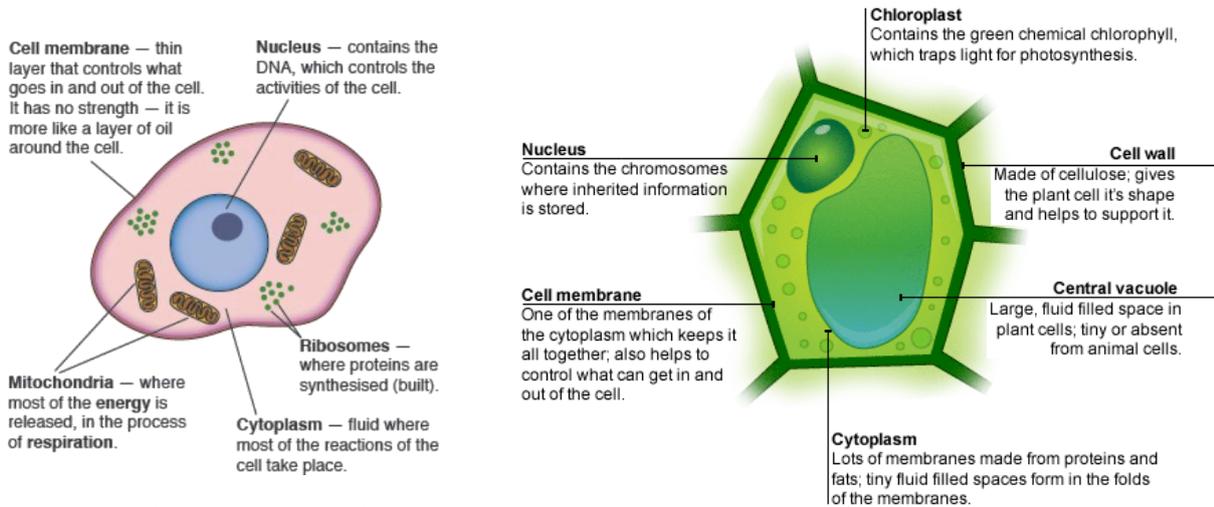
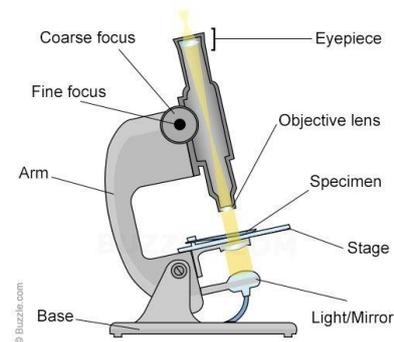


# Biology Paper 1 On A Page



The essential features on an animal cell

- There are many types of cells – animal (left), plant (right), bacteria, fungi, etc. Cells contain many organelles which carry out different functions. Main differences between animal and plant – animals do not have chloroplasts, vacuoles, or cell walls. Bacteria do not have a nucleus surrounding their DNA.
- Cells create more copies of themselves (in animals for growth and repair) through mitosis – the cell doubles its DNA and then splits into two new identical cells. Bacteria undergo binary fission to double in number very quickly.
- Required Practical: We look at cells using a microscope, by placing what we want to look at onto a glass slide, adding a stain and covering with a cover slip. We then place it on the stage and use the lowest objective lens to view it, focussing with the fine focus. We zoom in by changing the objective lens.
- Magnification is calculated with the formula  $\text{magnification} = \frac{\text{size of image}}{\text{size of real object}}$
- Cells specialise to carry out specific functions (i.e. sperm, nerves and muscles in animals, root hair, xylem and phloem in plants). Ideally you can recognise these cells and link how they are adapted to their function.
- Unspecialised cells are called stem cells and can be found in bone marrow (adult stem cells) or embryos (embryonic stem cells). We may be able to use stem cells to treat diseases such as diabetes but they are controversial.
- Diffusion, osmosis and active transport are cellular processes that transport substances. They all involve concentration gradients – diffusion and osmosis both transport substance from high to low concentration (although osmosis is water only and must be across a membrane), active transport goes from low to high and takes energy so the substance must be worth it (ions in roots, glucose in intestines).
- Cells are organised into structures. Cells → tissues → organs → organ systems → organisms.
- Organ systems you should know are the digestive system (digests and absorbs food) and circulatory system (transports oxygenated blood around the body).
- The digestive system relies heavily on enzymes which are biological catalysts that speed up chemical reactions. They have an optimal pH and temperature where they are most effective and can denature (stop working) if temperature too high or pH changes too much. Enzymes use the lock and key model – molecules they react with fit perfectly inside their active site (locks in a key). Examples include proteases, lipases and carbohydrases. Enzymes break down food into smaller, soluble molecules that can be absorbed into blood.
- Required practical: We carried out food tests. Benedict's for sugar (turns blue to red), iodine for starch (turns blue/black), biuret for proteins (turns purple).



- Required practical: We investigated the effect of changing either pH or temperature on the enzyme activity – testing for whether starch had been broken down or not, using the iodine starch test to determine the time taken for amylase to work.
- Your heart pumps blood around the body through arteries (away from the heart), capillaries (connects arteries and veins), and veins (back in to the heart).
- Arteries are thicker because the blood is pumped at higher pressure, veins have valves to prevent backflow and capillaries have very thin walls to speed up diffusion.
- Blood contains plasma (the liquid part), red blood cells (carry oxygen), white blood cells (fight infection) and platelets (help clot at scabs).
- Coronary heart disease is caused by fatty deposits inside the coronary arteries which deliver oxygenated blood to the heart muscle. Restricted blood flow to heart muscle might cause heart failure. Various treatments exist for cardiovascular disease. It is non-communicable (cannot be spread).
- Your lifestyle can increase your risk of disease (diet, smoking, obesity, alcohol, etc.).
- Cancer is the uncontrollable growth of cells. Benign tumours are contained and don't spread round body, malignant tumours spread around the body and form secondary tumours.
- Plants are organised in a complicated system like us, with the main organs being roots, stem, leaves and flowers. Water is transported around the plant, carrying dissolved ions, through the xylem. It is transported from the roots to the leaves in a process called transpiration.
- Diseases can be spread (communicable diseases) by pathogens. They can be spread by direct contact, by water or by air. Bacteria (e.g. salmonella and gonorrhoea) reproduce inside the body, producing toxins but can be treated with antibiotics – antibiotic resistance is a serious concern for the future. Viruses (e.g. measles, HIV, tobacco mosaic virus) also reproduce inside the body – using human cells to produce copies of themselves which can cause cell damage. Fungi (e.g. rose black spot) can be treated with fungicide. Protists (e.g. malaria) are also pathogens.
- Your body has defences against disease. Non-specific defences include skin, nose, trachea, and stomach. Immune system (white blood cells) defends through phagocytosis (engulfing and destroying cells), antibody production and antitoxin production.
- Antibiotics can be used to treat bacterial infections, whereas painkillers only mask symptoms. Viruses are hard to treat with drugs because they hide in body cells. New drugs take time and money to develop and must be tested for effectiveness and safety – double blind trials mean doctors and patients don't know who has real drugs and who has placebo (fake drug). Vaccines can be used to protect against infection by exposing immune system to dead or inactive forms of pathogen so body can prepare antibodies for future infections.
- There are two fundamental reactions that happen in plant and animal cells: respiration and photosynthesis (plants only).
- Photosynthesis reaction: carbon dioxide + water → glucose + oxygen (in the presence of light)
- Photosynthesis is affected by temperature, light intensity, carbon dioxide concentration and amount of chlorophyll. One of these will always limit the rate of photosynthesis.
- Required practical: We investigated the effect of light intensity on photosynthesis by measuring bubbles produced by pondweed with a lamp at different distances (to change light intensity).
- Glucose is used for respiration, is stored or converted into other molecules.
- Aerobic (with oxygen) respiration: oxygen + glucose → carbon dioxide + water
- Anaerobic (without oxygen) respiration: glucose → lactic acid (humans), glucose → ethanol + CO<sub>2</sub> (plants).
- Aerobic respiration releases the most energy but in times of low oxygen (such as high intensity exercise), the body switches to anaerobic. After this, lactic acid (a toxic substance) needs to be broken down so heart rate and breathing rate increase to increase supply of oxygen around the body (known as oxygen debt). Energy is used in many processes inside body (known as metabolism).

