

5 Chromosomes and mitosis – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)		
sister chromatids	_____	_____	_____
centromere	_____	_____	_____
mitosis	_____	_____	_____
genetically identical	_____	_____	_____
daughter cells	_____	_____	_____
multicellular	_____	_____	_____
asexual reproduction	_____	_____	_____
prophase	_____	_____	_____
nuclear envelope	_____	_____	_____
spindle	_____	_____	_____
metaphase	_____	_____	_____
equator	_____	_____	_____
anaphase	_____	_____	_____
poles	_____	_____	_____
telophase	_____	_____	_____

English	Write it 3 times (English)		
cytokinesis	_____	_____	_____
tumour	_____	_____	_____

Recall

From Part 1 you know a chromosome becomes two **sister chromatids** joined at the **centromere** after copying. Here we watch how they are shared out in **mitosis**.

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

New ideas

Read these first, then do the Practice.

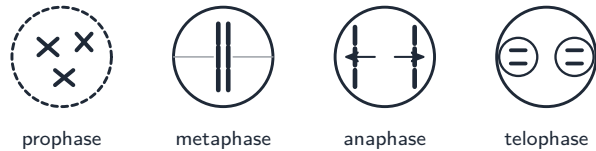
■ 1 Why mitosis matters

Mitosis makes two **daughter cells** with exactly the same genes as the parent. It is used for:

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

■ 2 The four stages of mitosis

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

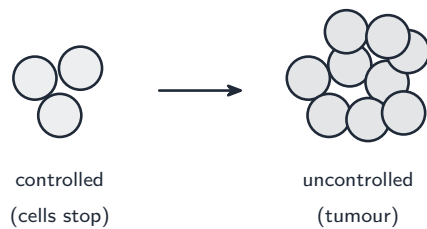


A simple way to remember the order: **P**rophase, **M**etaphase, **A**naphase, **T**elophase (“PMAT”).

■ 3 Cytokinesis and uncontrolled division

After telophase, **cytokinesis** 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**.



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]
