

Exercise walk-through

Data Compression ■ 2.2

eXercise

You must be able to

- explain why **compression** 压缩 reduces the bits needed to store or transmit data
- distinguish **lossless** 无损 from **lossy** 有损 compression
- describe the trade-off between file **size** and data **quality**
- explain how removing **redundancy** 冗余 speeds up transmission

Method — Compression

Reduces the number of **bits** needed to store or send data, saving space and time.

Method — Lossless vs lossy

- **Lossless** restores the original data **exactly** (used for text, program files; e.g. ZIP).
- **Lossy** discards some data, so it cannot be restored exactly, but achieves **smaller** files (e.g. JPEG, MP3).

Method — The trade-off

Smaller size usually means lower quality. Removing redundancy makes transmission **faster** over a network.

Practice 2.1 ■ 1 mark

State what data compression does.

Solution 2.1

Method: Compression

Worked steps

it reduces the number of bits needed to store or transmit the data **B1**.

Practice 2.2 ■ 2 marks

State the difference between lossless and lossy compression.

Solution 2.2

Method: Lossless vs lossy

Worked steps

lossless compression restores the original exactly; lossy compression discards some data and cannot **B1** **B1**.

Practice 2.3 ■ 1 mark

State one situation where lossless compression is needed.

Solution 2.3

Method: Compression

Worked steps

any one where exact data matters: text, program code, legal or medical files **B1**.

Exam-style 3.1 ■ 1 mark

Lossless compression

- A** loses some of the data
- B** restores the original data exactly
- C** works only on images
- D** increases the file size

Solution 3.1

- A** loses some of the data
- B** restores the original data exactly 
- C** works only on images
- D** increases the file size

Worked steps

B.

Exam-style 3.2 ■ 1 mark

A JPEG image file uses _____ compression.

A lossless

B lossy

C no

D text

Solution 3.2

A lossless

B lossy



C no

D text

Worked steps

B.

Exam-style 3.3 ■ 1 mark

A user must compress a legal text document, with no loss of data allowed.

- (a) State which type of compression to use.
- (b) State why lossy compression is not suitable.
- (c) State one benefit of compression when sending files.

Solution 3.3

Method: Lossless vs lossy

Worked steps

(a) lossless **B1**. (b) it would lose or change some of the text **B1**. (c) faster transmission (or less storage used) **B1**.