AP BIOLOGY • EXERCISE SHEET

8.3 Population Ecology

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

Objective

Build the skills to answer exam questions on **population ecology** —growth models.

You must be able to:

- distinguish **exponential** 指数 from **logistic** 逻辑斯蒂 growth
- explain **carrying capacity** 环境容纳量 K
- read a growth curve

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

■ Exponential growth

With unlimited resources, a population grows **exponentially** —a **J-shaped** curve that keeps steepening. Rare in nature except briefly (e.g. new habitat).

■ Logistic growth

With limited resources, growth **slows** as the population rises, leveling off at the **carrying capacity** K —an **S-shaped** curve.

■ Carrying capacity

K is the **maximum** population the environment can support long-term. Near K, births deaths and growth stops.

■ A worked reading

An S-curve that flattens at 500 individuals has a carrying capacity of 500. Growth is fastest in the middle of the curve, not at the top.

2 Practice

Now apply the methods above.

2.1 What shape is an exponential growth curve? [1]

2.2 What does carrying capacity mean? [1]

2.3 What shape is a logistic growth curve? [1]

3 Exam-style questions

3.1 Logistic growth levels off at the [1]

- **A** origin
- **B** carrying capacity
- **C** exponential phase
- **D** zero point

3.2 A population grows and then levels off at 1200 individuals.

(a) State the carrying capacity. [1]

(b) Explain why growth slows as the population approaches this value. [2]

3.3 Explain the difference between exponential and logistic growth in terms of resources. [2]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **8.3 Population Ecology** lesson on the **Learn** page;
- read the **Population Ecology** section of the AP Biology handout on the **Know** page.

Solutions

2.1 J-shaped.

2.2 The maximum population the environment can support long-term.

2.3 S-shaped.

3.1 B —the carrying capacity.

3.2 (a) 1200. (b) As the population grows, resources (food, space) become limited and competition rises, so births fall and deaths rise, slowing growth toward K.

3.3 Exponential growth assumes unlimited resources, so it keeps accelerating; logistic growth accounts for limited resources, so it slows and levels off at the carrying capacity.