Network devices

Practice 1

A network is a collection of interconnected computers and devices that communicate with each other to share information and resources. A range of different devices is used to create a network.

Match the correct name to the description for each of the following network devices.

Description	Device
Connects multiple computers or devices within a LAN and efficiently manages data traffic by forwarding data only to the intended recipient.	
Directs data between different computer networks, facilitating communication between devices within a local network and external networks, such as the internet.	
Enables a computer to connect to a network, providing the necessary interface for communication with other devices.	
Manages and connects various devices within a home network, providing features such as internet access, WiFi, and device communication.	
Provides centralised data storage and file-sharing services to multiple users and devices over a network.	
Allows WiFi-enabled devices to connect to a wired network using wireless communication.	

Items:

network access device (home hub) | network interface card | switch | file server | wireless access point | router

Components to move packets

Challenge 1

Dave's work computer is connected to his company's LAN. He types in the web address of a website he wants to visit.

Put the following network hardware components in the order in which they would receive the data packet containing this request.

(Note: This is not an exhaustive list of all hardware required. Some steps in the journey have been left out.)

Available items

- Switch
- Fibre optic cable
- Network interface card
- UTP cable
- Router

Quiz:
STEM SMART Computer Science Week 10

Bandwidth definition

Practice 1

In the context of computer networks, which of the following best defines the term **bandwidth**?

Choose one of the following options.

- The maximum speed at which data can be transmitted over a network
- The geographical area covered by a wireless network
- The physical width of network cables
- The number of devices that can be connected to a network

Quiz:
STEM SMART Computer Science Week 10

Network performance 2

Challenge 1

Ethernet is a very common communication protocol for local area networks.

In a busy Ethernet network, [ ] are possible. This will occur when two or more devices attempt to [ ] at the same time. This can really slow down a network because communication must stop, and the computers must wait a [ ] amount of time before attempting to [ ] again.

One solution is to use [ ] Ethernet. In this type of network, [ ] are replaced by [ ], which manage data traffic by forwarding data only to the intended recipient.

Items:

switches | switched | communicate | hubs | fixed | collisions | routers | random

Quiz:
STEM SMART Computer Science Week 10

Wireless connection issues 2

Practice 1

Sanjit is working from home but has found that his WiFi connection is variable. Complete the following paragraph that describes some potential problems and their causes, by dragging and dropping the words from the list provided into the correct place to complete the text.

A good wireless connection needs a strong [ ]. This can be affected by the [ ] of the device from the wireless access point. If this is a problem, Sanjit could use a [ ], which will rebroadcast the wireless signal.

Another potential problem is [ ], which can be caused by other devices that broadcast on the same [ ]. If this is an issue, Sanjit could change the [ ] so that there is less contention.

If the connection is still a problem, Sanjit might need to connect the device using a [ ]; this can sometimes be the only solution.

Items:

frequency signal cable interference distance repeater channel

Quiz:
STEM SMART Computer Science Week 10

IP addresses: 2

Practice 1

IP addresses are used to identify devices connected to the internet.

IPv4 is the original addressing scheme; each IPv4 address is 32 bits. A newer addressing scheme, IPv6, uses 128-bit addresses.

Which of the following addresses is a valid IPv4 address?

- 192.12.1.258
- 172.16.257.100
- 255.254.253.252
- 256.1.100.020

Quiz:
STEM SMART Computer Science Week 10

IP addresses: 3

Practice 1

IP addresses are used to identify devices connected to the internet.

Under which circumstances is it possible for a device on a local area network to have the same IP address as a device on a different local area network?

- When the two devices are each given a non-routable address.
- When the two devices will never communicate with each other.
- When the two devices use different network protocols.
- When the two devices are protected by a firewall.

Quiz:
STEM SMART Computer Science Week 10

IP addresses: 4

Practice 2

An IP address is split into two parts. The first part is the network ID and the second part is the host ID.

If the length of the network ID is 24 bits, how many hosts can there be on the network?

Quiz:
STEM SMART Computer Science Week 10

Routers 1

Practice 1

The internet is a global network. It is estimated that there are over 750 million routers in use across the internet.

What is the role of a router?

- It allows wireless devices on a home network to connect to the internet so that wireless messages can be routed.
- It inspects a packet for the destination IP address and then routes the packet towards its destination.
- It splits data into packets and attaches a packet header so the packet can be routed.

Quiz:
STEM SMART Computer Science Week 10

Routers 2

Practice 2

Routing is the process of moving packets from one router to another from a source network to a destination network.

Consider the process of a webpage being sent from a web server to a web client (i.e., the browser that requested the page).

Put the following steps into order to describe the journey from the server to the client.

Available items

- At the destination network, the packets are directed to the client that made the request.
- The destination address of the client is added to each packet header.
- The packet is routed across the internet. At each stage, the destination IP address is inspected and the packet is sent on until it reaches the destination network.
- The packets are reassembled and the page is displayed.
- The HTML document (that represents the webpage) is split into packets.
- The destination IP address is inspected. It is not on the local network, so the packet is sent to the default gateway.