Design in context

International Baccalaureate · IB Diploma · Design Technology · SL

Scope and prerequisites

This handout covers selected SL topics for the course first assessed in 2027; it is not the whole syllabus.

Prerequisites: read the stated quantities and units, and use arithmetic and the model conditions below.

The examples are original and fictional: they are not real measurements or real student investigations.

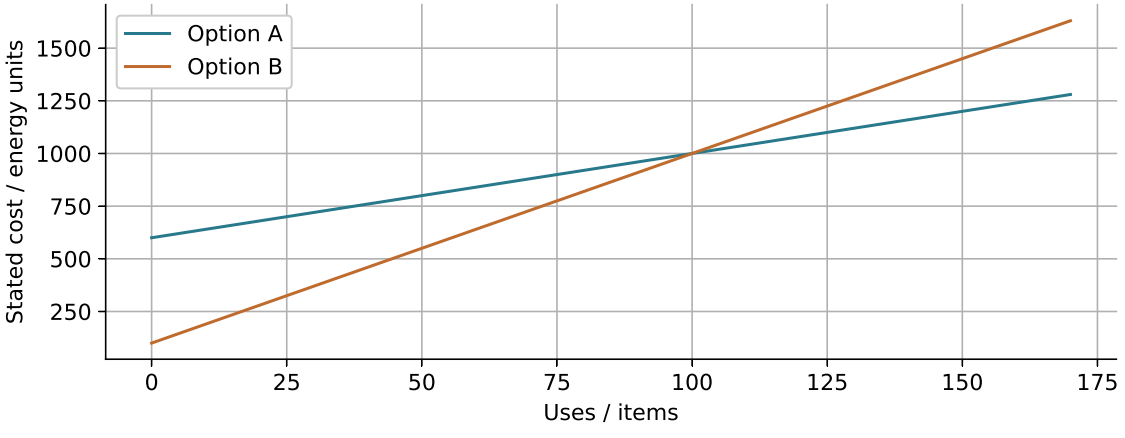
Design sustainability and production choices

What would explain this observation?

- A repairable product may cost more initially but stay in service longer. A design decision needs evidence across manufacture, use and disposal.

Build the model

- **Design for disassembly** supports separation of materials and replacement of parts.
- Manufacturing choices depend on production volume, **tolerances**, material properties and cost.
- Sustainability includes environmental and social effects.
- design for disassembly: Design supporting separation and replacement of parts.
- tolerance : An allowed dimensional variation.



Option A (600 + 4n) and option B (100 + 9n) cost the same at n = 100; above that A is cheaper

Choose evidence that can test it

- Compare a common service over a stated lifetime.
- Separate fixed tooling cost from cost per item.
- Include repair, energy, transport and realistic end-of-life pathways rather than using a recycled label as the whole judgement.

In the lab: Create a bill of materials and an annotated assembly plan. Test whether a worn part can be replaced with normal tools. For HL project development, evaluate production feasibility and commercial assumptions against the applicable cohort guide.

Work from known quantities

- Known: method A costs 600 fixed units plus 4 per item; method B costs 100 fixed units plus 9 per item.
- Equality: 600+4n = 100+9n.
- Rearranging: 500 = 5n, so n = 100 items.
- Other quality and sustainability criteria may change the choice.

Your turn: Fixed costs differ by 400 units and unit costs differ by 5. Find cost break-even quantity.

Check the conclusion and its limits

- A cheaper process is not automatically preferable.
- Cost estimates need currency, quantity and assumptions, and prototypes do not prove mass-production consistency.

Not true: A recycled-content label establishes the entire product life-cycle impact. Recycled content describes one input. The full life-cycle impact also includes manufacturing energy, transport, use phase and end-of-life; one label cannot establish all of them.

Key:

- Design for disassembly supports separation of materials and replacement of parts.
- Compare a common service over a stated lifetime.
- Watch for: A cheaper process is not automatically preferable.

Write from a break-even of 200 items

- Method A costs 900 fixed units plus 3 per item. Method B costs 300 fixed units plus 6 per item.
- Find the quantity where the costs are equal. Quality and disposal can still change the choice.

■ **Write from a full-life comparison**

- Method A is cheaper per item; method B lasts twice as long before disposal.
- Recompute the cost PER YEAR OF SERVICE: doubling service life can beat a lower unit price – sustainability arithmetic is a life-cycle choice, not a shelf choice.

■ **Write from a circularity check**

- A proposed product is recycled at end of life, but only 60 percent by mass.
- The other 40 percent is waste – a circular claim names the fraction, the route and the energy cost, or it is marketing.