

6 Nucleic acids – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)		
DNA	_____	_____	_____
Nucleic acids	_____	_____	_____
nucleotides	_____	_____	_____
phosphate	_____	_____	_____
sugar	_____	_____	_____
base	_____	_____	_____
purines	_____	_____	_____
pyrimidines	_____	_____	_____
double helix	_____	_____	_____
deoxyribose	_____	_____	_____
complementary base pairing	_____	_____	_____
hydrogen bonds	_____	_____	_____
antiparallel	_____	_____	_____
Replication	_____	_____	_____
semi-conservative	_____	_____	_____

DNA polymerase

Recall

At IGCSE you met **DNA** as the molecule in the nucleus that carries the genetic information. Now we look at what it is made of and how it is copied.

- DNA is a very long molecule built from small repeating units.
- It can be **copied** exactly, which is how cells pass on their information.

Nothing here is harder than IGCSE – it just adds detail and the right words.

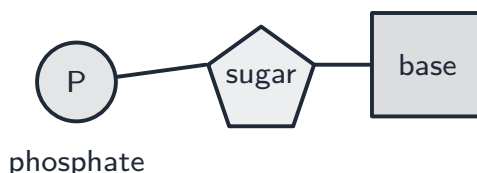
New ideas

Read these first, then do the Practice.

■ 1 Nucleotides

Nucleic acids (DNA and RNA) are polymers of **nucleotides**. Each nucleotide has three parts:

- a **phosphate** group,
- a 5-carbon **sugar**,
- a nitrogen-containing **base**.



There are five bases in two groups: **purines** (a double ring – adenine, guanine) and **pyrimidines** (a single ring – cytosine, thymine, uracil).

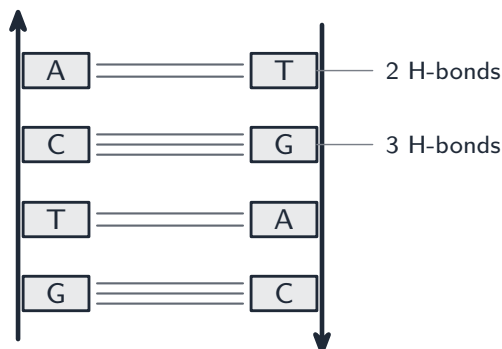
■ 2 The DNA double helix

A DNA molecule is two strands twisted into a **double helix**. Each strand has a backbone of alternating sugar (**deoxyribose**) and phosphate.

The two strands are held together by **complementary base pairing**:

- A pairs with T (two **hydrogen bonds**).
- C pairs with G (three hydrogen bonds).

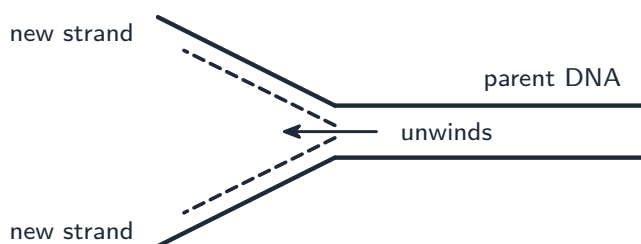
The strands run in opposite directions – they are **antiparallel** .



■ 3 DNA replication

Replication (copying) is **semi-conservative** : each new molecule keeps **one old strand and one new strand**.

1. the helix unwinds and the hydrogen bonds break, so the strands separate.
2. each old strand is a template; free nucleotides pair with the exposed bases.
3. the enzyme **DNA polymerase** joins the new nucleotides into a strand.



Watch out: A pairs with T (two hydrogen bonds), C pairs with G (three). The strands are *antiparallel*. Replication is *semi-conservative* – each new molecule keeps *one* old strand and one new strand.

Practice

Try these in order.

6.1 Name the three parts of a nucleotide.

[3]

6.2 In DNA, which base pairs with (a) adenine, (b) cytosine?

[2]

6.3 A C–G base pair is held by three hydrogen bonds; an A–T pair by two. Which pair is harder to separate? [1]

6.4 What is meant by saying the two DNA strands are *antiparallel*? [1]

6.5 Explain why DNA replication is described as *semi-conservative*. [2]

6.6 Name the enzyme that joins new nucleotides together during replication. [1]

6.7 Challenge. One strand of DNA reads A–T–G–C–C. Write the base sequence of the complementary strand. [2]
