

5 Chromosomes and mitosis – Part 2

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)		
sister chromatids	姐妹染色单体	_____	_____	_____
centromere	着丝粒	_____	_____	_____
mitosis	有丝分裂	_____	_____	_____
genetically identical	基因相同	_____	_____	_____
daughter cells	子细胞	_____	_____	_____
multicellular	多细胞	_____	_____	_____
asexual reproduction	无性生殖	_____	_____	_____
prophase	前期	_____	_____	_____
nuclear envelope	核膜	_____	_____	_____
spindle	纺锤体	_____	_____	_____
metaphase	中期	_____	_____	_____
equator	赤道	_____	_____	_____
anaphase	后期	_____	_____	_____
poles	两极	_____	_____	_____
telophase	末期	_____	_____	_____

English	中文	Write it 3 times (English)		
cytokinesis	胞质分裂	_____	_____	_____
tumour	肿瘤	_____	_____	_____

Recall

From Part 1 you know a chromosome becomes two **sister chromatids** 姐妹染色单体 joined at the **centromere** 着丝粒 after copying. Here we watch how they are shared out in **mitosis** 有丝分裂.

- Mitosis makes two new cells that are **genetically identical** 基因相同 to the parent.
- At IGCSE you saw cells dividing in a root tip.

New ideas

Read these first, then do the Practice.

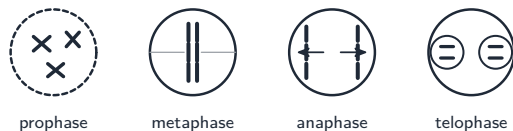
■ 1 Why mitosis matters

Mitosis 有丝分裂 makes two **daughter cells** 子细胞 with exactly the same genes as the parent. It is used for:

- **growth** of a **multicellular** 多细胞 organism (more cells).
- **repair** and **replacement** of damaged cells.
- **asexual reproduction** 无性生殖 (one parent, identical offspring).

■ 2 The four stages of mitosis

Stage	What happens
prophase 前期	chromosomes coil up and become visible; the nuclear envelope 核膜 breaks down; a spindle 纺锤体 forms
metaphase 中期	chromosomes line up along the middle (the equator 赤道)
anaphase 后期	the centromeres split; sister chromatids are pulled to opposite poles 两极
telophase 末期	a nuclear envelope forms around each set, making two nuclei

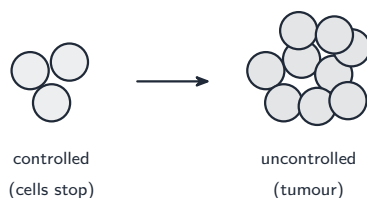


A simple way to remember the order: **P**rophase, **M**etaphase, **A**naphase, **T**elophase (“PMAT”).

■ 3 Cytokinesis and uncontrolled division

After telophase, **cytokinesis** 胞质分裂 splits the rest of the cell into two identical daughter cells.

The cell cycle is normally tightly controlled. If control is lost, a cell may divide again and again to form a lump of cells — a **tumour** 肿瘤.



Watch out: mitosis makes two *genetically identical* daughter cells; the stage order is PMAT (prophase → metaphase → anaphase → telophase). A tumour forms when the *control* of the cell cycle is lost — not from normal mitosis.

Practice

Try these in order.

5.1 State two uses of mitosis in the body. [2]

5.2 The two daughter cells made by mitosis are described as *genetically identical*. What does this mean? [1]

5.3 Name the stage of mitosis in which: (a) chromosomes line up at the equator, (b) sister chromatids are pulled to opposite poles. [2]

5.4 During prophase, two things happen to prepare for division. State them. [2]

5.5 What is the name of the process that splits the rest of the cell after mitosis? [1]

5.6 Explain how a tumour forms. [2]

5.7 **Challenge.** Mitosis normally makes genetically identical cells, yet a tumour keeps growing. Explain why a tumour still uses mitosis but is harmful. [2]
