

1.3 Data storage and compression

Name: _____ Class: _____ Date: _____

Total: 9 marks

Objective

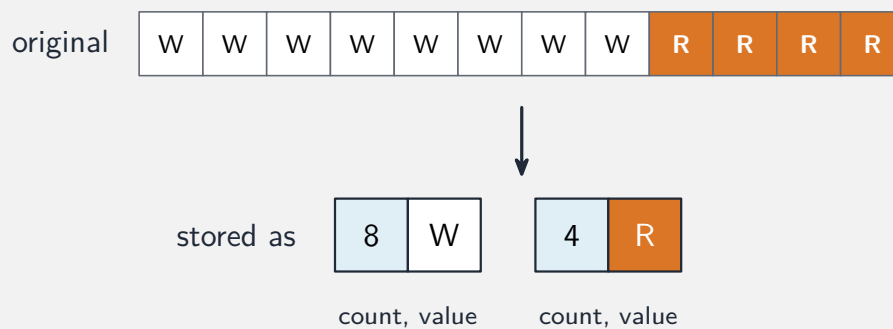
Build the skills to answer exam questions on **data storage and compression** 数据存储与压缩—storage units, **lossless** 无损 and **lossy** 有损 compression, and **run-length encoding** 行程编码.

You must be able to:

- use the storage units (each $\times 1024$)
- compare lossless and lossy compression
- apply run-length encoding (RLE)

1 Worked examples

■ Compression



RLE stores each run once as a count and a value (lossless)

- **lossless:** no data lost, original rebuilt exactly (text, programs); e.g. RLE.
- **lossy:** permanently removes data → much smaller (photos, music, video).
- units: byte → KiB → MiB → GiB, each $\times 1024$.

2 Practice

2.1 State one benefit of compressing a file.

[1]

2.2 State how many bytes are in 1 KiB. [1]

3 Exam-style questions

3.1 Which compression type permanently removes data? [1]

- **A** lossless
 - **B** lossy
 - **C** run-length encoding
 - **D** both are reversible
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3.2 A file must be compressed.

(a) State whether a text file should use lossless or lossy compression, and why. [2]

(b) Apply run-length encoding to the run **AAAAABBB**. [2]

3.3 Explain why RLE works well for an image with large areas of one colour. [2]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **1.3 Data storage and compression** past-paper sheet in the Library, or try these in **Practice mode**:

- 0478/11 N25 —Q2 (storage / compression)
- 0478/11 J25 —Q1 (compression)

Solutions

2.1 any of: uses less storage; needs less bandwidth; shorter transmission time.

2.2 1024 bytes.

3.1 B. Lossy compression permanently removes data.

3.2 (a) lossless; because every character must be kept exactly (a text file cannot lose data).

(b) 5A 3B (5 A's then 3 B's).

3.3 large areas of one colour are long runs of the same value; RLE stores each run as a single count + value, saving a lot of space.