AP PRECALCULUS • EXERCISE SHEET

2.5 Exponential Function Context and Data Modeling

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

KEY WORDS growth/decay factor 增长 • percentage 百分比 • exponential function 指数函数 • initial value 初始值

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 B
C D

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 B
C D

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]