AP BIOLOGY • EXERCISE SHEET

6.2 DNA Replication

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

Objective

Build the skills to answer exam questions on **DNA replication**.

You must be able to:

- describe **semiconservative** 半保留 replication
- state the roles of **helicase** 解旋酶 and **DNA polymerase** 聚合酶
- explain why each new molecule has one old and one new strand

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.

Semiconservative replication

DNA replication is **semiconservative**: the two strands separate, and each acts as a template for a new strand. Each new DNA molecule has **one old** and **one new** strand.

Key enzymes

- **Helicase** unwinds and separates the two strands.
- **DNA polymerase** adds complementary nucleotides to each template strand, building the new strand.

The steps

1. Helicase unzips the helix. 2. Each strand is a template. 3. DNA polymerase adds matching bases (A–T, C–G). 4. Two identical double helices result.

A worked idea

If one template strand reads 3′-TACG-5′, DNA polymerase builds 5′-ATGC-3′ alongside it —an exact complement.

2 Practice

Now apply the methods above.

2.1 What does ”semiconservative” mean for DNA replication? [1]

2.2 What does helicase do? [1]

2.3 What does DNA polymerase do? [1]

3 Exam-style questions

3.1 After replication, each new DNA molecule contains [1]

- **A** two new strands
- **B** two old strands
- **C** one old and one new strand
- **D** only RNA

3.2 A cell replicates its DNA.

(a) Describe the roles of helicase and DNA polymerase. [2]

(b) A template strand reads 3′-AATGCC-5′. Write the new strand. [2]

3.3 Explain why semiconservative replication ensures the two daughter molecules are identical to the original. [2]

4 Go further

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

- work through the **6.2 DNA Replication** lesson on the **Learn** page;
- read the **DNA Replication** section of the AP Biology handout on the **Know** page.

Solutions

2.1 Each new molecule keeps one original strand and gains one new strand.

2.2 Unwinds and separates the two DNA strands.

2.3 Adds complementary nucleotides to build the new strand.

3.1 C —one old and one new strand.

3.2 (a) Helicase unwinds/separates the strands; DNA polymerase adds complementary bases to each template. (b) 5′-TTACGG-3′.

3.3 Each original strand acts as a template, and complementary base pairing forces the new strand to match exactly, so both daughter molecules are copies of the original.