

# WYKE SIXTH FORM COLLEGE



## A Level Biology HOLIDAY HOMEWORK

Many students find the jump from GCSE to A level difficult. This pack is designed to aid that transition in Biology. It is especially useful for students who have completed a Core and Additional Science GCSE.

Read carefully through the pack and complete the questions section at the end.

Print this section with your name on it and hand it in at enrolment or the first day.

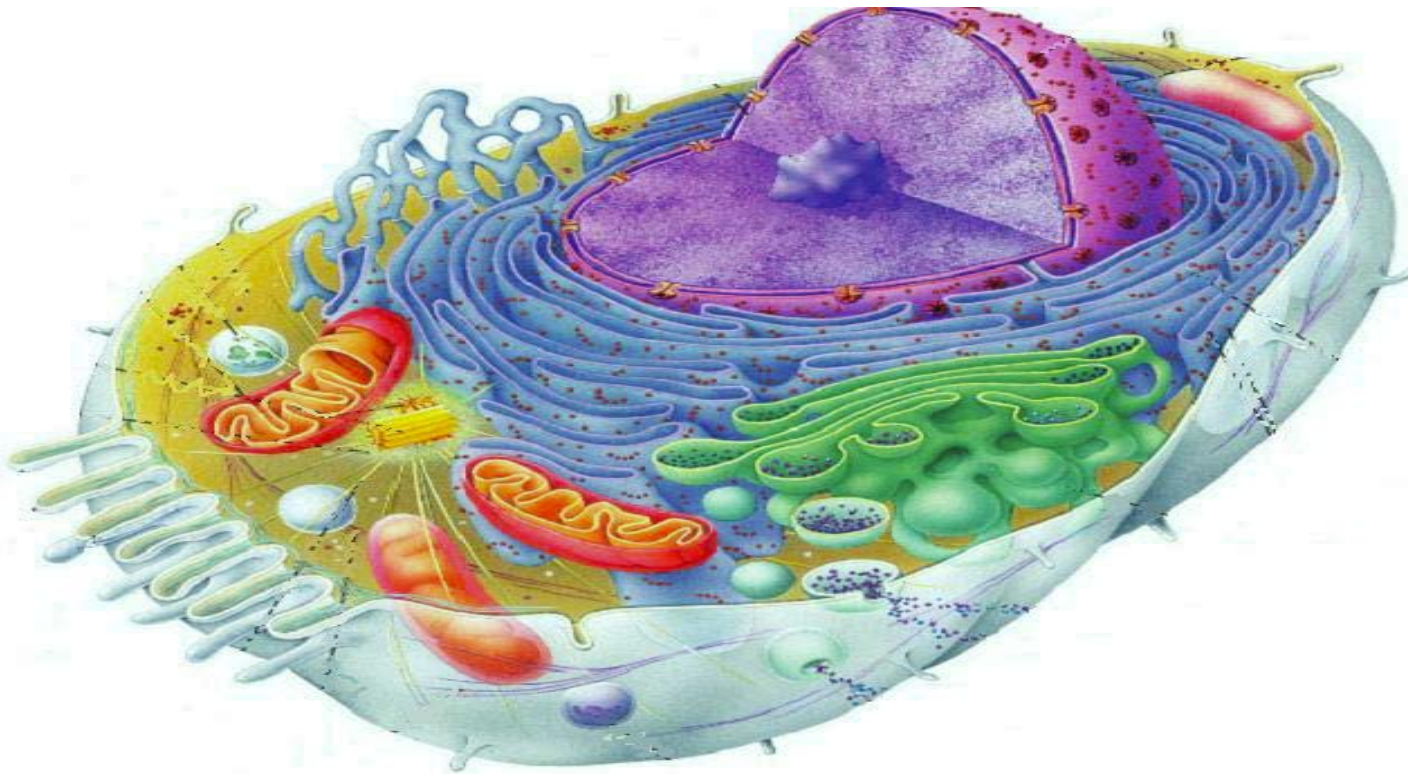
Completing this pack will help your progress during the first term of studying biology at A level.

# Cells

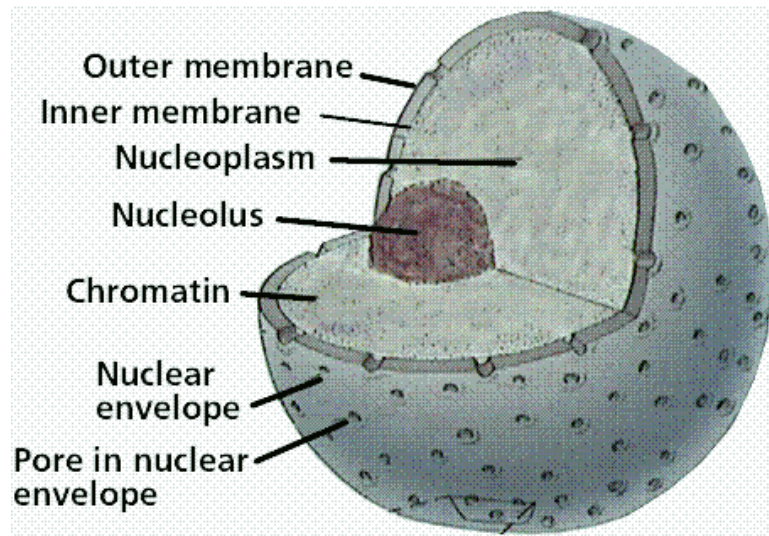
The study of cells at GCSE is based round the features that can be seen inside cells using an ordinary light microscope (the type you would use in a school science laboratory). At A Level cells are studied in a new level of detail (the detail seen with a more powerful type of microscope called an electron microscope).

This pack shows the variety of different structures within the cells. Reading this pack and doing the review questions will help you during your first term of AL Biology at Wyke. Human cells have a nucleus surrounded by a nuclear envelope, so that the genetic material is separated from the rest of the cytoplasm. In the cytoplasm, there is a complex system of internal membranes and membrane-bound organelles. Human cells vary widely in their structure and functions. You will be expected to be able to recognise and identify the structure of these cells as revealed by electron microscopy.

## The structure of a human cell revealed by the electron microscope



## The things within a cell (organelles) – their structures and roles.



**Nucleus:** dense, spherical structure in the cytoplasm, consisting of the nucleoplasm, containing the chromosomes and one or more nucleoli, surrounded by a nuclear envelope.

The outer membrane of the nuclear envelope is continuous with the endoplasmic reticulum and bears ribosomes. The space between the two membranes is very small and is continuous with the cisternae of the endoplasmic reticulum. At intervals the inner and outer membranes are fused, giving rise to nuclear pores.

**Functions:** to control activities within the cell through the regulation of the synthesis of proteins and enzymes. The nuclear envelope regulates the movement of molecules between the nucleus and the cytoplasm; it also separates the reactions taking place in the nucleus from those which take place in the cytoplasm.

**Nucleolus:** appears as a circular, granular structure within the nucleus. It does not have a membrane surrounding it.

**Function:** to make ribonucleic acid (RNA) and to assemble ribosomes. In the early stages of nuclear division, nucleoli disperse and reappear after separation of the chromatids has occurred.

**Endoplasmic reticulum:** a complex system of membrane-bound flattened sacs or tubules, called cisternae. The rough endoplasmic reticulum (RER) has ribosomes on the outer surface of the membranes. The smooth endoplasmic reticulum (SER) has no ribosomes attached and the cisternae are more tubular.

**Functions:** proteins are transported in the RER and it is extensive in cells that make and secrete proteins. The SER is involved in lipid synthesis and is well-developed in liver cells.

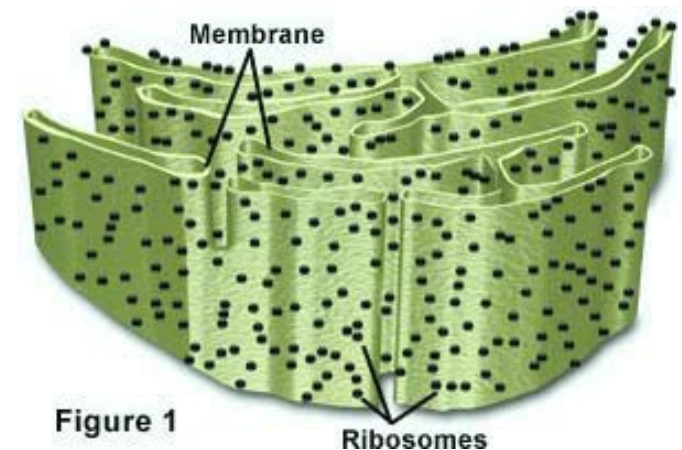
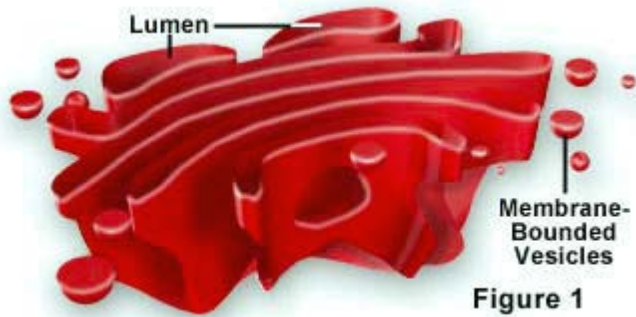


Figure 1

**Golgi apparatus:** also known as the Golgi body, consists of a stack of flattened cisternae

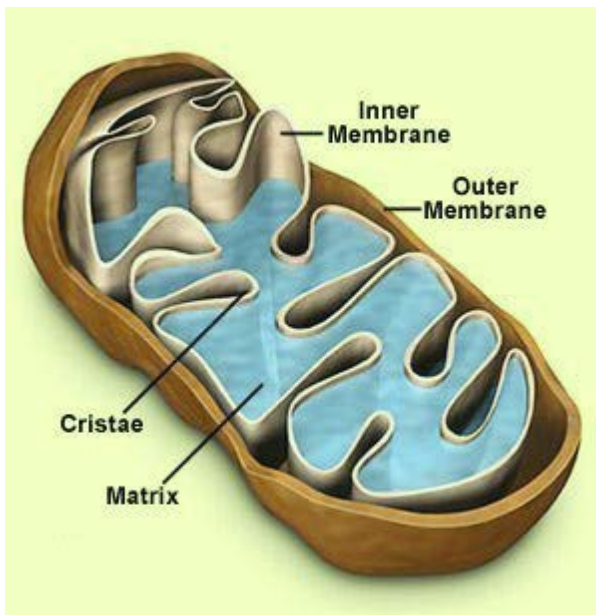


and associated vesicles. Functions: involved with the modification of proteins. Vesicles containing proteins are pinched off from the endoplasmic reticulum and fuse with the cisternae of the Golgi apparatus. The contents of the vesicles have carbohydrate molecules attached to them, forming glycoproteins. Vesicles containing the modified proteins bud off from the Golgi apparatus and are secreted out of the cell.

**Lysosomes:** membrane-bound organelles containing a variety of enzymes. They have few characteristic features and are difficult to identify in electron micrographs.

**Functions:** responsible for intracellular digestion of material taken up by endocytosis. They break down cell components (worn out organelles) and remove faulty proteins. The breakdown of macromolecules is achieved by digestive enzymes inside the lysosome. The products pass out of the lysosome through the membrane.

**Mitochondria:** rod-shaped structures, each surrounded by a double membrane (envelope). The outer membrane is smooth. The inner membrane is folded into cristae. The inner membrane encloses the mitochondrial matrix. There are small ribosomes and circular DNA present in the matrix.



**Functions:** the reactions concerned with aerobic respiration occur within the mitochondria. The matrix contains enzymes involved with the Krebs cycle and the reactions producing ATP take place on the cristae.

**Ribosomes:** small, dense structures composed of ribosomal RNA and protein, shaped like a cottage loaf which may be free in the cytoplasm or attached to the endoplasmic reticulum.

**Functions:** the site of protein synthesis. The proteins that are synthesised by free ribosomes remain within the cell, but those synthesised by ribosomes attached to the RER are modified by the Golgi apparatus and secreted out of the cell.

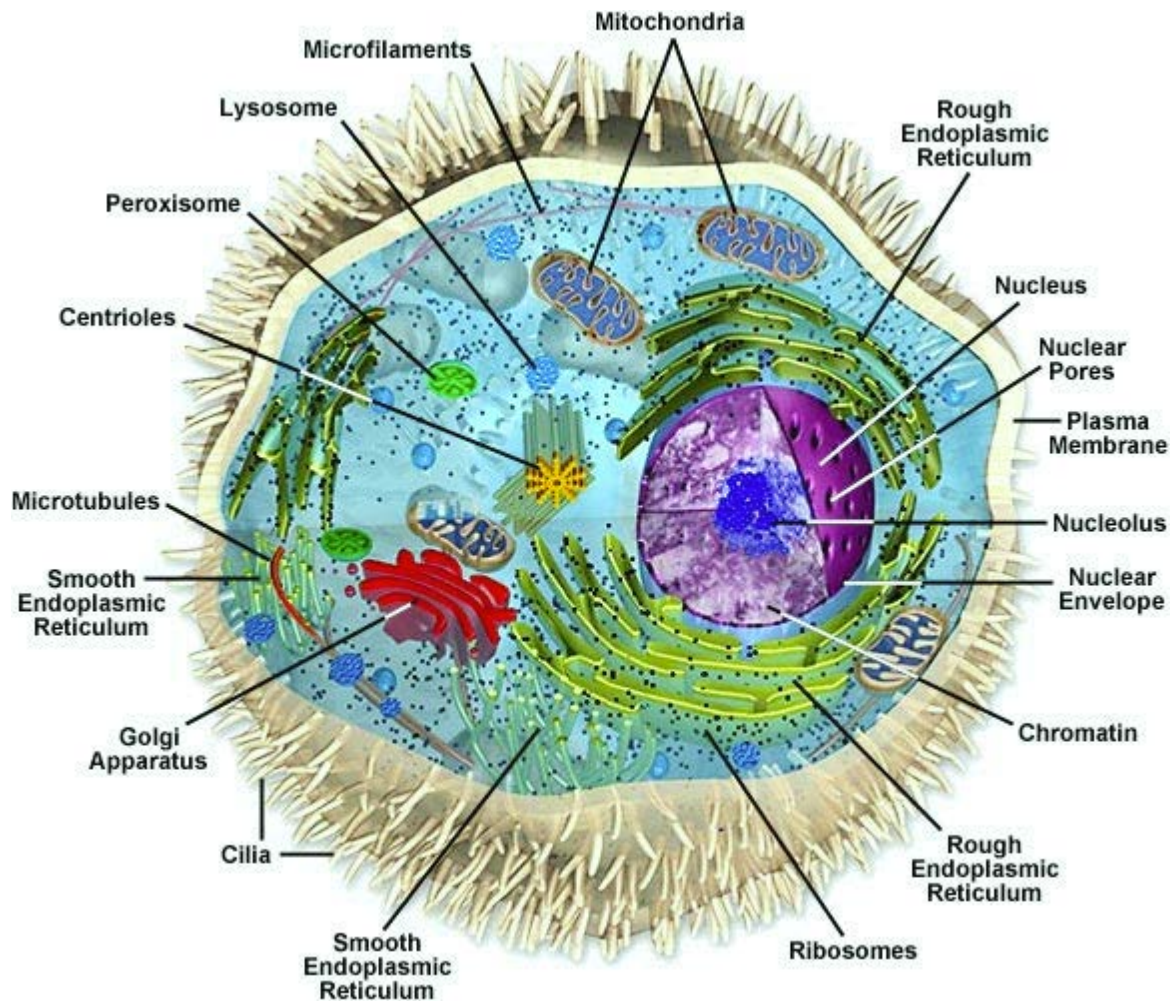
**Centrioles:** found in pairs in animal cells, but not in plant cells. They are hollow, cylindrical structures composed of nine triplets of microtubules. They occur close to the Golgi apparatus and are arranged at right angles to each other.

**Functions:** they appear to play a role in the organisation of the spindle in animal cells. They

separate and move to opposite poles of the cell at the beginning of nuclear division in animal cells.

**Microtubules:** fine, tubular, unbranched, hollow structures composed of the protein tubulin.

**Functions:** contribute to the cytoskeleton, involved in the structure of centrioles, make up the spindle during nuclear division. They contribute to the maintenance of the shape of organelles and are involved in transport and movement within cells.



# **WYKE A LEVEL BIOLOGY**

## **HOLIDAY HOMEWORK**

**NAME:**

**PRINT OUT THE FOLLOWING PAGES ONLY  
OF THIS COMPLETED HOMEWORK  
(BLACK AND WHITE WILL DO)  
AND HAND IN AT ENROLMENT OR  
FIRST DAY BACK IN COLLEGE**

## TASKS:

1. After reading through the pack ADD LINES TO THIS DIAGRAM AND LABEL AS MANY PARTS AS YOU CAN. Then go back through the pack and see if you can add any labels you missed. You should be able to label at least 10.

[http://www.frontrange.edu/docs/cms/Cell\\_Structure.bmp](http://www.frontrange.edu/docs/cms/Cell_Structure.bmp)

