

1.13 Function Model Selection and Assumption Articulation

Name: _____ Class: _____ Date: _____ **Total: 8 marks**

KEY WORDS function model 函数模型 • assumptions 假设 • limitations 局限性
• extrapolation 外推 • function 函数

Objective

Build the skills to answer exam questions on **function model selection and assumption articulation**.

You must be able to:

- select an appropriate **function model** 函数模型 (linear, quadratic, polynomial, rational) from how a quantity changes
- articulate the **assumptions** 假设 and **limitations** 局限性 of a model

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Choosing a model

- **constant** rate of change → linear;
- constant **second difference** → quadratic;
- several turning points → higher-degree polynomial;
- a horizontal asymptote → rational.

■ Assumptions and limitations

State the **domain** over which the model is valid, and note that predictions far outside the data (**extrapolation** 外推) may be invalid.

2 Practice

2.1 State the type of function that has a constant rate of change. [1]

2.2 State the type of function whose graph can have a horizontal asymptote. [1]

2.3 A data set has a constant second difference. State the best model type. [1]

3 Exam-style questions

3.1 A quantity changes at a constant rate. The best model is [1]

- **A** linear
- **B** exponential
- **C** rational
- **D** constant

3.2 A model built from data should state its [1]

- **A** colour
- **B** domain of validity and assumptions
- **C** author
- **D** title

3.3 A population is recorded each year for 5 years, and the yearly increases are equal.

- (a) State the best model type. [1]
- (b) State one assumption in using it to predict year 20. [1]
- (c) State one limitation. [1]

Solutions

2.1 a linear function.

2.2 a rational function.

2.3 quadratic.

3.1 A.

3.2 B.

3.3 (a) linear. (b) that the constant yearly increase continues unchanged. (c) extrapolating far beyond the 5 years of data may be unreliable.