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LEARN TO BE DISTINCT

Computing Reference Notes for Grade 4

Note: These notes are provided as an additional study aid for the subject. Main assessment will be based on the booklet, PPT slides, Worksheets etc shared with the students.

Unit: 3 Networks and Digital Communication

Unit:3.1 Network Structures

Networks:

- A computer network is when two or more computers are connected together.
- A connection can use wires or be wireless. The connection links the computer to a network.
- The network lets the computer or devices such as printers and storage devices, communicate and share things like files and programs.

Purpose of networks:

- Sharing: You can share files, games, or printers with others easily.
- Teamwork: Students or teachers can work together on the same project.
- Internet Access: Many computers can use the same internet connection.
- Saving Time: Sending messages or files is faster.

Internet:

- The Internet is a really big network of computers connected together.
- These connections allow data to be sent to and from the computers.
- The Internet connects digital devices across the world.

Wired connections: Some of the connections between computers are physical. Wireless connections use cables to link computers together. Some of the computers in your school will probably use wired connections.

Wireless connections: Some of the connections between computers are wireless, which means they have no wires. Satellites and Wi-Fi are examples of **wireless connections**. The Internet lets people share resources.

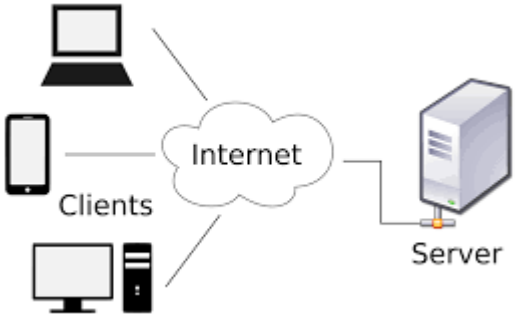
Resources are things like files and programs.

World Wide Web:

- The **World Wide Web** is an example of a resource that we share using the Internet.
- The World Wide Web is made up of lots of webpages that are linked together.
- You use a **web browser** to access the webpages on World Wide Web.
- The web browser shows you the webpage on your computer.
- You use a **search engine** to find content on the World Wide Web. You can use the search engine to find pictures, webpages, and videos.

Servers:

- A server is a computer in a network that provides files, programs, and storage that other computers can use.
- Servers are usually very big because they need lots of storage space.
- They cost a lot of money to build.
- A server can:
    - let us use services such as films or emails
    - store large documents and files such as photos or webpages.
    - let us use programs such as word processor or spreadsheets.



Large companies like Amazon, Google, and Microsoft have lots of servers across the world. They provide services such as email, file storage, and software for millions of people.

Client:

- A client is a device in a network that uses the services a server provides.
- A client must be connected to a network to access a server.
- You find client computers at school and at home.
- Most desktop and laptop computers act as client computers.
- Tablets and mobile phones can also be client computers.

Local Area Network: A group of computers and devices that are connected in a small area like a home, school, or office. **Example:** The computers in your school's computer lab connected to one printer.

Unit: 3.2 Efficient Networks

Internet Connections:

Internet has many connections between computers. These connections allow data to be sent to and from the computers. When you send data from one computer to another using the Internet, the data travels through many different connections. If some connections are broken, there are often other connections to use. There are often many connections to use. If too many passengers try to use the same train, the train gets very busy and some passengers may have to wait until the next train. This will cause delays to the journey. This is a bit like when some of the connections in the Internet get very busy and the Internet slows down. This means that data takes longer to get to your computer. It is delayed.

Ethernet

Wired connections have advantages and disadvantages.

Advantages	Disadvantages
1. Very fast connection speed	1.You cannot move the computer because it is wired.
2. The connection does not fail very often	2. Wires can get broken.
3. Cheaper to set up	3. Wires can get untidy and it is easy to trip over them.
4. It is more difficult for hackers to access your computer	4. You have to make holes in walls for the wires

Wired networks also usually connect towns, villages, and countries. The cable that connects towns and countries allow lots of data to be sent at the same time. This is a bit like a very, very large road with lots and lots of cars traveling along it. There are cables that run along the bottom of seas and oceans that connect computers in different countries together.

Wi-Fi

It is not always possible or sensible to connect computers with wires. Think about a smartphone. It would not be such a useful device if you had to plug it in every time you wanted to make a telephone call. Many computers use Wi-Fi instead of Ethernet to connect to the Internet. Wi-Fi allows computers to communicate without using wires. Wi-Fi is another language that computers can use. A device called a Wi-Fi router creates Wi-Fi signals that allow a device to connect to the Internet. These Wi-Fi signals get weaker when you move away from the Wi-Fi router. If you move too far away from the Wi-Fi router, you won't have any Wi-Fi signal, and you won't be able to get an Internet connection on your device. Wi-Fi connections also have advantages and disadvantages.

Advantages	Disadvantages
1. No need for wires.	1. Data travels more slowly over Wi-Fi, so it can take longer to download files
2. Anyone with a Wi-Fi device can connect	2. Other people can access your wireless connection.
3. You can use the Internet when you move around.	3. Wi-Fi speeds may not be reliable.
4. Many people can connect to any Wi-Fi device.	4. Too many people using Wi-Fi will slow the Internet speed.
	5. The Wi-Fi connection slows down or stops if you move too far away from the Wi-Fi router.

Network Interface Card: To connect to an Ethernet or Wi-Fi network, you need a special device called a network interface card. Sometimes this is a card that plugs into the motherboard, the brain of the computer. Other computers have a device that is plugged into the outside of the

computer. Most laptops and computers today have cards built into the computer to give them both Ethernet and Wi-Fi access.

Network Security A big problem with using networks is security.

Hackers are people who try to access networks to steal data. Hackers also try to damage computer systems. This often costs a lot of money to fix. Hackers often try to steal data from large companies or even governments. Sometimes they attack health services, banks, and even home computers. Every network can be hacked, but Ethernet networks are often harder to hack. This is because you need to be inside the building and have a computer with you to hack this type of network. Company and government buildings usually have good security to stop this type of hacking. Security guards stop people coming in. Security doors, key cards, and fingerprint scanners stop some people entering special areas. Hackers find it easier to steal data when computers do not have good security. For example, when people use passwords that are easy to guess, always use sensible passwords to protect your school and home computers. Do not share your passwords with anyone. Wi-Fi can be harder to keep secure. Wi-Fi signals can pass through walls. You could sit in a cafe or shop and get a Wi-Fi signal from buildings across the road. This can make it easier for hackers to hack a network.

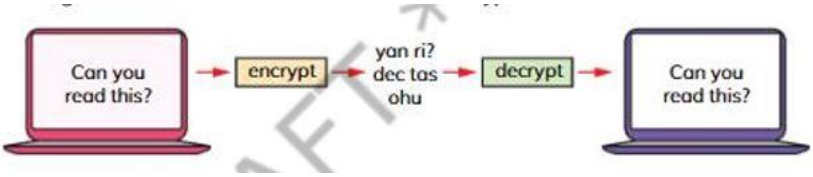
Network failure: This means that a connection in a network stopped working. Connections in a network can stop working for different reasons. For example, the power could go off, someone may trip over a cable and break it, someone may unplug a cable by accident. Network failures can stop people from accessing services on a server. Sometimes, data may be corrupted during a network failure. This means that data cannot be used or may be lost forever. It is a good idea to save your work regularly if you are working on a network. You are more likely to be disconnected if you are using Wi-Fi rather than Ethernet. But you should still take care and make sure you think about what would happen if your network connection fails.

Unit 3.3 Transferring Data Securely

Encrypting Data: Encryption means to change data so that it cannot be understood as it actually is.

- This helps to stop people from reading it without permission.
- This means computers use special algorithms to mix up the data before it is sent across the internet.
- Almost all data sent over the internet is encrypted.

Decryption: This is the opposite of encryption. We decrypt data that has been encrypted. Decryption uses an algorithm to make encrypted data readable.



- The algorithm needs to know what was used to encrypt the data.
- The algorithm used to encrypt data is called a **Cipher**.
- A Cipher creates a digital key.
- The key is used to encrypt and decrypt the data.
- Some encryption algorithms are very difficult to hack. Other encryption algorithms are much easier to hack.

The Caesars Cipher: The Caesars Cipher is a simple cipher used to encrypt messages. It is not a very safe way to encrypt private messages because a lot of people know how to use it.

How does the Caesars Cipher work?

Each letter in the plaintext (original message) is shifted a fixed number of places down the alphabet.

- For example, with a shift of 3:

A → D	X → A
B → E	Y → B
C → F	Z → C

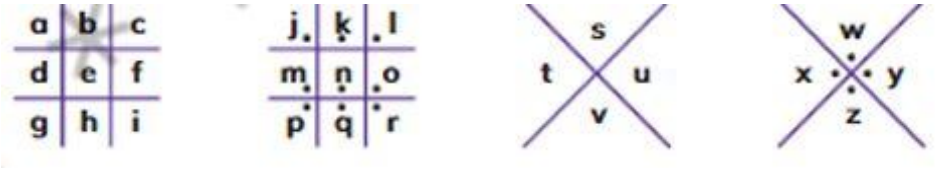
Plaintext: HELLO Shift: 3 (Plaintext is the original text)

Ciphertext: KHOOR (Ciphertext is the encrypted text)

The Pigpen Cipher: is a way to encrypt messages that uses shapes and dots to replace letters of the alphabet. **How it works:**

- The alphabet is arranged into grids and X-shaped patterns.
- Each letter is represented by the **part of the grid or X** in which it is placed.

This is an example of a pigpen cipher.



You can see how to encrypt a letter in the pigpen cipher.