Exercise walk-through

Exponential Function Context and Data Modeling ▪ 2.5

eXercise

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

Method — Growth and decay factors

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

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

Method — Example

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

Practice 2.1 ▪ 1 mark

State the growth factor for 5% growth per year.

Solution 2.1

Method: Growth and decay factors

Worked steps

1.05 B1.

Practice 2.2 ▪ 1 mark

State the decay factor for 20% decay per year.

Solution 2.2

Method: Growth and decay factors

Worked steps

0.80 B1.

Practice 2.3 ▪ 2 marks

Write a model for $\$200$ growing 10% per year.

Solution 2.3

Method: Example

Worked steps

$f(x) = 200 \cdot (1.10)^x$ M1 A1.

Exam-style 3.1 ▪ 1 mark

A quantity grows 3% per year. The growth factor b is

A 0.03

B 0.97

C 1.03

D 3

Solution 3.1

Method: Growth and decay factors

A 0.03

B 0.97

C 1.03 ✓

D 3

Worked steps

C.

Exam-style 3.2 ▪ 1 mark

A quantity decays 15% per year. The factor b is

A 1.15

B 0.85

C 0.15

D -0.15

Solution 3.2

Method: Growth and decay factors

A 1.15

B 0.85 ✓

C 0.15

D -0.15

Worked steps

B.

Exam-style 3.3 ▪ 1 mark

A colony of 100 bacteria doubles each hour.
(a) State the initial value.
(b) State the growth factor.
(c) Write the model $f(t)$.

Solution 3.3

Method: Growth and decay factors

Worked steps

(a) 100 B1. (b) 2 B1. (c) $f(t) = 100 \cdot 2^t$ B1.