Exercise walk-through

Nucleic Acids ▪ 1.6

eXercise

You must be able to

- describe **nucleotides** 核苷酸 (sugar, phosphate, nitrogen base)
- compare DNA and RNA
- explain that the base sequence stores information

Method — The nucleotide monomer

Nucleic acids (DNA and RNA) are polymers of **nucleotides**. Each nucleotide has three parts: a **sugar**, a **phosphate** group, and a **nitrogen base**.

Method — DNA vs RNA

- **DNA** — double-stranded, sugar deoxyribose, bases A, T, C, G; stores genetic information.
- **RNA** — single-stranded, sugar ribose, bases A, U, C, G; carries and helps express information.

Method — Information in the sequence

The **order of bases** along the strand encodes the genetic instructions — like letters spelling out a message. Different sequences mean different genes.

Method — Directionality and pairing

DNA strands run antiparallel and pair by complementary bases (A–T, C–G), the basis of accurate copying (replication) and reading.

Practice 2.1 ▪ 3 marks

Name the three parts of a nucleotide.

Solution 2.1

Method: The nucleotide monomer

Worked steps

A sugar, a phosphate group, and a nitrogen base B1 B1 B1.

Practice 2.2 ▪ 1 mark

State one difference between DNA and RNA.

Solution 2.2

Worked steps

Any one: DNA is double-stranded / RNA single-stranded; DNA has deoxyribose / RNA has ribose; DNA has thymine / RNA has uracil B1.

Practice 2.3 ▪ 1 mark

What part of the nucleotide sequence stores genetic information?

Solution 2.3

Worked steps

The sequence of bases B1.

Exam-style 3.1 ▪ 1 mark

The genetic information in DNA is stored in its

A sugar type

B phosphate groups

C sequence of bases

D double helix width

Solution 3.1

A sugar type

B phosphate groups

C sequence of bases ✓

D double helix width

Worked steps

C — the sequence of bases.

Exam-style 3.2 ▪ 2 marks

Compare DNA and RNA.
(a) State the number of strands and the sugar in each.
(b) State which base is found in RNA but not DNA.

Solution 3.2

Method: The nucleotide monomer

Worked steps

(a) DNA: double-stranded, deoxyribose; RNA: single-stranded, ribose M1 A1. (b) Uracil B1.

Exam-style 3.3 ▪ 2 marks

Explain how the same four bases can encode a huge number of different genes.

Solution 3.3

Method: Information in the sequence

Worked steps

The bases can be arranged in any order along a long strand, and the number of possible sequences grows enormously with length, so a vast number of distinct genes is possible M1 A1.