

Exercise walk-through

1.1

Environmental systems, feedback and perspectives

International Baccalaureate · IB Diploma · Environmental Systems and Societies ·

1.1 Environmental systems, feedback and perspectives

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

KEY WORDS stock • flow

Objective

Environmental systems, feedback and perspectives. Supported HL 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?

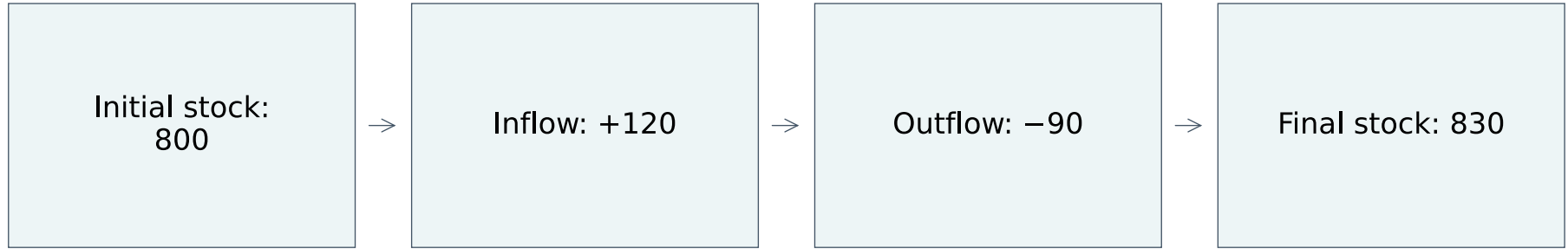
- A lake can respond to the same nutrient input differently depending on its current state. Environmental outcomes depend on **stocks** , **flows** and feedback.
- Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

■ Build the model

- A system model has a boundary, stores and flows. Negative feedback counteracts change; positive feedback amplifies it. An environmental perspective shapes what

people value and which management outcomes they prioritize.

- stock: An amount held within a system; flow: Transfer of an amount per unit time.



■ Choose evidence that can test it

- Separate physical evidence from value judgements. A stock is an amount at a time; a flow is an amount per time. Sustainability decisions require ecological, social and economic evidence and a stated scale.
 - Draw the system boundary before calculating a budget. Identify inflows, outflows and possible unmeasured terms. Compare stakeholder claims using the same evidence, then explain where values lead to different choices.
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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: a reservoir begins with 800 units, receives 120 and loses 90 during a week.

Change in storage = inflow-outflow = $120-90 = 30$. Final storage = $800+30 = 830$ units. The model assumes no omitted flow.

Example:

A stock starts at 600, receives 80 and loses 110. Find final stock. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

■ **Check the conclusion and its limits**

- A balance that closes mathematically can still omit a real process if terms were estimated to fit. Positive feedback does not mean a socially desirable result.
- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

Positive feedback always produces a socially beneficial outcome. This claim is false: A balance that closes mathematically can still omit a real process if terms were estimated to fit. Positive feedback does not mean a socially desirable result.

Key:

Environmental systems, feedback and perspectives: Separate physical evidence from value judgements. A stock is an amount at a time; a flow is an amount per time. Sustainability decisions require ecological, social and economic evidence and a stated scale.

Exercises 2.1-2.3

2.1 What makes a reservoir budget incomplete? Choose one answer.

- **A** An unmeasured outflow
- **B** Consistent units
- **C** An explicit boundary

[1]

2.2 A stock starts at 600, receives 80 and loses 110. Find final stock. Show the relation, substitution and units.

[2]

2.3 Decide whether this claim is true and justify: Positive feedback always produces a socially beneficial outcome.

[2]

Exercises 2.1-2.3

2.1 What makes a reservoir budget incomplete? Choose one answer.

- **A** An unmeasured outflow
- **B** Consistent units
- **C** An explicit boundary

[1]

2.1 A Separate physical evidence from value judgements. A stock is an amount at a time; a flow is an amount per time. Sustainability decisions require ecological, social and economic evidence and a stated scale.

2.2 A stock starts at 600, receives 80 and loses 110. Find final stock. Show the relation, substitution and units.

[2]

2.2 final stock = $600 + 80 - 110 = 570$ units.

2.3 Decide whether this claim is true and justify: Positive feedback always produces a socially beneficial outcome.

[2]

2.3 False. A balance that closes mathematically can still omit a real process if terms were estimated to fit. Positive feedback does not mean a socially desirable result.

Exercises 2.4·3.1

2.4 An amount held within a system: write the technical term. [1]

3.1 A fictional reservoir starts at 500, receives 90 and ends at 550. Evaporation is 20. Infer other outflow and give an alternative explanation if measurements are uncertain.[4]

Exercises 2.4·3.1

2.4 An amount held within a system: write the technical term. [1]

2.4 stock. stock means An amount held within a system.

3.1 A fictional reservoir starts at 500, receives 90 and ends at 550. Evaporation is 20. Infer other outflow and give an alternative explanation if measurements are uncertain.[4]

3.1 Total outflow 40, other outflow 20. The balance assumes complete flows; errors or omitted inflows change the inference. Distinguish stocks from rates.