Solutions

Each answer shows the steps, then the **result**.

2.1

- a sensor measures a physical quantity and sends it in
- it is an **input** device

2.2

- an actuator turns an electrical signal into **movement**

2.3

- a packet has three parts
- **header**, **payload**, **trailer**

2.4

- any **two** of: sender's IP / receiver's IP / packet number / total number of packets

2.5

- each packet is routed separately, so packets take **different routes**
- routes differ in length and congestion, so packets **arrive at different times**

3.1 C

- a **speaker** produces sound, so it is an output device
- A, B and D all take data in

3.2

(a)

- the scanner shines light at the bars and reads the pattern reflected back
- this is sent to the computer as the **product code**

(b)

- an **inkjet** (or laser) **printer**
- it can print the receipt **quickly on paper**

3.3

(a)

- convert: 1 MB = 1024 KB, so 6 MB = 6144 KB

$$\frac{6144 \text{ KB}}{3 \text{ KB/packet}} = \textbf{2048} \text{ packets}$$

(b)

- **header**: sender's and receiver's IP addresses and the packet number

- **payload**: the piece of the file being carried
- **trailer**: end marker and an error-checking value such as a checksum

(c)

- the file is split into numbered packets of equal size
- each packet is sent separately; routers choose a short or uncongested path
- packets may take different routes and arrive out of order
- the receiver **reassembles** them using the packet numbers

(d)

- the receiver notices the **missing number**
- only that packet is **resent**

(e)

- e.g. **real-time video** or live streaming
- a delayed packet arrives too late, so the picture or sound **breaks up**