

## 2.2 Data Compression

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Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

**Total: 9 marks****KEY WORDS** compression 压缩 • lossless 无损 • lossy 有损 • lossless compression 无损压缩 • lossy compression 有损压缩

### Objective

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Build the skills to answer exam questions on **data compression**.

**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

### 1 Worked examples

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Study these first. Each one shows the method for a question type used later.

#### ■ Compression

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

#### ■ 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).

#### ■ The trade-off

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

### 2 Practice

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**2.1** State what data compression does. [1]

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**2.2** State the difference between lossless and lossy compression. [2]

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**2.3** State one situation where lossless compression is needed. [1]

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### 3 Exam-style questions

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**3.1** Lossless compression [1]

- **A** loses some of the data
  - **B** restores the original data exactly
  - **C** works only on images
  - **D** increases the file size
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**3.2** A JPEG image file uses \_\_\_\_\_ compression. [1]

- **A** lossless
  - **B** lossy
  - **C** no
  - **D** text
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**3.3** A user must compress a legal text document, with no loss of data allowed.

- (a) State which type of compression to use. [1]
- (b) State why lossy compression is not suitable. [1]
- (c) State one benefit of compression when sending files. [1]

## Solutions

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

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

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

**3.1** B.

**3.2** B.

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