Bit and baud rate equivalence

Challenge 1

Select the statement that describes when the bit rate of a system is the same as the baud rate.

- Each block of transmitted data includes a start bit and a stop bit.
- The data is transmitted through a single wire.
- Each signal change represents exactly one bit of data.
- Only one signal change can occur per second.

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 43

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 43

Routers and TCP/IP stack

Practice 1

A router is a device that moves packets around the internet from source to destination.
Which layers of the TCP/IP stack does a router implement?

- Only the data link (link) layer
- All of the layers
- Internet (network) and transport layers
- Internet (network) and data link (link) layers

Quiz:
STEM SMART Computer Science Week 43

IP addresses: 5

Challenge 1

An internet host has the IP address `192.168.100.4/17` — the address is written in CIDR form.

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

- [ ] The subnet mask could be expressed as `255.255.128.0`
- [ ] The network (subnet) address is `192.168.100.0`
- [ ] Host `192.168.120.4` is on the same network (subnet)
- [ ] The host has a non-routable IP address
- [ ] The broadcast address is `192.168.255.255`
- [ ] The network (subnet) can support 32,768 hosts

Quiz:
STEM SMART Computer Science Week 43

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 43

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:
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Star topology characteristics 2

Practice 1

An organisation has decided to make office space available to remote working employees who occasionally wish to use an office. They need to consider how to set up the network and are considering a star topology using a switch.

Which **two** of the statements listed below are features of a star topology?

- [ ] Every device sends data packets through the switch
- [ ] The switch broadcasts the packets of data to all devices
- [ ] Every device is connected to the switch
- [ ] Terminators are used at the end of the cables so that the electrical signal does not bounce back
- [ ] The network will not allow two or more computers to transmit at the same time because it may cause a collision.

Quiz:
STEM SMART Computer Science Week 43

Network Address Translation

Practice 1

What is the primary role of NAT (Network Address Translation) when a private network connects to the internet?

- To allocate a unique domain name for each device on the private network.
- To assign a static IP address to each device on the private network.
- To convert private IP addresses to public IP addresses for routing over the internet.

Quiz:
STEM SMART Computer Science Week 43

Subnetting a network

Challenge 1

A school network administrator is tasked with managing a large network that spans multiple departments, including the library, computer labs, and staff offices. The administrator decides to divide the network into smaller, separate sections called subnets.

Identify two benefits of using subnets in a network.

[2 marks]