

5 Chromosomes and mitosis – 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)		
chromosomes	染色体	_____	_____	_____
genes	基因	_____	_____	_____
DNA	脱氧核糖 核酸	_____	_____	_____
chromosome	染色体	_____	_____	_____
histones	组蛋白	_____	_____	_____
nucleus	细胞核	_____	_____	_____
replication	复制	_____	_____	_____
sister chromatids	姐妹染色 单体	_____	_____	_____
centromere	着丝粒	_____	_____	_____
telomeres	端粒	_____	_____	_____
cell cycle	细胞周期	_____	_____	_____
interphase	间期	_____	_____	_____
mitosis	有丝分裂	_____	_____	_____
cytokinesis	胞质分裂	_____	_____	_____
stem cell	干细胞	_____	_____	_____

English	中文	Write it 3 times (English)
differentiate	分化	_____

Recall

At IGCSE you learned that **chromosomes** 染色体 in the nucleus carry the **genes** 基因, and that cells divide to make new cells.

- **DNA** 脱氧核糖核酸 is the molecule that stores the genetic information.
- A cell copies its DNA before it divides.

Nothing here is harder than IGCSE — it just adds the right words and a clearer picture.

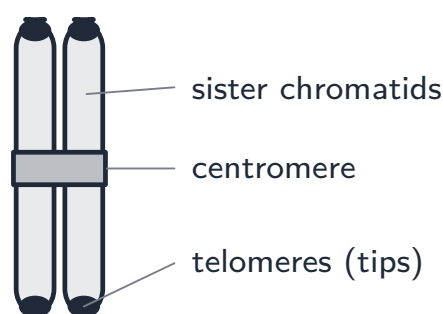
New ideas

Read these first, then do the Practice.

■ 1 The structure of a chromosome

A **chromosome** 染色体 is one long molecule of DNA wound tightly around proteins called **histones** 组蛋白. Winding it up lets a huge length fit inside the **nucleus** 细胞核.

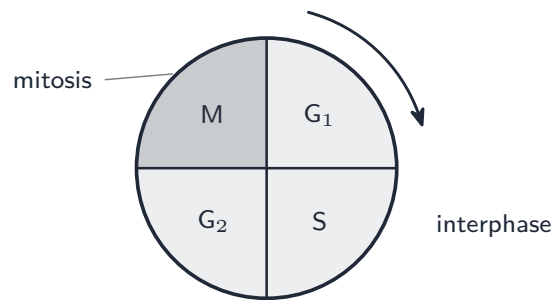
Before a cell divides, its DNA is copied (**replication** 复制). Each chromosome is then two identical copies — the **sister chromatids** 姐妹染色单体 — joined at the **centromere** 着丝粒. The tips are capped by **telomeres** 端粒.



■ 2 The cell cycle

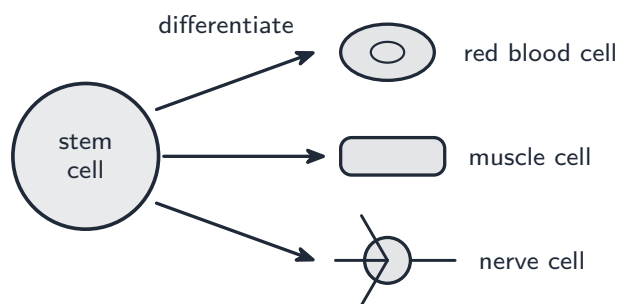
The **cell cycle** 细胞周期 is the full life of a cell from one division to the next:

1. **interphase** 间期 — the longest part: the cell grows, then copies its DNA (replication), then grows again.
2. **mitosis** 有丝分裂 — the nucleus divides into two identical nuclei.
3. **cytokinesis** 胞质分裂 — the rest of the cell splits into two.



■ 3 Telomeres and stem cells

- **telomeres** carry no genes. A little is lost at each division, so the telomeres shorten **instead of** important genes.
- a **stem cell** 干细胞 is an unspecialised cell that keeps dividing and can **differentiate** 分化 (change) into many specialised cell types.



Watch out: after replication a chromosome is *two* sister chromatids joined at the centromere — but it is still *one* chromosome until anaphase separates them. Telomeres are sacrificed at each division so the gene-carrying DNA is not lost.

Practice

Try these in order.

5.1 A chromosome is DNA wound around proteins. Name those proteins. [1]

5.2 After replication a chromosome has two identical parts. Name (a) these parts, (b) the point where they are joined. [2]

5.3 Put the cell cycle in order: mitosis, cytokinesis, interphase. [1]

5.4 In which stage of the cell cycle is the DNA copied? [1]

5.5 Telomeres carry no genes. Explain why this is useful when DNA is copied. [2]

5.6 What is a stem cell? [2]

5.7 Challenge. Most body cells can divide only a limited number of times before they stop. Suggest how the shortening of telomeres could explain this limit. [2]
