AP BIOLOGY • EXERCISE SHEET

6.1 DNA and RNA Structure

Name: _____ Class: _____ Date: _____ **Total: 11 marks**

Objective

Build the skills to answer exam questions on **DNA and RNA structure**.

You must be able to:

- describe the DNA **double helix** 双螺旋 and **complementary base pairing** 互补配对
- pair the bases (A–T, C–G; A–U in RNA)
- compare DNA and RNA structure

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.

The double helix

DNA is a **double helix** —two strands twisted together, held by hydrogen bonds between paired bases. The strands are **antiparallel** (run in opposite directions).

Base pairing

Bases pair specifically: **A–T** and **C–G** in DNA. This complementary pairing lets each strand act as a template to rebuild the other.

Reading a complementary strand

Given a strand 5′-ATGC-3′, its complement is 3′-TACG-5′ (A with T, C with G). In RNA, A pairs with **U** instead of T.

DNA vs RNA

- **DNA** —double-stranded, deoxyribose, bases A/T/C/G.
- **RNA** —single-stranded, ribose, bases A/U/C/G.

2 Practice

Now apply the methods above.

2.1 Which base pairs with adenine in DNA? [1]

2.2 Write the complementary DNA strand for 5′-AATGCC-3′. [2]

2.3 Which base replaces thymine in RNA? [1]

3 Exam-style questions

3.1 In DNA, cytosine pairs with [1]

- **A** adenine
- **B** thymine
- **C** guanine
- **D** uracil

3.2 A DNA strand reads 3′-TACGGA-5′.

(a) Write the complementary DNA strand. [2]

(b) Write the RNA sequence transcribed from the original strand. [2]

3.3 Explain how complementary base pairing allows DNA to be copied accurately. [2]

4 Go further

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

- work through the **6.1 DNA and RNA Structure** lesson on the **Learn** page;
- read the **DNA and RNA Structure** section of the AP Biology handout on the **Know** page.

Solutions

2.1 Thymine.

2.2 3′-TTACGG-5′.

2.3 Uracil.

3.1 C —guanine.

3.2 (a) 5′-ATGCCT-3′. (b) RNA from 3′-TACGGA-5′: 5′-AUGCCU-3′.

3.3 Each base pairs only with its complement (A–T, C–G), so each strand acts as a template that specifies the exact sequence of the new strand.