a)(i) Mark scheme

- 1 mark per bullet point, max 2 marks
- ■ Cloud storage can be free of charge for a limited amount
- ■ There is no need for personal storage devices
- ■ The data can be accessed from any computer with an internet connection
- ■ Cloud data services usually include data backup and recovery services
- ■ It is easier to share data / collaborate with colleagues
- ■ Cloud storage capacity can be quickly and easily increased if needed

Solution 8

(a)(ii) Mark scheme

- 1 mark per bullet point, max 2 marks
- ■ The storage/cloud can only be accessed with an internet connection
- ■ There may be no backups // possibly no control over backups // reliance on third party for backups
- ■ Uploading / downloading data could take a long time
- ■ Potential issues with the cloud storage company impacting access e.g.
 - downtime or technical problems
 - ■ Potential compatibility issues if wanting to move the data

Solution 8

- ■ Limited storage availability without paying extra
- ■ ... meaning (possibly) more expensive in the long term
- ■ Possibly security issues

Solution 8

(b)(i) Mark scheme

- 1 mark per bullet point, max 4 marks
- Methods to determine point of touch (Max 2)
 - ■ Resistive // two layers of material make contact and complete a circuit
 - ■ Capacitive // contact with the screen creates a change in charge
 - ■ Infrared // the beams are broken by the pointing device
 - ■ Optical imaging // a shadow is created when the surface is touched
 - ■ Acoustic pulse // the acoustic wave is absorbed by the pointing device
 - ■ Selection from the menu (Max 2)

Solution 8

- The point of touch is used to determine the x and y coordinates
- The menu item corresponding to the coordinate position is recognised and the menu item is added to the order

Solution 8

(b)(ii)

Mark scheme

- 1 mark per bullet point, max 2 marks
- ■ Disk repair / disk contents analysis
- ■ Back-up software

Question 4

9618/13 N25 ■ Q4 ■ 7 marks

A network engineer is setting up a Local Area Network (LAN) in an office. The network uses both wired and wireless connectivity.

(a) Give **three** advantages of a wireless network compared to a wired network.

1. 2. 3.

[3]

Question 4

Description	Memory technology
A read only memory where the contents can be erased using a voltage pulse. The contents can be changed multiple times without physically removing the memory.	
A read only memory where the contents are erased using ultraviolet (UV) light. The memory must be physically removed to be reprogrammed.	
A read only memory where the contents can be written only once after manufacture.	

Question 4

9618/13 N25 ■ Q4 ■ 7 marks

A network engineer is setting up a Local Area Network (LAN) in an office. The network uses both wired and wireless connectivity.

(b) Give **one** drawback of using a wireless network.

[1]

Question 4

9618/13 N25 ■ Q4 ■ 7 marks

A network engineer is setting up a Local Area Network (LAN) in an office. The network uses both wired and wireless connectivity.

(c) Complete the table by writing the name of the type of memory technology for each description.

Description	Memory technology
A read only memory where the contents can be erased using a voltage pulse. The contents can be changed multiple times without physically removing the memory.	
A read only memory where the contents are erased using ultraviolet (UV) light. The memory must be physically removed to be reprogrammed.	
A read only memory where the contents can be written only once after manufacture.	

Question 4

[3]

Solution 4

(a) Mark scheme

- 1 mark for each benefit, max 3
- ■ Devices can be more mobile as no physical connection is required
- ■ No cabling is needed so easier to set up
- ■ Easier to add additional devices
- ■ Multiple different device types can be connected
- 3
- October/November
- 2025

Solution 4

(b)

Mark scheme

- 1 mark for a drawback
 - Can be less secure
 - Transmission speed can be slow
 - Interference is possible
 - The signal degrades quickly without repeaters/boosters

Solution 4

(c) Mark scheme

- One mark for each correct row
- Description
- Memory
- Technology
- A read only memory where the contents can be erased using a voltage pulse. The contents can be changed multiple times without physically removing the memory.
- EEPROM

Solution 4

- A read only memory where the contents are erased using ultraviolet (UV) light. The memory must be physically removed to be reprogrammed.
- EPROM
- A read only memory where the contents can be written only once after manufacture.
- PROM
- 3
- October/November
- 2025

Question 6

9618/12 J25 ■ Q6 ■ 19 marks

A company has multiple sites in different cities. The company has drivers who deliver products to customers. Each driver can connect to the company's WAN (Wide Area Network) whilst out of the office using a smartphone.

(a) State **two** ways that a WAN is different to a LAN (Local Area Network).

1. 2.

[2]

Question 6

9618/12 J25 ■ Q6 ■ 19 marks

A company has multiple sites in different cities. The company has drivers who deliver products to customers. Each driver can connect to the company's WAN (Wide Area Network) whilst out of the office using a smartphone.

(b) The smartphones use the cell phone network to connect to the WAN.

Explain how data is transmitted using the cell phone network.

[4]

Question 6

9618/12 J25 ■ Q6 ■ 19 marks

A company has multiple sites in different cities. The company has drivers who deliver products to customers. Each driver can connect to the company's WAN (Wide Area Network) whilst out of the office using a smartphone.

(c) Devices that connect to the WAN have an IP address.

Complete the following description of IP addresses by writing the missing words.

IPv4 is displayed as four groups of 8-bit numbers separated by ____.

Each IPv4 address is 32 bits.

IPv6 is made of eight groups of 4 ____ numbers separated by colons.

Multiple consecutive groups of ____ can be replaced with a double colon.

Each IPv6 address is ____ bits.

A ____ IP address can change each time the computer connects to a network.

Question 6

A ____ IP address can only be accessed by other devices in the same LAN and is assigned by the router within the LAN.

[6]

Question 6

9618/12 J25 ■ Q6 ■ 19 marks

A company has multiple sites in different cities. The company has drivers who deliver products to customers. Each driver can connect to the company's WAN (Wide Area Network) whilst out of the office using a smartphone.

(d) The main office for the company has four wired computers, one server, two printers, one central switch and a device providing a single point of access for the internet. The network is set up as a star topology.

Draw the topology for the main office network. Label all devices.

[4]

Question 6

9618/12 J25 ■ Q6 ■ 19 marks

A company has multiple sites in different cities. The company has drivers who deliver products to customers. Each driver can connect to the company's WAN (Wide Area Network) whilst out of the office using a smartphone.

(e) Describe the role of a switch in a network.

[3]

Solution 6

(a)

Mark scheme

- 1 mark each to max 2
- ■ In a WAN devices can connect over a larger geographical area in a LAN devices connect over a smaller geographical area
- ■ A WAN may use non-dedicated hardware the hardware in a LAN is usually dedicated
- ■ A WAN uses external / not company owned transmission media // the transmission media for a LAN is usually company owned

Solution 6

(b)

Mark scheme

- 1 mark each to max 4 e.g.
 - Land is split into cells designed for maximum line of sight
 - Each cell has a tower with an antenna which receives and transmits data
 - Data is transmitted between the tower and the phone
 - Data transmission is wireless using low power radio signals/frequencies
 - Multiple devices can communicate simultaneously with the same tower

Solution 6

(c) Mark scheme

- 1 mark for each correct word
- ■ full stops
- ■ hexadecimal
- ■ zeros
- ■ 128
- ■ dynamic
- ■ private
- IPv4 is made of four groups of 8-bit numbers separated by full stops. Each

Solution 6

- IPv4 address is 32 bits.
- IPv6 is made of eight groups of 4 hexadecimal numbers separated by colons.
- Multiple consecutive groups of zeros can be replaced with a double colon.
- Each IPv6 address is 128 bits.
- A dynamic IP address can change each time the computer connects to a network.
- A private IP address can only be accessed by other devices in the same LAN and is assigned by the router within the LAN.

Solution 6

(d) Worked steps

Four marks, one per requirement, and every one is about **what connects directly to what**.

- The **server** connected directly to the switch.
- **Four labelled computers**, each connected directly to the switch.
- **Two printers**, each connected directly to the switch, the server, or a computer.
- A **router or modem** connected directly to the switch or the server, providing internet access.

Solution 6

The switch is the centre of the diagram, so draw it first and in the middle, then radiate everything else from it. That is a star topology, which is what a switched LAN is.

Three things lose marks here:

- **Label every device.** “Four labelled computers” is the wording of the mark point, so four identical unlabelled boxes score nothing.
- **Draw one line per device.** A single line to a bus with everything hanging off it is a different topology and does not meet “connected directly to the switch”.
- **Do not add devices nobody asked for.** An extra hub or a second router is not credited and can contradict a mark point.

Solution 6

The router goes at the edge, between the switch and the internet cloud — it is the boundary between this LAN and everything outside it.

Mark scheme

- 1 mark each
- ■ Server directly connected to the switch
- ■ Four labelled computers all connected directly to the switch
- ■ Two printers each directly connected to the switch / server / a computer
- ■ Router / modem directly connected to the switch / server for internet access e.g. Example only

Solution 6

(e)

Mark scheme

- 1 mark each to max 3 e.g.
 - To store the MAC addresses of devices connected to it
 - To receive packets from devices
 - To forward packets directly to the intended recipient
 - To provide a central point of connection for the network
 - to enable connected devices to communicate

Question 9

9618/13 N24 ■ Q9 ■ 14 marks

- 9** A computer is connected to a Local Area Network (LAN) that connects to a Wide Area Network (WAN).
- (a)** Describe the characteristics of a WAN.

Question 9

(b) Copper cable can be used to transmit data in a network.

Complete the table by identifying **and** describing **two other** transmission media that can be used to transfer data in the WAN.

Transmission medium	Description
.....	
	

Question 9

.....	
.....	
	

[4]

- (c) The computer on the LAN is used for real-time video conferences, where people connected to the internet communicate in real-time using video and audio.

Explain how bit streaming is used in a real-time video conference.

Question 9

- (d) The LAN has a router. The router has a public IP address and a private IP address.
 - (i) State the purpose of a public IP address and a private IP address.

Question 9

[2]

- (ii) The LAN uses subnetting.

Describe the purpose of subnetting in a network.

Solution 9

(a) Worked steps

Describe what makes a WAN a WAN, not what a network is. Two marks from:

- It covers a **large geographical area** — between cities, countries or continents.
- It uses **external or public infrastructure**, which the organisation does not own.
- Its hardware is **non-dedicated** — shared with other users.

The three points are one idea seen from three sides: because the distance is too great to cable yourself, you rent capacity on somebody else's network, which is therefore shared. That is also why a WAN is slower and less secure than a LAN, and why a VPN exists. **Mark scheme**

Solution 9

- 1 mark for each bullet point (max 2)
- ■
- A WAN covers a large geographical area
- ■
- External/public infrastructure is used
- ■
- Non-dedicated hardware
- 2

Solution 9

(b) Worked steps

Four marks: **two media, each with a matching description**. Choose the medium first, then describe the physics of *that* medium.

- **Fibre optic** — transmits data as **pulses of light** along a glass or plastic core.
- **Radio waves or microwaves** — transmit **electromagnetic waves at different frequencies**, through the air.

Solution 9

A copper cable answer works too: it carries data as **electrical signals**, as changing voltages along a conductor.

The word “matching” is the trap. Naming fibre optic and then describing electrical signals scores the identification only. Say what physically travels along the medium — light, electricity, or an electromagnetic wave through space. [Mark scheme](#)

- 1 mark for correct media 1 mark for matching description e.g.
- ■
- Fibre optic
- ■
- Transmits data as pulses of light

Solution 9

- ■
- Radio waves / microwaves
- ■
- Transmits electromagnetic waves on different frequencies
- 4

Solution 9

(c) Worked steps

Follow the video from the camera to the viewer's screen. Four marks from:

- The data is **compressed** before it is transmitted.
- The video and audio are transmitted **continuously, as a series of bits**.
- The video is **uploaded to a media server**.
- On download, the server sends the data into a **buffer**.
- The buffer **stores data ahead of the player** until the device is ready to process it.
- Playback starts once enough data has arrived, and continues while more is downloaded.

Solution 9

The buffer is the point of the question, and the reason is the same as for every other buffer: the network delivers data unevenly while playback must be smooth. A large enough buffer absorbs the variation; when it empties, playback stalls — which is exactly what buffering on a slow connection looks like. [Mark scheme](#)

- 1 mark for each bullet point (max 4)
 - ■
- Data is compressed before transmitting
 - ■
- The video and audio are transmitted continuously as a series of bits
 - ■

Solution 9

- The video is uploaded to a media server
- ■
- On download, the media server sends the data to a buffer
- ■
- The buffer stores data from server until the receiving device can
- process it
- ■
- The receiving device receives the bit stream from the buffer
- 4
- 9618/13

Solution 9

- October/November
- 2024

Solution 9

(d)(i) **Worked steps**

One mark for each address, and each is explained by **who needs to see the router**.

- The **public IP address** makes the router visible to the **internet** — the outside world addresses the whole network through it.
- The **private IP address** identifies the router to the computers **inside the LAN**, which use it as their gateway.

The router sits on two networks at once, so it needs an identity on each. Private addresses are not routable on the internet, which is why the public one cannot simply be reused inside. **Mark scheme**

Solution 9

- 1 mark for public IP address and 1 mark for private IP address:
- Public IP address:
 - ■
 - So that the router is visible to the Internet/external network/WAN
- Private IP address:
 - ■
 - So that the router is identified to computers within the LAN
- 2

Solution 9

(d)(ii) Worked steps

Two marks, and the second is the reason for the first.

- Subnetting **divides the network into smaller networks**.
- That **reduces traffic and congestion** in parts of the network ...
- ... because traffic only travels through the parts it needs to, instead of reaching every device.
- It also **hides the complexity** of the network and makes it **easier to maintain**.

Solution 9

The mechanism worth stating: traffic between two devices in the same subnet never leaves it, so each subnet carries only its own local traffic plus what genuinely crosses the boundary. Security is a further benefit — subnets can be isolated from one another — but the marks here are for congestion and manageability. [Mark scheme](#)

- 1 mark for each bullet point (max 2)
- ■
- It allows the network to be divided into smaller networks
- ■
- ... which reduces traffic in some parts of the network // reduces
- congestion

Solution 9

- ■
- ... because traffic only travels through the parts necessary
- ■
- ... which hides the complexity of network
- ■
- ... and allows for easier maintenance of the network
- 2

Question 8

9618/11 J24 ■ Q8 ■ 8 marks

8 A business is creating a local area network (LAN) in its office.

(a) The business is deciding which topology to use.

Tick (✓) **one or more** boxes in each row to identify the topology, or topologies, each statement describes.

Statement	Bus	Star	Mesh
all devices connect to one central device			
all devices connect to a central cable			
multiple paths for the packets to travel along			
robust against damage because if any line fails			

Question 8

robust against damage because if any line fails, the rest of the network retains full functionality			
most likely to lose data through collisions			

[5]

- (b)** The LAN will connect to the internet through a router. The router has a public IPv6 address.
- (i)** State why the router has a public IP address.

Question 8

- (ii) One difference between an IPv4 and IPv6 address is that the numbers in an IPv4 address are separated by full stops and in an IPv6 address they are separated by colons.

Identify **two other** differences between an IPv4 and IPv6 address.

Solution 8

(a) Mark scheme

- 1 mark for each correct row:
- Statement
- Bus
- Star
- Mesh
- all devices connect to one central device
- }
- all devices connect to a central cable

Solution 8

- }
- multiple paths for the packets to travel
- }
- robust against damage because if any line fails,
- the rest of the network retains full functionality
- }
- }
- most likely to lose data through collisions
- }
- 5

Solution 8

(b)(i)

Mark scheme

- 1 mark for:
- to be visible to and accessible by other devices on the internet
- 1

Solution 8

(b)(ii) Mark scheme

- 1 mark each:
- ■
- IPv4 has 4 groups of digits whilst IPv6 has 8 groups
- ■
- IPv4 is usually represented in denary whilst IPv6 is usually represented
- in hexadecimal
- ■
- IPv4 groups are between 0 and 255 whilst IPv6 is between 0 and FFFF

Solution 8

- ■
- IPv4 is 32 bits whilst IPv6 is 128 bits
- 2