

Exercise walk-through

DNA and RNA Structure ■ 6.1

eXercise

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

Method — 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).

Method — 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.

Method — 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.

Method — DNA vs RNA

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

Practice 2.1 ■ 1 mark

Which base pairs with adenine in DNA?

Solution 2.1

Worked steps

Thymine **B1**.

Practice 2.2 ■ 2 marks

Write the complementary DNA strand for 5'-AATGCC-3'.

Solution 2.2

Worked steps

3'-TTACGG-5' M1 A1.

Practice 2.3 ■ 1 mark

Which base replaces thymine in RNA?

Solution 2.3

Worked steps

Uracil **B1**.

Exam-style 3.1 ■ 1 mark

In DNA, cytosine pairs with

A adenine

B thymine

C guanine

D uracil

Solution 3.1

A adenine

B thymine

C guanine



D uracil

Worked steps

C — guanine.

Exam-style 3.2 ■ 2 marks

A DNA strand reads 3'-TACGGA-5'.

- (a) Write the complementary DNA strand.
- (b) Write the RNA sequence transcribed from the original strand.

Solution 3.2

Worked steps

(a) 5'-ATGCCT-3' M1 A1. (b) RNA from 3'-TACGGA-5': 5'-AUGCCU-3' M1 A1.

Exam-style 3.3 ■ 2 marks

Explain how complementary base pairing allows DNA to be copied accurately.

Solution 3.3

Method: Base pairing

Worked steps

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 **M1** **A1**.