Audit a Binary Search

Grade 11 | Technology | Assessment | 40 minutes

Learning target

Trace binary search and justify its sorted-data prerequisite and index updates.

Prerequisites and materials

Integer indices; floor division; comparisons. 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: Clarify directions and permitted references.

25 min: Learners respond independently with the reference page.

10 min: Collect work, then review reasoning and misconceptions.

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

Compare the number of inspected values with a left-to-right linear search for 42.

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Lesson reference

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Use zero-based indices and this fixed sorted array. At each step set mid = floor((low + high)/2). On a match, stop. If target is smaller, set high = mid - 1; if larger, set low = mid + 1. Stop unsuccessful when low > high.

Vocabulary	Meaning
search interval	The current inclusive range of candidate indices.
midpoint	The chosen middle index of an interval.
invariant	A condition maintained while an algorithm runs.

Reference data

Index	0	1	2	3	4	5	6	7	8
Value	3	8	12	17	23	31	42	56	70

Rules and assumptions

Begin low = 0 and high = 8. Count one inspected array value as one comparison step. Do not count the individual machine-level relational operations.



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