AQA A Level Biology

What is it?

- ✗ 2 year A level course that builds on what you have learnt at GCSE
- ✗ The course contains lots of practicals that you will need to complete to pass part of the course
- ✗ There is an ecology field trip to Wildwood Zoo in year 12

Who is this course aimed at?

1) Students who will achieve at least a grade 6 at GCSE Biology
2) Students who achieve at least a grade 5 in Maths and English GCSE
3) Students who want to have a career that is Biology based e.g. veterinary care, medicine, horticulture, agriculture etc
4) Students who enjoy Biology and want to learn more about the human body, animals, plants and the natural environment

Units

Section 1 – Biological molecules

Section 2 – Cells

Section 3 – Organisms exchange substances with their environment

Section 4 – Genetic information, variation and relationships between organisms

Section 5 – Energy transfer in and between organisms

Section 6 – Organisms respond to changes in their environments

Section 7 – Genetics, populations, evolution and ecosystems

Section 8 – The control of gene expression

Assessments

Paper 1	Paper 2	Paper 3
What's assessed • Any content from topics 1–4, including relevant practical skills	**What's assessed** • Any content from topics 5–8, including relevant practical skills	**What's assessed** • Any content from topics 1–8, including relevant practical skills
Assessed • written exam: 2 hours • 91 marks • 35% of A-level	**Assessed** • written exam: 2 hours • 91 marks • 35% of A-level	**Assessed** • written exam: 2 hours • 78 marks • 30% of A-level
Questions • 76 marks: a mixture of short and long answer questions • 15 marks: extended response questions	**Questions** • 76 marks: a mixture of short and long answer questions • 15 marks: comprehension question	**Questions** • 38 marks: structured questions, including practical techniques • 15 marks: critical analysis of given experimental data • 25 marks: one essay from a choice of two titles

Taster session – Stages of Mitosis!

Lesson Objectives:

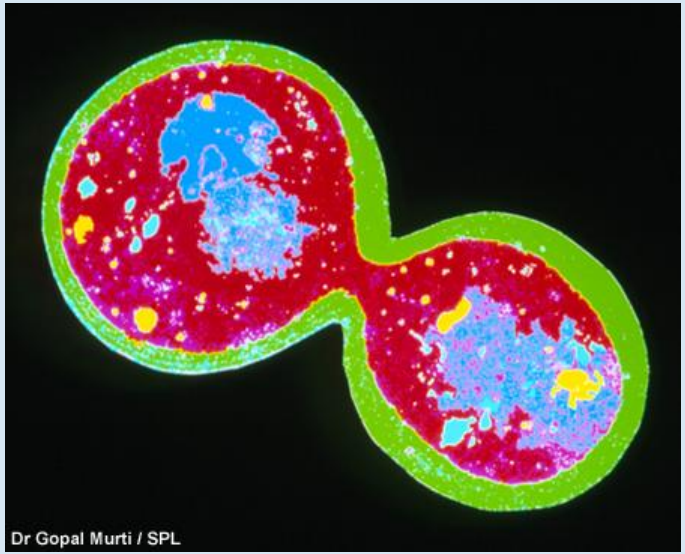
Learners should be able to demonstrate and apply their knowledge and understanding of:

- ✗ The main stages of mitosis
- ✗ The significance of mitosis in life cycles
- ✗ Model stages of mitosis

What is mitosis?

Mitosis specifically refers to the process of nuclear division that occurs before a cell physically divides in two.

During mitosis, the cell's DNA is copied into each of the two daughter cells. In multicellular organisms, mitosis provides new cells for growth and tissue repair.



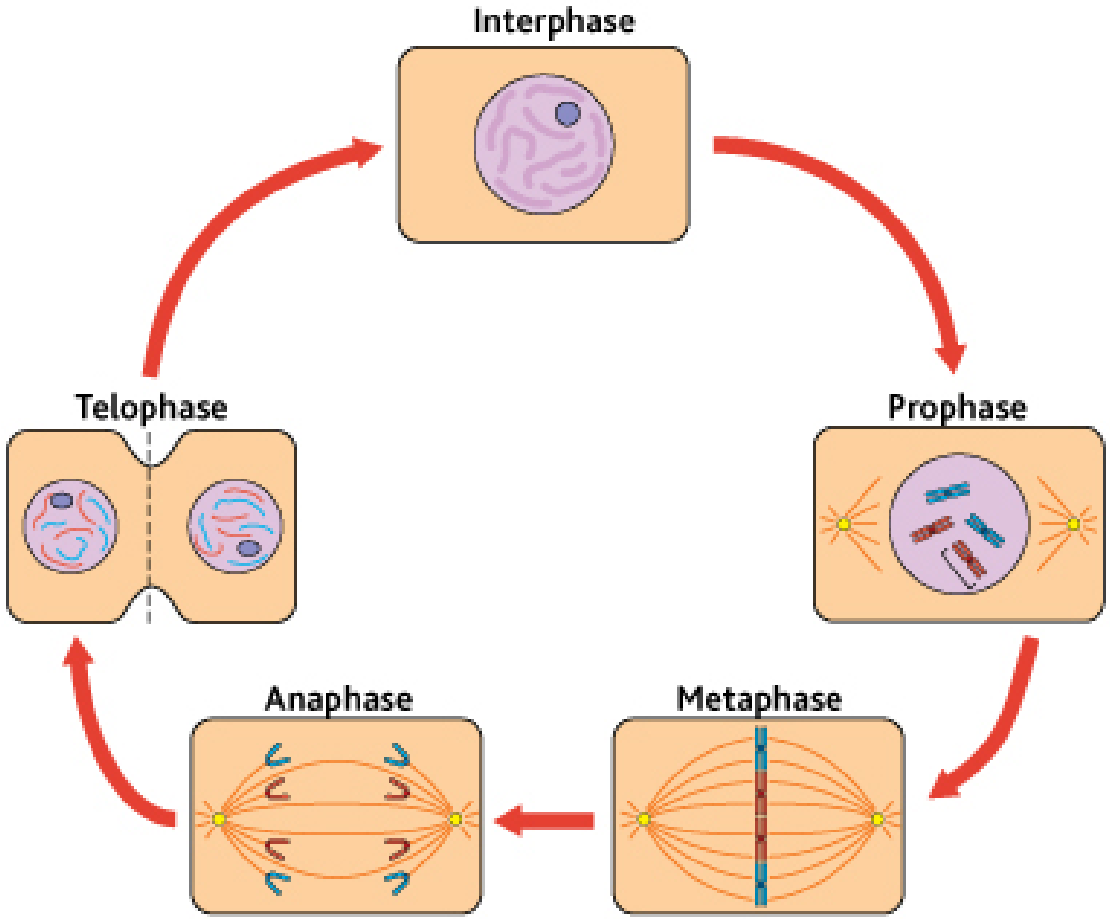
In eukaryotes, it can also be a form of asexual reproduction. This most commonly occurs in single-celled organisms, such as yeast.

Stages of mitosis

Mitosis is a continuous sequence but is divided into four stages:

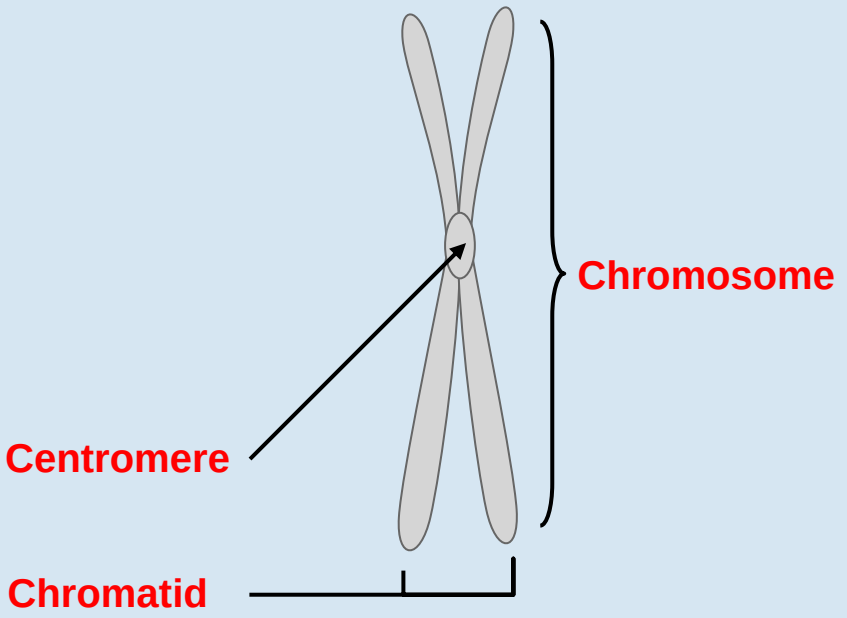
- Prophase
- Metaphase
- Anaphase
- Telophase

Each chromatid contains identical genetic information so each daughter cell also contains identical information.



A note about chromosomes

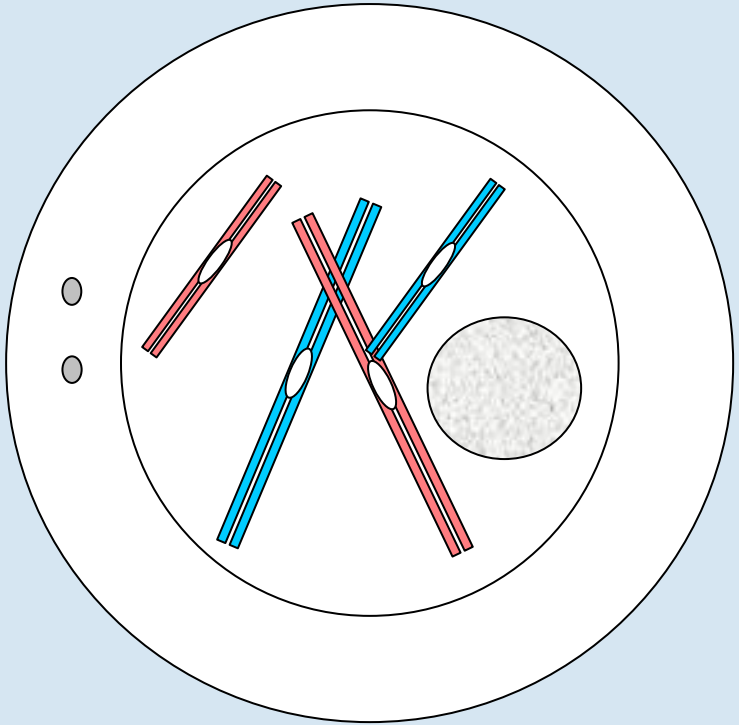
- ✗ Chromosomes are only visible during cell division.
- ✗ Each chromosome consists of two chromatids joined somewhere along its length at the centromere.
- ✗ Genetic information (genes/alleles) carried on each chromatid is identical.



Model Along with Me!

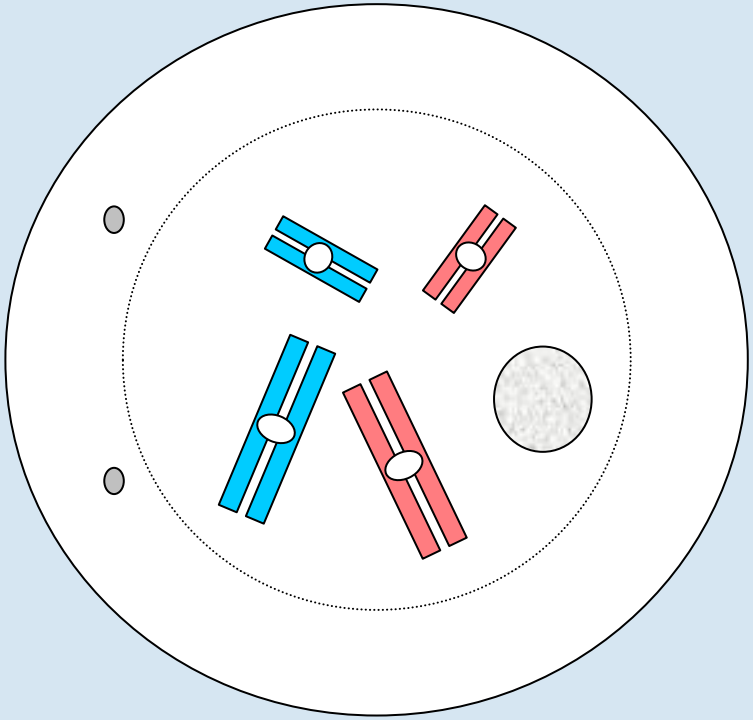
- ✗ You will be given a paper plate, a variety of sweets and some cocktail sticks
- ✗ Attempt to model each stage of mitosis as we encounter them!

Early Prophase



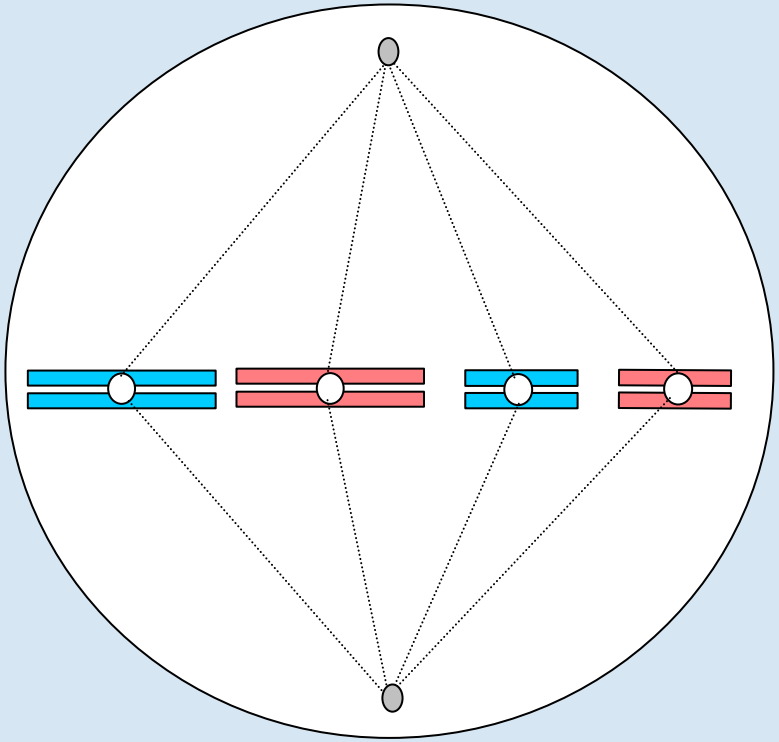
- ✗ During prophase the chromosomes become more distinct
  - ➢ They coil up
  - ➢ Shorten
  - ➢ Thicken
  - ➢ Take up stain more intensely
- ✗ The centriole (small organelles near the nucleus which make spindle fibres) divides
- ✗ Nucleolus (small dense sphere in the nucleus) becomes less prominent

Late Prophase



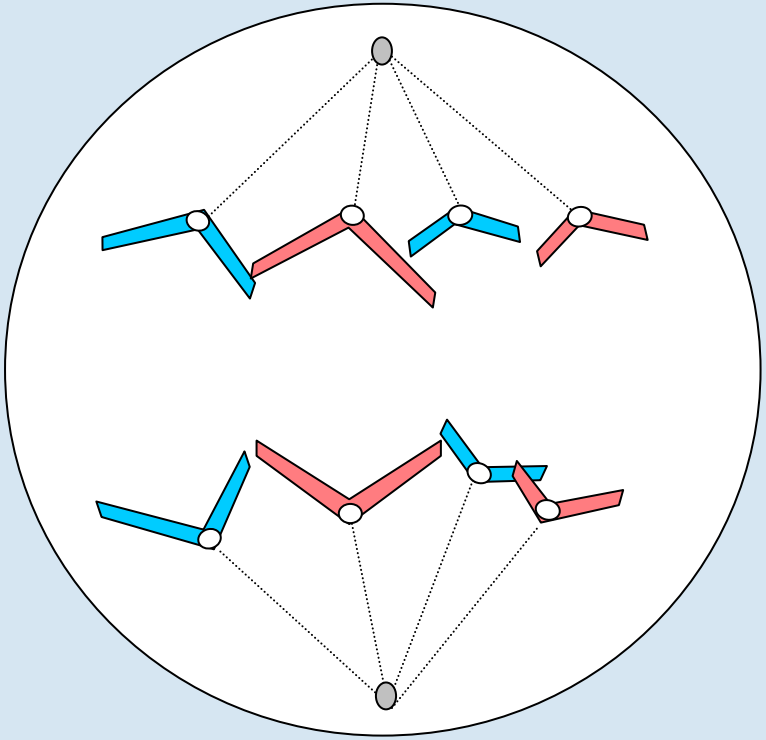
- ✗ The chromosomes have become more distinct and are seen to consist of two chromatids joined by a centromere
- ✗ The centrioles migrate to opposite poles of the cell
- ✗ The nucleolus continues to shrink and disappears
- ✗ The nuclear envelope disintegrates

Metaphase



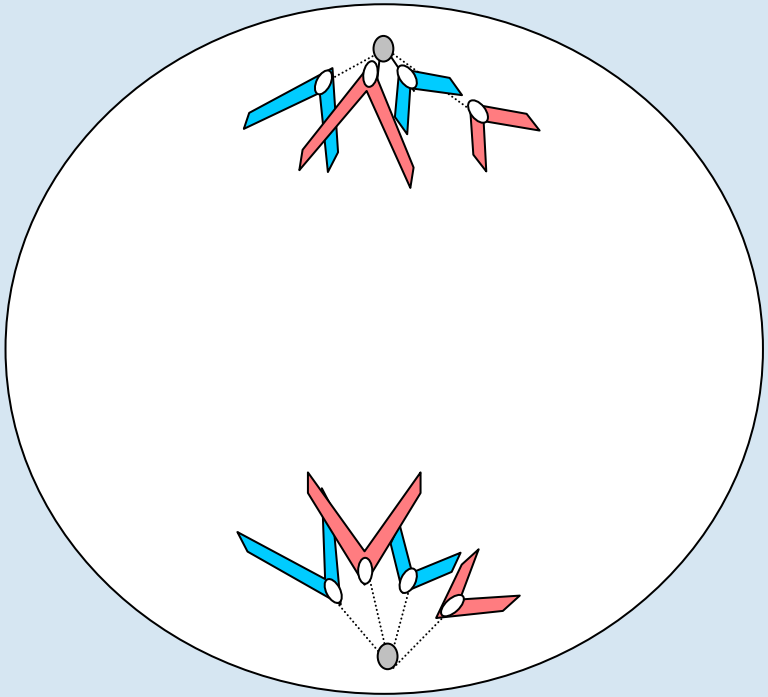
- ✗ Each centriole is at a pole
- ✗ Centrioles grow/produce spindle fibres
- ✗ Spindle fibres attach to the centromere of the chromosomes
- ✗ Each centromere is attached to both poles
- ✗ Chromosomes pulled to the metaphase plate or equator

Anaphase



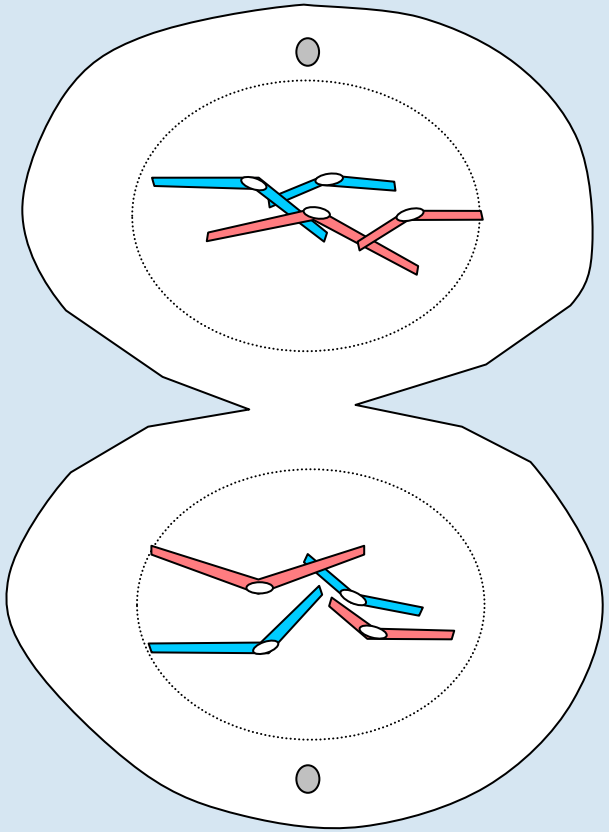
- ✗ Spindle fibres contract
- ✗ The centromere divides
- ✗ Chromatids (daughter chromosomes) are pulled to opposite poles of the cell
- ✗ Pulled centromere first
- ✗ Each half of the cell receives one chromatid from each chromosome

Telophase



- ✗ Chromatids reach the poles of the spindle
- ✗ They begin to uncoil
- ✗ They become less distinct
- ✗ Nuclear envelope starts to reform
- ✗ Chromatids now known as daughter chromosomes

Cytokinesis



- ✗ The cell divides

In animal cells:

- ✗ starts by constriction from the edges of the cell

In plant cells:

- ✗ a cell wall is laid down

Daughter cells have the same chromosome number and genetic makeup as each other and the parent cell – DNA replication precedes mitosis

Mitosis summary:

DNA is copied during Interphase – NOT prophase!

The four stages:

- ✗ **Prophase** – nuclear membrane disintegrates and doubled chromosomes condense, shorten and BEGIN to move to the equator.
- ✗ **Metaphase** – the chromosomes line up along the equator attached to spindles by their centromeres
- ✗ **Anaphase** – the chromatids of each replicated double chromosome are ripped apart at the centromere and pulled towards different 'poles'.
- ✗ **Telophase** – chromosomes (chromatids) arrive at the poles and new nuclear membranes form followed by cytokinesis – actual cytoplasm splitting to form two new IDENTICAL daughter cells

Mitosis summary:

A fun little way I use to remember the cell cycle is:

Pass (Prophase)
Me (Metaphase)
A (Anaphase)
Taco (Telophase)
Chief (Cytokinesis)

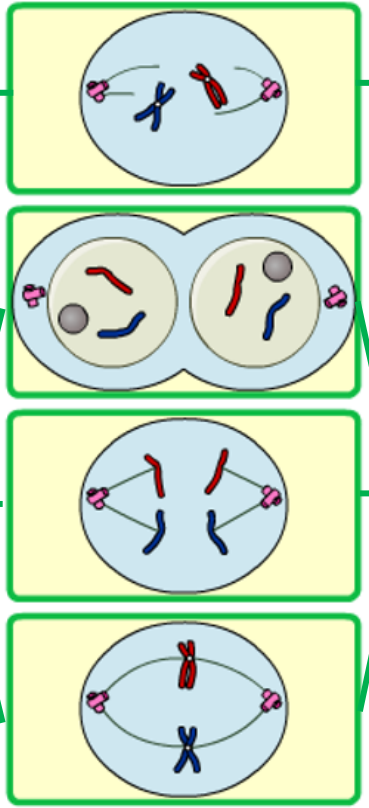
Match each term to its picture and description

prophase

metaphase

anaphase

telophase



chromatin condenses and spindle fibres form

spindle fibres attach and chromosomes align

centromeres cleave and chromatids separate

new nuclear envelope forms and chromosomes unfold

Example A level questions on mitosis:

Explain why we normally see chromosomes as a double structure containing two chromatids

[2 Marks]

Explain why is it essential that DNA replication results in two exact copies of the genetic material

[2 Marks]

Describe the differences between cytokinesis in animal and plant cells and give reasons for these differences

[4 Marks]