

# PiXL6 Gateway

## Essential Knowledge for A Level Biology

A Level Biology builds on your GCSE knowledge.

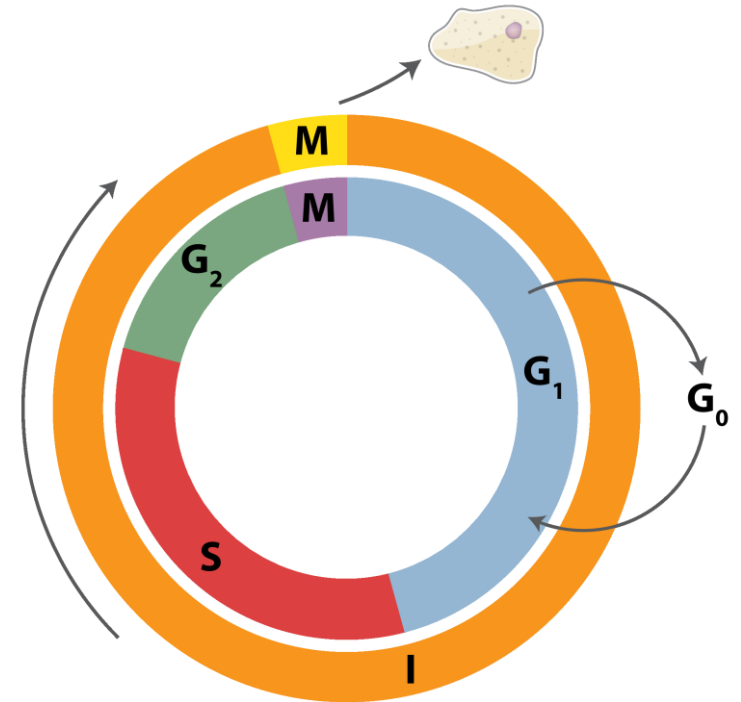
**Everyone** finds the A Level Biology course difficult, but it is incredibly rewarding so stick at it!

This lesson summarises some of the key concepts from GCSE Biology which will help form the foundation of your study of the advanced material in A-Level.



**Cell division and reproduction** are used to explain a wide range of applications in Biology including reproduction, antibiotic resistance and inheritance.

Throughout AS and A2 Biology you will be required to use and apply this knowledge.



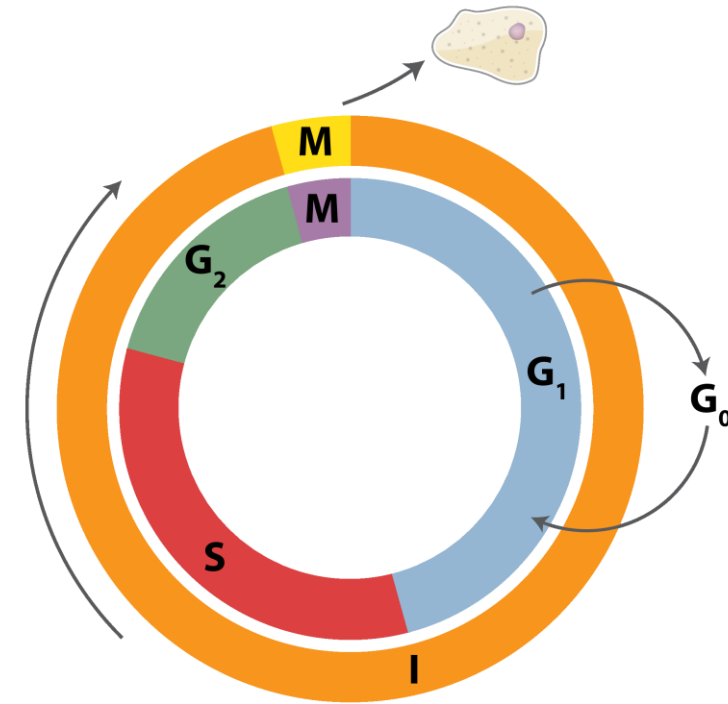
The **cell cycle** describes the stages that all dividing cells pass through.

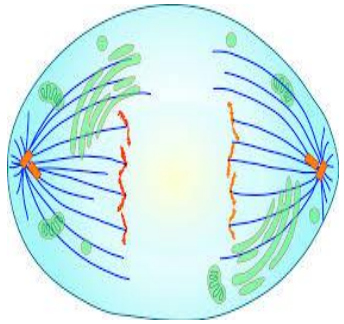
The majority of time is spent in **interphase**. During interphase cells grow, new organelles and cell proteins are made and the DNA of the cell is replicated.

The progression of the cell cycle is controlled by **tumour suppressor** and **oncogenes**. These can be used to explain the development of cancers.

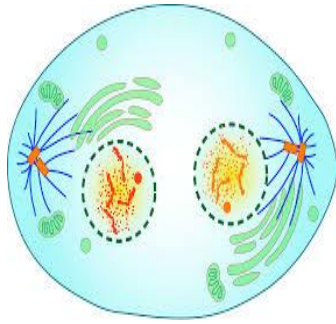
## Task:

Explain what happens to the cell at M on the diagram.

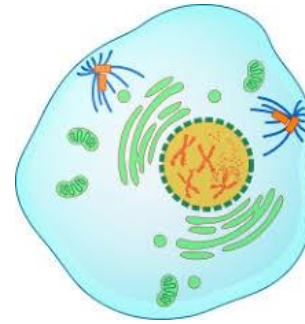




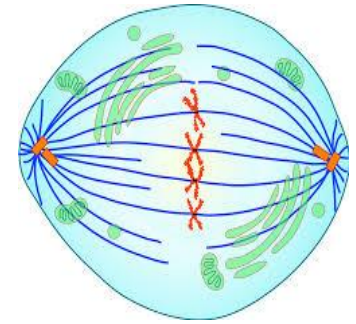
A



B



C



D

You must be able to **identify** and **describe** the appearance of cells undergoing mitosis. Examiners may use diagrams or micrographs to test this knowledge.

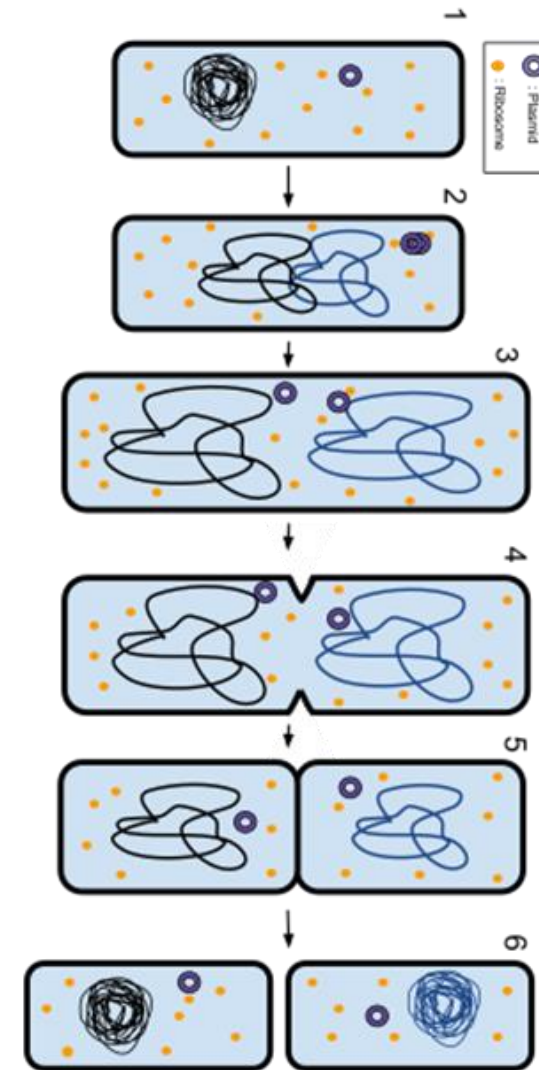
## Task:

Identify the stage that each cell is undergoing and explain why you have made this choice.

**Binary fission** is how bacteria reproduce.

**Task:**

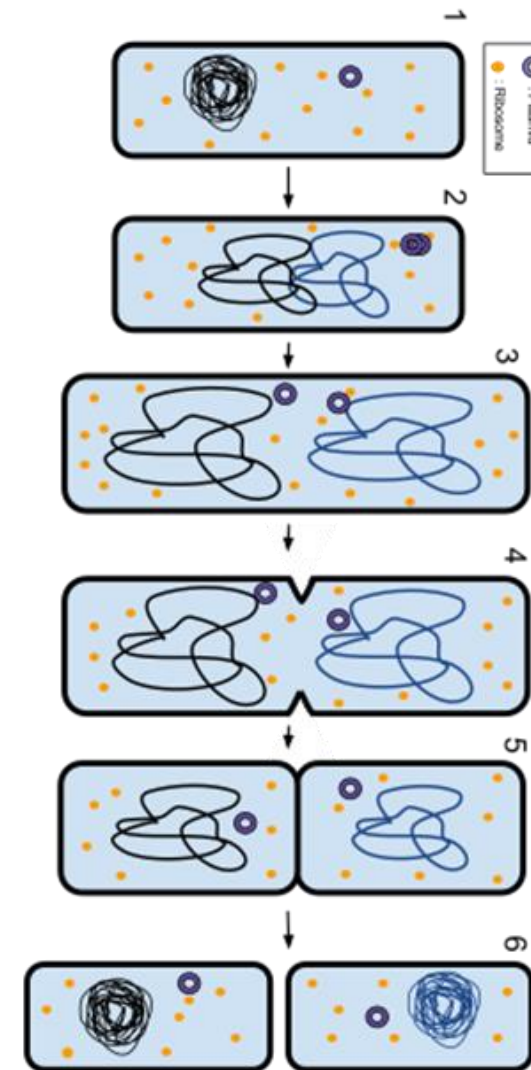
Describe how binary fission is similar and different to meiosis.



The **DNA** and **plasmids** in a prokaryote are **replicated**.

The prokaryote then splits into two new cells. The new cells contain some of the original DNA as well as copies of each of the plasmids.

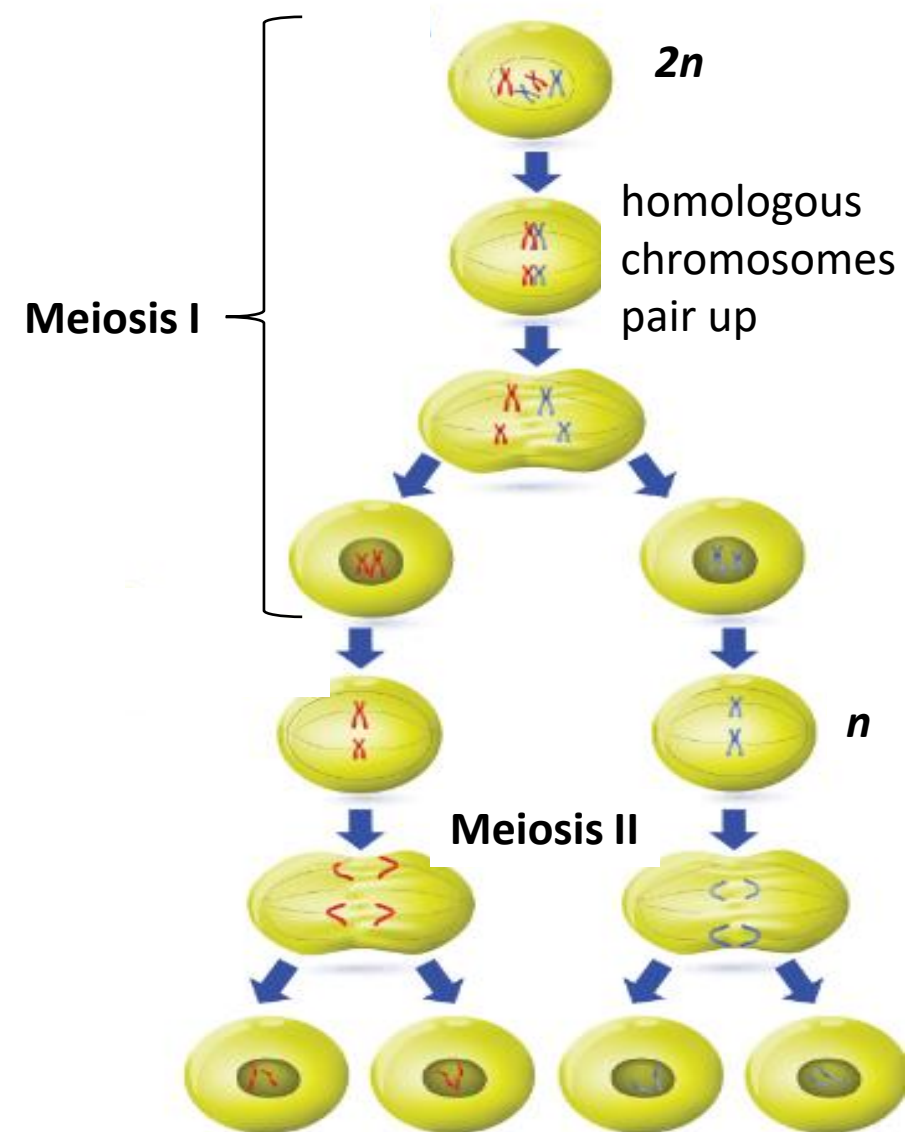
Bacteria can transfer genetic information **vertically** (i.e. between generations) and **horizontally** (i.e. within generations). This greatly enhances their ability to share advantageous alleles and **mutations**.



**Meiosis** is another form of cell division.

**Task:**

Summarise the similarities and differences between mitosis and meiosis.



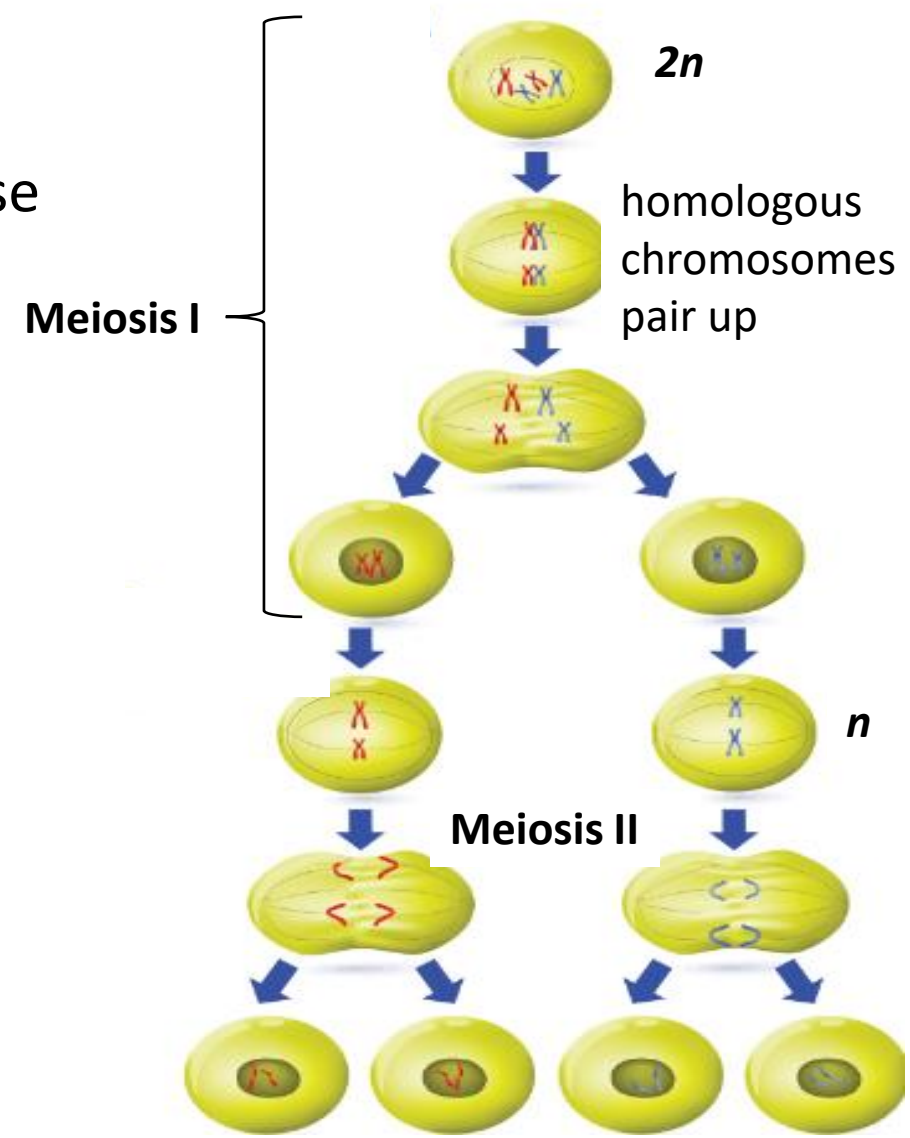


Cells undergoing **meiosis** pass through prophase, metaphase, anaphase and telophase **twice**. Remember to describe both phases as you can be credited twice for the same information!

**Four, genetically unique, daughter cells** are formed that are gametes, e.g. sperm or ova.

These cells are unique due to:

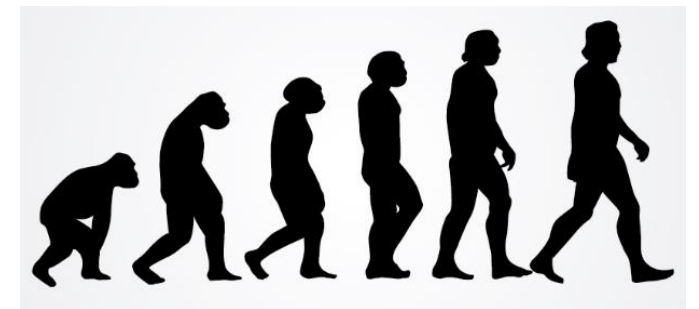
1. **Independent segregation**
2. **Cross over of homologous pairs**
3. **Mutation**



Inheritance builds on your knowledge of this topic from GCSE. It requires a more detailed answer at A Level including some key terms.

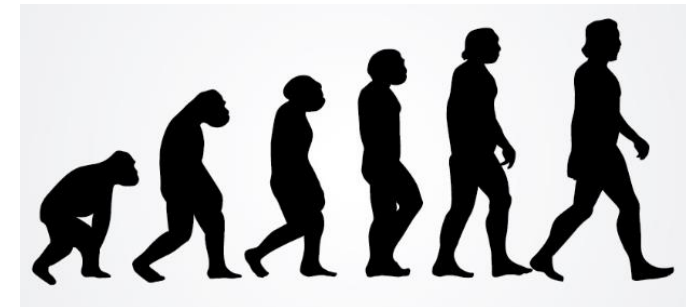
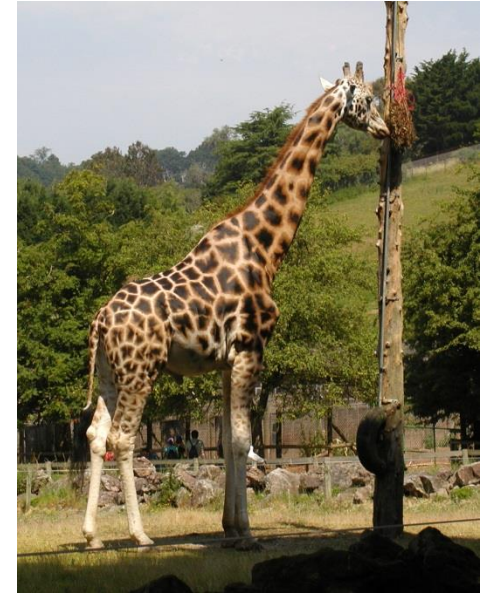
## Task:

Write down the process of evolution by natural selection. (You might want to use an example such as giraffes, antibiotic resistant bacteria, or the peppered moth).



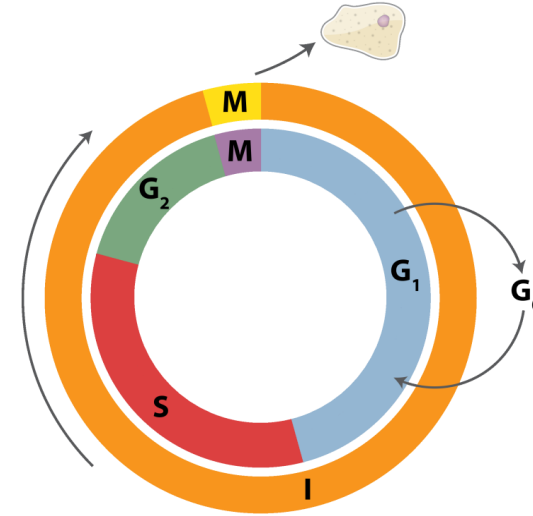
How many of the following points and **key terms** did you include?

- Populations show **genetic diversity**
- **Random mutation** can result in **new alleles** of a gene appearing
- If the new allele is advantageous, this could lead to **increased reproductive success** (i.e. the organism survives, reaches maturity and reproduces)
- The **advantageous allele** is **inherited** by the next generation
- The new allele **increases in frequency** within the population over many generations.
- This leads to species that are **better adapted** to their environment either **anatomically, physiologically** or **behaviourally**.



**Neurons** normally remain in **G<sub>0</sub>** of the **cell cycle** where they do not replicate or divide.

Alzheimer's disease is a disease effecting neurones in the brain. Scientists think that in Alzheimer's, cells incorrectly re-enter the cell cycle but lose the ability to regulate cell death (apoptosis). This results in a build up of proteins that lead to further symptoms of the disease.



1. Use this information to suggest why spinal cord injuries are very difficult to treat.
2. 99% of Alzheimer's disease is not inherited. Use your knowledge of meiosis and the cell cycle to suggest an explanation for this.
3. Suggest what a healthy sample of neurone cells would look like under a light microscope (you may use a sketch if you wish).
4. Suggest how anti-cancer therapies could prove useful in the treatment of Alzheimer's disease.