

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.

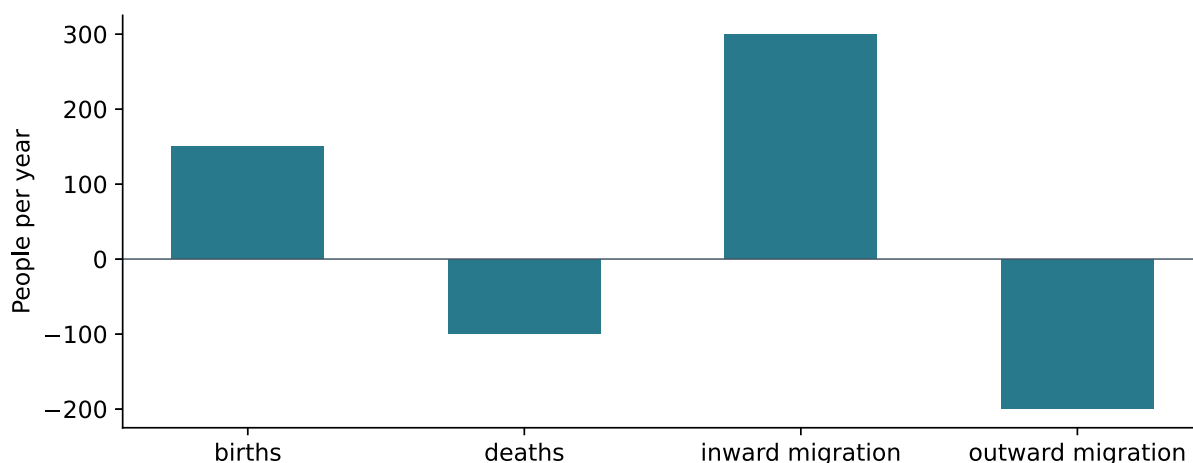
1 Key knowledge and worked examples

■ 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 → model → relation → substitution → unit and interpretation.

■ Check the conclusion and its limits

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

2 Practice

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]

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

3 Exam-style questions

3.1 A fictional town starts at 5,000. Births80, deaths60, immigration150 and emigration70 occur in one year. Find final population and growth percentage. [4]

Solutions

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

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.

2.4 immigration. immigration means Movement into a population.

3.1 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.