

Populations and communities · supported focus

International Baccalaureate · IB Diploma · Biology · HL

Scope and prerequisites

Supported HL focus. First assessment 2025; current subject brief acquired; full Biology guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.

Prerequisites: read the stated quantities and units, use arithmetic and the model conditions below. Each lesson develops its own method before independent transfer.

These are original or explicitly fictional teaching examples, not actual measurements or completed assessed learner investigations.

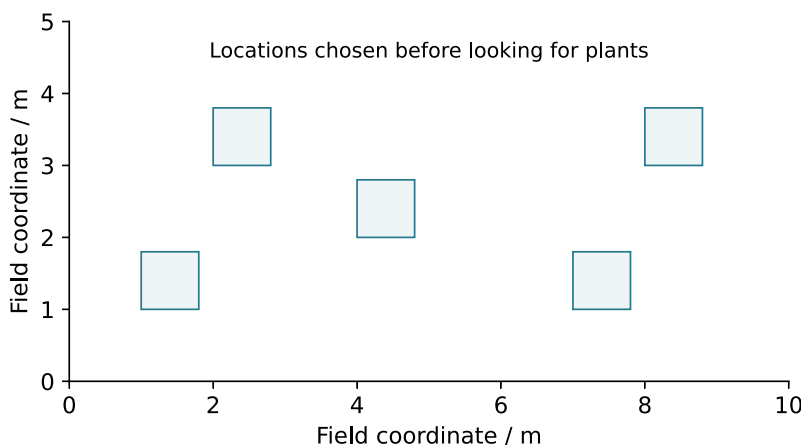
Sampling populations without choosing the answer

■ What would explain this observation?

- A field edge looks richer in plants than its centre. Choosing only the richest patches would build the desired result into the sampling method.
- Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

■ Build the model

- A **population** consists of organisms of one species in a defined area. Random **quadrats** estimate density without deliberately selecting patches. A transect investigates change along an environmental gradient.
- quadrat : A defined area used for sampling; population: Organisms of one species in a defined area.



■ Choose evidence that can test it

- Estimate total abundance by multiplying mean density by area, with consistent units. This assumes sampled areas represent the habitat. Patchiness and too few samples widen uncertainty.
 - Choose coordinates with random numbers before visiting the patches. Record quadrat area and counting rules. For a transect, use fixed distances and measure a relevant abiotic variable. Do not damage habitats or sample unsafe locations.
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■ Work from known quantities

- State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution.
- Known: five 0.25 square metre quadrats contain 3, 4, 6, 5 and 2 plants. Mean count = $20/5 = 4$. Density = $4/0.25 = 16$ plants per square metre. Estimated abundance in 100 square metres = $16 \times 100 = 1,600$ plants.

Example:

Mean count is 6 in a 0.5 square metre quadrat. Find density per square metre. Use the same sequence: known quantities → model → relation → substitution → unit and interpretation.

■ Check the conclusion and its limits

- Quadrats suit organisms that do not move quickly. A food chain arrow shows the direction of energy transfer, not the direction a predator travels.
- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

Sampling only the most crowded patches gives an unbiased population estimate. This claim is false: Quadrats suit organisms that do not move quickly. A food chain arrow shows the direction of energy transfer, not the direction a predator travels.

Key:

Sampling populations without choosing the answer: Estimate total abundance by multiplying mean density by area, with consistent units. This assumes sampled areas represent the habitat. Patchiness and too few samples widen uncertainty.