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Name : _____

Date:

Lower Secondary Sciences: Cells

1. <u>Cells</u>

- Cells are the **basic building blocks of life**.
 - They take in nutrients from food and convert them into energy.
 - They can also carry out specialised functions and reproduce.
- Living organisms can be classified into **unicellular** (with only one cell) and **multicellular** (with many cells).

Unicellular	Multicellular
Amoeba, Protozoa, Algae and Yeast	Animals, Fungi and Plants

The size of animal cells and plant cells is very small, in the range of 1 to 100 micrometres (μm). They can only be visible with the help of a microscope.

A) Understanding Animal Cells and Plant Cells

- All animal cells **do not have a cell wall**.
- The basic structure of a typical animal cell and a plant cell:



• The table below shows the function for each organelle:

Organelle	Function	
Cell membrane	• A semi-permeable structure which controls the movement of materials in and out of the cell	
Nucleus	 Controls all the activities of a cell Contains chromosomes which store heredity materials which pass from parents to offspring Chromosomes contain many genes. which are made up of DNA. 	
Vacuole	• Contains a membrane-enclosed fluid which stores food, water and nutrients needed by the cell.	
Cytoplasm	• Made up of jelly-like material which allows various chemical reactions to take place.	
Cell Wall*	• Made up of cellulose which provides support and maintains regular shape of the cell	
Chloroplast*	• Contains chlorophyll to absorb light energy for photosynthesis	

*only present in plant cells

- In animal cells and plant cells, **protoplasm** (cytoplasm and nucleus) refers to the 'living **part of the cell**' that is surrounded by the cell membrane.
- B) Differences between an animal cell and a plant cell

Organelle/Characteristics	Animal cell	Plant cell
Cell wall	Absent	Present
Vacuala	Small hut many	Big but one
vacuore	Sman out many	(central vacuole)
Chloroplast	Absent	Present
Shape	Irregular	Regular

2. Differentiation of Cells

• In multicellular organisms, cells are specialized in performing different functions in order for organisms to coordinate and survival better.

Specialised cell		Specialised feature and function
Red Blood Cell	Side View	 Contains haemoglobin to transport oxygen. No nucleus (to make more room for haemoglobin). Biconcave shape to maximize surface area to volume ratio for oxygen
	Top View	diffusion.
Muscle Cell	Skeletal muscle	Striated appearance.Enable the movement of body.
Sperm		 Contain genetic materials (DNA) for hereditary.
Egg		• Considered as haploid cells.
Nerve cell	John K	 Consist of basic cell body with thread- like structures. Carry electrical messages around the body for action and reaction responses.
Bone cell		• Maintains the bone tissue so that the bones can support the body.

<u>In animals</u>

<u>In plants</u>

S	pecialised cell	Specialised feature and function
Root hair cell		 Elongated structure to increase the surface area of the cell for absorbing water effectively Does not contain chloroplasts as it does not carry out photosynthesis.
Guard cells		• Controls the pores of stomata for gaseous exchange
Xylem vessel	AXYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	• Non-living structure that contains lumen for transporting water and mineral salts.

3. Division of labour

- Division of labour refers to refers to the specialised functions of cells where cells have a particular function. This ensures the efficient and smooth functioning of the multicellular organisms so that they can survive.
- The levels of organisation of cells can be summarized in the following sequence:

Level	Description		
Cell	• Each cell has a specific function in the body of an organism.		
Tissue	 A group of cells performing similar function. Examples: Blood, muscle and skin tissue. 		
Organ	 A group of tissues performing similar functions. Examples: Heart, liver, stomach, lungs. 		
Organ system	 A group of organs linked together to perform a particular function(s). Examples: Digestive system, Circulatory system, Respiratory system, 		
Organism	 A group of systems working in a systematic and coordinated way to allow the organism to survive. Examples: Animals and plants 		

4. Using a Microscope*

- The light microscope makes an object appear bigger by magnifying it. It is useful to see objects which are not visible to the naked eye.
- The eye piece of a microscope contains the ocular lens which has a 10 times $(10\times)$ magnification and the objective lens 3 magnifications: scanning, low and high.
- Total magnification = Magnification of ocular lens × objective lens

	Magnification		T-4-1
	Ocular	Objective lens	l otal magnification
Scanning	10×	4×	40×
Low power	10×	10×	100×
High power	10×	40×	400×

• The table below shows the important parts and their functions:



Part	Function	
Coarse focus knob	• Focus the specimen.	
Fine focus knob	• Fine tune the focus to give a clear image of the specimen.	
Eye piece	• Allow the user to look through. It magnifies the specimen $10 \times$.	
Objective lens	• Allow the users to magnify the specimen to the greatest power.	
Stage	• A flat platform where the slide of the specimen is placed.	
Mirror	• Acts as light source to reflect light shining through the specimen.	



Name : _____

Date:

Cells (Worksheet 2)

Section A: MCQ

1. What is the function of the type of cell shown in the diagram below?



- A. makes strong bones to support the body
- B. contracts and relaxes to help humans move
- C. transports oxygen from the lungs to the body
- D. removes waste materials from the cells
- 2. Which of the following is not a reason why humans have different types of cells in their body?
 - A. Each type of cell can carry out specific function in the body.
 - B. Each type of cell can take over the function of other cells in the body.
 - C. Different types of cells need to work together to help body function efficiently.
 - D. There is a division of labor among the different cells in the body.
- 3. Which row matches the part of the cell to its function?

	part	function
А	cell membrane	contains genetic material
В	cell membrane	produces energy for the cell
С	cytoplasm	contains water and food materials
D	cytoplasm	controls all cell activities

- 4. Which of the following describes the function of bone cells?
 - A. They provide us with the flexibility of enabling movement of our bodies.
 - B. They allow us to feel pain by sending signals to the brain.
 - C. They transport oxygen around the body.
 - D. They make up the structure that supports our body.
- 5. The purpose of the cell membrane is to:
 - A. control activities in the cell
 - B. control materials entering and leaving the cell
 - C. multiply and pass genes to the next generation
 - D. provide a medium for cell reactions to occur
- 6. Which specialized cell is correctly matched to its function?

	cell	function
А	bone cell	sends and receives signals
В	brain cell	supports the body
С	nerve cell	helps the body move
D	red blood cell	transports oxygen around the body

7. Which of the following is **not** a characteristic of the cell shown in the diagram?



- A. It is biconcave.
- B. It contains a nucleus.
- C. It is circular in shape.
- D. It contains a red pigment.

Section B: Structured Questions [10 m]

1. The diagram shows an animal cell and a plant cell.



- (a) Label on the diagram the names of the parts of the cells. [2]
- (b) Compare and describe one similarity and one difference between an animal cell and a plant cell. [2]
- (c) Define the term tissue.

[1]

2. Fig. 2.1 shows some cells found in the blood of humans.



Fig 2.1

 (d) State the function of these cells.
 [1]

 (e) Explain the function of the nucleus in a cell.
 [1]

 (f) The cells do not have nuclei when they mature. Explain the significance of this adaptation.
 [1]

 (g) Describe and explain another adaptation of these cells.
 [2]