

## 3.4 Carrying Capacity

---

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 9 marks

**KEY WORDS** carrying capacity 环境容纳量 • die-off 骤减 • overshoot 超载  
• limiting factors 限制因素

### Objective

---

Build the skills to answer exam questions on **carrying capacity**.

You must be able to:

- define **carrying capacity** 环境容纳量  $K$
- explain **overshoot** 超载 and **die-off** 骤减
- describe **limiting factors** 限制因素

### 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.

#### ■ Carrying capacity

**Carrying capacity** ( $K$ ) is the maximum population an environment can support long-term, set by **limiting factors** (food, water, space, disease).

#### ■ Overshoot and die-off

If a population grows **past**  $K$  (an **overshoot**), resources are used up faster than they renew, causing a **die-off** (crash) back below  $K$ .

#### ■ Limiting factors

**Density-dependent** factors (competition, disease) intensify as the population grows and pull it toward  $K$ . **Density-independent** factors (weather) can also cap it.

#### ■ A worked scenario

Deer multiply past the food supply (overshoot); winter food runs out and many starve (die-off), dropping the population below carrying capacity.

## 2 Practice

---

Now apply the methods above.

**2.1** Define carrying capacity. [1]

---

**2.2** What is an overshoot? [1]

---

**2.3** Name one limiting factor. [1]

---

## 3 Exam-style questions

---

**3.1** When a population exceeds carrying capacity, the likely result is a [1]

|   |   |
|---|---|
| A | B |
| C | D |

**A** continued rise

**B** die-off (crash)

**C** stable population

**D** new carrying capacity

**3.2** A deer population grows rapidly and exceeds the food supply.

(a) Name what happens to the population next, and why. [2]

(b) State one density-dependent limiting factor. [1]

---

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

---