

3.5 Population Growth and Resource Availability

Name: _____ Class: _____ Date: _____

Total: 11 marks

KEY WORDS logistic 逻辑斯蒂增长 • carrying capacity 环境容纳量

Objective

Build the skills to answer exam questions on **population growth and resource availability**.

You must be able to:

- use the **growth-rate** formula (births – deaths, plus migration)
- calculate a percent growth rate
- link resources to exponential vs logistic growth

1 Worked examples

Study these first. Each one shows the method for a question type used later — follow the steps and you can do the Practice and Exam-style questions yourself.

■ Growth rate

A population's growth depends on births, deaths, and migration:

$$\text{growth rate} = (\text{births} + \text{immigration}) - (\text{deaths} + \text{emigration}).$$

■ Percent growth rate

As a percentage of the population:

$$\% \text{ growth} = \frac{\text{births} - \text{deaths}}{\text{population}} \times 100.$$

(For humans, often expressed per 1000 people.)

■ A worked calculation

A country of 1000 has 30 births and 10 deaths in a year: $\text{growth} = 30 - 10 = 20$;
 $\text{percent} = \frac{20}{1000} \times 100 = 2\%$.

■ Resources shape the curve

With abundant resources, growth is **exponential** (J-curve); as resources become limited, growth slows to **logistic** (S-curve), leveling at carrying capacity.

2 Practice

Now apply the methods above.

2.1 Write the percent growth-rate formula (births and deaths). [1]

2.2 A population of 2000 has 60 births and 20 deaths. Find the percent growth rate. [2]

2.3 What shape is growth with unlimited resources? [1]

3 Exam-style questions

3.1 With limited resources, population growth follows a [1]

- | | |
|---|---|
| A | B |
| C | D |
- A J-shaped (exponential) curve
 B S-shaped (logistic) curve
 C straight line
 D decreasing curve

3.2 A town of 5000 has 100 births, 40 deaths, 30 immigrants, and 10 emigrants in a year.

(a) Find the net population change. [2]

(b) Find the percent growth rate. [2]

3.3 Explain why a population's growth slows as it approaches its carrying capacity. [2]