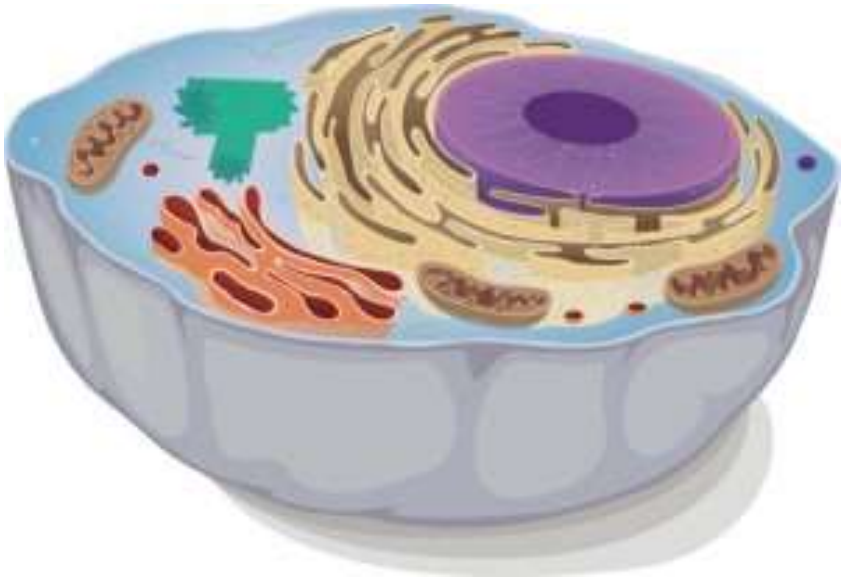
National 5 Biology

Unit 1 Cell Biology

1.1 Cell structure



Name _____

Class _____

Teacher _____

Cell Structure

All living organisms are made up of cells. Organisms are classified as either unicellular: with only one cell or multicellular: with more than one cell. Organisms can be divided into groups. These include animals, plants, fungi and bacteria.

Using a light microscope some of the basic structures present in cells can be seen. An electron microscope is much more powerful and allows us to see even more detail. This allows us to examine the ultra-structure of cells. Structures called organelles become visible and they are the sites of specialised functions. Cells vary in the type and numbers of organelles that they contain.

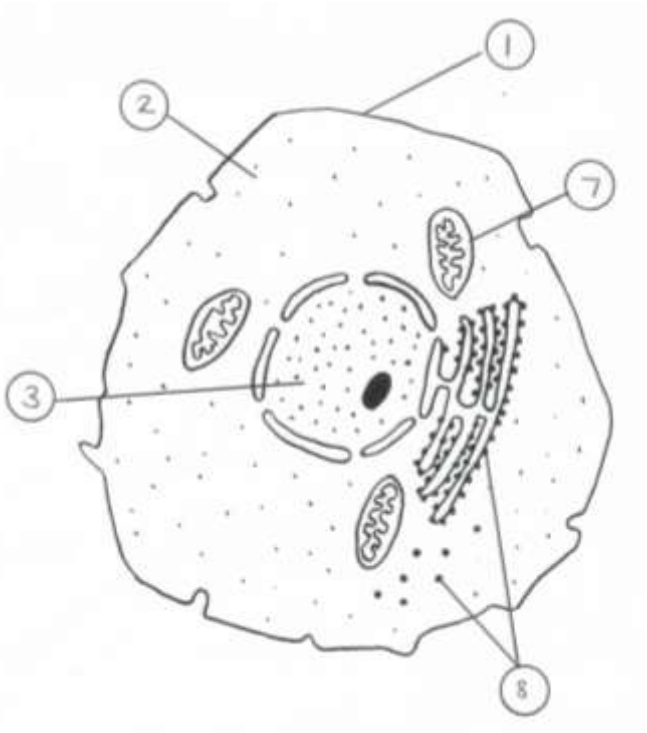
Learning intention

We are learning how to name and identify the structures present in an animal cell.

Animal cells

All animals are made up of many animal cells, so are said to be multicellular. An example of a typical animal cell is a human cheek epithelial cell. Many of these cells together form the protective lining on the inside of your mouth.

Complete the table to name each of the structures shown in the diagram below.



Number of Structure	Name of Structure
1	
2	
3	
7	
8	

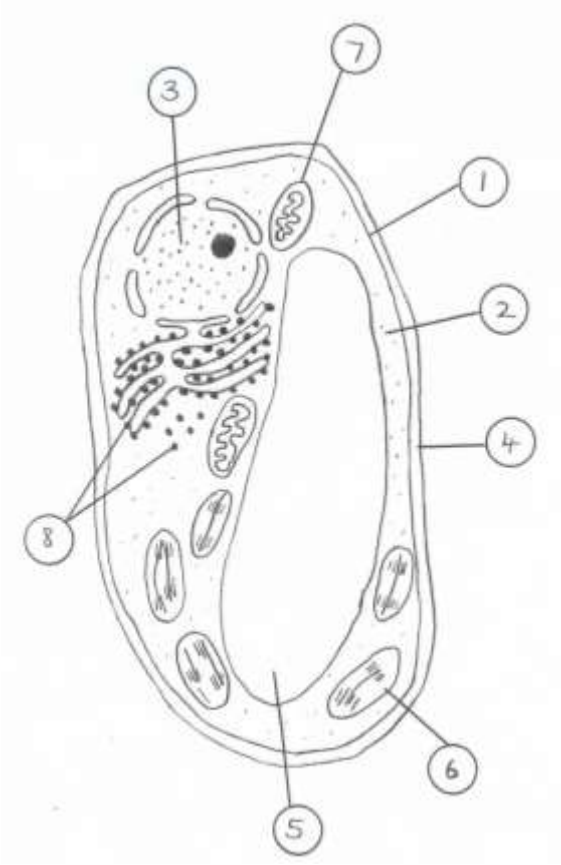
Learning intention

We are learning how to name and identify the structures present in a plant cell.

Plant cells

All plants are made up of many plant cells, so are said to be multicellular. An example of a typical plant cell is a leaf mesophyll cell.

Complete the table to name each of the structures shown in the diagram below.



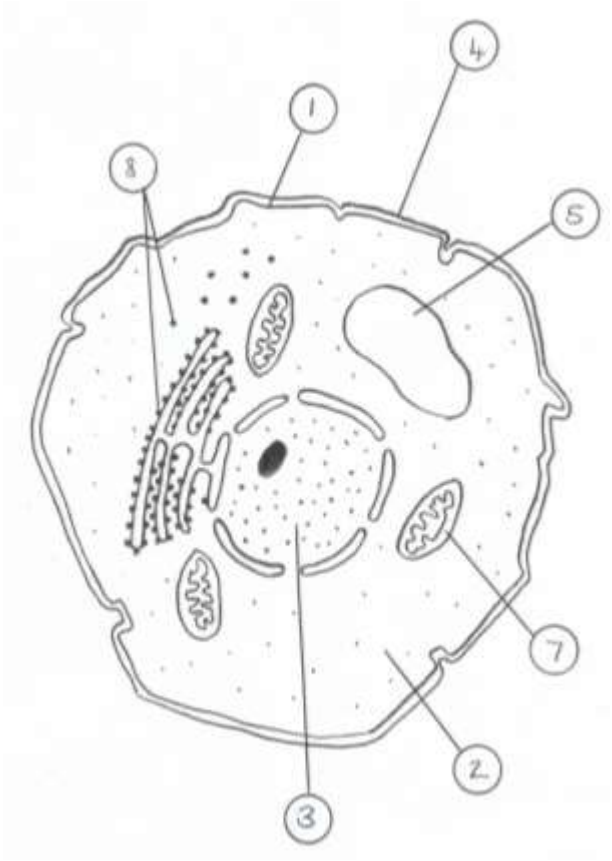
Number of Structure	Name of Structure
1	
2	
3	
4	
5	
6	
7	
8	

Learning intention

We are learning how to name and identify the structures present in a fungal cell.

Fungal cells

A fungus is a single-celled (unicellular) organism and a typical example is yeast. Complete the table to name each of the structures shown in the diagram below.



Number of Structure	Name of Structure
1	
2	
3	
4	
5	
7	
8	

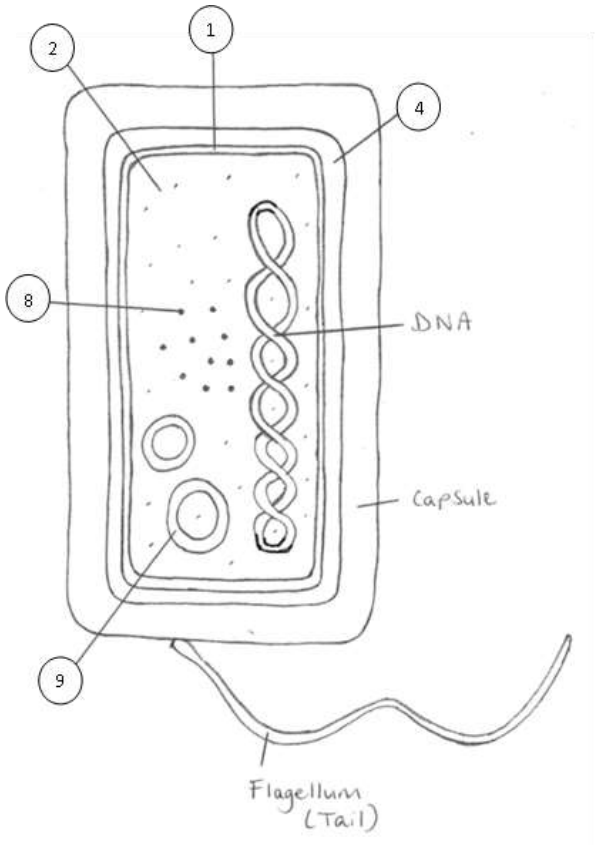
Learning intention

We are learning how to name and identify the structures present in a bacterial cell.

Bacterial cells

Bacterial cells have a simpler structure compared to animal, plant and fungal cells and are usually much smaller. They still have a cell membrane and ribosomes, but they lack organelles such as the nucleus.

Complete the table to name each of the structures shown in the diagram below.



Number of Structure	Name of Structure
1	
2	
4	
8	
9	

Learning intention

We are learning how to identify structural similarities and differences between animal, plant, fungal and bacterial cells.

Similarities and differences

Complete the table below by adding a tick to show which structures are present in each of the different cell types.

	Different types of cell			
Structures	Animal	Plant	Fungal	Bacterial
Cell membrane				
Cytoplasm				
Nucleus				
Cell Wall				
(Sap) Vacuole				
Chloroplast				
Mitochondria				
Ribosome				
Plasmid				

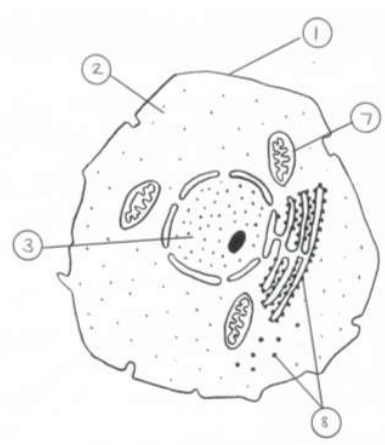
Learning intention

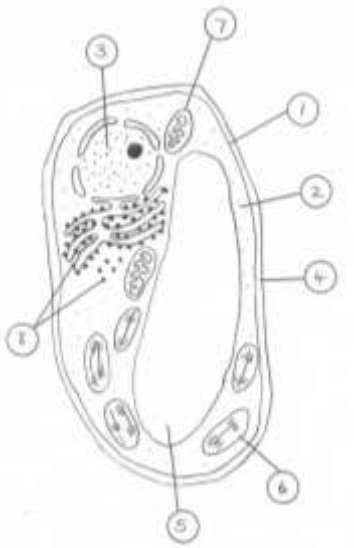
We are learning how to explain the function of the structures found in animal, plant, fungal and bacterial cells.

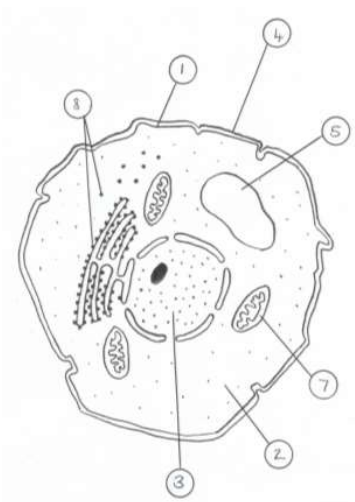
Structure and function

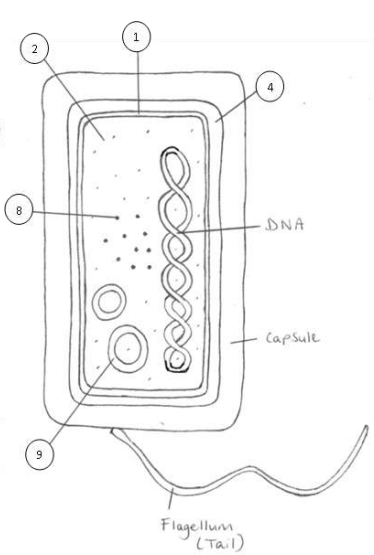
Each structure found in a cell has a specific function. Complete the table below to match the correct structure to its function.

	Structure	**Function**
1.		Selectively permeable membrane that controls the entry and exit of substances.
2.		Contains organelles that are the site of various chemical reactions.
3.		Contains genetic information and is important in the control of cell activities in animal, plant and fungal cells.
4.		Freely permeable. Involved in support of plant, fungal and bacterial cell.
5.		Membrane-bound sac, involved in the storage of water, salts and sugar. Helps keep the shape of the cell.
6.		Site of photosynthesis in green plants.
7.		Site of energy (ATP) production in aerobic respiration.
8.		Site of protein synthesis.
9.		Circular piece of DNA.









Learning intention

We are learning how to describe structural differences of the cell wall in plant, fungal and bacterial cells.

Cell wall structure

Plant cells, fungal cells and bacterial cells all have a cell wall.

Plant cell walls are made of a material called _____.

During photosynthesis plants make glucose, which is joined together to make this strong, fibrous substance that strengthens the cell wall.

Fungal and bacterial cells also have a cell wall. However, their cell walls are composed of a material that is _____ to plant cell walls.

Hint: You don't need to know the chemical composition of fungal and bacterial cell walls, only plant cell walls.

Learning intention

We are learning how to perform calculations relating to magnification and cell size.

Magnification

A microscope makes an object appear larger than that it actually is. The object is not really larger it has just been magnified. The magnification can be altered on a microscope to make objects appear much larger than they actually are.

Part of Microscope	Magnification
Eye piece	X
Low power objective lens (red)	X
Medium power objective lens (yellow)	X
High power objective lens (blue)	X

Look carefully at a microscope and then complete the table below to show the magnification of the different parts of the microscope.

The total magnification of each lens is calculated using a simple formula.

Total magnification = Eyepiece lens magnification X objective lens magnification

Use the formula to work out the total magnification of your microscope. Remember you have used the same eyepiece each time.

Power	Eyepiece lens magnification	Objective lens magnification	Total magnification
Low	X 10		
Medium		X10	
High			X400

1. A microscope has a choice of three objective lenses. The total magnification depends on the magnification of the eyepiece lens and the objective lens. Complete the table below to show the magnifications of the microscope.

Eyepiece lens magnification	Objective lens magnification	Total magnification
X7	X10	X70
X7		X140
	X40	X280

2. The magnification of a microscope is calculated using the following formula.

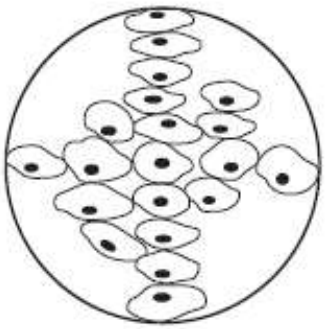
Total magnification= eyepiece lens magnification X objective lens magnification

Use the formula to complete the following table.

The same eyepiece was used each time.

Power	Eyepiece lens magnification	Objective lens magnification	Total magnification
Low	X12	X4	
Medium		X10	
High	X12		X480

3. The diagram shows a group of cells as seen under a microscope. The field of view was 2mm in diameter.



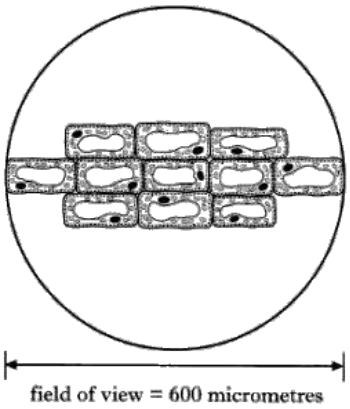
Calculate the average length and width of the cells.

Space for calculation

Average length _____mm

Average width _____mm

4. The diagram shows some plant cells as they appear when viewed under a microscope.



Calculate the average length of the cells.

Space for calculation

_____micrometres

5. The table below gives information about the size of some cells.

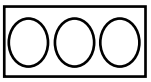
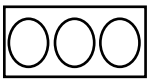
Type of cell	**Length of cell (micrometres)**
Red blood cell	7
Human skin cell	20
Elodea leaf cell	80
Onion epidermal cell	100

Calculate the length of an onion epidermal cell in millimetres.

(1 millimetre = 1000 micrometres)

Space for calculation

_____millimetres

I can:	
Identify the following structures in animal cells; nucleus, cell membrane, cytoplasm, mitochondria and ribosomes.	
Identify the following structures in plant cells; nucleus, cell membrane, cytoplasm, cell wall, sap vacuole, chloroplasts, mitochondria and ribosomes.	
Identify the following structures in fungal cells (e.g yeast); nucleus, cell membrane, cytoplasm, cell wall, vacuole, mitochondria and ribosomes.	
Identify the following structures in bacterial cells; cell membrane, cytoplasm, cell wall, ribosomes and plasmids.	
Compare the structural similarities and differences of animal, plant, fungal and bacterial cells.	
State the functions of the following structures in animal cells; nucleus, cell membrane, cytoplasm, mitochondria and ribosomes	
State the functions of the following structures in plant cells; nucleus, cell membrane, cytoplasm, cell wall, sap vacuole, chloroplasts, mitochondria and ribosomes.	
State the functions of the following structures in fungal cells (e.g yeast); nucleus, cell membrane, cytoplasm, cell wall, vacuole, mitochondria and ribosomes.	
State the functions of the following structures in bacterial cells; cell membrane, cytoplasm, cell wall, ribosomes and plasmids.	
State that in plant cells the wall is made of cellulose, but in fungal and bacterial cells the walls are composed of a different material.	
Calculate cell sizes based on known magnification.