AP BIOLOGY • EXERCISE SHEET

6.2 DNA Replication

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

KEY WORDS dna polymerase 聚合酶 • helicase 解旋酶 • semiconservative 半保留 • nucleotides 核苷酸 • complementary base pairing 互补配对

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 B
C D

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]