**Isaac GCSE Booster – Network Fundamentals**

**Handout 1 – Workbook ANSWERS**

**Activity 1 – Match the Hardware**

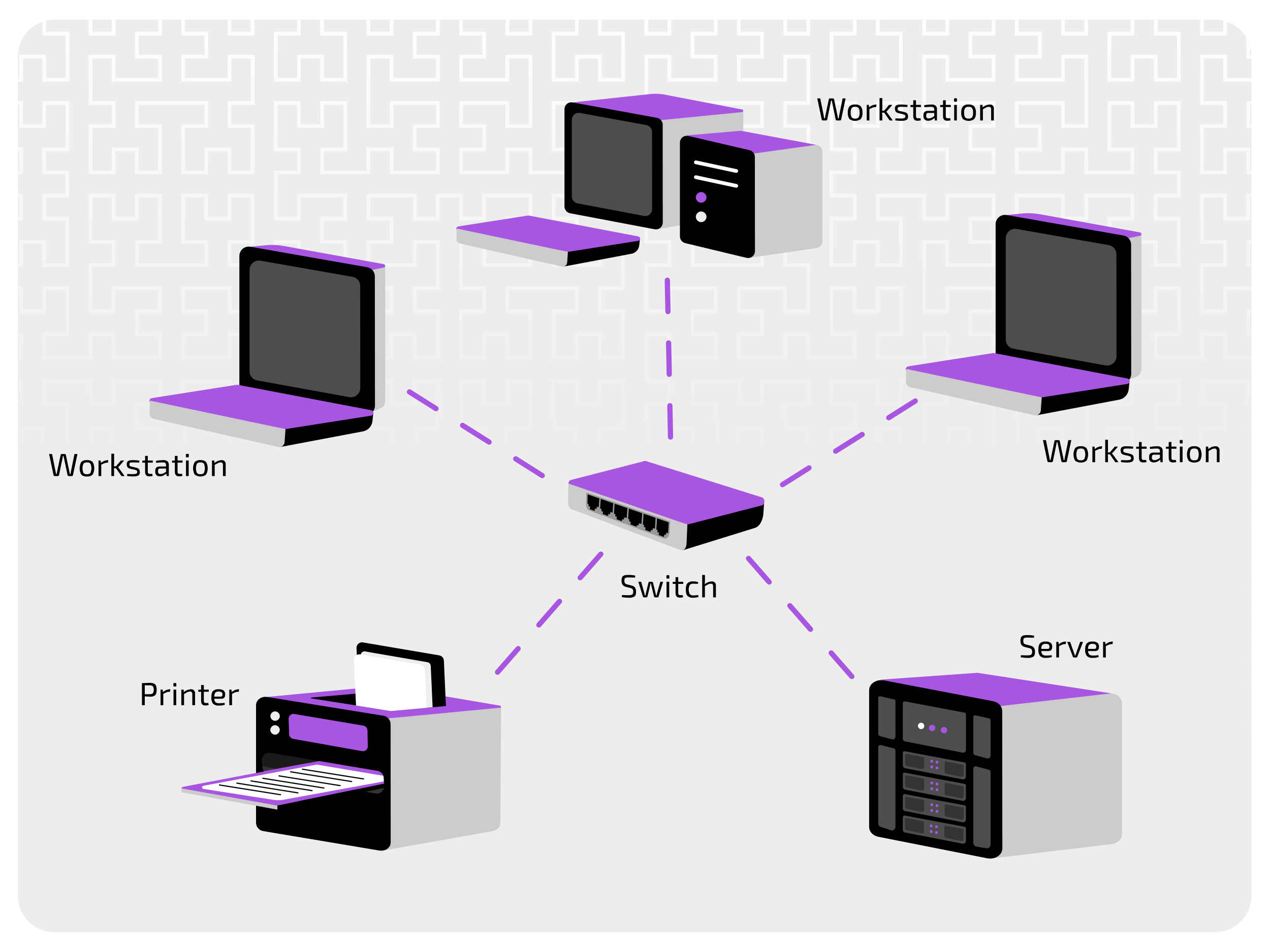
Read the descriptions in the final column of the table. Type the name of the component that matches this description in the Name column, drag the right image into the Image column, then complete the missing words in the Description column. *Copper cable has been done for you.*

**~~Copper cable, Switch, NIC, WAP, Fibre optic cable, Router~~**

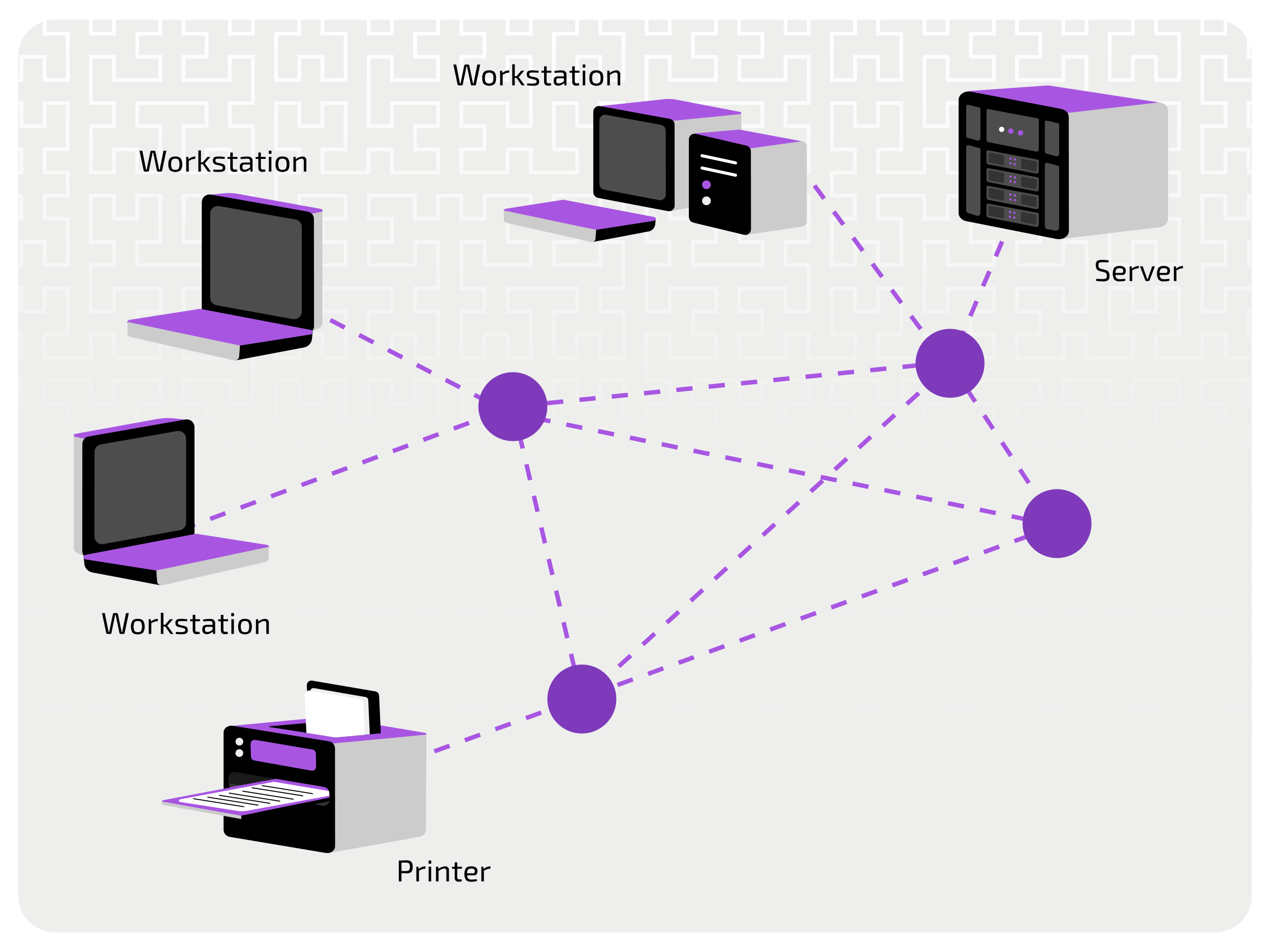
|  |  |  |
| --- | --- | --- |
| Name | Image | Description |
| Copper cable | Image result for twisted pair cable | A transmission medium. Local area networks are usually made with unshielded twisted pair (UTP) copper cable. It is cheap and flexible which makes it easy to install |
| NIC |  | Connects a device wired or wirelessly to a LAN. It uses a **protocol** to ensure successful communication with other devices. Has a permanent, unique number, called the **MAC** address |
| Switch | A five-port network switch with a yellow and red UTP cable connected to it. Green lights on the machine indicate that data is being transmitted. | Sends data between computers on a local area network. It can only route traffic on a **local** network. It uses the **MAC** address on a device to route traffic |
| Router | Three core routers; larger machines than a consumer product. | Connects different networks. It reads the **IP** address and forward messages to the correct **network** |
| WAP |  | Allows wireless devices to connect to a wired network. Converts data it received through cables into a **wireless** signal (& vice versa) |
| Fibre optic cable | Image result for fibre optic cable | Long-distance connections and wide area networks are usually connected with this. It has a higher **bandwidth** than copper and suffers from less **interference**. |

**Activity 2 – Hide and Draw!**

1. Drag the shapes into a Star network topology



1. Now create a Mesh network topology.

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**Activity 3 – Compare wired v wireless**

Drag the "Wired and "Wireless" icons to where you think they should sit

on the diagram, poor on the left, good on the right. If stuck, use Isaac to help you: <https://isaaccomputerscience.org/concepts/net_network_wired_wireless>

A diagram of a speed security range

Description automatically generated

Note that these are rough averages, because there are many standards with overlapping performances, and these are improving all the time.

**Activity 4 – Client-server v. Peer to Peer**

Use Isaac to complete this table by dragging and dropping the statements in to the correct empty cells. <https://isaaccomputerscience.org/concepts/net_network_network>

|  |  |  |
| --- | --- | --- |
| Factor | Client–server | Peer-to-peer |
| Setup cost | Servers will need to be set up and configured. These will generally be high-performance computers capable of supporting a large number of users. | No additional devices are needed. |
| Physical security | Servers can be located in secure rooms. They do not need to be physically accessible to every user. It is easier to monitor a server room (e.g. by CCTV) than to monitor every device on the network. | .  On peer-to-peer networks, workstations may be at multiple different locations, including at home, and are difficult to oversee. |
| Backups | most important files are stored on servers. It is therefore much easier to make sure that all of these files are backed up. In a large organisation, there is likely to be a network manager who will be responsible for the security and back up of the servers. | individual users are likely to be responsible for backing up their own data. |
| Points of failure | If a server fails, many users will be affected. For example, if a file server fails, no-one will be able to access their files until the service is restored. | If one device fails, it will have less impact. Most users will be able to carry on with their work. |

**Activity 5 – Past Paper Style Question Answers**

1. A school runs a LAN (Local Area Network). The Computing department and the Library have desktop computers connected by cable and all staff have laptops that connect wirelessly.

(a) Name two hardware devices needed in this network, and the purpose of each. [2 marks]

Device 1: **Any of NIC, Hub, Switch, Router, WAP, cable**

Purpose: **Correct purpose (see activity 2) – both needed for a mark**

Device 2: **Any other device from NIC, Hub, Switch, Router, WAP, cable**

Purpose: **Correct purpose (see activity 2) – both needed for a mark**

(b) Staff in the PE block report that their connection is very slow and unreliable. Give two reasons why this might be. [2]

* **Too far / long distance from the WAP / wireless router**
* **Obstructions / walls in the way (reducing signal strength)**
* **Interference from other devices nearby**
* **Congestion / too many users on one WAP**

(c) Students in Computing lessons report that the network is slow when all computer labs are full of students. Give one reason why this might be. [1]

* **Congestion / too many users on a switch or the network at the same time**
* **Not enough bandwidth for all the users at once**

(d) Students use the library computers to access the world wide web for homework. When a student types bbc.co.uk/bitesize into the browser address bar, the BBC Bitesize website is loaded. Fill in the missing terms to explain how this works. Choose from the following terms, two of which are not needed. [4]

**~~HTML, DNS server,~~ MAC address, ~~web server,~~ SMTP, ~~client, URL, address bar, IP address, HTTPS.~~**

BBC Bitesize is hosted on a **web server**. The student computer is called a **client**. The string ‘bbc.co.uk/bitesize’ is an example of an **URL** The student types this into the browser **address bar**. The browser sends a request to a **DNS server** for the matching **IP address** for that URL. The client browser can then send a request to this IP address for the website content, which is written in **HTML** and sent using the application protocol **HTTPS**.

**Activity 6 – Isaac Gameboard**

Have a go at this gameboard to test your knowledge!

<https://ncce.io/isc-net1>