## **Year 9 - 4.1a Cells and Simple Transport**

Cells are the basic unit of all forms of life. In this section we explore how structural differences between

types of cells enables them to perform specific functions within the organism. These differences in cells

are controlled by genes in the nucleus. For an organism to grow, cells must divide by mitosis producing

two new identical cells.

If cells are isolated at an early stage of growth before they have become too specialised, they can retain

their ability to grow into a range of different types of cells. This phenomenon has led to the development

of stem cell technology. This is a new branch of medicine that allows doctors to repair damaged organs

by growing new tissue from stem cells.

### **4.1 Cell Structure**

**4.1.1.1 Eukaryotes and prokaryotes**Plant and animal cells (eukaryotic cells) have a cell membrane, cytoplasm and genetic material enclosed in a nucleus.

Bacterial cells (prokaryotic cells) are much smaller in comparison. They have cytoplasm and a cell membrane surrounded by a cell wall. The genetic material is not enclosed in a nucleus. It is a single DNA loop and there may be one or more small rings of DNA called plasmids.

Demonstrate an understanding of the scale and size of cells and be able to make order of magnitude calculations, including the use of standard form.

**4.1.1.2 Animal and plant cells**

Explain how the main sub-cellular structures, including the nucleus, cell membranes, mitochondria, chloroplasts in plant cells and plasmids in bacterial cells are related to their functions.

Most animal cells have the following parts: A nucleus, cytoplasm, cell membrane, mitochondria, ribosomes.

In addition to the parts found in animal cells, plant cells often have: chloroplasts, a permanent vacuole filled with cell sap and a cell wall made of cellulose, which strengthens the cell.

**Required practical activity 1: use a light microscope to observe, draw and label a selection of plant**

**and animal cells. A magnification scale must be included**.

**4.1.1.3 Cell specialisation**

Students should be able to, when provided with appropriate information, explain how the structure of different types of cell relate to their function in a tissue, an organ or organ system, or the whole organism. Cells may be specialised to carry out a particular function:

* sperm cells, nerve cells and muscle cells in animals
* root hair cells, xylem and phloem cells in plants.

**4.1.1.5 Microscopy**

Students should be able to:

• understand how microscopy techniques have developed over time

• explain how electron microscopy has increased understanding of sub-cellular structures.

An electron microscope has much higher magnification and resolving power than a light microscope. This means that it can be used to study cells in much finer detail. This has enabled biologists to see and

understand many more sub-cellular structures.

Carry out calculations involving magnification, real size and image size using the formula:   
*Magnification = size of image/size of real object.*

Express answers in standard form if appropriate.

### **4.2.1 Principles of organisation** Cells are the basic building blocks of all living organisms.

### A tissue is a group of cells with a similar structure and function.

### Organs are aggregations of tissues performing specific functions.

### Organs are organised into organ systems, which work together to form organisms.

### You have also covered:

### **4.2 Organisation II – The Circulatory System and Heart Disease**

#### Check in your folder for this specification sheet, ask you teacher if you do not have a copy. You do not need to learn **4**.2.2.4 Coronary heart disease: a non-communicable disease but you should have notes on this topic.

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