AP BIOLOGY • EXERCISE SHEET

7.10 Speciation

Name: _____ Class: _____ Date: _____ **Total: 10 marks**

Objective

Build the skills to answer exam questions on **speciation**.

You must be able to:

- define a **species** by the biological species concept
- distinguish **allopatric** 异域 and **sympatric** 同域 speciation
- explain the role of **reproductive isolation** 生殖隔离

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.

What a species is

By the **biological species concept**, a species is a group that can **interbreed and produce fertile offspring**. Two groups that can no longer do so are separate species.

Speciation needs isolation

New species form when populations become **reproductively isolated** —gene flow between them stops —and then diverge until they cannot interbreed.

Allopatric vs sympatric

- **Allopatric** —a **geographic barrier** (mountain, river) separates populations, which diverge.
- **Sympatric** —populations diverge **without** physical separation (e.g. differences in mating time or habitat).

A worked example

A river splits a population; the two sides evolve differently and eventually cannot interbreed —**allopatric** speciation.

2 Practice

Now apply the methods above.

2.1 Define a species (biological species concept). [1]

2.2 What must happen for speciation to occur? [1]

2.3 Which type of speciation involves a geographic barrier? [1]

3 Exam-style questions

3.1 Speciation requires that populations become [1]

- **A** larger
- **B** reproductively isolated
- **C** identical
- **D** extinct

3.2 A mountain range separates one population into two, which evolve differently.

(a) Name this type of speciation. [1]

(b) Explain how two species can form from one. [3]

3.3 Explain how sympatric speciation can occur without a physical barrier. [2]

4 Go further

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

- work through the **7.10 Speciation** lesson on the **Learn** page;
- read the **Speciation** section of the AP Biology handout on the **Know** page.

Solutions

2.1 A group that can interbreed and produce fertile offspring.

2.2 The populations must become reproductively isolated (gene flow stops).

2.3 Allopatric speciation.

3.1 B —reproductively isolated.

3.2 (a) Allopatric speciation. (b) The barrier stops gene flow between the two groups; each accumulates different mutations and adaptations; eventually they diverge so much they can no longer interbreed —two species.

3.3 Populations in the same area can be isolated by differences in mating time, habitat, or behavior, so they stop interbreeding and diverge without a physical barrier.