AP BIOLOGY • EXERCISE SHEET

1.6 Nucleic Acids

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

Objective

Build the skills to answer exam questions on **nucleic acids**.

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

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 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**.

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.

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.

Directionality and pairing

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

2 Practice

Now apply the methods above.

2.1 Name the three parts of a nucleotide. [3]

2.2 State one difference between DNA and RNA. [1]

2.3 What part of the nucleotide sequence stores genetic information? [1]

3 Exam-style questions

3.1 The genetic information in DNA is stored in its [1]

- **A** sugar type
- **B** phosphate groups
- **C** sequence of bases
- **D** double helix width

3.2 Compare DNA and RNA.

(a) State the number of strands and the sugar in each. [2]

(b) State which base is found in RNA but not DNA. [1]

3.3 Explain how the same four bases can encode a huge number of different genes. [2]

4 Go further

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

- work through the **1.6 Nucleic Acids** lesson on the **Learn** page;
- read the **Nucleic Acids** section of the AP Biology handout on the **Know** page.

Solutions

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

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

2.3 The sequence of bases.

3.1 C —the sequence of bases.

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

3.3 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.