6 Nucleic acids – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
DNA	脱氧核糖核酸			
Nucleic acids	核酸			
nucleotides	核苷酸			
phosphate	磷酸			
sugar	糖			
base	碱基			
purines	嘌呤			
pyrimidines	嘧啶			
double helix	双螺旋			
deoxyribose	脱氧核糖			
complementary base pairing	碱基互补配对			
hydrogen bonds	氢键			
antiparallel	反平行			
Replication	复制			
semi-conservative	半保留			

English	中文	Write it 3 times (English)		
DNA polymerase	聚合酶			

Recall

At IGCSE you met **DNA** 脱氧核糖核酸 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.

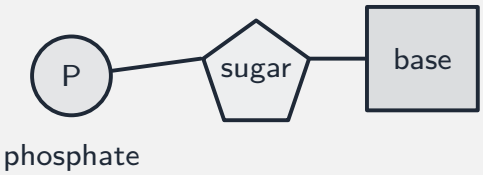
New ideas

Read these first, then do the Practice.

1 Nucleotides

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

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



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

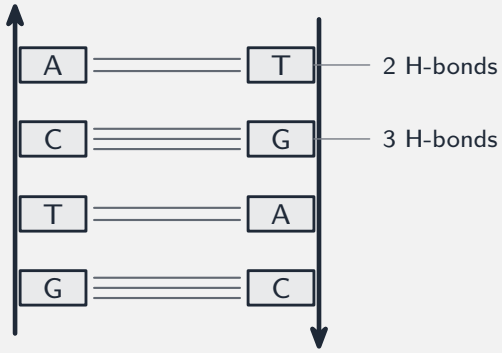
2 The DNA double helix

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

The two strands are held together by **complementary base pairing** 碱基互补配对:

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

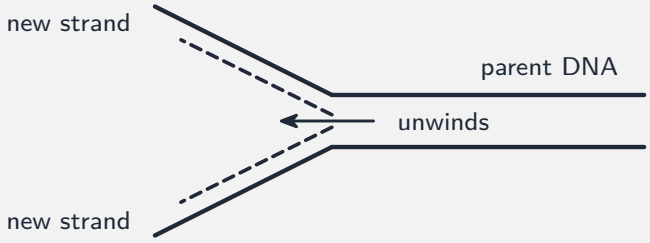
The strands run in opposite directions —they are **antiparallel** 反平行.



3 DNA replication

Replication 复制 (copying) is **semi-conservative** 半保留: 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** 聚合酶 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]