Unit 1 Cell Biology

Topic 1: Cell Structure

animal cell

- cell membrane
- cytoplasm
- nucleus

plant cell

- vacuole
- cell wall
- found only in plants cells
Lesson 1.1.1

I will know I am successful if I can:

1. Label all parts of plant and animal cells and state their functions
2. State the differences between plant and animal cells
3. Calculate the size of cells using information from diagrams

Cells

A cell is the basic unit of life, from which larger structures such as tissues and organs are made. Animals and plants are made of cells.

Cells are very small. These photographs show cells seen through a microscope.

Cheek cells

These are cheek cells, seen through a microscope.

Onion cells

These are onion cells, seen through a microscope.
Lesson 1.1.1 continued

Animal cells usually have an irregular shape, and plant cells usually have a regular shape.

Cells are made up of different parts.

Copy the diagrams below and label the parts:

WORD BANK:
- Cell membrane
- Cell wall
- Cytoplasm
- Mitochondria
- Nucleus
- Vacuole
- Chloroplasts
Lesson 1.1.1 continued

Mitochondria and Ribosomes

Some cell structures are too small to be seen with the light microscope. Ribosomes are like this. They are found in the cytoplasm or attached to structures called endoplasmic reticulum and are the site of protein synthesis. They can only be seen using an electron microscope.

Mitochondria are tiny structures found in cells (one is called a mitochondrion). Respiration, the chemical reaction that releases energy from glucose, happens in mitochondria. This provides energy for life process such as movement and growth.
Lesson 1.1.1 Continued

Yeast and bacterial cells

Yeast is a single celled fungus.

It does not contain chlorophyll and cannot make its own food by photosynthesis.

It reproduces by budding.

WORD BANK

<table>
<thead>
<tr>
<th>Cell membrane</th>
<th>food storage granule</th>
<th>cell wall</th>
<th>nucleus</th>
</tr>
</thead>
<tbody>
<tr>
<td>vacuole</td>
<td>bud</td>
<td>cytoplasm</td>
<td></td>
</tr>
</tbody>
</table>

Bacteria are unicellular organisms.

They feed on substances in their surroundings and reproduce by dividing in two.

Bacteria do not have a nucleus but they do have a chromosome and plasmids which contain the genetic information.
Lesson 1.1.1 Continued

Copy and complete:

**Function of the parts of cells**

<table>
<thead>
<tr>
<th>Cell part</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nucleus</td>
<td></td>
</tr>
<tr>
<td>Cell Membrane</td>
<td></td>
</tr>
<tr>
<td>Cytoplasm</td>
<td></td>
</tr>
<tr>
<td>Cell wall</td>
<td></td>
</tr>
<tr>
<td>Chloroplasts</td>
<td></td>
</tr>
<tr>
<td>Vacuole</td>
<td></td>
</tr>
<tr>
<td>Mitochondria</td>
<td></td>
</tr>
<tr>
<td>Ribosomes</td>
<td></td>
</tr>
</tbody>
</table>

Using the information from the diagrams and table, complete the following table to show if a structure is present (✓) or absent (x)

**Differences between cells**

<table>
<thead>
<tr>
<th>Cell part</th>
<th>Plant cell</th>
<th>Animal cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nucleus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cell Membrane</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cytoplasm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cell wall</td>
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<td></td>
</tr>
<tr>
<td>Ribosomes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lesson 1.1.1 Continued

We now know a lot about the structures and functions of parts of cells, and we know they are small. So how small are they?

1. Measure the diameter of the field of view
2. Count how many cells are along the diameter of that field of view
3. Divide the diameter of the field of view by the number of cells

The diameter of the field of view is 2 mm.

1 millimetre (mm) = 1000 micrometres (μm)
1 μm = 0.001 mm

Calculate the length of one cell

Length of 5 cells = 2 mm or 2000 μm

Length of 1 cell = \( \frac{2}{5} \) or \( \frac{2000}{5} \)

= 0.4 mm or 400 μm

To convert from micrometers (μm) into millimetre (mm) - divide by 1000

To convert from millimetre (mm) into micrometres (μm) - multiply by 1000
Lesson 1.1.1 continued

Try the following problems

1. The diagram shows three human cheek cells under a high power microscope. The diameter of the field of vision is 0.03mm.

What is the average diameter of a cheek cell in micrometres?

(2)

2. The unit used to measure the size of cells is the micrometer (μm)

The drawing shows rhubarb epidermal cells as seen through a microscope. The diameter of the microscope field is 0.12mm

0.12mm

a. Calculate the average length of a single rhubarb cell  (2)

b. Given that a human cheek epithelial cell is, on average, only one quarter the length of a rhubarb epidermal cell, calculate the length of a cheek cell.  (2)

c. Given that a red blood cell is 7μm in diameter, list the three different cell types in decreasing order of size
Cells are very small and cannot be seen with the naked eye; therefore, we need to use a microscope to enlarge the structures. Stains are coloured dyes which are often used to see the more structures clearly. Examples of stains include iodine solution and methylene blue.

**Parts of a microscope**
Lesson 1.1.2 continued

Preparing a microscope slide

*See Practical Guide for step by step instructions*

Preparing an onion slide

Preparing a cheek slide
Success Criteria for Topic 1: Cell Structure

I will know I am successful in Topic 1 if I can state the following:

- Cells contain organelles which have functions.

- Bacterial cells are different from animal and plant cells as they have no organelles which have membranes and their cell wall is chemically different.

- Fungi have a cell wall which is not made of cellulose.
**Success Criteria for Topic 1: Cell Structure**

- Bacteria have plasmids and circular DNA.

<table>
<thead>
<tr>
<th>Organelle</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>mitochondria</td>
<td>ATP is produced here when oxygen is present</td>
</tr>
<tr>
<td>chloroplast</td>
<td>absorbs light energy for photosynthesis</td>
</tr>
<tr>
<td>Cell membrane</td>
<td>controls movement of substances in and out of cell</td>
</tr>
<tr>
<td>vacuole</td>
<td>stores water and solutes to regulate water content</td>
</tr>
<tr>
<td>nucleus</td>
<td>controls cell activities and passes info to next generation</td>
</tr>
<tr>
<td>ribosome</td>
<td>where proteins are formed</td>
</tr>
<tr>
<td>plasmid</td>
<td>small circle of DNA found in bacteria</td>
</tr>
<tr>
<td>Cell wall</td>
<td>provides shape and support to cells</td>
</tr>
</tbody>
</table>