Encode, Decode, Compare

Grade 10 | Technology | Visual learning | 40 minutes

Learning target

Apply a stated run-length encoding and explain when it saves space.

Prerequisites and materials

Count repeated symbols; calculate a percentage. Provide pages 2-3, pencil, and a calculator if needed. These are paper-based analyses of fictional data; no physical experiment is required.

Teaching sequence

7 min: Read the data and vocabulary.

8 min: Trace the diagram or organizer with a partner.

15 min: Complete the four application questions.

7 min: Compare calculations and justify conclusions.

3 min: Identify one limit of the model.

Assessment and access

12 points: 3 per response. Keep calculations, units, and reasoning visible. Allow oral rehearsal, annotate variables, and supply a calculator or worked example with different values during practice. For assessment, clarify directions without giving answers.

Extension

Suggest an unambiguous extension for runs of 10 or more, and explain what delimiter or count rule is needed.

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PREVIEW - first two pages only. Full package includes responses and answer key.

Lesson reference

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Use the classroom encoding below, not a claim about real file sizes. A run is written as one symbol followed by one single-digit count. Inputs contain only A and B; runs have at most 9 symbols.

Vocabulary	Meaning
run	A consecutive group of the same symbol.
lossless	Allowing the original data to be reconstructed exactly.
overhead	Extra symbols needed to describe the representation.

Reference data

Input	Original symbol count
AAAABBBAA	9
ABABAB	6

Use the visual model

Original runs: AAAA | BBB | AA

Symbol-count pairs: A4 | B3 | A2

Decode: repeat each letter by its count. The separators above aid reading only.

Rules and assumptions

Example: AAAAA becomes A5. Each letter and each digit counts as one stored symbol. Decode by repeating the letter by its following count. Savings = (original count - encoded count) / original count x 100%.



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