Protocols 1

Challenge 1

Protocols are agreed sets of rules that allow devices to communicate with each other.

The table contains descriptions of some protocols which are used on the internet. Drag and drop the name of the protocol into the table to correctly match its description.

Internet protocol	Description
	Used to access webpages and responsible for retrieving information from remote servers across the World Wide Web.
	Encapsulates all of the requested information in an encrypted data stream so that it is secure.
	Used to transfer and share files across the internet.
	Used when an email-client application wants to send an email to an email server.
	Retrieves emails from the email server. Deletes the remote copy of the email once it has been downloaded to a computer.
	Responsible for retrieving emails from email servers by email-client applications.

Items:

Simple Mail Transfer Protocol (SMTP) Secure Hypertext Transfer Protocol (HTTPS)

Hypertext Transfer Protocol (HTTP) Post Office Protocol (POP)

File Transfer Protocol (FTP) Internet Message Access Protocol (IMAP)

TCP/IP stack layer protocols 6

Practice 1

The TCP/IP stack is a set of protocols that work together. The stack is divided up into four layers that work together in a way that allows a manufacturer or software house to focus on their own product. So long as they adhere to the necessary standards and implement the appropriate protocol(s), the component will be able to interact with the other layers to communicate effectively.

The following section provides a definition of each layer. Complete the name of each layer by dragging and dropping each term into the correct position.

The [ ] layer uses protocols that are designed to work with specific types of end-user software, for example a web browser uses HTTP, while an email client uses SMTP, alongside either IMAP or POP3.
The [ ] layer breaks the data from the previous layer down into segments (TCP) or datagrams (UDP). Sequence numbers are allocated, and source and destination port numbers are added to the header. For TCP, delivery is acknowledged, and lost segments are retransmitted.
The [ ] layer prepares packets for routing across the internet. Source and destination IP addresses are added at this stage.
The [ ] layer is responsible for moving IP packets from point to point in the path between client and server. At this level, networking protocols, such as Ethernet, are used.

Items:

transport internet (network) link (data link) application

Quiz:
STEM SMART Computer Science Week 11

TCP/IP stack layer protocols 7

Practice 2

Complete the table by dragging the correct layer or protocol into the spaces so that each protocol matches the layer at which it operates.

Layer	Protocol
Application	
	TCP
Internet	
	Ethernet

Items:

Wireless Link HTML IP Transport CAT4 Frame Packet HTTP

Quiz:
STEM SMART Computer Science Week 11

TCP/IP stack layer protocols 3

Challenge 1

The TCP/IP networking model is split into four layers. Each of these layers has a specific purpose and supports different protocols (rules for communication).

Each protocol works only on a single layer. Drag and drop the protocol into the correct position in the table.

Layer	Protocol
Application layer	
Transport layer	
Network layer (internet layer)	
Link layer (data link layer)	

Items:

UDP IP HTTP Wi-Fi

Quiz:
STEM SMART Computer Science Week 11

TCP/IP stack layer protocols 5

Practice 1

Joni is flying home for the winter holiday. She has arrived at the airport and has to scan her boarding pass. The information from the pass is encoded in a QR code and transmitted to the airport's server using secure hypertext transfer protocol (HTTPS).

Part A Which layer 1

At which layer of the TCP/IP protocol stack is HTTPS initially handled?

- Application
- Internet
- Network
- Link
- Transport

Part B Difference between HTTPS and HTTP

What is the difference between the protocols HTTPS and HTTP?

- The data is compressed.
- The data is encrypted.
- The data is encoded.

Part C Which layer 2

When the data is received at the server it is checked against Joni's booking record. If the check is OK, a data signal is returned to the security gate to allow Joni to pass through the turnstile. Communication between the server and the gate is made using TCP (Transmission Control Protocol).

At which layer of the TCP/IP protocol stack is this protocol initially handled?

- Network
- Internet
- Transport
- Link
- Application

Quiz:
STEM SMART Computer Science Week 11

Loading a web page

Challenge 1

Put the following statements in order, to explain what happens when you type the URL of a webpage into your browser. (Assume that none of the information is cached.)

Available items

- The DNS server looks up the IP address of the server that you want.
- Your computer sends a lookup request to the DNS server.
- You type the URL into your browser.
- Your computer sends a request to the web server's IP address.
- The DNS server sends your computer the relevant IP address.
- The web server sends your computer the webpage.

Quiz:
STEM SMART Computer Science Week 11

Breakdown of a URL

Challenge 1

A URL contains lots of information. Consider this URL:

```
https://mail.google.com/mail/u/0/#inbox
```

Three facts in the list below can be determined by studying the URL. Select the three that are correct.

- [ ] **google.com** is a fully qualified domain name
- [ ] The request will use server port 143
- [ ] The TLD is **com**
- [ ] **mail** is a subdomain
- [ ] The data exchanged between client and server will be encrypted

Quiz:
STEM SMART Computer Science Week 11

Specific domain name servers

Practice 1

Assuming that no use is made of cached data, what type of domain name server is responsible for getting the IP address of a web server and returning it to the client?

Quiz:
STEM SMART Computer Science Week 11

Domain name server hierarchy

Practice 2

The domain name system is used to convert user-friendly domain names into IP addresses. The mapping from a specific domain name to a specific IP address is stored on an **authoritative name server**. This information is maintained by the person or organisation who manages the domain name.

When a domain name look-up is performed, many servers in the domain name server hierarchy may be used. Put the following steps into order so they correctly describe the look-up sequence.

Available items

- The TLD name server is contacted and returns the details of the authoritative name server.
- The authoritative name server is queried and returns the IP address.
- A root server is contacted and returns the details of the top level domain (TLD) name server.
- If the recursive DNS resolver has the relevant IP address, it is returned to the client.
- A server known as a recursive DNS resolver (or caching server) is contacted.

Quiz:
STEM SMART Computer Science Week 11

Client-server networks 1

Practice 1

In a client-server network, systems are designated as "clients" or "servers".

From the following options, select all examples of "clients".

- [ ] A web browser
- [ ] An end user
- [ ] A mobile phone
- [ ] An email app on a mobile phone
- [ ] A software process