

2.5 Exponential Function Context and Data Modeling

Name: _____ Class: _____ Date: _____

Total: 9 marks

Objective

Build the skills to answer exam questions on **exponential function context and data modeling**.

You must be able to:

- turn a **percentage** 百分比 growth or decay rate into a **growth/decay factor** 增长/衰减因子 b
- write an exponential model $f(x) = a \cdot b^x$ from a context

1 Worked examples

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

■ Growth and decay factors

A quantity starting at a and changing by $p\%$ per period has factor

$$b = 1 + \frac{p}{100} \text{ (growth)} \quad \text{or} \quad b = 1 - \frac{p}{100} \text{ (decay)}.$$

■ Example

\$500 growing 4% per year: $f(x) = 500 \cdot (1.04)^x$.

2 Practice

2.1 State the growth factor for 5% growth per year. [1]

2.2 State the decay factor for 20% decay per year. [1]

2.3 Write a model for \$200 growing 10% per year. [2]

3 Exam-style questions

3.1 A quantity grows 3% per year. The growth factor b is [1]

- **A** 0.03
 - **B** 0.97
 - **C** 1.03
 - **D** 3
-

3.2 A quantity decays 15% per year. The factor b is [1]

- **A** 1.15
 - **B** 0.85
 - **C** 0.15
 - **D** -0.15
-

3.3 A colony of 100 bacteria doubles each hour.

- (a) State the initial value. [1]
- (b) State the growth factor. [1]
- (c) Write the model $f(t)$. [1]

4 Go further

- work through the **2.5 Exponential Function Context and Data Modeling** lesson on the **Learn** page;
- read the **Exponential and Logarithmic Functions** section of the AP Precalculus handout on the **Know** page.

Solutions

2.1 1.05.

2.2 0.80.

2.3 $f(x) = 200 \cdot (1.10)^x$.

3.1 C.

3.2 B.

3.3 (a) 100. (b) 2. (c) $f(t) = 100 \cdot 2^t$.