OCR GCSE (J277)

Module E: Networks

Workbooklet · 10 parts · 201 marks

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MODULE E NETWORKS · E1

LANs and WANs

Original practice questions · 21 marks · ~25 minutes · OCR J277 spec 1.3.1

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 **21 marks**.

1

Total: 2 marks

(a) State what the letters **LAN** stand for. **[1]**

(b) State what the letters **WAN** stand for. **[1]**

2

Total: 4 marks

(a) Tick (✓) **one** box in each row to show whether each network is a LAN or a WAN. **[4]**

Network	LAN	WAN
A hospital has 4,000 computers in its buildings on one site, all connected by cables the hospital owns		
A chain of bakeries links the tills in its shops in eight different towns, using lines rented from a telecoms company		
A couple connect their two laptops and a printer to their own router at home		
A shipping firm connects the computers on its ships at sea to its head office using satellite links		

3

Total: 4 marks

(a) Give **two** characteristics of a LAN. **[2]**

1

2

(b) Give **two** characteristics of a WAN. **[2]**

1

2

4 Total: 4 marks

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

Statement	True	False
Whether a network is a LAN or a WAN is decided by how many computers it connects		
A WAN can use satellite links to connect computers		
The internet is an example of a WAN		
All the hardware in a WAN is usually owned by the organisation that uses it		

5 Total: 5 marks

A veterinary practice has one surgery with 30 computers connected in a LAN. It is opening a second surgery in a city 200 km away. Both surgeries need to share the same records of animals and appointments.

(a) Explain why the network that joins the two surgeries will be a WAN. **[2]**

(b) The practice manager says: "If the new surgery has 300 computers, its network will have to be a WAN." Explain why the manager is **not** correct. **[2]**

(c) State the name of the largest WAN. **[1]**

6 Total: 2 marks

(a) Explain **one** reason why a LAN is usually cheaper for an organisation to run than a WAN. **[2]**

Total for this worksheet: 21 marks

MODULE E NETWORKS · E2

What affects network performance

Original practice questions · 20 marks · ~25 minutes · OCR J277 spec 1.3.1

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: 2 marks

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

(b) Give **one** unit that bandwidth can be measured in. **[1]**

2

Total: 4 marks

(a) Tick (✓) **one** box in each row to show whether each change is most likely to **improve** or **reduce** the performance of a network. **[4]**

Change	Improve	Reduce
Twenty more devices connect to the same network		
Copper cables are replaced with fibre optic cables		
A laptop is moved further from the wireless access point, behind a thick wall		
Large file downloads are moved from working hours to overnight		

3 **Total: 4 marks**

A small accountancy office has an internet connection with a bandwidth of 200 Mbps. The bandwidth is shared equally between the 40 devices connected to its network.

(a) Calculate the bandwidth available to each device. Show your working. **[1]**

(b) The office takes on new staff and 10 more devices join the network. The bandwidth is still shared equally. Calculate the new bandwidth available to each device. **[1]**

(c) Explain why connecting more devices can reduce the performance of the network. **[2]**

4 **Total: 4 marks**

A warehouse manager uses a laptop connected to the network by wireless. Their desk is at the far end of the building, two brick walls away from the wireless access point. A microwave oven is used in the staff room between them. Video calls on the laptop often freeze.

(a) Explain **two** reasons why the manager's wireless connection may perform poorly. **[4]**

1

2

5 **Total: 3 marks**

A video production company connects all its editing computers to its network by wireless. Editors regularly copy very large video files to a file server.

(a) Explain how connecting the editing computers using wired connections instead could affect the performance of the network. **[3]**

6 **Total: 3 marks**

A garden centre's network has one low-specification switch that connects all its devices. Every day at noon, all its computers back up their files to a server at the same time, and staff complain that the network is slow at lunchtime.

(a) Explain **one** change the garden centre could make to improve the performance of its network at lunchtime. **[3]**

Total for this worksheet: 20 marks

MODULE E NETWORKS · E3

Client-server vs peer-to-peer networks

Original practice questions · 20 marks · ~25 minutes · OCR J277 spec 1.3.1

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: 4 marks

(a) Tick (✓) **one** box in each row to show whether each statement describes a client-server network or a peer-to-peer network. **[4]**

Statement	Client-server	Peer-to-peer
All computers have equal status		
User accounts and security are managed centrally		
Each computer can act as both a client and a server		
If one central computer fails, the other computers lose access to the shared files		

2

Total: 4 marks

A hotel chain runs a client-server network. Its servers include a web server and a file server.

(a) State the service provided by each server. **[2]**

Web server

File server

(b) Describe the role of a **client** in a client-server network. **[2]**

3

Total: 3 marks

(a) Describe what is meant by a **peer-to-peer** network. **[3]**

4 **Total: 3 marks**

A two-person furniture repair workshop has four computers connected in a peer-to-peer network. Each computer stores some of the workshop's files, and the other computers can open them.

(a) Give **one** reason why a peer-to-peer network is suitable for this workshop. **[1]**

(b) One computer is switched off at the end of the day. A worker on another computer then tries to open a file. Explain why the worker might not be able to open the file. **[2]**

5 **Total: 6 marks**

An accountancy firm has grown to 60 staff. Its computers are connected in a peer-to-peer network. The firm is thinking about changing to a client-server network.

(a) Explain **two** advantages to the firm of changing to a client-server network. **[4]**

1

2

(b) Explain **one** disadvantage to the firm of changing to a client-server network. **[2]**

Total for this worksheet: 20 marks

MODULE E NETWORKS · E4

Network hardware: NIC, switch, router, wireless access point and cables

Original practice questions · 20 marks · ~25 minutes · OCR J277 spec 1.3.1

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: 4 marks

(a) Tick (✓) **one** box in each row to show which piece of hardware performs each task. **[4]**

Task	NIC	Switch	Router	Wireless access point
Lets wireless devices connect to a wired network using radio waves				
Connects a local area network to the internet				
Hardware inside a device that allows it to connect to a network				
Connects devices within a LAN and sends data only to the device it is meant for				

2

Total: 3 marks

Transmission media carry data between the devices on a network.

(a) Give **two** examples of transmission media that can be used to carry data in a **wired** network. **[2]**

1

2

(b) State the transmission medium used by a **wireless** network. **[1]**

3 **Total: 4 marks**

A small printing company has six desktop computers. Each one has a network interface card (NIC) and is connected by cable to a switch.

(a) Describe how the switch makes sure that data sent from one computer arrives only at the computer it is meant for. **[2]**

(b) The company's manager says: "Now we have a switch, we do not need a router." Explain why the company still needs a router if staff want to use the internet. **[2]**

4 **Total: 3 marks**

The printing company buys two laptops. Each laptop has a wireless NIC but no Ethernet port.

(a) Identify the piece of hardware the company should add so that the laptops can join the wired network. **[1]**

(b) Explain why each laptop still needs a NIC, even though it connects without a cable. **[2]**

5 **Total: 6 marks**

A firm of architects has four stand-alone desktop computers that are not connected to each other. Visitors bring tablets that can only connect wirelessly. The firm wants all of these devices to share files on a local area network (LAN) and to use the internet.

(a) Explain what hardware the firm needs to connect its devices into a LAN that can reach the internet. For each piece of hardware, explain the task it performs. **[6]**

Total for this worksheet: 20 marks

MODULE E NETWORKS · E5

Star and mesh topologies

Original practice questions · 20 marks · ~25 minutes · OCR J277 spec 1.3.1

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

Diagrams A and B show two networks. Each has the same five computers.

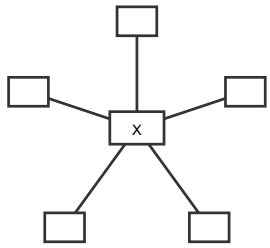


Diagram A

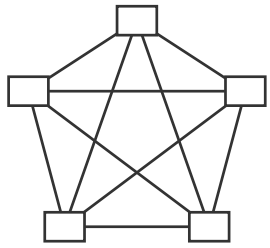


Diagram B

(a) Identify the topology shown in **Diagram A** and the topology shown in **Diagram B**. **[2]**

A

B

(b) State the name of the device labelled **X** in Diagram A. **[1]**

2

Total: 3 marks

A small architects' office has three desktop computers, one laptop and one printer. It wants to connect them as a **star** network.

(a) Draw a diagram of the star network for this office. Label each device. **[3]**

3 Total: 4 marks

(a) Tick (✓) **one** box in each row to show whether each statement describes a star topology, a full mesh topology, or both. **[4]**

Statement	Star	Full mesh	Both
Every device is connected directly to every other device			
If the central device fails, no device can communicate with any other			
If one cable fails, the other devices can still communicate			
Each device has only one connection, to the central device			

4 Total: 3 marks

A sound studio connects five computers in a wired full mesh.

(a) State how many cables are needed to connect the five computers in a full mesh. **[1]**

Answer: ..... cables

(b) One cable in the mesh is damaged. Describe how data can still reach the two computers at each end of that cable. **[2]**

5 Total: 4 marks

A veterinary practice has twelve computers and a file server connected in a star topology. It expects to take on more staff next year.

(a) Explain **one** advantage to the practice of using a star topology. **[2]**

(b) Explain **one** disadvantage to the practice of using a star topology. **[2]**

6 **Total: 3 marks**

A water treatment works uses a network of computers to monitor its pumps and valves, day and night. The engineers say the network must keep working even if part of it fails.

(a) Identify whether a star or a mesh topology would be more suitable for the water treatment works. Justify your choice. **[3]**

Topology

Justification

Total for this worksheet: 20 marks

MODULE E NETWORKS · E6

Wired vs wireless: Ethernet, Wi-Fi and Bluetooth

Original practice questions · 20 marks · ~25 minutes · OCR J277 spec 1.3.2

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) Tick (✓) **one** box in each row to show whether each mode of connection is wired or wireless. **[3]**

Mode of connection	Wired	Wireless
Bluetooth		
Ethernet		
Wi-Fi		

(b) A delivery driver connects a pair of wireless headphones to their phone using Bluetooth. **[1]**
Give **one** reason why Bluetooth is suitable for this connection.

2

Total: 3 marks

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

Statement	True	False
Walls can weaken a Wi-Fi signal		
A wired connection lets a device be moved freely around a building while it stays connected		
Bluetooth is designed to connect devices that are a long way apart		

3 **Total: 6 marks**

A large garden centre has an office with four desktop computers that never move. Staff on the shop floor and in the greenhouses use tablet computers to check stock. The office computers use Ethernet. The tablets use Wi-Fi.

(a) Explain **two** benefits to the garden centre of using Wi-Fi for the tablets. **[4]**

1

2

(b) Explain **one** drawback of using Wi-Fi for the tablets. **[2]**

4 **Total: 3 marks**

Describe **three** benefits to the garden centre of using wired (Ethernet) connections for the office computers, instead of Wi-Fi. **[3]**

1

2

3

5 **Total: 4 marks**

For each situation, recommend **one** mode of connection (Ethernet, Wi-Fi or Bluetooth) and justify your choice.

(a) A hotel wants guests to be able to get their phones online in any of its rooms. **[2]**

Connection

Justification

(b) A video production company keeps a file server in a fixed rack. Very large video files are copied to and from it all day. **[2]**

Connection

Justification

Total for this worksheet: 20 marks

MODULE E NETWORKS · E7

IP addressing and MAC addresses

Original practice questions · 20 marks · ~25 minutes · OCR J277 spec 1.3.2

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**. All addresses on this sheet are made up.

1

Total: 3 marks

(a) State the purpose of an IP address. **[1]**

(b) State the number of bits in an IPv4 address and in an IPv6 address. **[2]**

IPv4: ..... bits

IPv6: ..... bits

2

Total: 4 marks

A network technician finds four addresses in a log file.

(a) Tick (✓) **one** box in each row to show what each address is. **[4]**

Address	IPv4 address	IPv6 address	MAC address	Not a valid address
192.168.40.17				
3A:7C:19:D2:5E:08				
10.12.256.3				
2001:0DB8:7A21:0000:0000:3C4F:0912:BE07				

3

Total: 6 marks

(a) Describe the format of an IPv4 address. **[3]**

(b) Describe the format of a MAC address. **[3]**

4 Total: 4 marks

A small architecture office has a LAN. A switch connects six computers and a printer. A router connects the LAN to the internet. An architect on one of the computers downloads a drawing from a web server in another country.

(a) Explain how IP addresses and MAC addresses are used to get the drawing from the web server to the architect's computer. **[4]**

5 Total: 3 marks

(a) Explain why IPv6 was introduced. **[2]**

(b) Give **one** difference between how an IPv6 address and an IPv4 address are written. **[1]**

Total for this worksheet: 20 marks

MODULE E NETWORKS · E9

Protocols and standards: TCP/IP, HTTP, HTTPS and FTP

Original practice questions · 21 marks · ~25 minutes · OCR J277 spec 1.3.2

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 **21 marks**.

1

Total: 3 marks

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

An office buys a network printer from one manufacturer. The office's laptops are made by a different manufacturer, but they can all print to it.

(b) Explain how **standards** make this possible. **[2]**

2

Total: 4 marks

A regional museum uses the internet for several tasks.

(a) Complete the table by writing the **most suitable** protocol for each task. Choose from: **TCP/IP**, **HTTP**, **HTTPS**, **FTP**. Each protocol may be used once, more than once or not at all. **[4]**

Task	Protocol
A web designer sends a folder of new web page files from their computer to the museum's web server	
A visitor enters their card details to pay for exhibition tickets on the museum's website	
A visitor's browser requests the museum's public page of opening times	
Data is split into numbered packets, given addresses and routed across the internet	

3 Total: 4 marks

A large image is sent from a web server to a computer across the internet.

(a) Describe how **TCP/IP** is used to send the image and make sure it arrives correctly. **[4]**

4 Total: 4 marks

A garden centre has a website that uses HTTP. It is adding a page where customers log in with a username and password to see their orders.

(a) Explain why the log-in page should use HTTPS instead of HTTP. **[3]**

(b) State **one** way a customer can tell that a web page is using HTTPS. **[1]**

5 Total: 3 marks

(a) Describe what happens, using HTTP, when a web browser opens a web page. **[2]**

(b) State the purpose of **FTP**. **[1]**

6 **Total: 3 marks**

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

Statement	True	False
Different protocols are used for different purposes		
HTTPS stops data from being intercepted		
HTTP and HTTPS are both used to request and send web pages		

Total for this worksheet: 21 marks

MODULE E NETWORKS · E10

Email protocols: POP, IMAP and SMTP

Original practice questions · 19 marks · ~25 minutes · OCR J277 spec 1.3.2

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 **19 marks**.

1

Total: 2 marks

(a) State what the letters SMTP stand for. **[1]**

(b) State what the letters IMAP stand for. **[1]**

2

Total: 4 marks

Tick (✓) **one** box in each row to show which protocol is used for each task. **[4]**

Task	SMTP	POP	IMAP
Sending an email from a laptop to the sender's mail server			
Passing an email from one mail server to another mail server			
Downloading emails to one device, usually deleting them from the mail server			
Keeping emails on the mail server so that several devices show the same inbox			

3

Total: 3 marks

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

Statement	True	False
SMTP is used to collect new emails from a mail server		
An email downloaded with POP can be read on that device without a connection		
IMAP needs storage space on the mail server for the emails		

4 **Total: 3 marks**

A retired engineer reads email on one desktop computer at home and never uses any other device for email. Their email software uses POP.

Describe how POP handles the engineer's new emails. **[3]**

5 **Total: 7 marks**

A mobile florist runs her business alone. She reads and answers customer emails on a phone in her van, a tablet at market stalls and a computer in her workshop.

(a) Recommend whether her devices should use POP or IMAP to receive email. Justify your recommendation. **[3]**

Protocol

Justification

(b) The florist deletes an order email on her phone. Explain what happens to that email on her workshop computer if her devices use the protocol you recommended in (a). **[2]**

(c) Explain **one** drawback for the florist of the protocol you recommended in (a). **[2]**

Total for this worksheet: 19 marks

MODULE E NETWORKS · E11

Layers and the 4-layer TCP/IP model

Original practice questions · 20 marks · ~25 minutes · OCR J277 spec 1.3.2

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: 6 marks

(a) State what is meant by a **layer** in network communication. **[2]**

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

Statement	True	False
Each layer has its own protocols		
A layer uses the services of the layer above it		
When data is sent, it passes down through the layers on the sending device		
If one layer is changed, every other layer must also be rewritten		

2

Total: 3 marks

An accountancy firm's desktop computer sends a file to a printer server in another building. Both devices use the TCP/IP model.

(a) State how many layers there are in the TCP/IP model. **[1]**

(b) Describe how the file passes through the layers from the desktop computer to the printer server. **[2]**

3 Total: 4 marks

A team of programmers is writing the networking software for a new range of smart thermostats. The software is divided into layers.

(a) Explain **two** benefits to the programmers of dividing the software into layers. **[4]**

1

2

4 Total: 3 marks

A warehouse connects its handheld barcode scanners to its network with cables. The warehouse manager replaces the cables with a wireless connection. The stock-control program on the scanners is not changed.

(a) Explain how the use of layers means the stock-control program still works after the change. **[3]**

5 Total: 2 marks

A dental surgery buys a laptop from one manufacturer and a network printer from a different manufacturer.

(a) Explain why the laptop and the printer can communicate, even though they were made by different manufacturers. **[2]**

6 **Total: 2 marks**

A network technician at a train operator is told that messages between two offices are not arriving.

(a) Explain how the use of layers helps the technician to find and fix the problem. **[2]**

Total for this worksheet: 20 marks