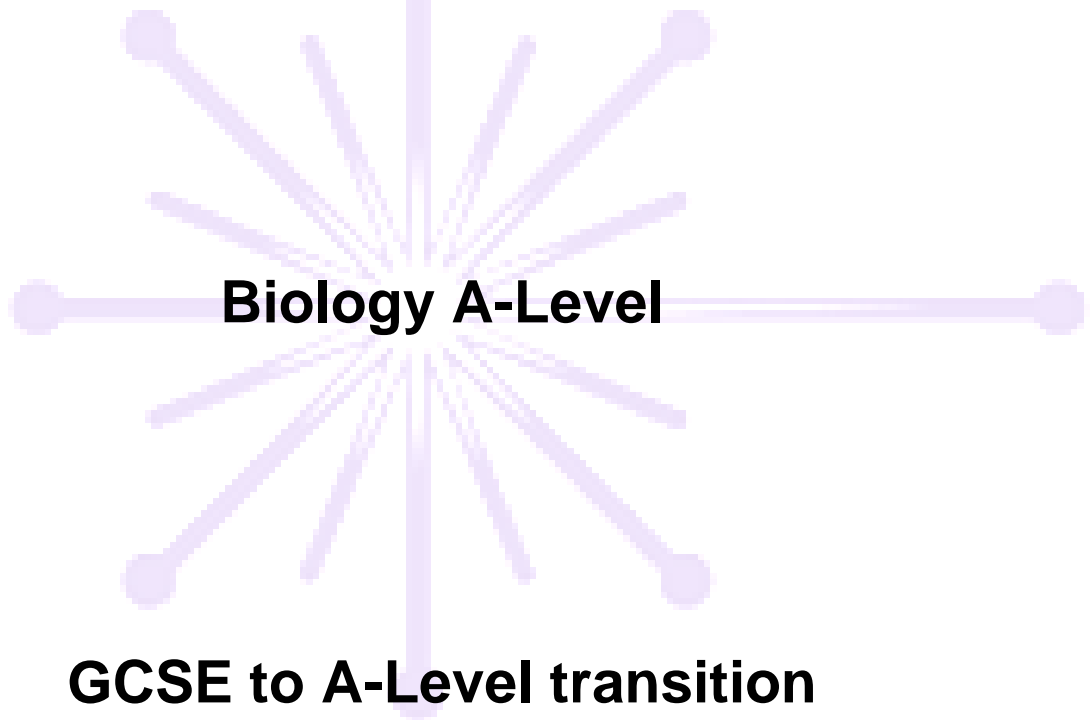


**The Priory Academy LSST**



Welcome to A-Level Biology! We follow the Edexcel B Biology specification and examinations at The Priory Academy LSST. There will be a combination of theory work, core practicals and data analysis/skills work; which is assessed across three examinations at the end of Year 13.

The Year 12 work is split into four sections:

- Biological molecules
- Cells and viruses
- Classification and biodiversity
- Exchange and transport.
- 

Here is a link to the specification:

[https://qualifications.pearson.com/content/dam/pdf/A%20Level/biology-b/2015/specification-and-sample-assessment-materials/9781446930892\\_GCE2015\\_A\\_BioB\\_spec.pdf](https://qualifications.pearson.com/content/dam/pdf/A%20Level/biology-b/2015/specification-and-sample-assessment-materials/9781446930892_GCE2015_A_BioB_spec.pdf)

This pack will support you to effectively transition from Biology GCSE to A-Level.

### **Biological molecules**

#### **GCSE recap:**

1. Describe the structure of a carbohydrate.
  
2. Draw and label the structure of a lipid.
  
  
  
  
  
  
  
  
  
  
3. Explain one similarity and one difference between the two structures.
  
  
  
  
  
  
  
  
  
  
4. Give two functions of lipids.
  
  
  
  
  
  
  
  
  
  
5. Explain 2 differences between an unsaturated fat and a saturated fat.

6. State one function of calcium ions in humans and one function of calcium ions in plants.
  
7. Describe the difference between a hydrolysis and a condensation reaction.
  
8. Explain the tests used to detect the presence of carbohydrates and of proteins.

**Define the following key terms:**

- Hydrophilic
  
- Hydrophobic
  
- Isomer
  
- Catalyst
  
- Optimum

**Read the following passage:**

Proteins are the most complex and varied of the molecules that living organisms are made of and this allows them to have a huge variety of functions. They are **polymers** – long molecules made of repeated small molecules, but the reason they are so varied in structure, shape and function is that they are polymers made up from not just 1 repeated small molecule but any one of 20 **amino acids**, arranged in

any order. In contrast, starch is polymer made of repeated glucose molecules and it has just 1 function, to act as an insoluble store of carbohydrate in plant cells. Each of the 20 amino acids is slightly different, so whilst they are similar enough to join to any neighbouring amino acid in the protein, they have slightly different chemical properties and can make slightly different chemical bonds within the protein. So a long chain of amino acids (a protein) will have hundreds of these chemical bonds holding it in a precise 3 dimensional shape called its **tertiary structure**.

The order of amino acids in the protein is coded by the DNA sequence of a **gene** (the order of A, C, G and T) in the nucleus of the cell. So if a mutation occurs in a gene, a different amino acid will be coded for, a slightly different pattern of chemical bonds occurs in the protein, and the 3 dimensional shape of the protein is slightly different too.

In enzymes, this idea of tertiary structure and 3 dimensional shape is familiar to you. Each type of enzyme has an **active site** that is just the right shape to bind to its **substrate** and catalyse a reaction – the active site is a **complementary** shape to the substrate. This is why the enzyme maltase can digest the sugar called maltose but it can't digest the sugar called lactose.

People with the condition **haemophilia** have problems with their blood clotting process. It is caused by a mutated gene for an enzyme called factor VIII. Factor VIII is involved in converting prothrombin to thrombin to cause blood clotting. The faulty factor VIII enzyme is not able to catalyse this reaction.

You should remember that in the immune response, **antibodies** can attach to just 1 type of **antigen** so antibodies that help give immunity against measles do not work against flu. Antibodies are proteins with a particular order of amino acids and so a precise tertiary structure and 3-dimensional shape. Part of each antibody is called the **antigen binding site** and this has a 3 dimensional shape that is complementary to the shape of the antigen. Each type of antibody has a slightly different order of amino acids and so a slightly different shaped antigen binding site that is complementary in shape to a different antigen.

**Haemoglobin** is a large protein found in red blood cells that allows them to carry oxygen from the alveoli or gills to the other tissues of the body. These tissues use the oxygen for aerobic respiration. Some mammals need haemoglobin that binds very tightly to oxygen – if they live in places where there is not much oxygen in the environment; other mammals need haemoglobin that releases its oxygen more easily – if they have a very high rate of respiration. So the haemoglobin protein of each mammal is slightly different, having a slightly different order of amino acids and so a slightly different tertiary structure. This is what gives the different types of haemoglobin their different properties.

**Answer the following question, using the passage above and your own independent research:**

1. Give the names of 4 different proteins mentioned in the article and briefly explain their function.

- 1.
- 2.
- 3.
- 4.

2. Explain why proteins are described as polymers.

3. Why is it significant that there are 20 different amino acids?

4. What is meant by the 'tertiary structure' of a protein?

5. Why does an enzyme bind to only one substrate and catalyse only one reaction?

6. Using your answer to question 5, why does a mutation to the gene for factor VIII cause non-functional factor VIII to be produced?

7. Explain in terms of protein structure, why antibodies against one type of 'flu' virus can't give immunity to other strains of 'flu' virus.

8. Suggest 2 animals that might need haemoglobin that is especially good at binding to oxygen.

## Cells and viruses

### **GCSE recap:**

1. Name the two groups of organisms which have a cell wall.
2. Describe two similarities and two differences between plant cells and bacterial cells.
3. Explain the function of mitochondrion.
4. Name one place in your body mitosis regularly occurs.
5. Where in the body does meiosis occur?
6. Define the term haploid.
7. Where are certain cells haploid?
8. In flowering plants, pollination is not the same as fertilisation. Explain why.

### **Define the following key terms:**

- Differentiation
- Magnification
- Resolution (microscopy)

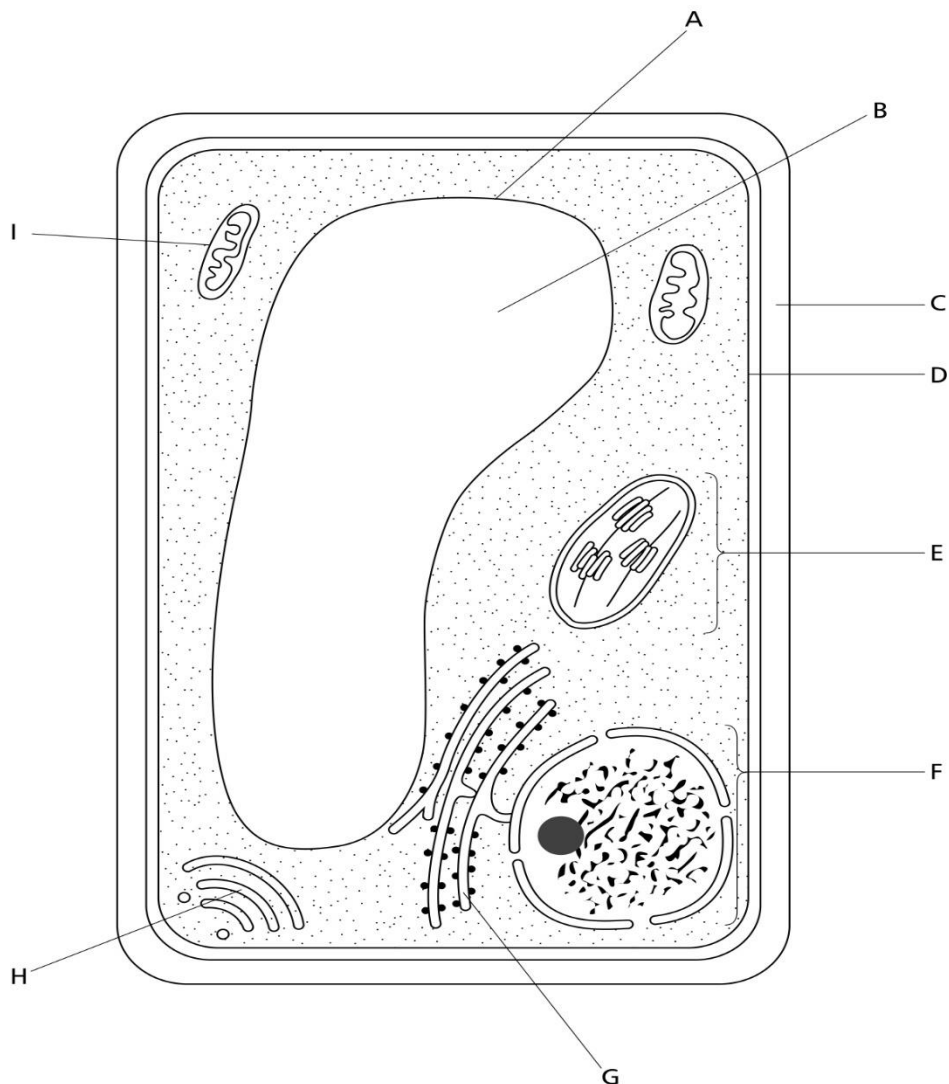
- Artefact (microscopy)
- Allele
- Gametes

**Research the structure and function of the following organelles found in cells:**

<b>Organelle</b>	<b>Structure</b>	<b>Function</b>
<b>Nucleus</b>		
<b>Chloroplasts</b>		
<b>Endoplasmic reticulum</b>		
<b>Plant cell wall</b>		
<b>Centrioles</b>		
<b>Golgi apparatus</b>		

**Exam style question:**

Label structures A-I on the plant cell diagram (9 marks).



**Research the similarities and differences between mitosis and meiosis. The following passage may help you:**

The cell cycle is a **regulated process** in which cells divide to produce two genetically **identical daughter cells** for growth, repair and asexual reproduction. As all the cells produced by mitosis are genetically identical, mitosis does not give rise to genetic variation.

**There are three stages of the cell cycle:**

1. **Mitosis** – prophase, metaphase, anaphase and telophase.
2. **Cytokinesis** – during cytokinesis the **cytoplasm divides**, thus producing two daughter cells.

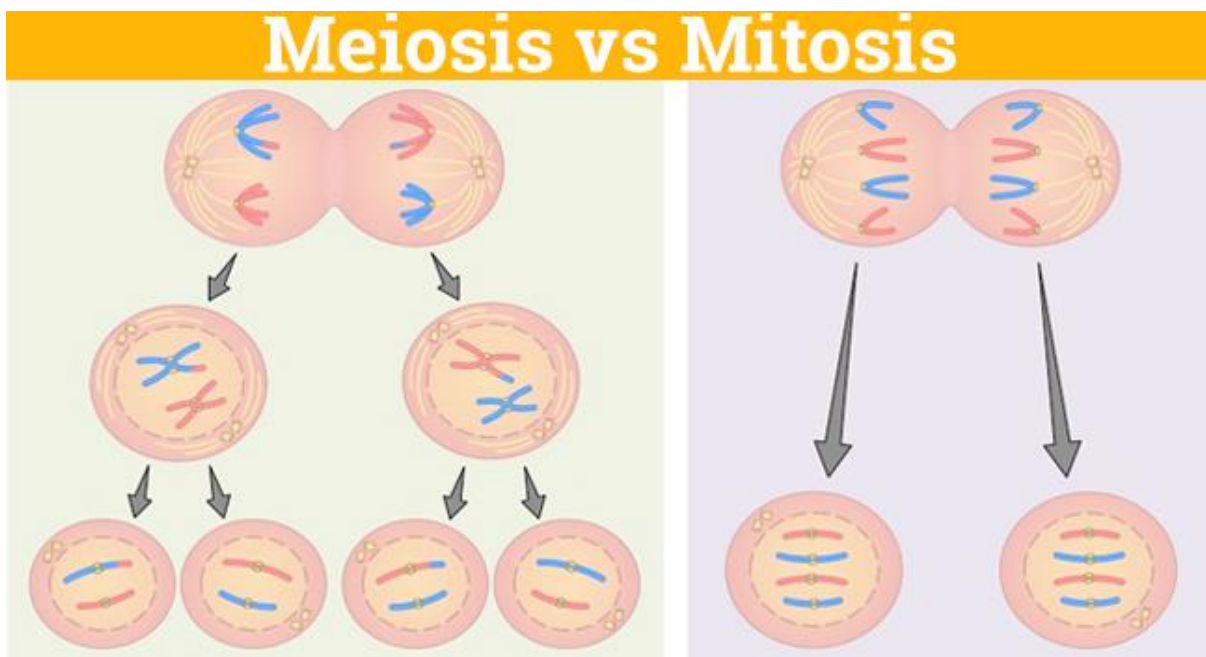


3. **Interphase** – during this stage the cell **grows, DNA replicates and the cell prepares to divide** – chromosomes and some organelles are replicated, chromosomes also begin to condense to form chromatin.

**Meiosis** is a form of cell division that gives rise to **genetic variation**. The main role of meiosis is **production of haploid gametes and maintenance of chromosome number** as cells produced by meiosis have half the number of chromosomes.

Meiosis produces genetically different cells, genetic variation is achieved through:

- **Crossing over** - the exchange of sections of DNA between homologous chromosomes.
- **Independent assortment** – there are various combinations of maternal and paternal chromosome arrangement.



Similarities	Differences

## **Classification and Biodiversity**

### **GCSE recap:**

1. Lions and tigers are closely related and could interbreed. Give two reasons why they normally do not interbreed.
2. List (or research) the full classification of the lion from kingdom to species.
3. Describe the structure of DNA.
4. What are the differences between eukaryotes and prokaryotes?
5. What is the difference between continuous and discontinuous variation?
6. Define heterozygous allele.

### **Define the following key terms:**

- Species
- Binomial naming system
- Domain
- Ecosystem

- Ecological niche
- Gene pool
- Speciation
- Species richness

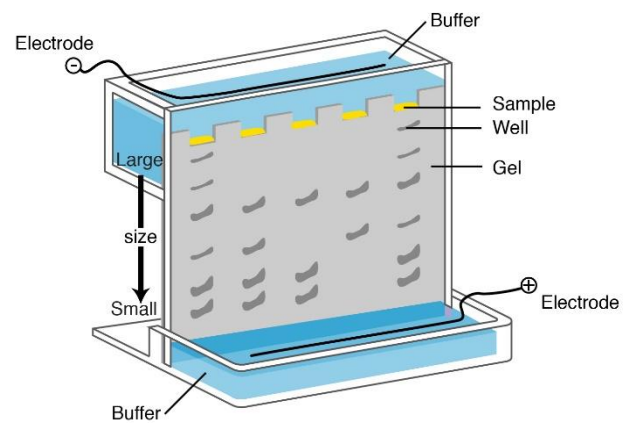
### Research task

Watch the following two YouTube videos on electrophoresis.

Describe the process of electrophoresis and explain why we use it in classification.

<https://www.youtube.com/watch?v=ga7t24aOdzQ>

<https://www.youtube.com/watch?v=ZDZUAleWX78>

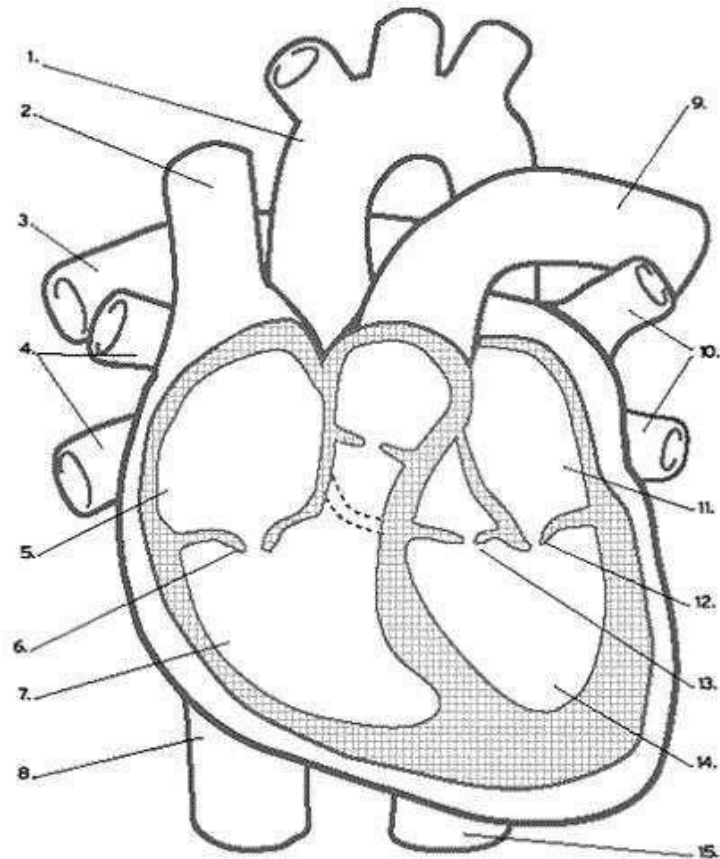


## Exchange and transport

### **GCSE recap questions:**

1. Define diffusion.
2. Name and explain three factors which affect the rate of diffusion.
3. Define osmosis.
4. Why can osmosis not occur in solids?
5. How is diffusion and osmosis different to active transport?
6. Most plants close their stomata at night. Explain why.
7. State the correct name for a red blood cell.
8. Name the main artery carrying blood from the left ventricle.
9. Explain why veins need valves but arteries do not.

10. Label the chambers and vessels of the heart. You are required to know the journey of the blood around the heart and body.



**Define the following key terms:**

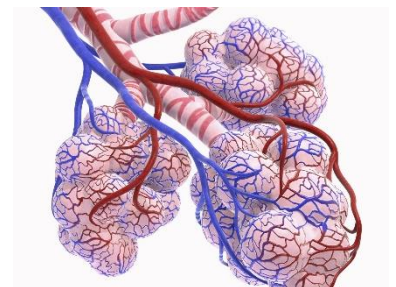
- Kinetic energy
- Exocytosis
- Tracheae

- Haemoglobin
- Diaphragm
- Spongy mesophyll
- Xylem
- Phloem
- Transpiration

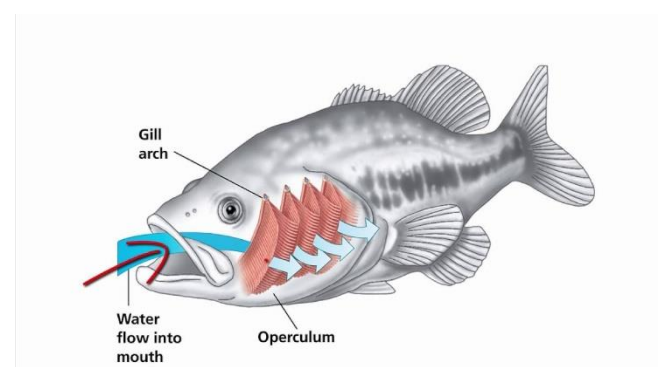
### Research task

Explain how diffusion rate is maximised in these biological examples. Think about how the organism is adapted to enable effective diffusion.

1. Oxygen diffusing into the blood in human alveoli



2. Oxygen diffusing into the blood in fish gills



## **Data analysis and skills**

**Define the following key words/phrases:**

- Accuracy
- Anomaly
- Calibration
- Causal link
- Control
- Correlation
- Dependent variable
- Errors
- Independent variable
- Precision
- Reliability
- Validity