The Checksum Relay

Grade 12 | Technology | Escape room | 40 minutes

Learning target

Calculate a simple modular checksum and demonstrate a limitation of error detection.

Prerequisites and materials

Integer sums; remainders. 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

5 min: Introduce the mission and source data.

5 min: Model a similar calculation using different values.

20 min: Teams solve the locks; each learner records work.

7 min: Complete the transfer question independently.

3 min: Compare the code and discuss model limits.

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

Explain why swapping any two data values leaves this checksum unchanged.

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



Lesson reference

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Use this deliberately simple classroom rule: checksum = sum of the four nonnegative integer data values, modulo 11. Transmit the four values plus their checksum. This is an error-detection model, not encryption or a secure authentication system.

Vocabulary	Meaning
checksum	A value computed from data to help detect a change.
modulo	The remainder after integer division.
collision	Different messages producing the same checksum.

Reference data

Message	Data values
Original	4, 7, 2, 8
Changed A	4, 7, 3, 8
Changed B	5, 6, 2, 8

Rules and assumptions

Compare the recomputed checksum with the original transmitted checksum. Lock 1: original checksum 10 = digit 6; 21 = digit 1. Lock 2: Changed A detected = digit 3; not detected = digit 8. Lock 3: Changed B detected = digit 2; not detected = digit 5.



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