

Solutions

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

2.1

- extra bit added to a byte so the receiver can check it
- used **to detect an error after transmission**

2.2

- a check digit is calculated from the other digits
- any **one** of: an **incorrect digit** / a **transposition** / a **missing or extra digit**

2.3

- any **two** of: LAN is one building / WAN is a large area; LAN cabling belongs to the owner / WAN uses third-party links; a LAN is usually faster

2.4

- sends data only to the correct port: **switch**
- connects two different networks: **router**

2.5

- any **two** of: faster / more reliable (fewer dropouts) / more secure (signal cannot be picked up outside)

3.1 A

- 1101001 has four 1s, already even, so the even-parity bit is **0**
- B would make the count odd; C and D are not how even parity works

3.2

(a)

- checksum is calculated before sending and again at the receiver
- if the two values **differ**, an error has occurred

(b)

- if two bits flip, the number of 1s may still be even (or odd) as required
- the parity check **passes despite the error**

3.3

- the receiver sends a positive or negative acknowledgement
- if the sender gets **no positive ACK before a timeout**, it **resends** the packet

3.4

(a)

- eight computers in one building, office owns the cabling

• LAN

(b)

- MAC address and join the network: **NIC**
- send data only to the addressed port: **switch**
- connect the office to the internet: **router**

(c)

- **MAC**: fixed in the hardware by the manufacturer; identifies the device
- **IP**: identifies where the device is on a network and can change
- a switch uses MAC addresses inside the LAN; a router uses IP addresses between networks

(d)

- benefit: visitors can **move around** and need no cabling
- drawback: **slower or less secure**, and walls can weaken the signal

(e)

- without a key, anyone in range could join
- the key **encrypts** the traffic and **keeps outsiders out**