

3.8 Human Population Dynamics

Name: _____ Class: _____ Date: _____

Total: 11 marks

KEY WORDS doubling time 倍增时间 • crude birth rate 出生率 • crude death rate 死亡率

Objective

Build the skills to answer exam questions on **human population dynamics**.

You must be able to:

- use **crude birth rate** 出生率 and **crude death rate** 死亡率
- calculate a growth rate and the **doubling time** 倍增时间 (rule of 70)
- explain factors affecting human populations

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.

■ Birth and death rates

Crude birth rate (CBR) and **crude death rate (CDR)** are births/deaths per 1000 people per year. The natural growth rate is:

$$\% \text{ growth} = \frac{\text{CBR} - \text{CDR}}{10}.$$

(Dividing by 10 converts “per 1000” to a percentage.)

■ A worked growth rate

$$\text{CBR} = 30, \text{CDR} = 10: \text{growth} = \frac{30 - 10}{10} = 2\% \text{ per year.}$$

■ Doubling time (rule of 70)

The time for a population to double is approximately:

$$\text{doubling time} \approx \frac{70}{\% \text{ growth rate}}.$$

At 2%, doubling time = $70/2 = 35$ years.

■ Factors

Growth is affected by health care (lowers CDR), education, economic development, and family planning (lower CBR).

2 Practice

Now apply the methods above.

2.1 A country has $\text{CBR} = 25$ and $\text{CDR} = 5$. Find the percent growth rate. [2]

2.2 Write the rule-of-70 doubling-time formula. [1]

2.3 Find the doubling time for a 2% growth rate. [1]

3 Exam-style questions

3.1 The doubling time for a population growing at 3.5% is about [1]

- A 10 years
- B 20 years
- C 35 years
- D 70 years

3.2 A country has $\text{CBR} = 40$ and $\text{CDR} = 12$ per 1000.

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

(b) Find the doubling time. [2]

3.3 Explain how improved health care can, at first, increase population growth. [2]

Solutions

2.1 $\frac{25 - 5}{10} = 2\%$.

2.2 doubling time $\approx \frac{70}{\% \text{ growth rate}}$.

2.3 $70/2 = 35$ years.

3.1 B — $70/3.5 = 20$ years.

3.2 (a) $\frac{40 - 12}{10} = 2.8\%$. (b) $70/2.8 = 25$ years.

3.3 Better health care lowers the death rate (fewer people die) while birth rates stay high, so the gap between births and deaths widens, increasing growth.