

2.3 Exponential Functions

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

KEY WORDS growth 增长 • initial value 初始值 • decay 衰减 • base 底数
• exponential function 指数函数

Objective

Build the skills to answer exam questions on **exponential functions**.

You must be able to:

- read the **initial value** 初始值 a and **base** 底数 b from $f(x) = a \cdot b^x$
- decide whether the function models **growth** 增长 or **decay** 衰减

1 Worked examples

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

■ Exponential form

$f(x) = a \cdot b^x$ with base $b > 0$, $b \neq 1$.

- a is the **initial value** — the output at $x = 0$;
- $b > 1$ gives **growth**; $0 < b < 1$ gives **decay**.

■ Example

$f(x) = 3 \cdot 2^x$: $f(0) = 3$, $f(2) = 3 \cdot 4 = 12$; growth since $b = 2 > 1$.

2 Practice

2.1 In $f(x) = a \cdot b^x$, state what a represents. [1]

2.2 State the condition on b for growth. [1]

2.3 For $f(x) = 3 \cdot 2^x$, find $f(0)$ and $f(2)$. [2]

3 Exam-style questions

3.1 In $f(x) = a \cdot b^x$, the value a is the [1]

- **A** base
- **B** initial value
- **C** exponent
- **D** asymptote

3.2 The function $f(x) = 5 \cdot (0.5)^x$ represents [1]

- **A** growth
- **B** decay
- **C** linear change
- **D** a constant

3.3 $f(x) = 4 \cdot 3^x$.

(a) State $f(0)$. [1]

(b) State $f(1)$. [1]

(c) Is it growth or decay? [1]

Solutions

2.1 the initial value (the output at $x = 0$).

2.2 $b > 1$.

2.3 $f(0) = 3$; $f(2) = 3 \cdot 2^2 = 12$.

3.1 B.

3.2 B.

3.3 (a) 4. (b) 12. (c) growth.