

Exercise walk-through

8.1

Population, urban systems and indicators

International Baccalaureate · IB Diploma · Environmental Systems and Societies ·

8.1 Population, urban systems and indicators

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

KEY WORDS immigration • indicator

Objective

Population, urban systems and indicators. Supported HL concept preparation; original classroom practice, not an official IB paper or assessed learner work.

1 Key knowledge and worked examples

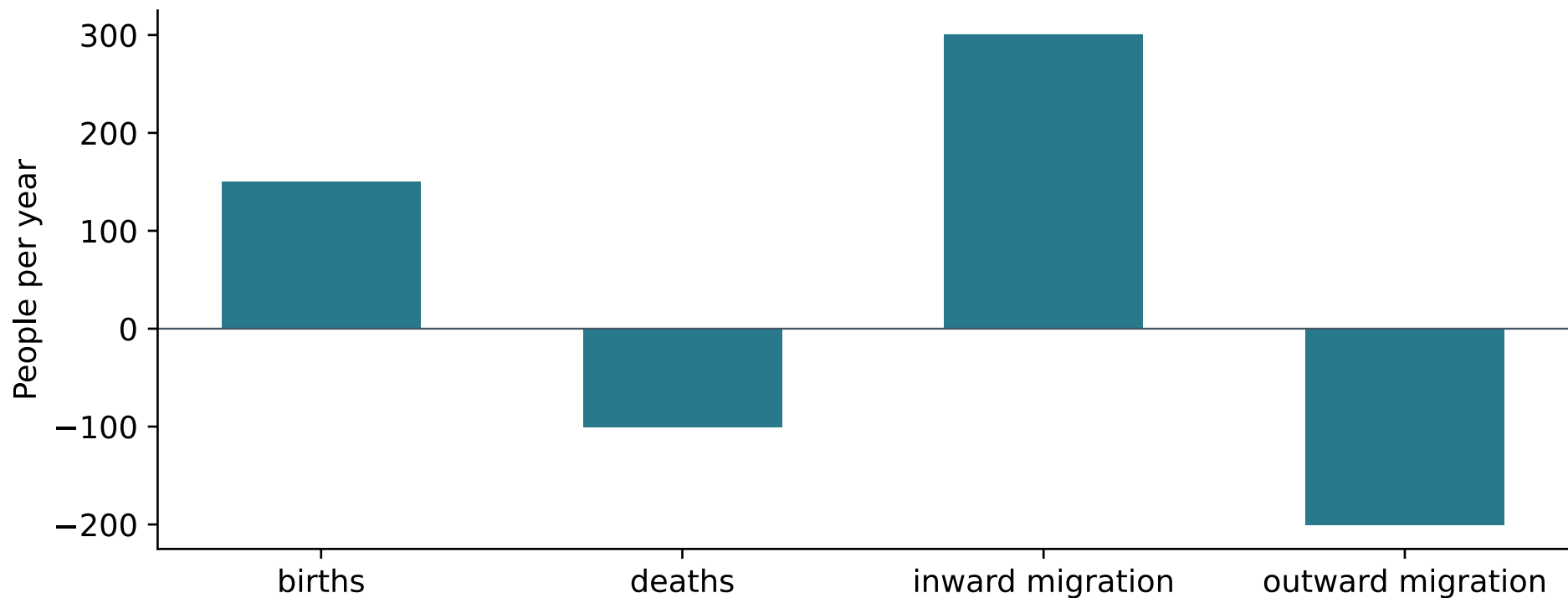
■ What would explain this observation?

- A city can grow because people move into it even when births equal deaths. Population change has several flows.
- Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

■ Build the model

- Population change depends on births, deaths, **immigration** and emigration. Urban systems exchange energy, materials and waste with a wider region. A sustainability **indicator** measures a specified feature rather than total wellbeing.

- immigration: Movement into a population; indicator: A measure of a specified condition.



■ Choose evidence that can test it

- Compare rates with a common denominator and interval. An average can hide unequal access to services. At HL, evaluate how economic incentives, legal responsibilities and ethical priorities change an urban management proposal.
- Use published demographic and city-service data with dates and definitions. Protect privacy when collecting local opinions. Compare the same geographical boundary rather than mixing an urban core with a whole metropolitan region.

■ 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 city has 10,000 people; births 150, deaths 100, immigration 300 and emigration 200 in one year. $\text{Change} = 150 - 100 + 300 - 200 = 150$. $\text{Growth percentage} = 150 / 10,000 \times 100 = 1.5\%$.

Example:

A population of 2,000 grows by 40 in a year. Find percentage growth. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

■ Check the conclusion and its limits

- A projected population is conditional on assumptions. Urban growth does not auto-

matically mean improved health, income or environmental quality for every resident.

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

Warn:

Population growth depends only on births and deaths. This claim is false: A projected population is conditional on assumptions. Urban growth does not automatically mean improved health, income or environmental quality for every resident.

Key:

Population, urban systems and indicators: Compare rates with a common denominator and interval. An average can hide unequal access to services. At HL, evaluate how economic incentives, legal responsibilities and ethical priorities change an urban management

proposal.

Exercises 2.1-2.3

2.1 Which contributes positively to population change? Choose one answer.

- **A** Emigration
- **B** Immigration
- **C** Deaths

[1]

2.2 A population of 2,000 grows by 40 in a year. Find percentage growth. Show the relation, substitution and units. [2]

2.3 Decide whether this claim is true and justify: Population growth depends only on births and deaths. [2]

Exercises 2.1-2.3

2.1 Which contributes positively to population change? Choose one answer.

- **A** Emigration
- **B** Immigration
- **C** Deaths

[1]

2.1 B Compare rates with a common denominator and interval. An average can hide unequal access to services. At HL, evaluate how economic incentives, legal responsibilities and ethical priorities change an urban management proposal.

2.2 A population of 2,000 grows by 40 in a year. Find percentage growth. Show the relation, substitution and units.

[2]

2.2 growth percentage = $40/2,000 \times 100 = 2\%$ per year.

2.3 Decide whether this claim is true and justify: Population growth depends only on births and deaths.

[2]

2.3 False. A projected population is conditional on assumptions. Urban growth does not automatically mean improved health, income or environmental quality for every resident.

Exercises 2.4-3.1

2.4 Movement into a population: write the technical term.

[1]

3 Exam-style questions

3.1 A fictional town starts at 5,000. Births 80, deaths 60, immigration 150 and emigration 70 occur in one year. Find final population and growth percentage.

[4]

Exercises 2.4·3.1

2.4 Movement into a population: write the technical term. [1]

3 Exam-style questions

2.4 immigration. immigration means Movement into a population.

3.1 A fictional town starts at 5,000. Births 80, deaths 60, immigration 150 and emigration 70 occur in one year. Find final population and growth percentage. [4]

3.1 $\text{Change} = 80 - 60 + 150 - 70 = 100$; final 5,100; growth 2%. Projecting this rate assumes stable rates and constraints; one year does not establish that assumption.