

Exercise walk-through

5.1

Land, food and resource decisions

International Baccalaureate · IB Diploma · Environmental Systems and Societies ·

5.1 Land, food and resource decisions

Name: _____ Class: _____ Date: _____ **Total: 10 marks**

KEY WORDS erosion • resource

Objective

Land, food and resource decisions. Supported SL concept preparation; original classroom practice, not an official IB paper or assessed learner work.

1 Key knowledge and worked examples

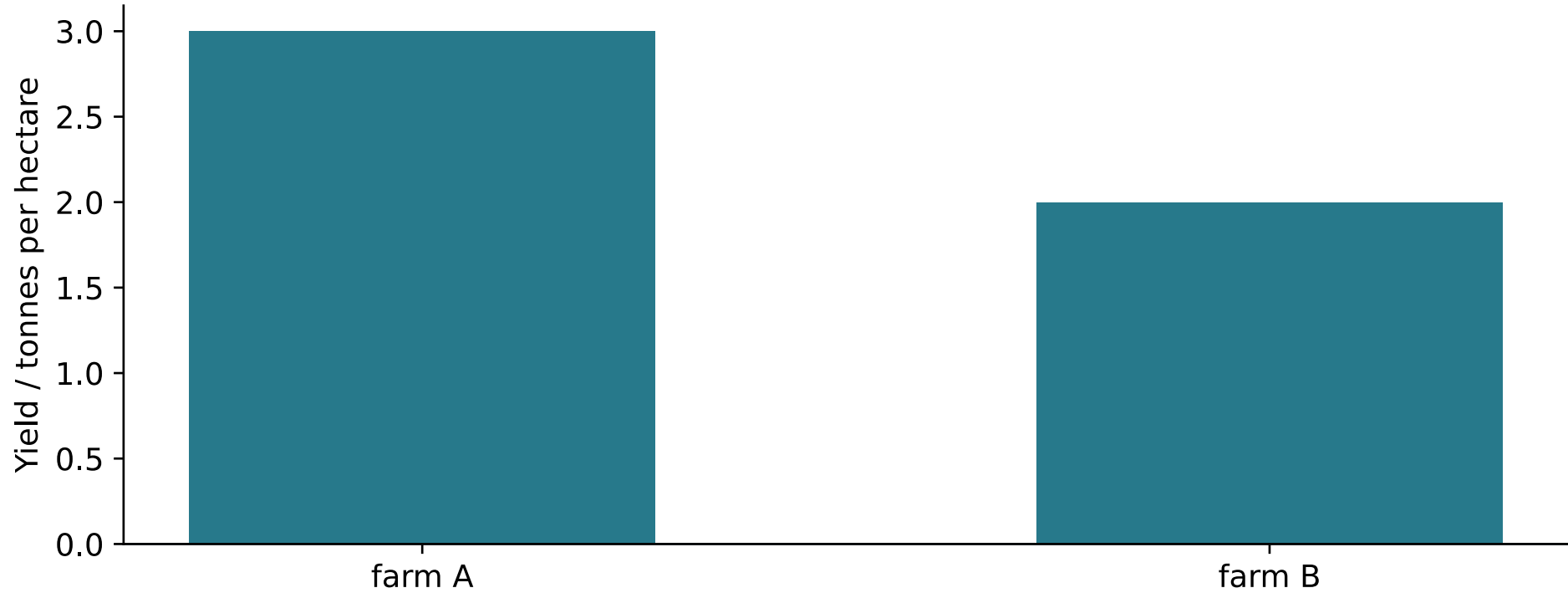
■ What would explain this observation?

- A farm can increase yield while increasing soil loss or water demand. Food-system evaluation requires more than tonnes harvested.
- Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

■ Build the model

- Soil supports nutrient cycling, water storage and organisms. **Erosion** removes soil; nutrient depletion changes fertility. **Resource** use involves extraction, production, distribution and waste.

- erosion: Removal and transport of soil or rock; resource: A material or service used to meet needs.



■ **Choose evidence that can test it**

- Distinguish total yield from yield per area and energy input. Sustainable management must consider regeneration rates and impacts beyond the farm boundary. Different stakeholders may rank food security, biodiversity and income differently.
- Compare management options using a stated functional unit and the same timescale. Use approved secondary datasets or non-destructive soil observations. Explain trade-offs instead of claiming a method has no disadvantages.

■ **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: farm A harvests 18 tonnes from 6 hectares. Yield per area = $18/6 = 3$ tonnes per hectare. Farm B harvests 20 tonnes from 10 hectares, so its yield is 2 tonnes per hectare despite a larger total harvest.

Example:

A farm harvests 28 tonnes from 7 hectares. Find yield per hectare. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

■ Check the conclusion and its limits

- A high yield is not proof of long-term soil health. Renewable resources can be depleted when use exceeds regeneration.

- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

A renewable resource cannot be depleted. This claim is false: A high yield is not proof of long-term soil health. Renewable resources can be depleted when use exceeds regeneration.

Key:

Land, food and resource decisions: Distinguish total yield from yield per area and energy input. Sustainable management must consider regeneration rates and impacts beyond the farm boundary. Different stakeholders may rank food security, biodiversity and income

differently.

Exercises 2.1-2.3

2.1 Which comparison measures land productivity? Choose one answer.

- **A** Total harvest without land area
- **B** Harvest divided by cultivated area
- **C** Only fertilizer price

[1]

2.2 A farm harvests 28 tonnes from 7 hectares. Find yield per hectare. Show the relation, substitution and units.

[2]

2.3 Decide whether this claim is true and justify: A renewable resource cannot be depleted.

[2]

Exercises 2.1-2.3

2.1 Which comparison measures land productivity? Choose one answer.

- **A** Total harvest without land area
- **B** Harvest divided by cultivated area
- **C** Only fertilizer price

[1]

2.1 B Distinguish total yield from yield per area and energy input. Sustainable management must consider regeneration rates and impacts beyond the farm boundary. Different stakeholders may rank food security, biodiversity and income differently.

2.2 A farm harvests 28 tonnes from 7 hectares. Find yield per hectare. Show the relation, substitution and units.

[2]

2.2 yield per area = $28/7 = 4\text{t/ha}$.

2.3 Decide whether this claim is true and justify: A renewable resource cannot be depleted.

[2]

2.3 False. A high yield is not proof of long-term soil health. Renewable resources can be depleted when use exceeds regeneration.

Exercises 2.4-3.1

2.4 Removal and transport of soil or rock: write the technical term. [1]

3 Exam-style questions

3.1 Fictional farms produce 24 t on 6 ha and 30 t on 10 ha. Compare yield and total output. Can sustainability be inferred? [4]

Exercises 2.4·3.1

2.4 Removal and transport of soil or rock: write the technical term. [1]

3 Exam-style questions

2.4 erosion. erosion means Removal and transport of soil or rock.

3.1 Fictional farms produce 24 t on 6 ha and 30 t on 10 ha. Compare yield and total output. Can sustainability be inferred? [4]

3.1 Yields 4 and 3 t/ha; second total is larger. Inputs, soil, water, biodiversity and timescale are missing. Yield is only one criterion.