ANSWERS

F10.3 Network performance

Networks · GCSE · OCR J277 1.3.1, Edexcel 1CP2 4.1.5 · about 15 min

What this lesson is about

Bandwidth, transfer time calculations, what slows a network, and measuring latency with a ping.

- Speed and bandwidth
- Calculating transfer time
- What slows a network down?
- Measuring latency

Questions

5 marks in all

1. How many seconds does a 25 MB file take to send at 10 Mbps? [1 mark]

> **Answer:** 20. 25 × 8 = 200 megabits, and 200 ÷ 10 = 20.

2. What is bandwidth? [1 mark]

- ☐ **A** The most data a connection can carry each second
- ☐ **B** The length of a cable
- ☐ **C** The number of devices on a network
- ☐ **D** The delay before data arrives

> **Answer:** A. It is measured in bits per second.

3. Why is a home internet connection often slower in the evening? [1 mark]

- ☐ **A** More users are sharing the bandwidth
- ☐ **B** Cables cool down at night
- ☐ **C** Routers switch off at night
- ☐ **D** Servers run slower in the dark

> **Answer:** A. Everyone streaming at once shares the same connections.

4. What is latency? [1 mark]

- ☐ **A** The delay for data to travel from one device to another
- ☐ **B** The total amount of data sent
- ☐ **C** The number of packets lost
- ☐ **D** The speed of the processor

> **Answer:** A. A ping measures it.

5. How many megabytes per second is a 100 Mbps connection? [1 mark]

> **Answer:** 12.5. 8 bits in a byte: 100 ÷ 8.

The task: ping the server

Ping the Server three times. For each ping, send `ping`, time how long until a reply arrives using `clock()`, and print `ping <n>: <seconds> s`, rounded to two decimal places. Then print `average: <seconds> s`, also rounded to two decimal places.

```
# the two lines every program starts with: the commands, then the robot
from bugbot import *
connect()
```

The hint students can ask for: For each ping, take a clock reading, send, then wait in small steps until a reply arrives, and take the clock reading again. The difference is the round trip. Collect them so you can average them at the end.

A solution

```
from bugbot import *
connect()
times = []
for n in [1, 2, 3]:
    start = clock()
    send("ping")
    reply = None
    while reply is None:
        wait(0.02)
        for sender, text in messages():
            reply = text
    took = clock() - start
    times.append(took)
    print(f"ping {n}: {took:.2f} s")
print(f"average: {sum(times) / len(times):.2f} s")
```

Any program that meets the task's checks is marked correct in the simulator; this is one way, not the only way.