



10 Things to Do to Prepare for...

GCSE Biology

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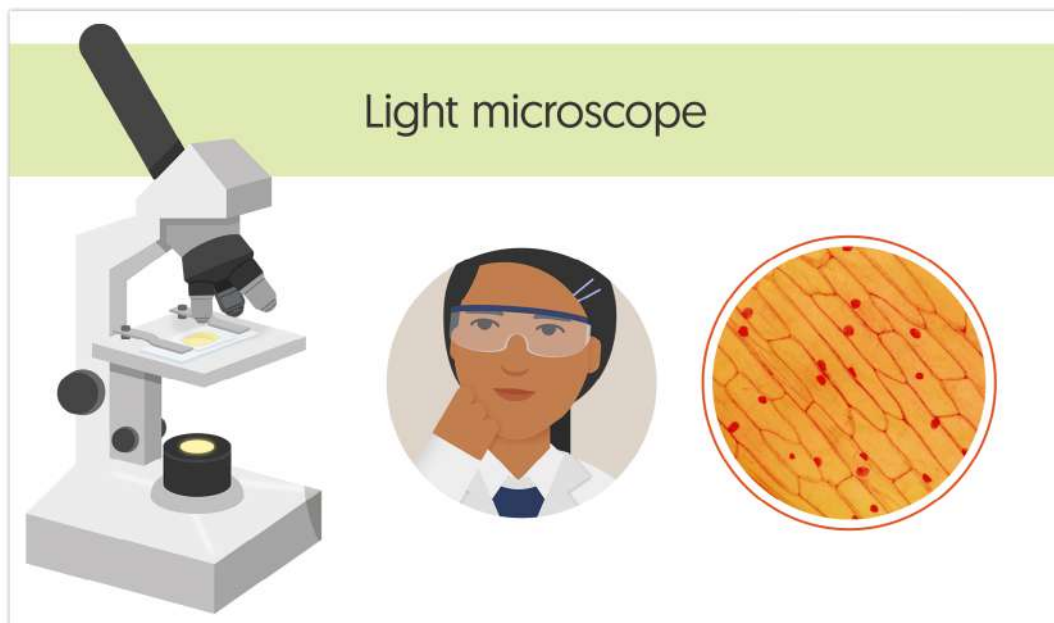
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Activities

1. Cells and organisms, including the role of diffusion and respiration

- Can you describe how to use a light microscope to observe and draw plant and animal cells? This is a required practical at GCSE and you will need to be able to calculate magnification using the formula $\text{magnification} = \frac{\text{size of the image}}{\text{real size of the object}}$. You will need to be able to make use of standard form, which you will also learn in your maths lessons.
- Are you able to name the structures (also known as components and organelles) found in plants and animal cells and describe their functions? You will need to be able to compare the structures of plant and animal cells. Can you describe how some unicellular organisms are adapted and how cells in multicellular organisms are specialised to carry out certain roles? Practise drawing and labelling animal and plant cells.
- Are you familiar with the hierarchical organisation of multicellular organisms? This takes us from cells to tissues to organs to systems to organisms. Can you name examples of each?
- Can you describe diffusion as the movement of molecules from where they are more concentrated to where they are less concentrated and relate that to key processes in living things? This includes the exchange of carbon dioxide and oxygen in the lungs, and you should be familiar with diagrams that model this.





2. Cellular respiration

- Can you compare aerobic and anaerobic respiration (in humans and microbes) and summarise both using word equations? This needs to include the reactants and products and energy implications for the organism. Learn the word equations.

3. Nutrition and digestion

- Can you name the components of a healthy human diet? Can you describe why each component is needed and give sources of them in our food? Summarise this in a table.
- You will need to know the parts of the digestive system and the ways in which it is adapted to help digest and absorb food. This should include the role of enzymes and of bacteria in the gut.
- Are you able to calculate energy requirements of different diets, for example a pregnant woman, an athlete, and an office worker? Can you relate imbalances in the diet to dietary diseases such as deficiency and obesity?
- Can you describe how a green plant gets the nutrients it needs from the soil and makes carbohydrates in its leaves?

4. Photosynthesis, including the adaptations of a leaf

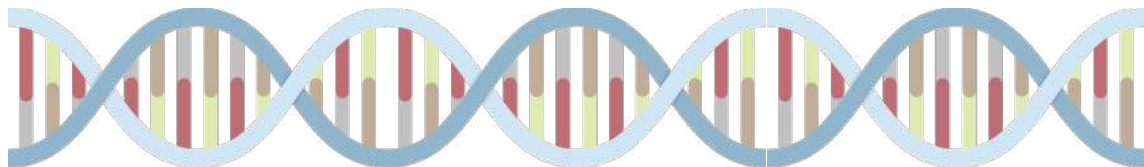
- Learn the word equation that summarises photosynthesis. Can you relate the structure of the leaf to the requirements for photosynthesis? Practise drawing a section through a leaf and labelling it, identifying each feature in relation to its contribution to photosynthesis.
- Learn the role of photosynthesis in the carbon cycle and practise drawing a simple version of the carbon cycle to show the relationship between photosynthesis and the other processes that contribute to carbon stores and carbon dioxide in the atmosphere.





5. Evolution and extinction

- Learn the definition: “heredity is the transfer of genetic formation from one generation to the next”. Can you describe the role of DNA, genes and chromosomes in heredity and the role of the scientists Watson, Crick, Wilkins and Franklin in establishing the model of the DNA molecule?
- Can you explain the difference between continuous and discontinuous variation between individuals of the same species and name examples of such variation? Are you familiar with how these differences may be measured and displayed in graphs?
- The differences (variation) between species and between individuals of a species mean that some are better adapted for their environment, so are more likely to survive and pass on this adaptation. This drives natural selection. Learn some examples of how animals and plants are adapted to their environment and be able to relate that to successful competition.
- Environmental changes can lead to species being unable to compete or have poor adaptation and this can lead to extinction. This is where every individual from a species has died and that species no longer exists. Can you name examples of species that have become extinct? Human activity is also leading to extinction but we have taken steps such as gene banks and seed banks to preserve species for the future.
- Can you explain why it is important for us to preserve biodiversity (the variety of living things) on Earth?



6. Inheritance and genetics, competition and interdependence

- Can you draw and interpret simple food webs and food chains and describe the relationships between species in them? You should be able to identify producers and different levels of consumers and recognise that there is interdependence between different parts of an ecosystem. This includes the dependence on insects for pollination by many flowering plants.
- Can you explain the importance of insects, such as bees, to the security of human food supply?
- Can you describe examples of how living things affect their environment and are in turn affected by it? This includes the behaviour of humans and how toxic materials that we have used and discarded find their way into other things and accumulate in their tissues. You should be able to name examples of this, such as the use of the pesticide DDT, lead in petrol and the steps that were taken to lower impact.

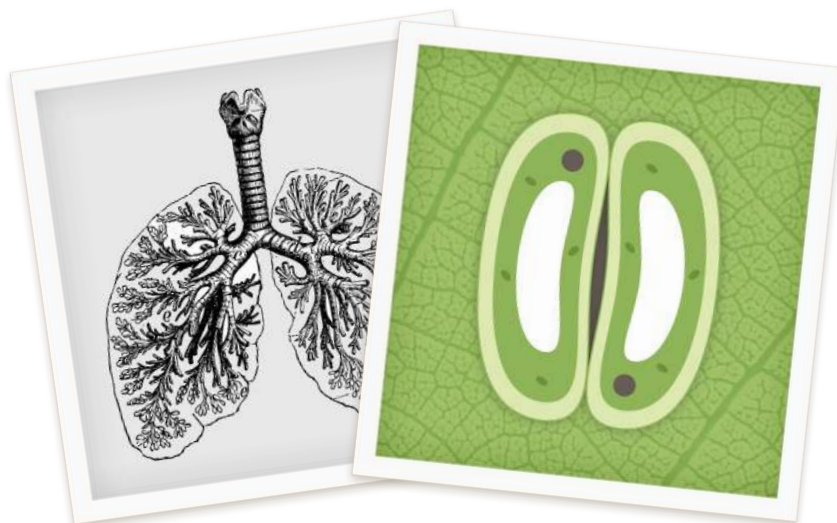


7. Reproduction in mammals (with humans as an example) and flowering plants

- Can you label the parts of the male and female reproductive systems? Practise labelling diagrams of them.
- Learn the key stages of the menstrual cycle and be able to define gametes (the sex cells), fertilisation, gestation and birth and the role that each stage plays in the perpetuation of human life. Can you identify healthy and unhealthy choices for lifestyle and diet during pregnancy?
- Practise drawing and labelling diagrams of a flowering plant. Can you relate the structure of flowers and pollen to wind and insect pollination? Can you describe the structure of a seed and name different methods of seed dispersal? Are you able to describe a scientific investigation into methods of seed dispersal, such as size of sycamore related to distance dispersed?

8. Gas exchange in humans and in plants

- Can you describe the structure and function of the gas exchange system in humans and how it is adapted to make it more efficient?
- Can you describe the steps in the breathing mechanism to move air in and out of the lungs and relate that to a model that you have seen (bell jar and rubber diaphragm)? Can you describe a simple experiment that would allow you to measure lung volume?
- Can you explain the impact of asthma, exercise and smoking on the breathing system?
- Can you explain the role of the stomata in the leaf of a plant in gas exchange? Practise drawing the guard cells and the opening and closing of the stoma.





9. Scientific method

- Can you describe what is meant by a hypothesis and a prediction? Can you explain the difference between the independent, dependent and control variables in a test?
- Can you define repeats, repeatable and reproducible?
- Are you familiar with the correct method for recording data and how make your table of data clear? Can you do the same for graphs, including plotting the points accurately, with a cross and drawing in an appropriate line of best fit [that shows the relationship between variables]? This might be a straight line but often, in Biology, is a curve.
- Can you calculate the average (mean, median and mode) from a set of data? Can you round numbers to the nearest decimal place?

10. Scientific theories and models

- Models and theories change as we learn more and new evidence is gathered that helps us refine them. Write down the basics of the theory of “blending”, which was the predominant belief of how heredity occurred before Darwin and Wallace. Compare that to the theory of natural selection.
- Can you describe the different ways in which scientists communicate about their work and findings?
- Theories lead to predictions which can then be tested experimentally. This will often allow a relationship to be shown using mathematics and graphs. Sketch graphs to show relationships that are linear, directly proportional and indirectly proportional.