

8.4 Effect of Density on Populations

Name: _____ Class: _____ Date: _____

Total: 9 marks

Objective

Build the skills to answer exam questions on **density-dependent** and **density-independent** factors.

You must be able to:

- distinguish **density-dependent** 密度制约 from **density-independent** 非密度制约 factors
- give examples of each
- predict which limits a population

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.

■ Density-dependent factors

These have a **stronger effect** as the population gets **denser**: competition for food, disease spread, predation, and waste build-up. They help regulate the population toward carrying capacity.

■ Density-independent factors

These affect the population **regardless** of its size: weather, natural disasters (fire, flood), and temperature. A storm kills the same fraction whether the population is large or small.

■ A worked identification

Disease spreading faster in a crowded population = **density-dependent**. A drought killing many plants regardless of number = **density-independent**.

■ Why the distinction matters

Density-dependent factors **regulate** populations around K ; density-independent factors can cause sudden crashes unrelated to density.

2 Practice

Now apply the methods above.

2.1 Give one density-dependent factor. [1]

2.2 Give one density-independent factor. [1]

2.3 Which type of factor helps regulate a population near carrying capacity? [1]

3 Exam-style questions

3.1 A disease that spreads faster in a crowded population is a [1]

- **A** density-independent factor
- **B** density-dependent factor
- **C** carrying capacity
- **D** producer

3.2 A sudden flood kills many organisms in a population.

(a) Classify this factor. [1]

(b) Explain why its effect does not depend on population density. [2]

3.3 Explain how density-dependent factors help keep a population near its carrying capacity. [2]

4 Go further

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

- work through the **8.4 Effect of Density on Populations** lesson on the **Learn** page;
- read the **Effect of Density on Populations** section of the AP Biology handout on the **Know** page.

Solutions

2.1 Any one: competition, disease, predation, waste build-up.

2.2 Any one: weather, natural disaster, temperature.

2.3 Density-dependent factors.

3.1 B —a density-dependent factor.

3.2 (a) Density-independent. (b) A flood affects the same proportion of organisms whether the population is large or small —its effect does not change with density.

3.3 As density rises, competition, disease, and predation increase, raising deaths and lowering births; this pushes the population back down toward the carrying capacity.