Will the Parts Fit?

Grade 10 | Engineering | Assessment | 40 minutes

Learning target

Use worst-case tolerance intervals to test clearance and a minimum-clearance requirement.

Prerequisites and materials

Decimals and interval endpoints. 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

Find the largest symmetric shaft tolerance that would just guarantee the minimum clearance, keeping all other values fixed.

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

Lesson reference

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Evaluate a fictional cylindrical model part on paper. Ignore temperature change, surface roughness, and shape errors. The design requires clearance of at least 0.10 mm in every permitted case.

Vocabulary	Meaning
nominal	The stated central dimension.
tolerance	The permitted variation around a nominal dimension.
clearance	Hole diameter minus shaft diameter in this simplified fit model.

Reference data

Part	Nominal diameter	Tolerance
Hole	10.20 mm	+/- 0.05 mm
Shaft	10.00 mm	+/- 0.04 mm

Rules and assumptions

Minimum clearance uses the smallest hole and largest shaft. Maximum clearance uses the largest hole and smallest shaft. A positive clearance means no interference in this model, but does not by itself meet every design requirement.



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