Chhetri Academy

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GCSE COMPUTER SCIENCE

1.3

OCR J277 | Specification point 1.3.1

Networks and topologies

Untiered

Past paper question booklet

11	2014-2025	Untiered
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

1 Zoe is organising a LAN-party. Her friends will each bring a computer to the party so that they can play games against each other.

(a) Describe what is meant by a Local Area Network (LAN).

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..... **[2]**

(b) Zoe plans to use the star topology in the LAN.

Describe the star topology.

You may use a diagram.

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..... **[2]**

(c) State **two other** topologies that can be used when creating a LAN.

1 .....

2 .....

[2]

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9 A bank uses a local area network to connect all the computers in its head office.

(a) State **two** ways the local area network can be used to monitor the work of employees.

1 .....

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2 .....

..... **[2]**

(b) Computers in the network can be identified using both IP addresses and MAC addresses.

Describe **two** differences between IP addresses and MAC addresses.

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..... **[4]**

(c) The bank network uses failover.

Describe what is meant by failover and justify the need for failover in the network.

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..... **[4]**

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7 A company, OCR Supermarkets, has supermarket stores throughout the country. The computers for each store connect to the central office using a Wide Area Network (WAN).

(a) Identify **two** differences between a WAN and a LAN (Local Area Network).

Difference 1: .....

.....

Difference 2: .....

.....

.....

[2]

(b) OCR Supermarkets use a client-server network to connect the checkout computers to the store's server.

Describe **two** benefits to OCR Supermarkets of using a client-server network instead of a peer-to-peer network.

Benefit 1: .....

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.....

Benefit 2: .....

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[4]

The supermarket manager's computer can access the Internet and the World Wide Web.

(c) Explain the difference between the Internet and the World Wide Web.

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..... **[2]**

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6 A small accountancy firm, OCR Accounts, currently uses stand-alone computers within the office.

OCR Accounts is considering implementing a network.

(a) One benefit of having a network over stand-alone computers is the ability to monitor devices and employees on the network.

Explain, using examples for OCR Accounts, **two** additional benefits of having a network over stand-alone computers.

1 .....

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2 .....

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[6]

(b) OCR Accounts have a set of laptops that will form the network.

(i) Identify **one** hardware device that would be needed to connect the laptops to the Internet.

..... **[1]**

(ii) Identify **two** additional pieces of hardware that OCR Accounts could use to set up the network and describe what each piece of hardware would be used for within the network.

1 .....

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2 .....

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[4]

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(c)* OCR Accounts are setting a number of network policies.

Describe the network policies that OCR Accounts could implement and explain the purpose of each of these policies within the network.

The quality of your written communication will be assessed in your answer to this question.

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2 A house has computers in each room and a central router. Every room allows both Ethernet and WiFi connections to the router.

(a) Identify if the house network is a LAN (local area network) or a WAN (wide area network). Justify your choice.

Network type: .....

Justification: .....

.....

.....

.....

[3]

(b) The following table has descriptions of Ethernet and WiFi.

Tick (✓) **one** box in each row to identify if the description is more appropriate for Ethernet or WiFi.

Description	Ethernet	WiFi
A wired connection		
More likely to be affected by interference		
Data can be transmitted at a faster speed		
Wireless transmission		
Shorter transmission range before data is lost		

[5]

(c) **(i)** Describe the purpose of the router in the house's network.

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.....

..... **[2]**

(ii) Identify **two** additional items of network hardware, apart from cables and a router, that may be used within the house network.

1 .....

2 .....

[2]

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Turn over

(d) A user enters a uniform resource locator (URL) into a web browser on one of the computers in the house. A system is then used to find the IP address of the web server associated with the URL.

(i) Name the system which matches URLs to IP addresses on the web.

.....

..... **[1]**

(ii) The following statements describe what happens after the IP address has been found and returned to the user's computer.

There are **five** missing statements in the table.

Write the letter of the missing statements from the table in the correct place to complete the description.

1 The request is put into packets

2 .....

3 The packets are sent across the network

4 .....

5 .....

6 If they have not arrived:

7 A timeout is sent to request the packets are resent

8 If they have arrived:

9 .....

10 .....

Letter	Statement
A	The server checks if all the packets have arrived
B	The packets are put in order
C	The request is processed by the web server
D	The packets are received by the host server
E	Each packet is given the address and a number

[5]

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(e) The house owner is concerned about potential threats to the network from being connected to the Internet.

(i) Describe **three** possible threats to the computers connected to the network and give **one** way each threat can be reduced or prevented.

Threat 1 .....

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Prevention .....

Threat 2 .....

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Prevention .....

Threat 3 .....

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Prevention .....

[9]

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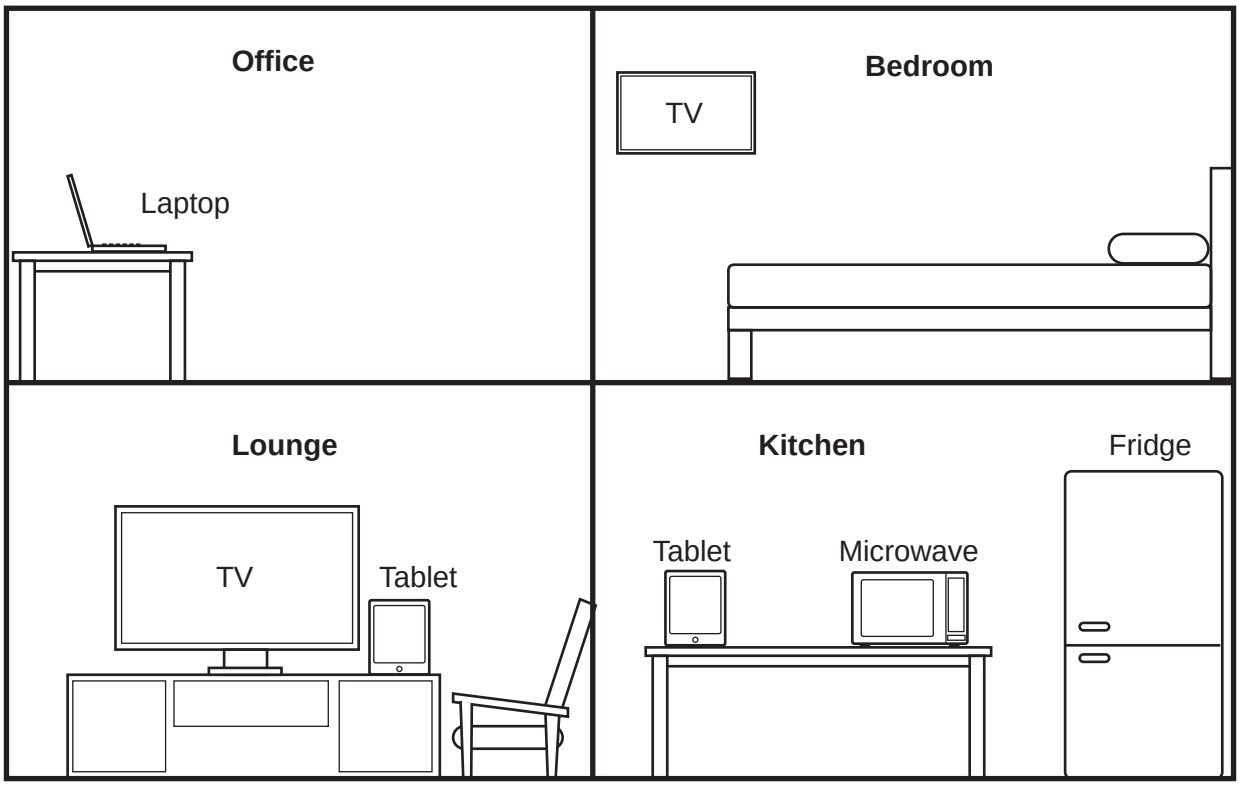
Turn over

2 Hope has a network in her house. The main devices are shown in the diagram.



(a) State whether Hope's network is a LAN or a WAN. Justify your choice.

Choice .....

Justification .....

.....

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..... **[3]**

(b) Devices on the network do not currently have Internet access.

Identify **one** device that Hope can use to connect her home network to the Internet.

..... **[1]**

(c) The network has one wireless access point in the kitchen that transmits data on the 5 GHz frequency.

(i) When the laptop is in the kitchen, it has better network performance.

Explain why the laptop's network performance is lower in the bedroom.

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.....

..... **[2]**

(ii) State **two** ways Hope could improve the wireless network performance in the bedroom.

1 .....

.....

2 .....

.....

[2]

(d) Explain why Hope's network uses a peer-to-peer model and not a client-server model.

.....

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..... **[3]**

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(e) Some of Hope's files are stored on the cloud.

Describe the benefits and drawbacks to Hope of storing her files on the cloud.

Benefits

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Drawbacks

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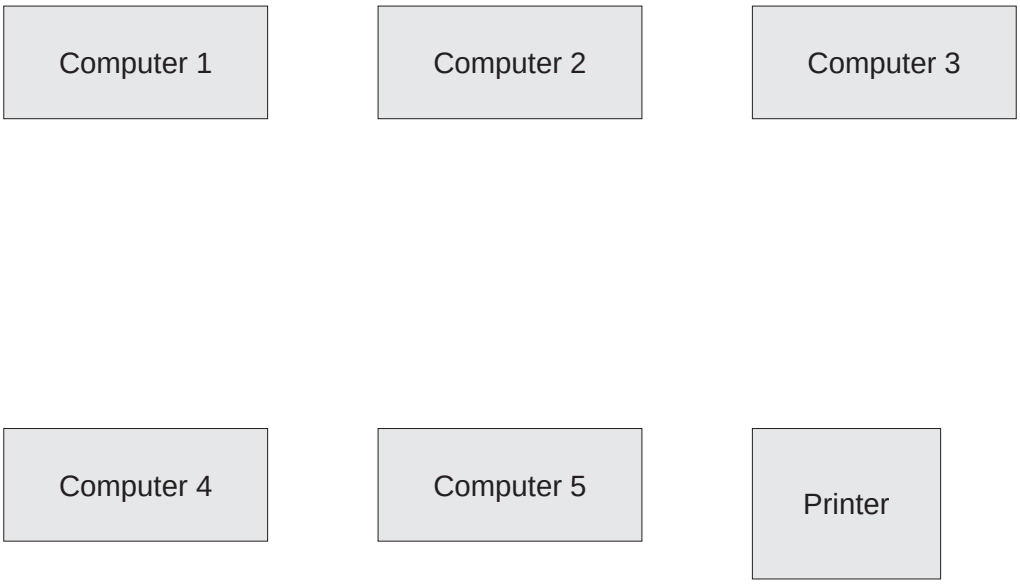
[6]

6 Naomi's office has five computers connected into a Local Area Network (LAN). There is also one printer that all the devices can print to.

(a) The LAN is set up as a mesh topology.

Draw connections to show one way that the devices could be connected using a mesh topology.



[2]

(b) Ethernet cables are used within the office building.

Tick **one** box in each row to identify if the statement about Ethernet is True or False.

Statement	True	False
Ethernet is a protocol		
Ethernet uses wireless data transmission		
Ethernet can transmit data at speeds of up to 100 Gbits per second		
Ethernet is a protocol within the TCP/IP stack		

[4]

(c) Computer 1 enters the URL www.ocr.org.uk into a web browser. This is then converted into the IP address of the webserver that hosts the website.

(i) Explain how the URL www.ocr.org.uk is converted into the IP address.

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..... **[3]**

(ii) The website request is sent using packet switching. Each packet has a header.

State **three** items of data that would be contained in a packet header.

1 .....

2 .....

3 .....

[3]

7 A university has buildings in two sites that are 5 miles apart.

(a) Describe the difference between a LAN and a WAN.

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.....

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..... **[2]**

(b) Site A has 4 classrooms. Site B has 2 classrooms. The network on each site between the classrooms is a star topology using a switch. The two sites are connected over the Internet.

Complete the network diagram for **site A** of the University.



[2]

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(c) Site B has a higher network performance than site A.

(i) Explain how each of the following can contribute to the performance of a network.

Wifi frequency .....

.....

Interference .....

.....

Number of concurrent users .....

.....

Type of network traffic .....

..... **[4]**

(ii) Identify **one** other factor that can contribute to the performance of a network.

.....

..... **[1]**

(iii) The data transmitted between the two sites uses packet switching. Data is transmitted from a computer in site A to a computer in site B.

Describe how packet switching can be used when sending data from one site to the other.

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..... **[4]**

(d) The university want to protect their data against threats when connected to the Internet.

(i) Describe the threat malware can pose to the university's network and give a prevention method that the university can use.

Description .....

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.....

Prevention .....

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[3]

(ii) Describe the threat a brute force attack can pose to the university's network and give a prevention method that the university can use.

Description .....

.....

.....

.....

Prevention .....

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[3]

(e) Data transmitted over the network uses different protocols.

Tick **one** box in each row to identify whether the protocol is related to email, transferring files or accessing websites.

Protocol	Email	Transferring files	Accessing websites
POP			
FTP			
SMTP			
HTTPS			

[4]

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(f) The building is considering the implementation of a virtual network.

Describe what is meant by a virtual network.

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..... **[2]**

3 A library has a LAN (Local Area Network).

(a) The LAN allows access by both wired and wireless devices.

Users have reported that the network sometimes runs very slowly.

(i) Explain why the number of devices using the network at the same time can affect the performance of the network.

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..... **[3]**

(ii) Identify **one** other factor that can affect the performance of the network.

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..... **[1]**

(b) Users can access websites from the library computers.

Complete the description of accessing websites using the given list of terms. Not all terms will be used.

0 1 127 128 255 256 Colon

Domain Name Server Embedded systems File server Full stop

Hyphen Internet protocol MAC address Router

Uniform Resource Locator Web server Clients

A website is hosted on a ..... . The computers that access the websites are called ..... .

The user enters the ..... into a web browser. The web browser sends a request to the ..... for the matching IP (Internet Protocol) address. If found the IP address is returned. A request is then sent to this IP address.

An IPv4 address is made of 4 groups of digits. Each group can be between the denary values ..... and ..... . The groups of digits are separated by a ..... .

[7]

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(c) The wired connection is an Ethernet connection. Ethernet is considered a standard.

Explain why Ethernet is a standard.

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..... **[2]**

(d) The network has several routers.

Identify **three** tasks carried out by a router.

1 .....

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2 .....

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3 .....

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[3]

(e) The library does not use encryption when data is transmitted through the network.

Give **two** reasons why the library should use encryption.

1 .....

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2 .....

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[2]

(f) Protocols are used to transmit data through the network and over the internet.

Identify **one** protocol that can be used to perform each of the following tasks:

Send an email .....

Access a website securely .....

[2]

2 A student is performing a range of actions on the internet using their computer.

(a) A range of protocols are used for the transmission of data by the student's computer, and the web servers they are accessing.

(i) Complete the table by identifying the most appropriate protocol for each of the tasks the student is performing.

Task	Protocol
Requesting to view a news webpage from a web server	
Entering a username and password to access their bank account	
Downloading a text document from a web server	
Checking for new emails in their inbox	

[4]

(ii) Some protocols have layers.

Give **two** reasons why protocols have layers.

1 .....

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2 .....

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[2]

(b) The student's computer is part of their home Local Area Network (LAN). The LAN currently only has wired connections.

(i) One characteristic of a LAN is that they are set up over a small geographical area.

Give **one** other characteristic of a LAN.

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..... **[1]**

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(ii) Describe the benefits of the student changing their home LAN to include wireless connections.

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..... **[4]**

(iii) State **two** drawbacks of changing their home LAN to include wireless connections.

1 .....

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2 .....

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[2]

4 A youth centre is creating a network with 20 computers in a single building that will be connected in a Local Area Network (LAN).

(a) Identify **two** reasons why this network will be a LAN and not a Wide Area Network (WAN).

1 .....

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2 .....

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[2]

(b) The network design connects the computers in a mesh topology.

(i) Describe what is meant by a mesh topology.

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..... **[2]**

(ii) Describe **one** benefit **and one** drawback of the network using a mesh topology instead of a star topology.

Benefit .....

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Drawback .....

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[4]

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(c) The network design originally only had wired connections. The design is updated to include wireless connections via Wi-Fi.

(i) Explain the benefits to the youth centre of also providing Wi-Fi connections.

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..... **[3]**

(ii) The decision to use wired and/or wireless connections can affect the performance of the network.

Complete the table by explaining how each factor can affect the performance of a network.

Factor	How it affects performance
Bandwidth	....
Number of users accessing the network at the same time	....

[4]

(d) The youth centre is going to store data about users and events using cloud storage.

Describe the drawbacks to the youth centre of storing the data on the cloud.

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..... **[5]**

(e) Users will have access to the internet.

(i) Identify **one** device that will be required to allow the LAN to connect to the internet.

..... **[1]**

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(ii) The computers will be allocated an IPv4 address.

Tick (✓) **one** box on each row to identify if the IPv4 address is valid **or** invalid.

IPv4 address	Valid (✓)	Invalid (✓)
192.154.21.2		
258.0.0.3		
56.1.2.66.1		
251.58.3.7		

[4]

(iii) When a user wants to access a website they enter the URL into the address bar of a web browser.

Describe the steps that take place to convert the URL into the website's IP address.

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..... **[4]**

(f) Identify **one** piece of legislation that the youth centre will need to follow when storing users' data **and** describe the steps they need to take to meet the requirements of this legislation.

Legislation .....

Steps the youth centre needs to follow .....

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[4]

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