OCR Cambridge Technicals – Level 3
Information Technology

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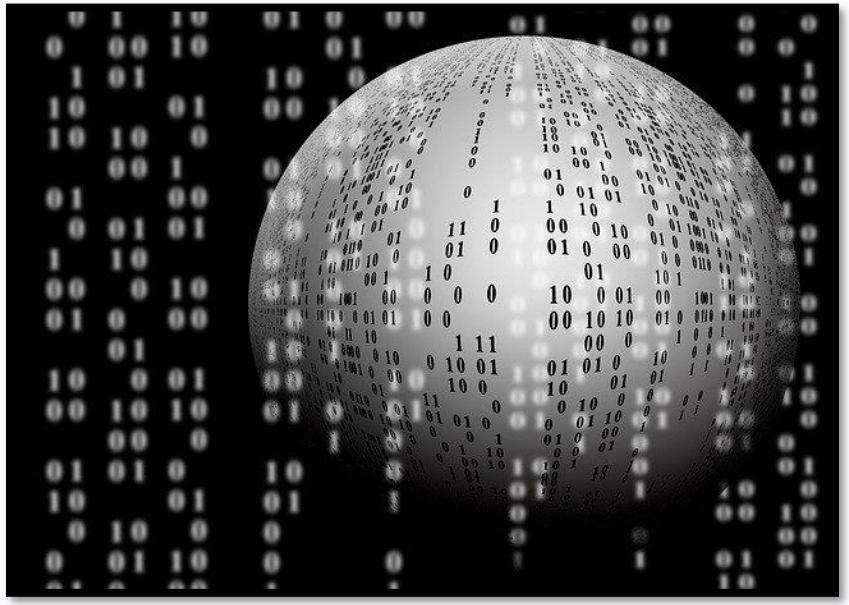
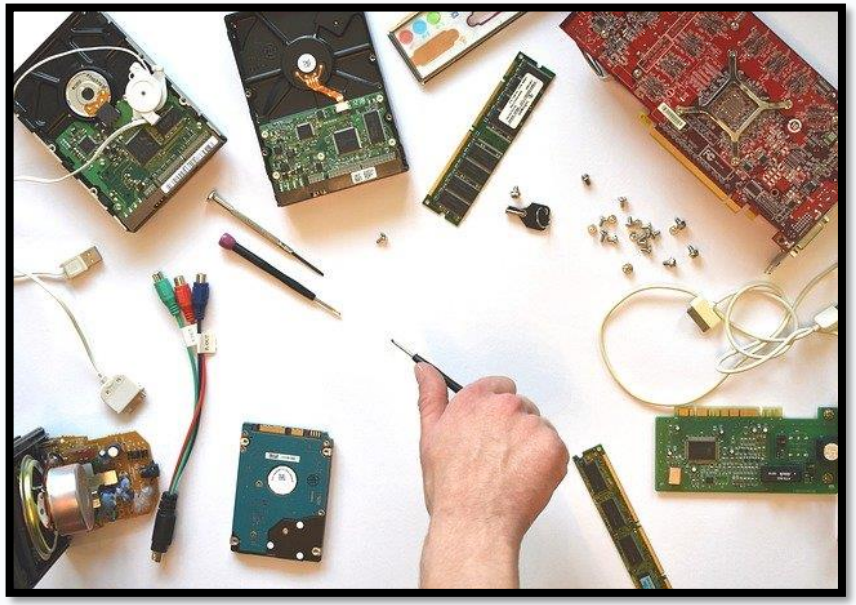
NAME:

Extended Diploma in IT
Summer Independent Learning





Introduction & Contents

Welcome to IT @ New College!

In this document you will be completing several independent learning tasks designed to prepare you for some of the early topics of the Level 3 IT course at New College.

It is anticipated that completion of this whole document will take in the region of between 10-12 hours in total, including associated research. Most slides require some kind of input, so please read carefully. Sometimes there will be links signposting you to websites with relevant information, often these will be videos. However, it is important to remember that KS5 study requires you to begin developing your own research techniques, so you are strongly encouraged to read around each topic as widely as possible. There is a 'sources table' on the penultimate slide of this document – please make use of this to show your research and referencing skills.

You will need to ensure that this work is ready for submission in your very first lesson at college in September. This can either be printed or sent to your teacher via email. Good luck and have a great summer!

Contents

1.1 – Computer Hardware

What is a Computer?

A computer is simply a device that takes an input from a user, processes this input (this means to perform a calculation or change the data in some way) and then produce an output.

Computers are made up of both hardware and software. It is important that you understand the basic differences between hardware and software.

Watch the video below before completing the task on the right:

https://www.youtube.com/watch?v=VzVSt6jxiqw

Explain, using examples, the various *differences* between **HARDWARE** and **SOFTWARE**.

1.1 – Computer Hardware

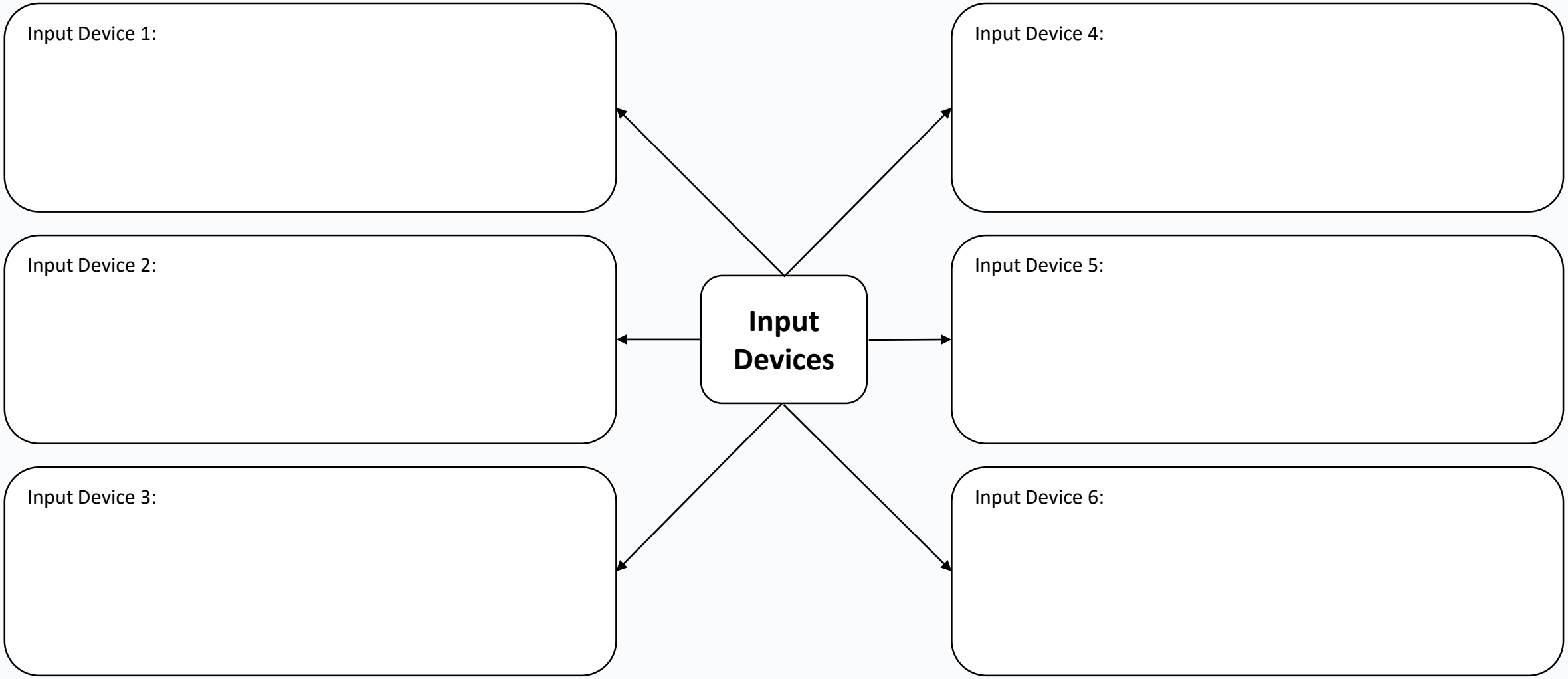
Watch the video below. It contains useful information that will help you complete these tasks:

https://www.youtube.com/watch?v=MMzdKTtUIFM

The purpose of a computer can be represented very simply using the above diagram. Briefly explain, using an example, what happens in each of these three stages.

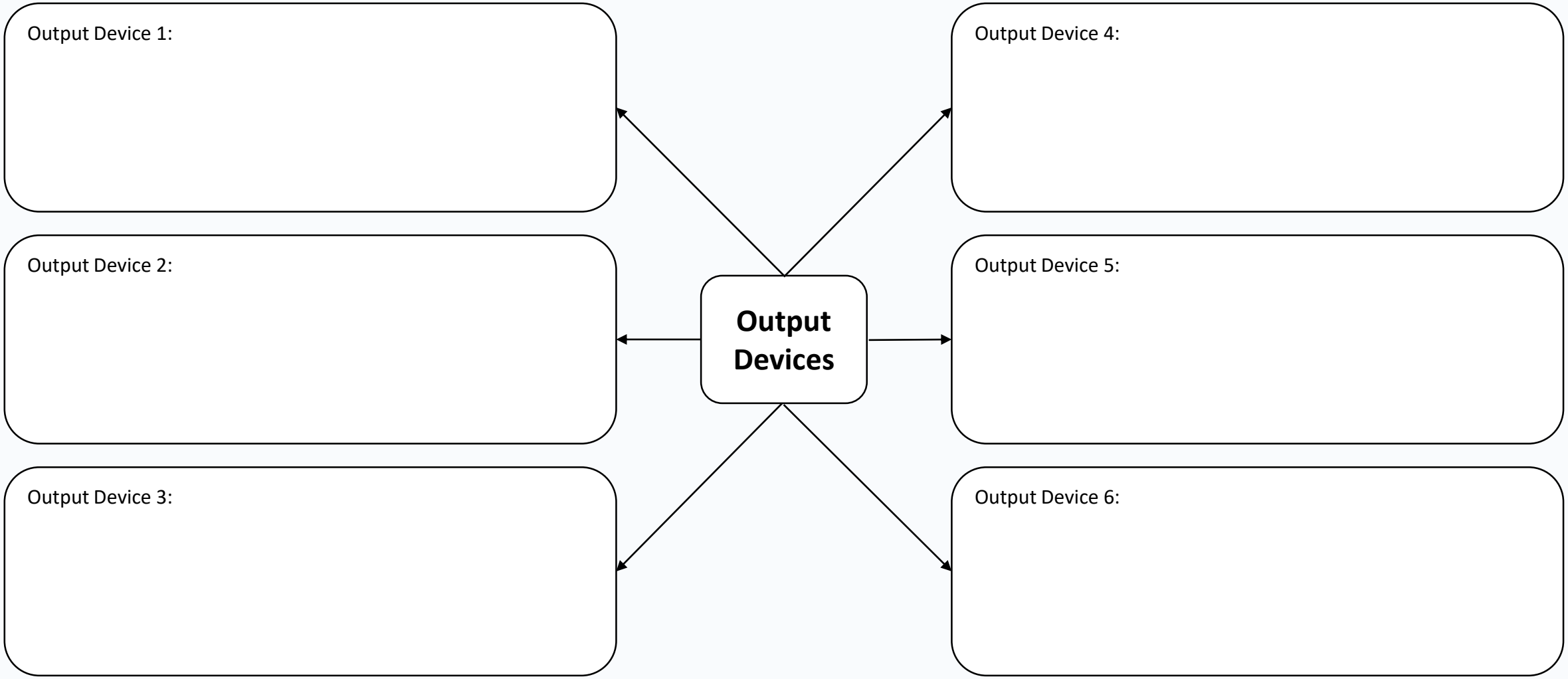
1.1 – Input Devices

Using the boxes below, identify and describe six different input devices of your choice.



1.1 - Output Devices

Using the boxes below, identify and describe six different output devices of your choice.



1.1 – Specialist Devices & Accessibility

Do some research into the various specialist hardware available for users with physical impairments. This mini-website is a useful starting point:

https://www.teach-ict.com/as_a2_ict_new/ocr/AS_G061/312_software_hardware/specialist_hwsw/miniweb/index.htm

Explain, using examples, your understanding of the term '***accessibility***' when relating to computer systems.

On the next three pages, create a mini-presentation about '*specialist hardware for users with physical impairments*'. You need to cover devices for visually impaired users, devices for auditory impaired users and devices for motor impaired users. You should include information about the various specialised hardware available.

1.1 - Specialist Devices for Visually Impaired Users

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1.1 - Specialist Devices for Auditory Impaired Users

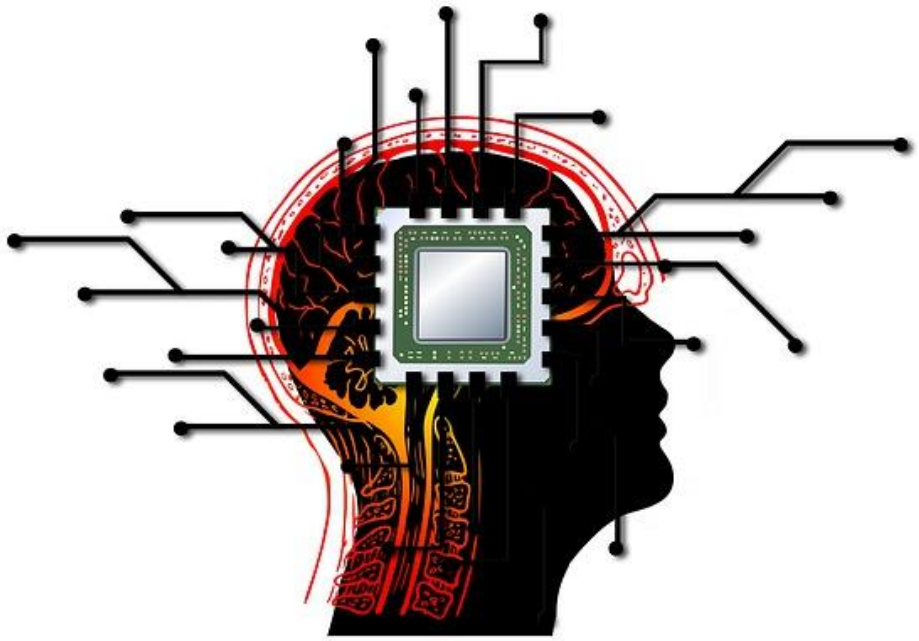
1.1 - Specialist Devices for Motor Impaired Users

1.2 Computer Components

Complete this table…

Name of Component	Explanation of Role of Component – *'What does it do?'*
CPU / Processor	
Heat Sink & Fan	
HDD / Hard Disk Drive	
GPU / Graphics Card	
PSU / Power Supply	
RAM	
Optical Drive	

1.2 - The CPU

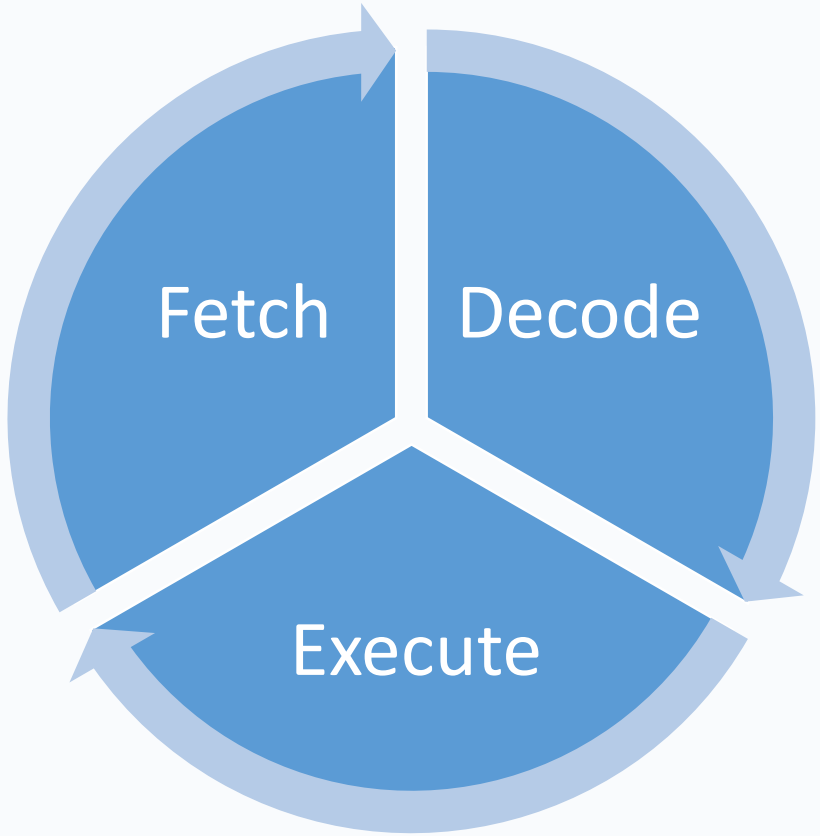


Watch the video below about the CPU – this will be useful when completing the next few tasks:

https://www.youtube.com/watch?v=DvgJZvVyJfA

1.2 – The CPU: FDE Cycle

It is important to realise that the CPU follows the 'fetch-decode-execute' cycle. Do some research into the FDE cycle and briefly explain what happens in each stage below.



Fetch	
Decode	
Execute	

Visit the mini-website here for more information about the FDE cycle:

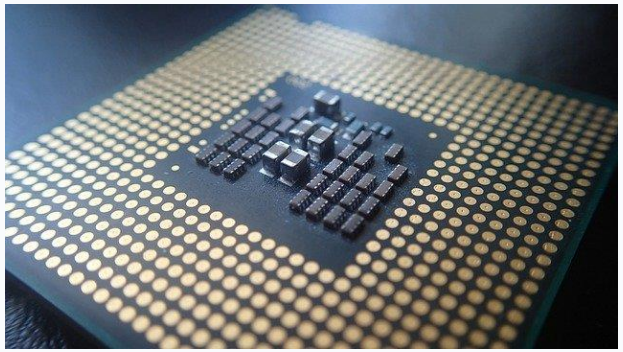
http://teach-ict.com/gcse_computing/ocr/212_computing_hardware/cpu/miniweb/pg3.php

1.2 – The CPU: Performance Factors

There are three main factors that determine the performance of a CPU. These are as follows:

- **Clock speed**
- **Number of cores**
- **Cache size**

In the table on the right, explain how each of these three factors affects the performance of a CPU.



Visit the website link here for more information about these three CPU performance factors:

https://www.bbc.co.uk/bitesize/guides/z7qqmsg/revision/5

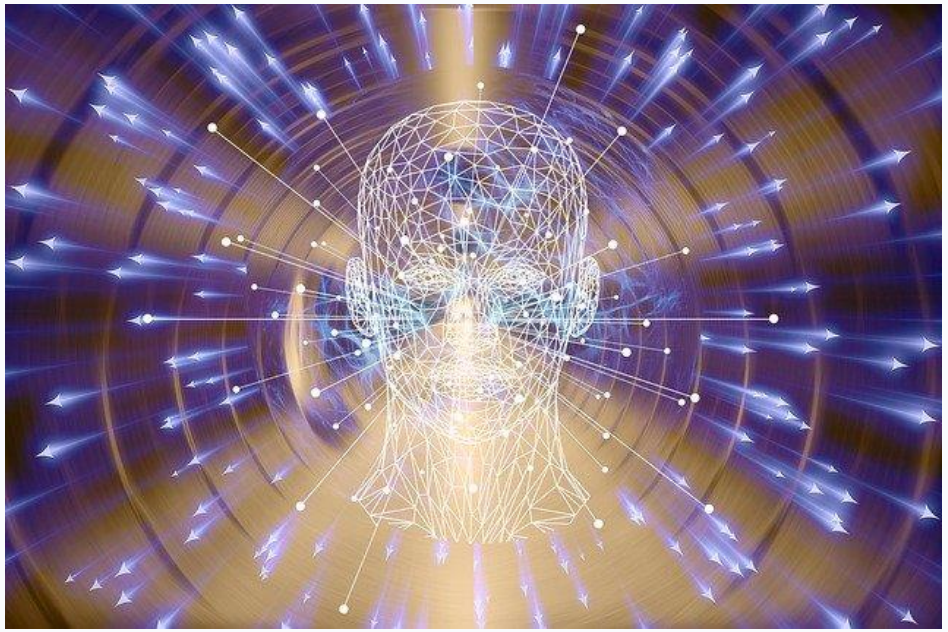
Clock Speed	
No. of Cores	
Cache Size	

1.2 – Memory: Differences of RAM & ROM

Do some research into RAM and ROM (including watching this video):
https://www.youtube.com/watch?v=tsH7IGcWSLg

List as many differences between RAM and ROM as you can!
Explain each one (if you can) in order to show greater depth of understanding.

1.2 – Memory: The Need for Virtual Memory



https://www.youtube.com/watch?v=qr6IPzYW1eY

Watch the above video about 'virtual memory' and then, in your own words, explain the following:

- Why is 'virtual memory' needed?
- How does 'virtual memory' work?
- What are the benefits and limitations of 'virtual memory'?

Why is 'virtual memory' needed?
How does 'virtual memory' work?
What are the benefits and limitations of 'virtual memory'?

1.3 – Types of Computer System

- We have looked at the components of a computer, but they can be put together with different specifications and features to become more **specialised systems**.

How many types of computer system can you list below?

1.3 – PCs Vs Servers

Desktop/Server Systems	Definitions: What is…?	Where is it Used, and Who By?
Help: https://youtu.be/ByI1PHMcPJQ Servers and desktop machines share similar hardware, so how are they different? Simple guide: https://www.csnewbs.com/1-3typesofcomputersystem	**A Desktop PC:**	**Desktop PC:**
	A Server:	**Server:**

1.3 – Smartphones Vs Tablets

- Many of us have a smartphone and a tablet, but which is best?
  - You decide!

- For the next exercise read these two articles, then on the next slide present your case for which is the *best*, **and why**!

Article 1:
https://www.pcworld.com/article/247387/5_ways_tablets_are_better_than_laptops_or_smartphones.html

Article 2:
https://www.pcworld.com/article/247388/5_ways_smartphones_are_better_than_laptops_or_tablets.html

1.3 – Smartphones Vs Tablets

Smartphone	Features	Benefits	Limitations	Your overall score (Out of 10)
Add an image here!	List as many as you can here!	What does a Smartphone do especially well?	What does a Smartphone struggle to do?	What would you give it **and why**?

Clues: Remember a system included hardware and software, what can you find out about…

Hardware, battery, screen, OS software, application software (apps), uses, cost, size, weight, portability, and any other features of your choice.

1.3 – Smartphones Vs Tablets

Tablet	Features	Benefits	Limitations	Your overall score (Out of 10)
Add an image here!	List as many as you can here!	What does a tablet do especially well?	What does a tablet struggle to do?	What would you give it **and why**?

Clues: Remember a system included hardware and software, what can you find out about…

Hardware, battery, screen, OS software, application software (apps), uses, cost, size, weight, portability, and any other features of your choice.

1.3 – Smartphones Vs Tablets

After considering the evidence – your winner is the…
Because…

1.3 – Other Types of Computer Systems

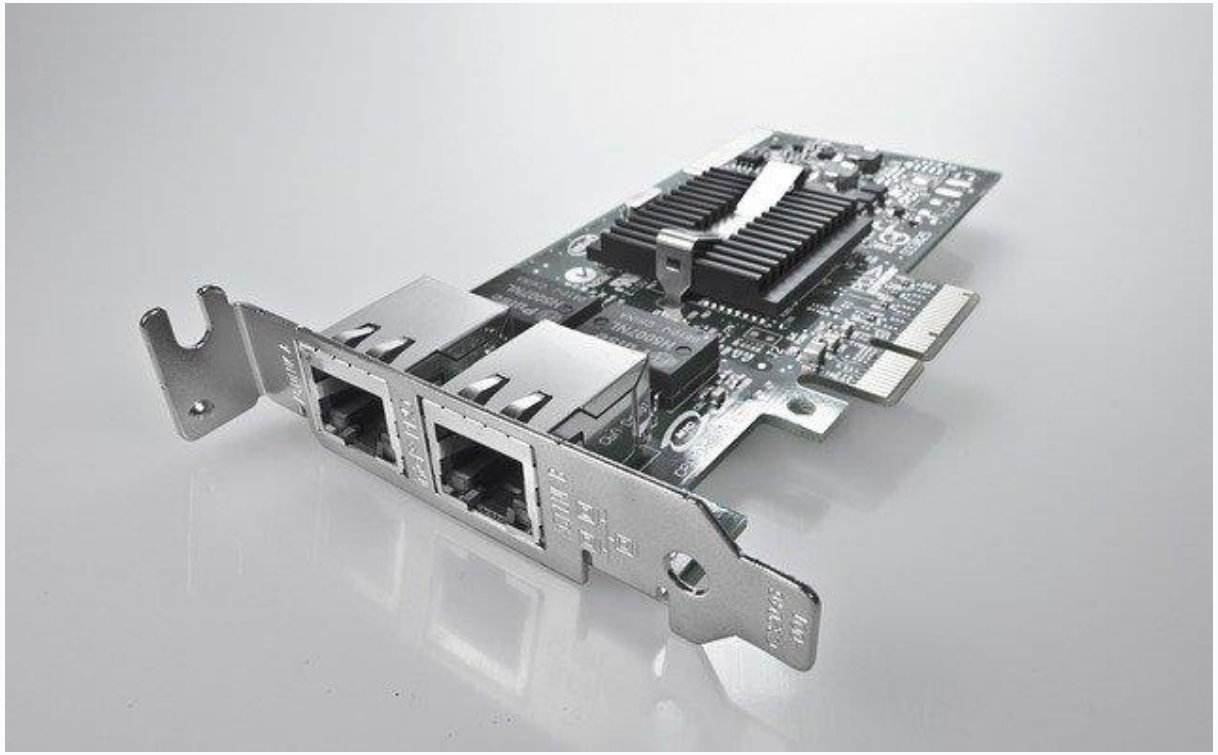
- We will look at the following in more detail when you start the course with us, but what can you find out about:

Embedded Systems	Mainframe Systems	Quantum Systems

Help!

https://www.csnewbs.com/1-3typesofcomputersystem

1.5 – Communications Hardware



What is it?

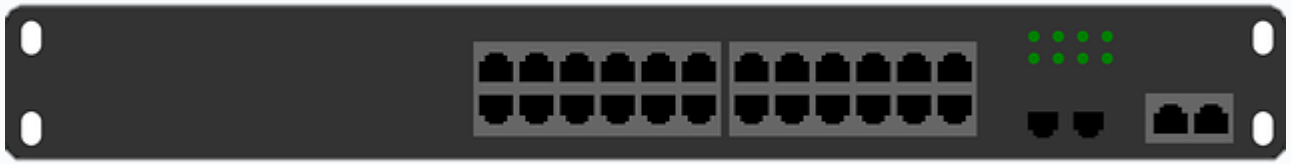
- *Name of hardware*

What does it do?

- *Explanation*

Help: https://youtu.be/R5ihpcOpwQA

1.5 – Communications Hardware



What is it?

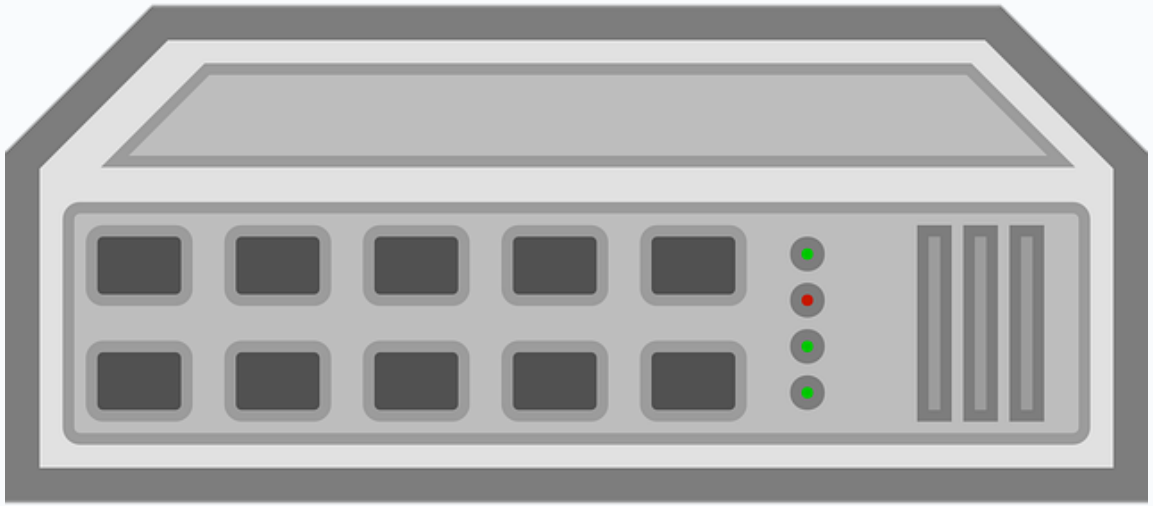
- *Name of hardware*

What does it do?

- *Explanation*

Help: https://youtu.be/R5ihpcOpwQA

1.5 – Communications Hardware



What is it?

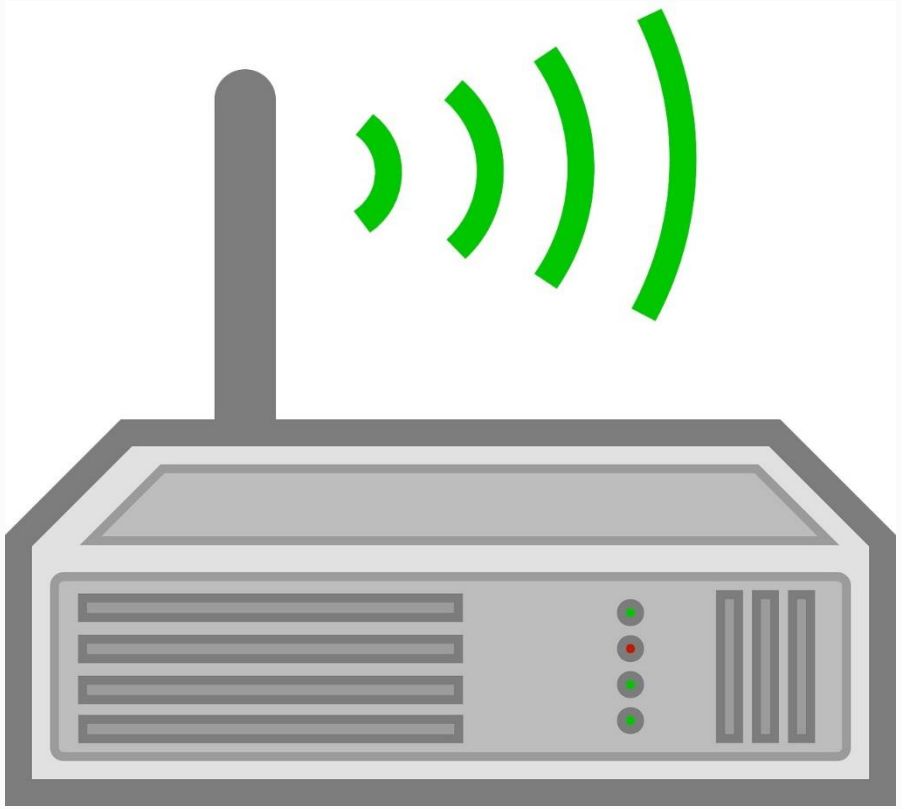
- *Name of hardware*

What does it do?

- *Explanation*

Help: https://youtu.be/R5ihpcOpwQA

1.5 – Communications Hardware



What is it?

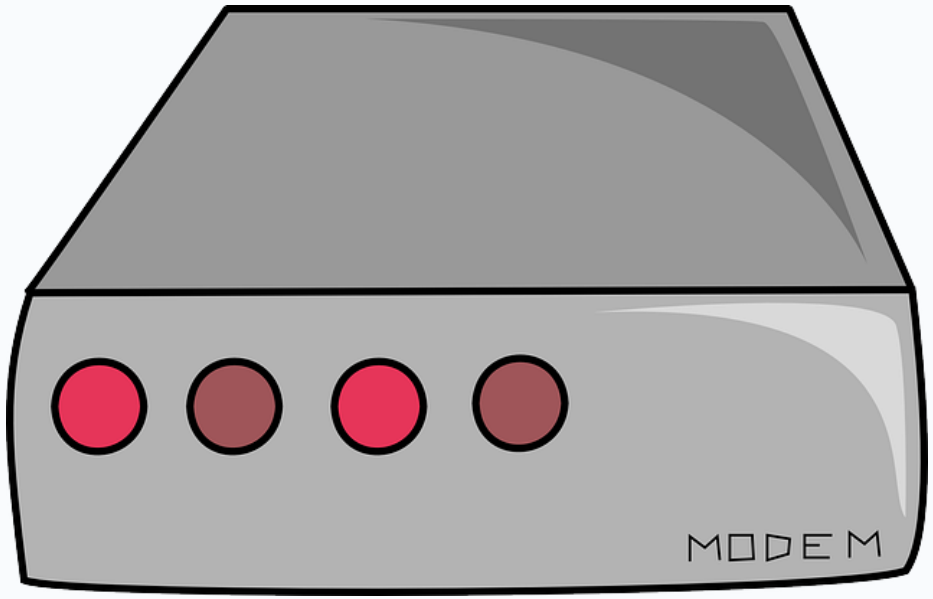
- *Name of hardware*

What does it do?

- *Explanation*

Help: https://youtu.be/R5ihpcOpwQA

1.5 – Communications Hardware



What is it?

- *Name of hardware*

What does it do?

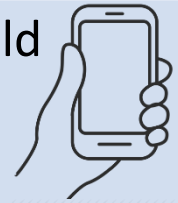
- *Explanation*

Help: https://youtu.be/T4oeyn9Pxsc

2.1 Types of Information Access and Storage Devices (2.1.3)

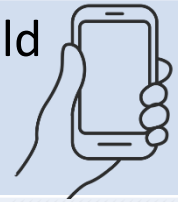
Define below each type of information access and briefly explain what purpose each type serve?

The first one has been completed for you

Type of information access	Definition	Purpose
Handheld 	Equipment that can he held and used in the hand.	Designed to provide computer based and communication in a device that is close to a size of a palm or can be held with one hand.
Portable 		
Fixed 		
Shared 		

2.1 Types of Information Access and Storage Devices (2.1.3)

Provide <u>two examples</u> of each type of information access, add their main characteristics and <u>two advantages and disadvantages</u> for each.

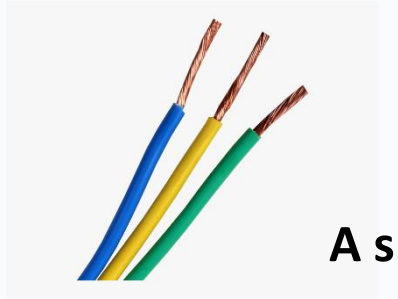
Type of information access	Two examples	Characteristics, two advantages and two disadvantages on each type of information access
Handheld 		
Portable 		
Fixed 		
Shared 		

2.2 The Internet (2.1.4)

The Internet is a global wide area network which connects devices via many interconnected networks

Create a **report** describing the below internet connection types and their characteristics (e.g. speed, range/distance, storage capacity, where commonly used):

- Copper Cable
- Fibre Optic Cable
- Bluetooth
- Microwave
- Satellite
- Cellular



A small advertising company has moved to a new building and wants to connect their computers to the internet. Suggest which connection types would be more suitable and why? (continue on the same report with the answer to this question)

2.3 Information Styles and Uses (2.2.1)

Define the following forms/mediums of information. Give an example to show your full understanding

Information Form/Medium	Definition	Example
Text		
Graphic		
Video		
Animated graphic		
Audio		
Numerical		
Boolean		
Charts/Graphs		

2.4 Information Classification (2.2.2)

Information can be classified into various categories. Complete the table below to define these categories and give an example of where you may find this type of info.

Classification	Definition	Example
Sensitive & Non--sensitive		
Public & Private		
Personal & Business		
Confidential		
Classified		
Partially Anonymised		
Completely Anonymised		

2.5 Information Security using IT Systems

In the box below discuss the impact on an organisation as a result of keeping information secure using IT systems. Be sure to discuss the following keywords (Cost, Technical Knowledge, Risks and Laws (National and International e.g. GDPR).

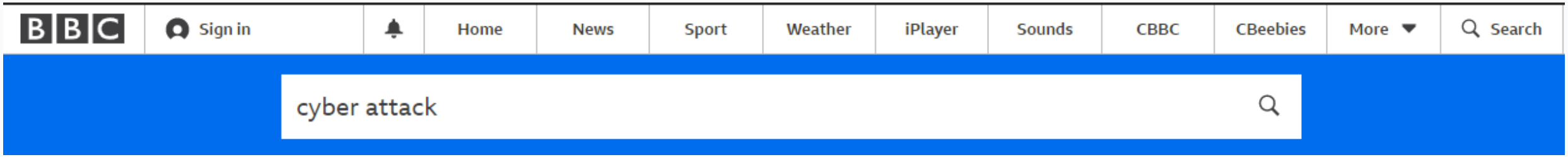
3.1 Types of Cyber Attackers

What is Cyber Security (CS)?

- CS is how individuals and organisations reduce the risks of **cyber attacks**
- The main purpose of CS is to **protect** the devices/systems we use and the services we access, online or at workplace, from **theft** or **damage**.
- CS is also about preventing **unauthorised access** of our **personal information** we store on our devices/systems

(Source: https://www.ncsc.gov.uk/section/about-ncsc/what-is-cyber-security)

There are many cyber attacks that take place daily around the world. Just have a quick check on BBC News by searching for 'cyber attack'. You will come across many recent cyber attack articles from around the world.



Now watch the below clips and complete the task on the next slide based on the different cyber attackers and their motives.

- https://www.youtube.com/watch?v=4RnND-1dB4Y
- https://www.youtube.com/watch?v=IJc3viPKXk4

3.1 Types of Cyber Attackers

Describe each type of cyber attacker, their characteristics (age, background etc.) and their motives (financial, political, take revenge etc.)

Types of cyber attackers	Characteristics and Motives
Hacktivist	
Cyber criminal	
Insider	
Script kiddie	
Vulnerability broker	
Scammers	
Phishers	
Cyber terrorists	

3.2 Testing & Monitoring Measures

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Consistent testing and monitoring systems is crucial for all organisations to establish vulnerabilities and install measures to prevent cyber security attacks. Below you can find a list of the different types of testing and monitoring measures. Research each type and add a description with an example where possible.

Testing and Monitoring Method/Measure	Define/Describe (add examples where possible)
Vulnerability testing	
Penetration Testing	
Fuzzing	
Sandboxing	
Intrusion detection system (IDS) Network intrusion detection system (NIDS) Host intrusion detection system (HIDS) Distributed intrusion detection system (DIDS)	
Anomaly Based	
Signature Based	
Honeypot	
Intrusion prevention system (IPS)	

Employability & Jobs / Careers in IT

IT Technician

What are '*transferable skills*'? https://www.reed.co.uk/career-advice/what-are-transferable-skills/

Person Specification:

Successful applicants will need to demonstrate the following:

- Experience of IT maintenance
- Organisational skills
- Good administration skills
- Problem solving skills
- Knowledge of networking protocols
- Good work ethic
- Good punctuality
- Good numeracy skills
- Excellent communication skills
- Excellent team working skills
- Ability to take initiative
- Possible leadership experience if looking to progress to senior role

Salary £25k / 37.5 hours per week

Transferable Skills / Personal Qualities Needed for this Job	WHY are these transferable skills so important in IT jobs?

Above (left) is part of a job advert for an IT Technician. It is outlining some of the transferable skills and personal qualities that the company is looking for in that role. It the table above (right), list the transferable skills / personal qualities needed and explain why these are so important in the IT industry, especially in the role of an IT Technician (someone who repairs & maintains computer systems for other people).

Sources Table

Use the table below to acknowledge any internet (or other) sources that you have used as part of completing this SIL work. It is vital that you get used to keeping a sources table (or 'bibliography') whenever you complete any kind of coursework task in any subject. The first one has been done as an example.

Slide No. / Topic	Source Used	Description
EXAMPLE: Slide 3 – Hardware & Software	https://www.youtube.com/watch?v=VzVSt6jxiqw	YouTube video about hardware and software.

Additional Activities

Additional Content

The following slides (41-58) contain a variety of optional activities that are designed to further prepare you for studying IT at New College Pontefract. While not compulsory, we would strongly encourage you to go through each slide and make notes where necessary. This will help you further understand the course and perform better in the exams.

Why Use Networks?

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Write a definition of a 'computer network'

Write a definition of a 'standalone computer'

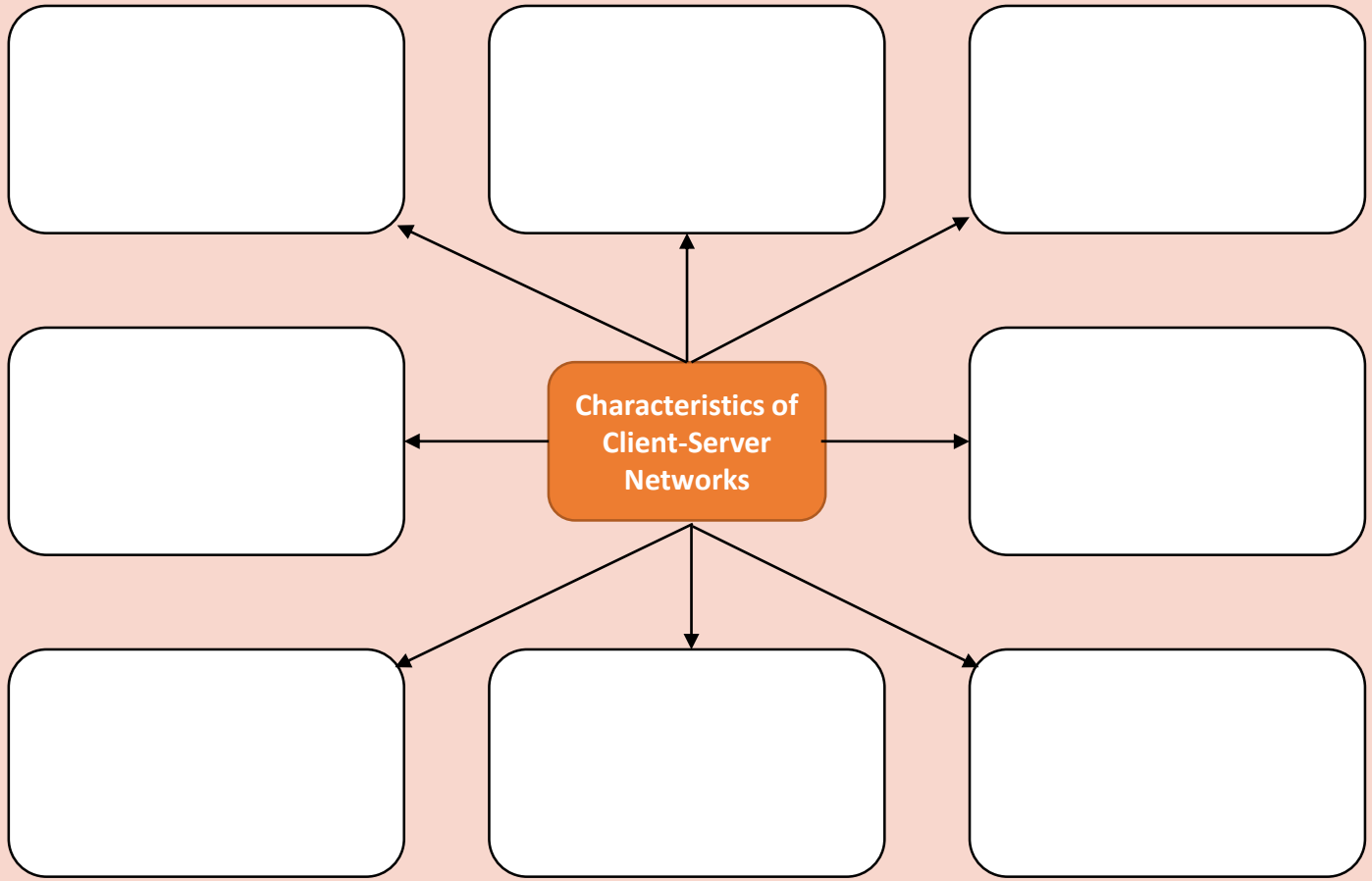
Advantages of Computer Networks	Advantages of Standalone Computers

Client-Server Networks

Write a definition of a 'client-server' network

Draw a diagram to represent a 'client-server' network

Complete the diagram below by explaining various characteristics of 'client-server' networks.

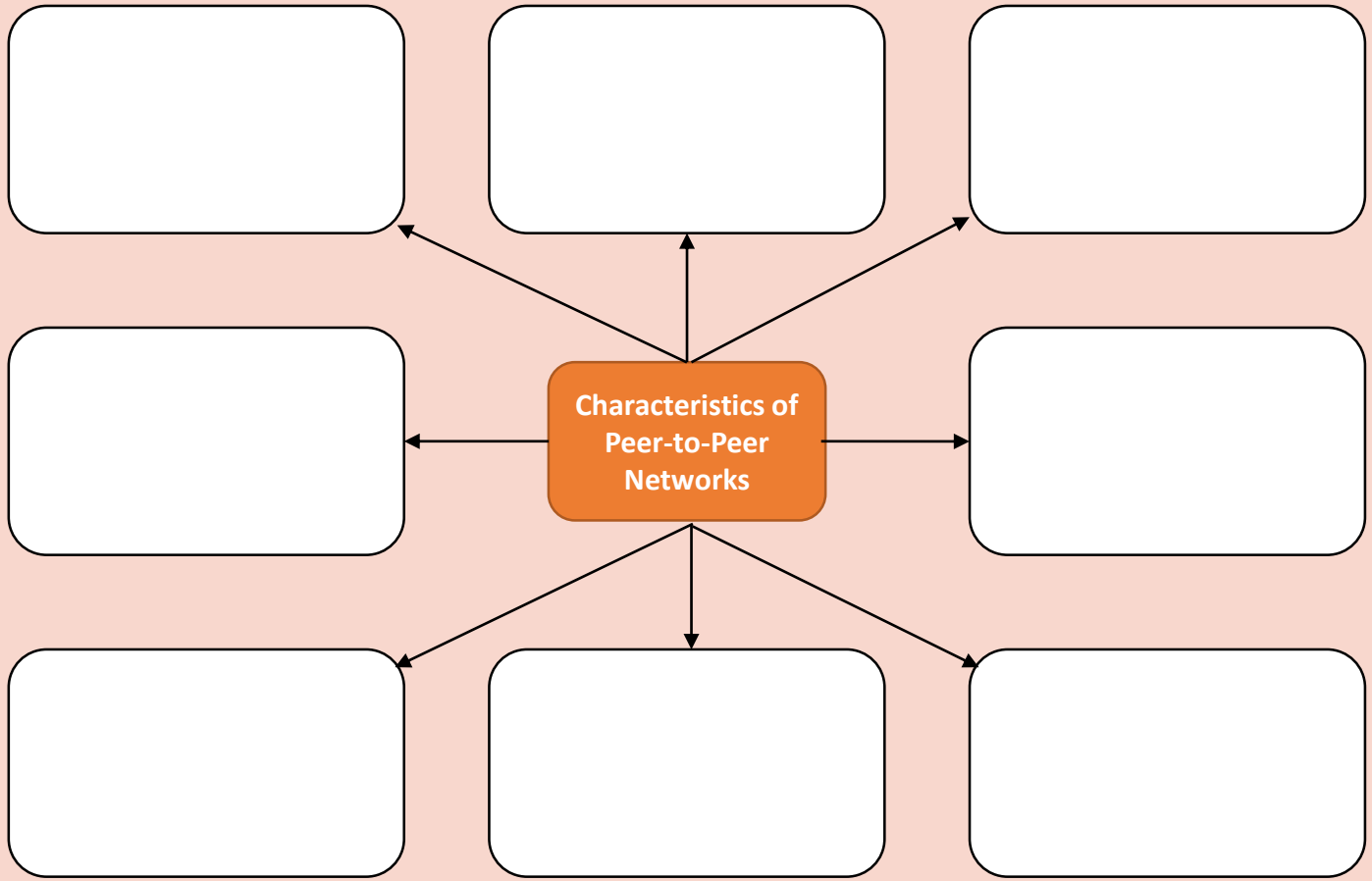


Peer-to-Peer Networks

Write a definition of a ‘peer-to-peer’ network

Draw a diagram to represent a ‘peer-to-peer’ network

Complete the diagram below by explaining various characteristics of ‘peer-to-peer’ networks.

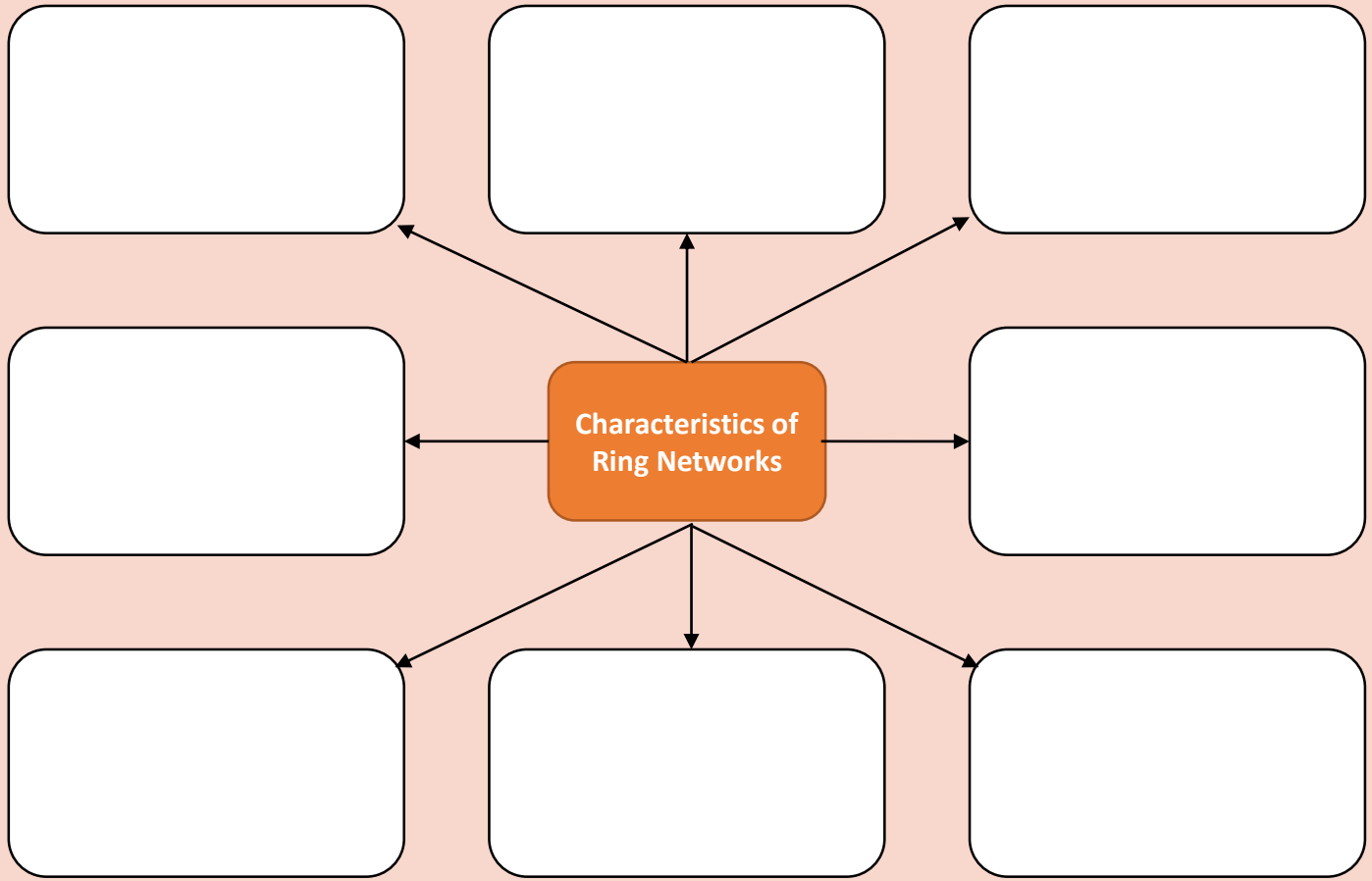


Ring Network Topology

Write an explanation of a ‘ring’ network topology

Draw a diagram to represent a ‘ring’ network topology

Complete the diagram below by explaining various characteristics of ‘ring’ networks.

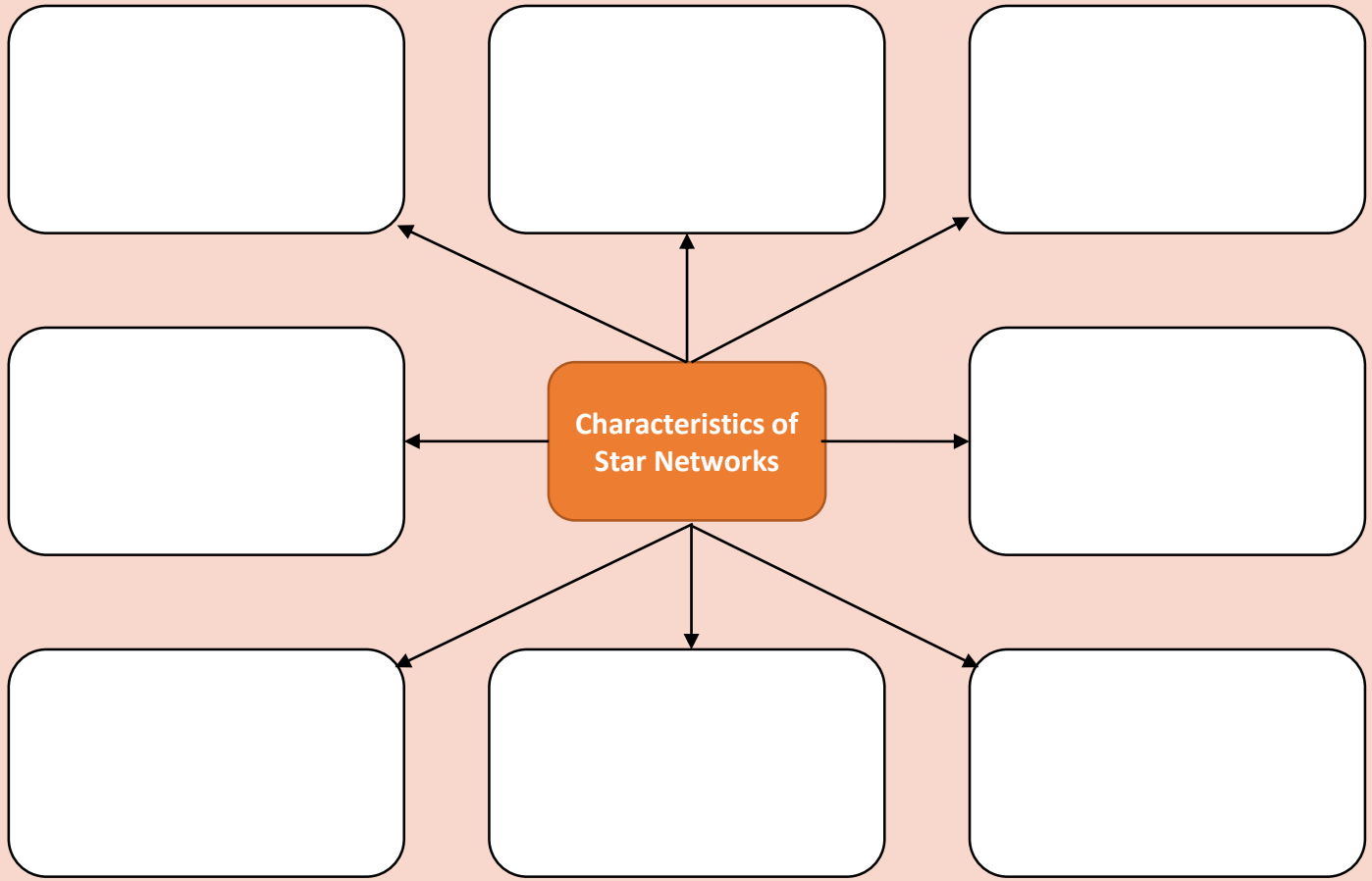


Star Network Topology

Write an explanation of a ‘star’ network topology

Draw a diagram to represent a ‘star’ network topology

Complete the diagram below by explaining various characteristics of ‘star’ networks.

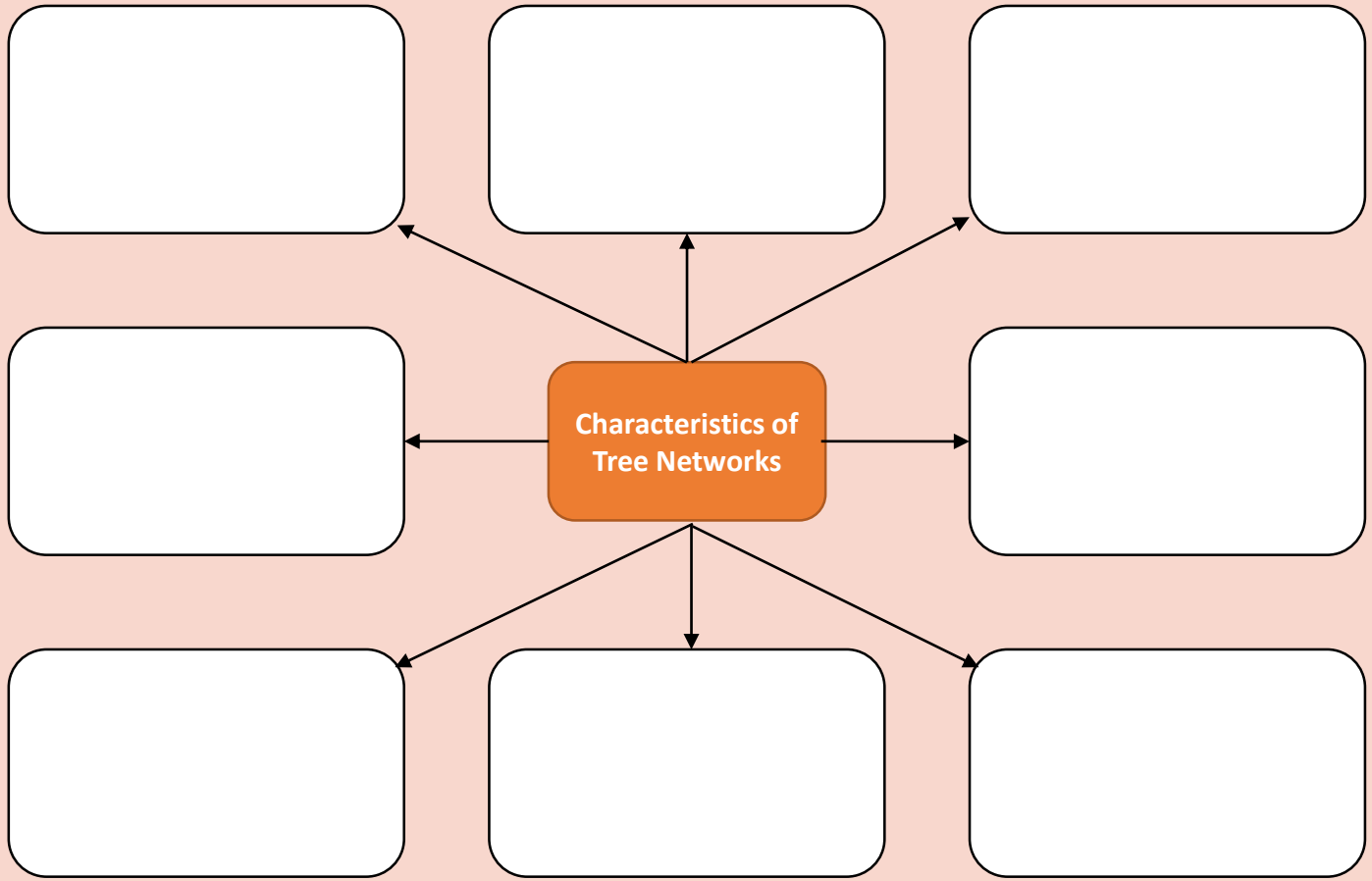


Tree Network Topology

Write an explanation of a ‘tree’ network topology

Draw a diagram to represent a ‘tree’ network topology

Complete the diagram below by explaining various characteristics of ‘tree’ networks.

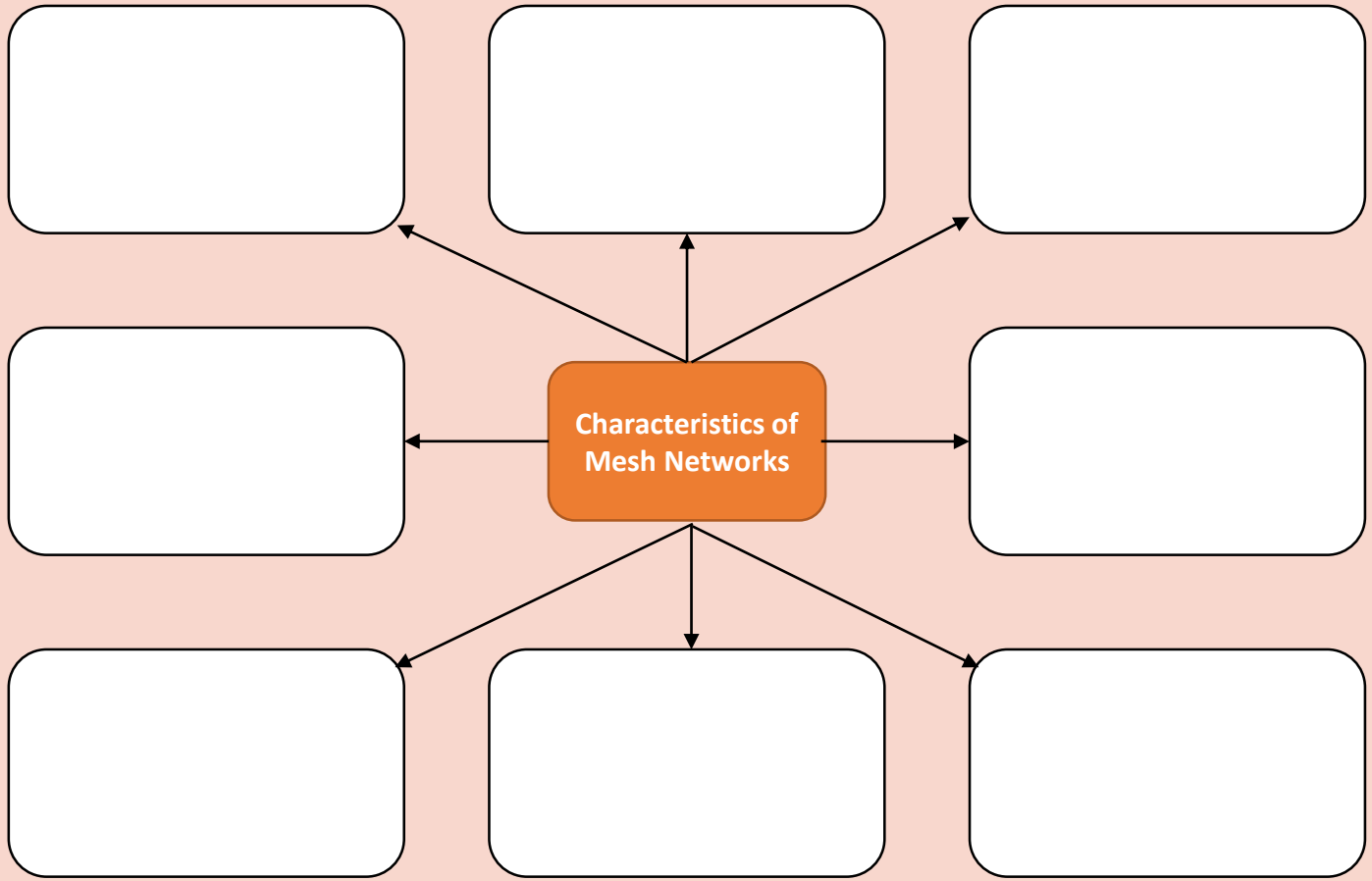


Mesh Network Topology

Write an explanation of a ‘mesh’ network topology

Draw a diagram to represent a ‘mesh’ network topology

Complete the diagram below by explaining various characteristics of ‘mesh’ networks.

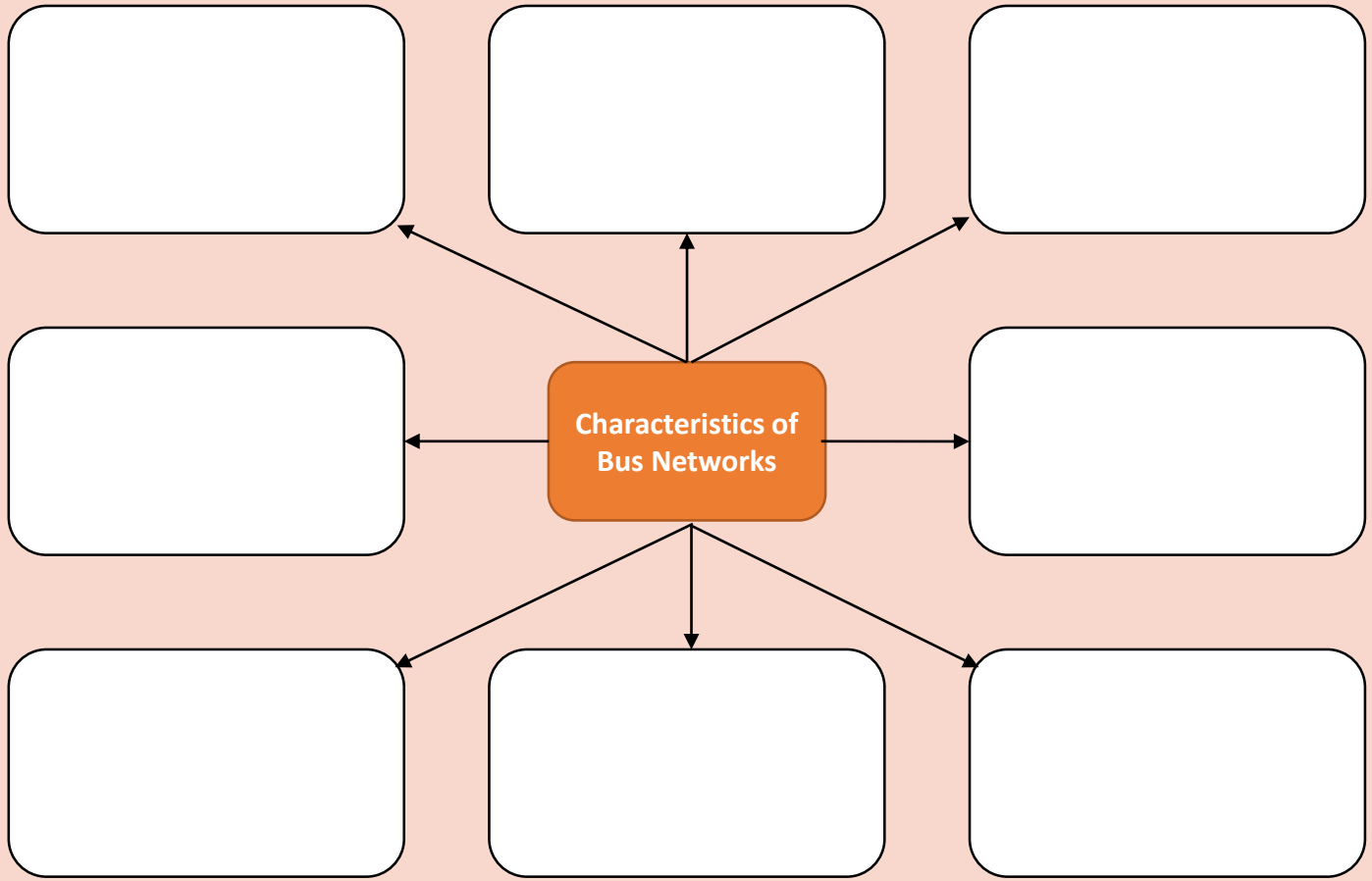


Bus Network Topology

Write an explanation of a 'bus' network topology

Draw a diagram to represent a 'bus' network topology

Complete the diagram below by explaining various characteristics of 'bus' networks.



Network Protocols

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Write a definition and explanation for 'network protocols'.

Network Protocol	Definition & Explanation of Use
TCP	
IP	
SMTP	
DHCP	
HTTP/HTTPS	
FTP	
UDP	
RFID	
Bluetooth	
3G/4G/5G Cellular	

Types of Networks - LANs, WLANs, WANs, & MANs

Explanation of a ‘LAN’	Explanation of a ‘WLAN’	Explanation of a ‘WAN’	Explanation of a ‘MAN’

Characteristics of LANs, WLANs, WANs,& MANs

Characteristics of a LAN	Characteristics of a WLAN	Characteristics of a WAN	Characteristics of a MAN

Network Security

Network Security Feature	Explanation of Security Feature	Pros and Cons of Security Feature
Anti-Virus Software		
Backups		
Levels of Authorisation/Network Access Permissions		
Firewall		
Physical Security (Locks/Alarms/CCTV etc.)		
Two-Factor Authentication		
Biometrics		

Past paper

Below is a link where you can find past exam papers for Units 1, 2, 3 and CC (Cloud Computing) of the IT course:

https://www.ocr.org.uk/qualifications/cambridge-technicals/information-technology/assessment/#level-3

It will be really useful to have a look through the exam papers to see the format and style of questions used.

You could even have a go at printing and completing some of the questions based on your prior learning and knowledge from this SIL!

The mark scheme for this past paper can also be found on the same link

Quizizz

A big part of learning at New College Pontefract is focused on retrieval. These activities are designed to help transfer your knowledge into long term memory.

Have a go at some Quizizz based on your SIL work!

Computer hardware:

- https://quizizz.com/admin/quiz/5fce02231c55f3001b90cdf1
- https://quizizz.com/admin/quiz/5f631dd9274ca5001d1bcfb0

Computer components:

- https://quizizz.com/admin/quiz/5f6458a7a1eeb8001ff87e8e

Types of computer system:

- https://quizizz.com/admin/quiz/5fce026ee756c0001ba76d14

Global information and data:

- https://quizizz.com/admin/quiz/5afbce191fc325001def224a

Cyber Security:

- https://quizizz.com/admin/quiz/5d8ccc8fb27b52001c237129

Cyber Security Threats:

- https://quizizz.com/admin/quiz/5eb1784c812575001bf9e7ba

YouTube Channels

There are a series of good YouTube channels that regularly post interesting videos about the world of IT and Computing:

Linus Tech Tips
https://www.youtube.com/user/LinusTechTips
Computerphile
https://www.youtube.com/user/Computerphile
Techquickie
https://www.youtube.com/user/Techquickie
Crash course computing
https://youtube.com/playlist?list=PLH2l6uzC4UEW0s7-KewFLBC1D0l6XRfye
Explaining computers
https://www.youtube.com/user/explainingcomputers

YouTube Videos

Here are a collection of interesting talks and interviews that will expand your understanding of the world of IT and Computing:

Joe Rogan Experience #1368 - Edward Snowden

https://youtu.be/efs3QRr8LWw

YouTube CEO Susan Wojcicki | Full interview | Code 2019

https://youtu.be/jkzx9V55ptk

How I used to rob banks! by FC (aka Freaky Clown)

https://youtu.be/mDdRGlSW9Ro

GOTO 2018 • The Future of the Web • Sir Tim Berners-Lee

https://youtu.be/Rxqko96C5ZI

The mind behind Linux | Linus Torvalds

https://youtu.be/o8NPllzkFhE

YouTube Videos (related to other units)

Below you can find some other interesting YouTube clips that relate to other units you will be taught:

Unit 24 – Enterprise Computing

- https://www.youtube.com/watch?v=84RsYvBJEUA

Enterprise Software - What is it

- https://www.youtube.com/watch?v=IsFVm0RAR0s

What is enterprise computing

Unit CC – Cloud Computing

- https://www.youtube.com/watch?v=dH0yz-Osy54

What is cloud computing

- https://www.youtube.com/watch?v=36zducUX16w

Cloud Computing Basics

- https://www.youtube.com/watch?v=zDAYZU4A3w0

Google data centre 360 degree tour

News Articles

Another great exercise is to regularly read news articles and stories. These will keep you up to date with all of the latest happenings in technology:

BBC

https://www.bbc.co.uk/news/technology

Sky

https://news.sky.com/technology

The Guardian

https://www.theguardian.com/uk/technology

Computer World

https://www.computerworld.com/uk/news/

CNET

https://www.cnet.com/news/