

# Topic 1

## BIODIVERSITY AND CLASSIFICATION OF MICRO-ORGANISMS

<b>MY WORKBOOK</b>
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During this topic we will be focusing on the following:

1. Introduction
  2. Biodiversity of micro-organisms: viruses; bacteria; protists and fungi.
  3. Symbiotic relationships
  4. Effect and Management of diseases
  5. Immunity
  6. Treatment and uses of micro-organisms
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## DAY 1:

► Complete page 2 of your Workbook using the Teacher's guidelines slides 3 and 4.

DATE:

# 1. Introduction

In Grade 10 you have studied the five-kingdom system.

According to this system all living organisms are divided into five kingdoms:

1. \_\_\_\_\_: Prokaryotic (without a true nucleus)
2. \_\_\_\_\_
3. \_\_\_\_\_: Eukaryotic (with a true nucleus)
4. \_\_\_\_\_
5. \_\_\_\_\_

# 2. Biodiversity and classification of micro-organisms

In this topic we will be looking at organisms that's so small that it cannot be seen with the naked eye.

2.1 \_\_\_\_\_

2.2 \_\_\_\_\_

2.3 \_\_\_\_\_

2.4 \_\_\_\_\_

Micro-organisms are the most abundant organisms on earth and are found in huge numbers in \_\_\_\_\_ environment.

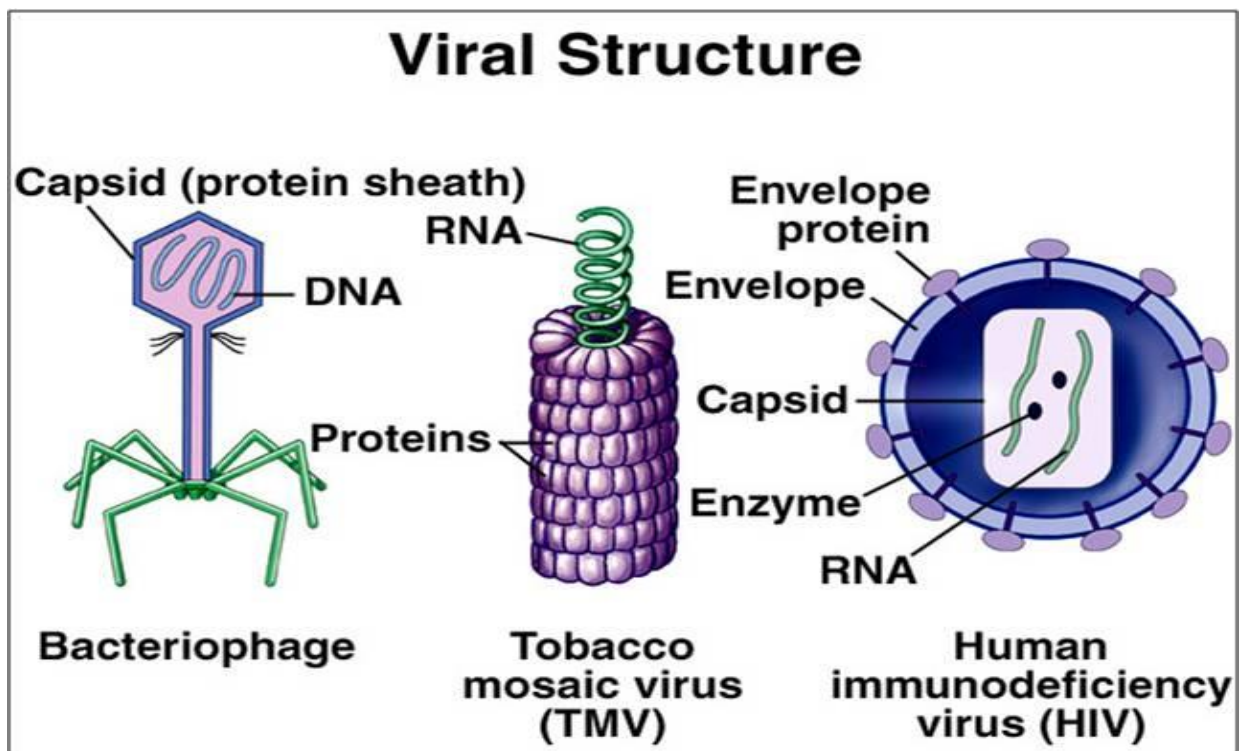
Favourable conditions for the growth and multiplication of micro-organisms include \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.

► Complete page 3 of your Workbook using the Teacher's guidelines slide 5.

## 2.1 VIRUSES

### BASIC STRUCTURE:

- ❖ Very \_\_\_\_\_ and \_\_\_\_\_ in composition.
- ❖ Consist of a central \_\_\_\_\_ and a \_\_\_\_\_.
- ❖ Viruses can infect \_\_\_\_\_, \_\_\_\_\_ or \_\_\_\_\_ cells.
- ❖ Contain either \_\_\_\_\_ or \_\_\_\_\_ (never both).
- ❖ Are acellular and have no nucleus (prokaryotic); cytoplasm or organelles.
- ❖ The shape varies from \_\_\_\_\_, \_\_\_\_\_ to more \_\_\_\_\_ shapes.



»Activity 1: Please draw the structure of a Bacteriophage using page 22 of your textbook.

**END OF DAY 1**

**HOW DO YOU FEEL ABOUT THE WORK OF DAY 1?** 😊 or 😞

**IF YOU DO NOT FEEL COMFORTABLE WITH THE WORK, CONSIDER TO WORK THROUGH THE CONTENT AGAIN.**

## DAY 2:

► Complete page 5 of your Workbook using the Teacher's guidelines slides 7 - 9.

DATE:
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### CHARACTERISTICS:

- \_\_\_\_\_.
- \_\_\_\_\_.
- They use nucleic acid and ribosomes of \_\_\_\_\_ for reproduction.
- \_\_\_\_\_.
- \_\_\_\_\_.
- Most viruses are \_\_\_\_\_ and cause diseases.

**NB: In an exam you may be asked to explain why viruses are not considered to be living organisms.**

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Reproduction in Viruses takes place in two phases:

1. \_\_\_\_\_

OR

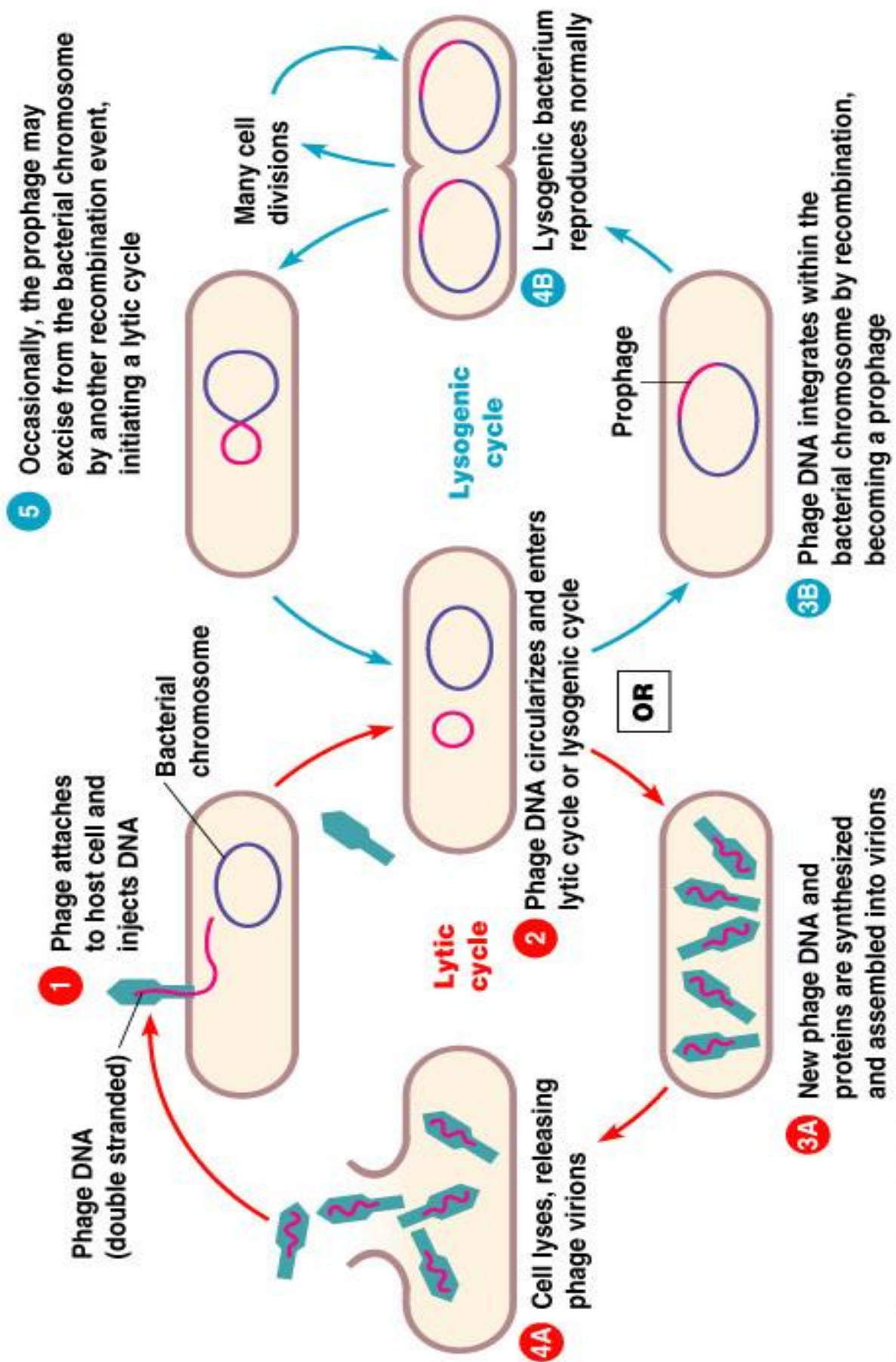
2. \_\_\_\_\_

#### 1.Lytic cycle:

Viruses enter a cell and \_\_\_\_\_ and then make the cell \_\_\_\_\_, releasing \_\_\_\_\_ viruses.

#### 2.Lysogenic cycle:

Viruses enter a \_\_\_\_\_ with their \_\_\_\_\_ cells. Their nucleic acid replicates at the same \_\_\_\_\_ as the host cells.



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## »Activity 2: Viruses

1.Name the seven processes that characterise living organisms.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (7)

2. Explain why viruses are considered as 'particles' and not regarded as living organisms.

(2)

3. Give the biological term for each of the following:

3.1 Viruses which attack bacteria. \_\_\_\_\_(1)

3.2 Organisms which cause diseases. \_\_\_\_\_(1)

3.3 The name given to the protein coat surrounding the nucleic acid in viruses.

\_\_\_\_\_ (1)

3.4 A cell that does not have a nuclear membrane. \_\_\_\_\_(1)

4. Give four diseases caused by viruses.

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(4)

[17]

**Activity 2: My mark \_\_\_\_\_ out of 17**

## END OF DAY 2

HOW DO YOU FEEL ABOUT THE WORK OF DAY 2? 😊 or ☹️

**IF YOU DID NOT RECEIVE 50% FOR ACTIVITY 2 CONSIDER WORKING THROUGH THE CONTENT AGAIN.**

### **DAY 3:**

► Complete page 8 of your Workbook using the Teacher's guidelines slides 11 and 12.

DATE:
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## 2.2 BACTERIA

### **BASIC STURCTURE:**

- \_\_\_\_\_ and occur as single cells, filaments or colonies.
- Surrounded by a \_\_\_\_\_ that consists of polysaccharides, proteins and lipids.
- Some bacteria (especially those that cause diseases – \_\_\_\_\_) the cell wall is surrounded by a \_\_\_\_\_ or capsule which protects the bacterial cell from enemies (i.e. immune cells)
- A plasma membrane (cell membrane) which encloses the cytoplasm occurs directly below the cell wall.
- \_\_\_\_\_ (vacuole; plastids) are found but you do come across ribosomes.
- \_\_\_\_\_
- The genetic material (DNA) is concentrated in a chromatin body known as the \_\_\_\_\_.
- Some bacteria move in a liquid by means of long; thread like structures called \_\_\_\_\_ (singular: flagellum)

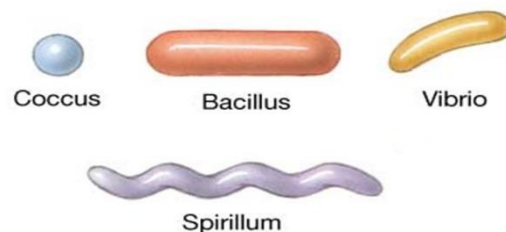


» **Activity 3: Draw the structure of a Bacteria cell by using slide 14 of your teachers' guidelines**



Bacteria occur in various **shapes**:

- ❖ Rod shaped (Bacillus)
- ❖ Round/Spherical (Coccus)
- ❖ Spiral shaped (Spirillum)
- ❖ Comma-shaped (Vibrio)



**END OF DAY 3**

**HOW DO YOU FEEL ABOUT THE WORK OF DAY 3?** 😊 or ☹️

**IF YOU DO NOT FEEL COMFORTABLE WITH THE WORK, CONSIDER TO WORK THROUGH THE CONTENT AGAIN.**

#### DAY 4:

► Complete page 10 of your Workbook using the Teacher's guidelines slides 18 and 19.

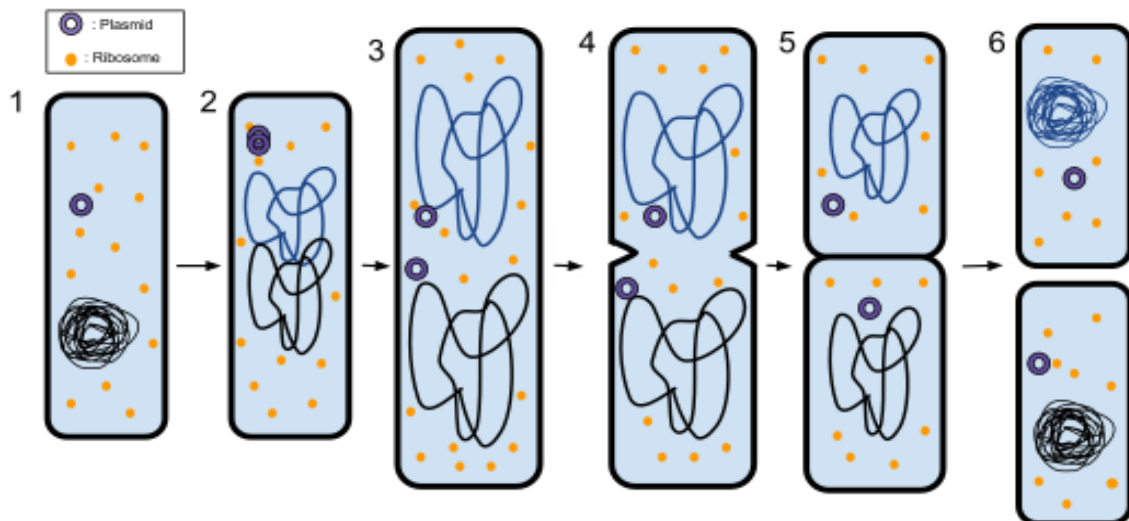
DATE:

#### CHARACTERISTICS:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- They are capable of the following life functions: nutrition; death; growth; reproduction; excretion; respiration; movement
- In favourable conditions they can reproduce asexually by means of \_\_\_\_\_.
- In unfavourable conditions they become \_\_\_\_\_ and turn into \_\_\_\_\_ until the conditions are favourable again.

Binary Fission: (\_\_\_\_\_)

Cell duplicates its genetic material (DNA) and divides into two identical parts – new cells



► Complete page 11 of your Workbook using the Teacher's guidelines slide 20.

### **CHARACTERISTICS CONTINUE:**

- Some bacteria are \_\_\_\_\_ and produce their own organic substances by \_\_\_\_\_ or by chemosynthesis.
- The majority of bacteria are \_\_\_\_\_ and cannot produce their own organic substances:
- Three types:
  1. \_\_\_\_\_ – obtain food from living organisms
  2. \_\_\_\_\_ – obtain food from dead organic material
  3. \_\_\_\_\_ – obtain food from a symbiotic relationship with another organism (both benefit from the relationship)

### **»Activity 4: Bacteria**

A certain bacterium reproduces every 30 minutes. The table below shows the number of bacteria if each one divides every half hour.

1. Complete the table below.

TIME AFTER START (hours)	0	½	1	1½	2	2½	3	3½	4	4½
TOTAL NUMBER	1	2	4	8	16					

(5)

2. How many bacteria will there be after 6 hours? \_\_\_\_\_ (1)

3. Give the name for each of the following:

(a) Structure used for movement in bacteria. \_\_\_\_\_ (1)

(b) Asexual reproduction in bacteria. \_\_\_\_\_ (1)

(c) Name of the slime capsule. \_\_\_\_\_ (1)

4. Provide a function of the slime capsule. \_\_\_\_\_

(2)

[11]

Activity 4: My mark \_\_\_\_\_ out of 11.

#### END OF DAY 4

HOW DO YOU FEEL ABOUT THE WORK OF DAY 4? 😊 or 😞

IF YOU DID NOT RECEIVE 50% FOR ACTIVITY 4 CONSIDER WORKING THROUGH THE CONTENT AGAIN.

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#### DAY 5:

► Complete page 12 of your Workbook using the Teacher's guidelines slide 21.

DATE:

## 2.3 Protists

### BASIC STRUCTURE:

Protists can be divided into three main groups according to their basic structures:

1. \_\_\_\_\_: animal-like; unicellular, heterotrophic organisms

*Amoeba*



*Paramecium*

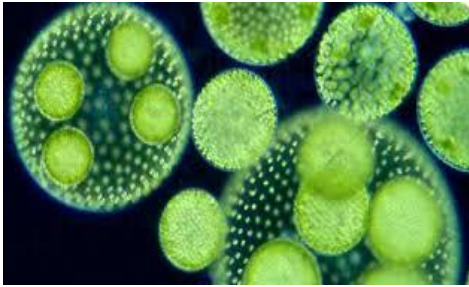


► Complete page 13 of your Workbook using the Teacher's guidelines slides 22 and 23.

2. \_\_\_\_\_: plant-like, uni- or multicellular, autotrophic organisms

Uni-cellular:

*Diatom*



Multi-cellular:

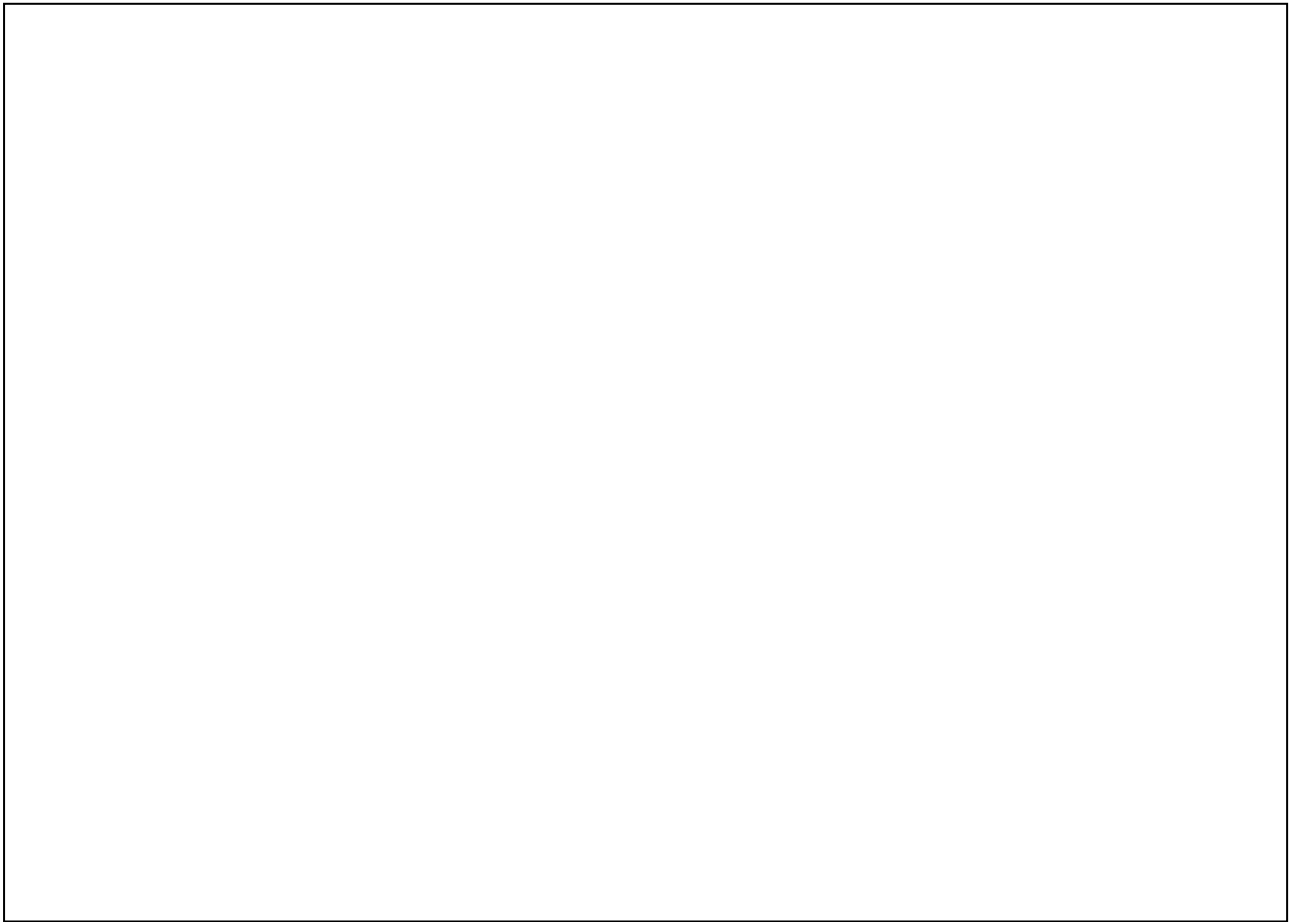
*Spirogyra*



3. \_\_\_\_\_: fungus-like, multicellular, heterotrophic organisms.



» Activity 5: Draw the structure of a *Amoeba proteus* sp. by using slide 24 of your teachers' guidelines



► Complete page 14 of your Workbook using the Teacher's guidelines slide 25.

**CHARACTERISTICS:**

- \_\_\_\_\_  
\_\_\_\_\_
- \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- \_\_\_\_\_  
\_\_\_\_\_  
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- \_\_\_\_\_  
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- \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

### END OF DAY 5

HOW DO YOU FEEL ABOUT THE WORK OF DAY 5? 😊 or 😞

IF YOU DO NOT FEEL COMFORTABLE WITH THE WORK, CONSIDER TO  
WORK THROUGH THE CONTENT AGAIN.

### **DAY 6:**

► Complete page 16 of your Workbook using the Teacher's guidelines slide 26.

DATE:

## 2.4 Fungi

### **BASIC STRUCTURE:**

Fungi are divided into two main groups, due to their structures:

1. \_\_\_\_\_: the fleshy fungi with clear visible fruiting bodies known as mushrooms

2. \_\_\_\_\_: unicellular yeasts or the multicellular thread-like moulds (bread mould – *Rhizopus*); some parts can be seen with the eye but other parts can only be seen with a microscope

» **Activity 6: Draw the structure of a *Rhizopus*. (fungi) by using page 32 in your textbook.**



► Complete page 17 of your Workbook using the Teacher's guidelines slides 28 and 29.

**CHARACTERISTICS:**

- \_\_\_\_\_ cells
- Cells are arranged in thread-like \_\_\_\_\_.
- The hyphae often form masses of tissue called, \_\_\_\_\_.
- The cell walls of fungi usually contain \_\_\_\_\_, a fibrous carbohydrate.
- They reproduce asexually via \_\_\_\_\_ when conditions are favourable, OR \_\_\_\_\_ in unfavourable conditions.

Summary of structural characteristics of the four groups of micro-organisms.

GROUP	STRUCTURAL DIFFERENCES
Viruses	_____ _____
Bacteria	_____ _____
Protista	_____ _____ _____
Fungi	_____ _____

**END OF DAY 6**

**HOW DO YOU FEEL ABOUT THE WORK OF DAY 6?** 😊 or 😞

**IF YOU DO NOT FEEL COMFORTABLE WITH THE WORK, CONSIDER TO WORK THROUGH THE CONTENT AGAIN.**

**DAY 7:**DATE: 





» **Activity 7: Summary of the basic structure and general characteristic of micro-organisms. Use your textbook page 85 to complete the table.**

	<b>VIRUSES</b>	<b>BACTERIA</b>	<b>PROTISTA</b>	<b>FUNGI</b>
General structure				
Size				
Prokaryote of eukaryote				
Unicellular of multicellular				
Specialised tissue present				
Reproduction				
Feeding				
Environment				

► Complete page 19 of your Workbook using the Teacher's guidelines slides 30 - 32.

## 3. Symbiotic Relationships

Micro-organisms plays a role in different areas in the biosphere:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

### (1) Role as producers in food chains:

Autotrophic bacteria and protists produce \_\_\_\_\_ organic nutrients by means of \_\_\_\_\_.

∞ \_\_\_\_\_ link in food chain = \_\_\_\_\_.

### (2) Role as decomposers:

Decomposition bacteria, fungi and protists break down dead \_\_\_\_\_.

∞ Water, carbon dioxide, ammonia and heat energy are released \_\_\_\_\_ into the soil.

### (3) Role in the Nitrogen cycle:

Free living soil bacteria and nodule bacteria convert free \_\_\_\_\_ into \_\_\_\_\_ and makes it accessible to plants.

∞ \_\_\_\_\_ bacteria = release nitrates in soil.

∞ \_\_\_\_\_ bacteria = release nitrates in atmosphere.

### (4) Marinating balance between oxygen and carbon dioxide:

Autotrophic bacteria and protists use carbon dioxide and release \_\_\_\_\_.

∞ \_\_\_\_\_ = responsible for more than 50% of oxygen that is produced by photosynthesis.

## END OF DAY 7

HOW DO YOU FEEL ABOUT THE WORK OF DAY 7? 😊 or 😞

IF YOU DO NOT FEEL COMFORTABLE WITH THE WORK, CONSIDER TO WORK THROUGH THE CONTENT AGAIN.

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## DAY 8

► Complete page 20 of your Workbook using the Teacher's guidelines slide 33.

DATE:
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# 4. Effect and Management of diseases

Each group of Micro-organisms has many different diseases it may cause:

- \_\_\_\_\_: rabies; HIV/Aids; influenza
- \_\_\_\_\_: cholera, TB; anthrax; Blight
- \_\_\_\_\_: Malaria
- \_\_\_\_\_: Thrush; ringworm; athlete's foot; Rusts

**»Activity 8: Effect and management of diseases (Use your textbook page 39 – 65)**

Disease	Cause	Method of spread	Treatment	Textbook number
VIRUSES				
Rabies				39 - 40
AIDS				41 - 43
Influenza				45 – 47
BACTERIA				
Cholera				48 - 49
Tuberculosis				51- 54
Anthrax				55 – 57
PROTISTS				
Malaria				58 - 61
FUNGI				
Thrush				65

## END OF DAY 8

HOW DO YOU FEEL ABOUT THE WORK OF DAY 8? 😊 or 😞

IF YOU DO NOT FEEL COMFORTABLE WITH THE WORK, CONSIDER TO WORK THROUGH THE CONTENT AGAIN.

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### DAY 9

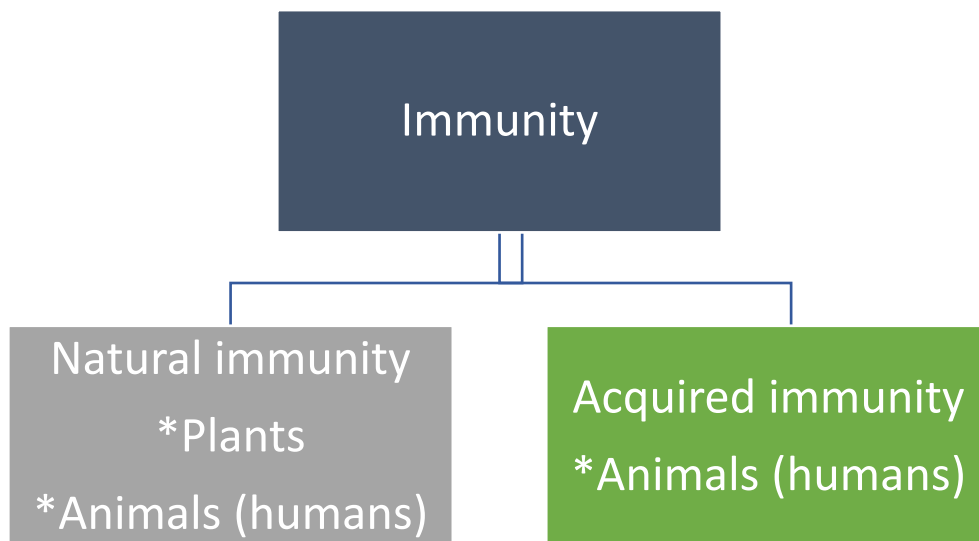
► Complete page 22 of your Workbook using the Teacher's guidelines slides 34 and 35.

DATE:

## 5. Immunity

DEFINITION: \_\_\_\_\_

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### Natural Immunity:

- \_\_\_\_\_ of defence
- Not aimed at \_\_\_\_\_ pathogen
- Can destroy \_\_\_\_\_ of pathogens
- Occurs because the body/plant is \_\_\_\_\_ immune to illness.

► Complete page 23 of your Workbook using the Teacher's guidelines slides 36 - 38.

### Acquired Immunity:

- Acquired immunity actively \_\_\_\_\_ pathogens
- Store a \_\_\_\_\_ of response
- Gets acquired once it has suffered through infection and produced its own antibodies in response to proteins, called \_\_\_\_\_ on the surface of the pathogens.
- \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

### TWO types of leucocytes:

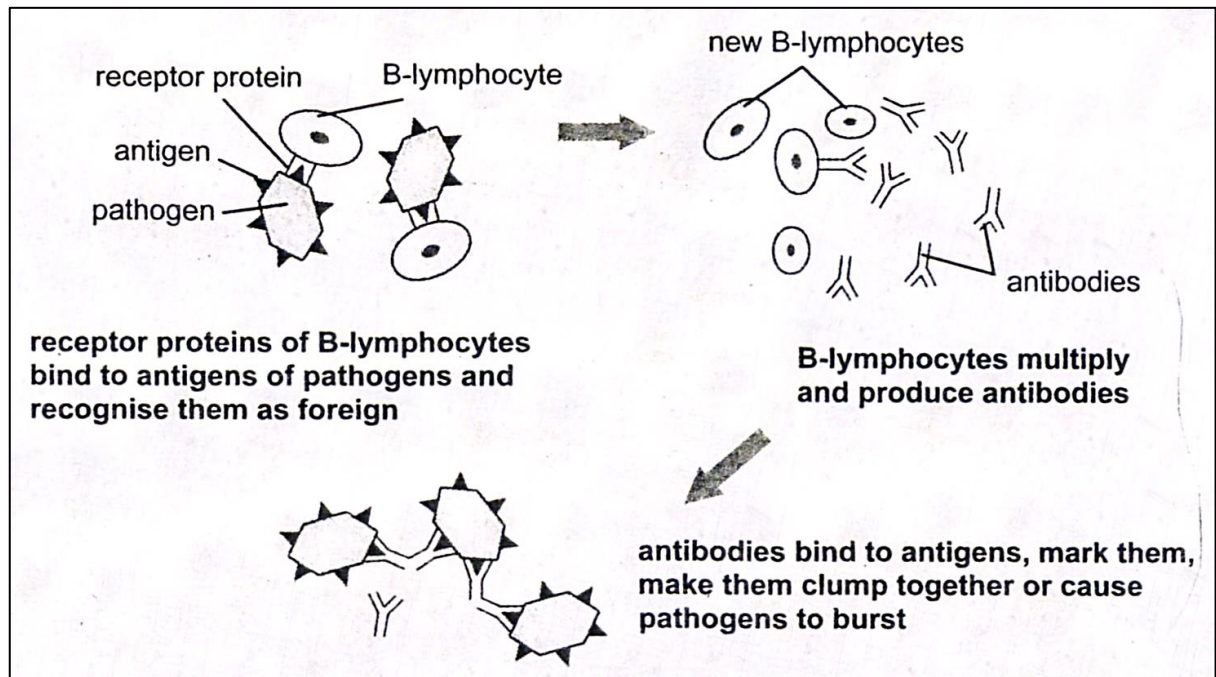
- ❖ \_\_\_\_\_ = B-lymphocytes and T-lymphocytes
- ❖ \_\_\_\_\_

### LYMPHOCYTES:

#### B-lymphocytes:

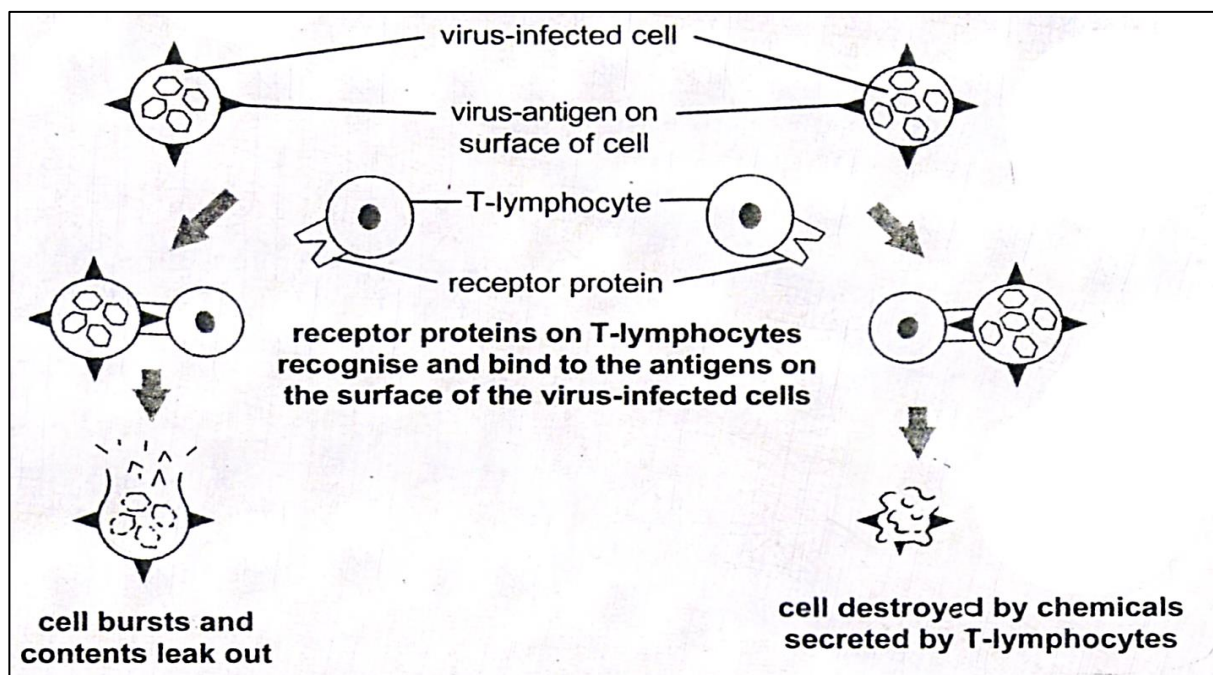
- Have receptors on their surface which attach to a \_\_\_\_\_.
- It \_\_\_\_\_ and produces millions of \_\_\_\_\_ B-lymphocytes and it's released into the \_\_\_\_\_. (\_\_\_\_\_)
- The antibodies bind to the \_\_\_\_\_ antigens. (found on the surface of the pathogen)
  - they mark the pathogens for ingestion by \_\_\_\_\_.
  - cause the pathogen to \_\_\_\_\_ together, which \_\_\_\_\_ them.
  - this causes the pathogens to \_\_\_\_\_.

► Complete page 24 of your Workbook using the Teacher's guidelines slides 39 - 41.



### T-lymphocytes:

- \_\_\_\_\_ and \_\_\_\_\_ the body's cells that are infected by the pathogen.
- Pathogen \_\_\_\_\_ inside body cells = antibodies can't reach them.
- But the T-lymphocytes can \_\_\_\_\_ the antigens on the outside of the infected body cell and then \_\_\_\_\_ the whole cell and in that manner the pathogen as well.





► Complete page 25 of your Workbook using the Teacher's guidelines slides 42 - 44.

**Please note:**

Some B- and T-lymphocytes become \_\_\_\_\_ that remains in the blood.

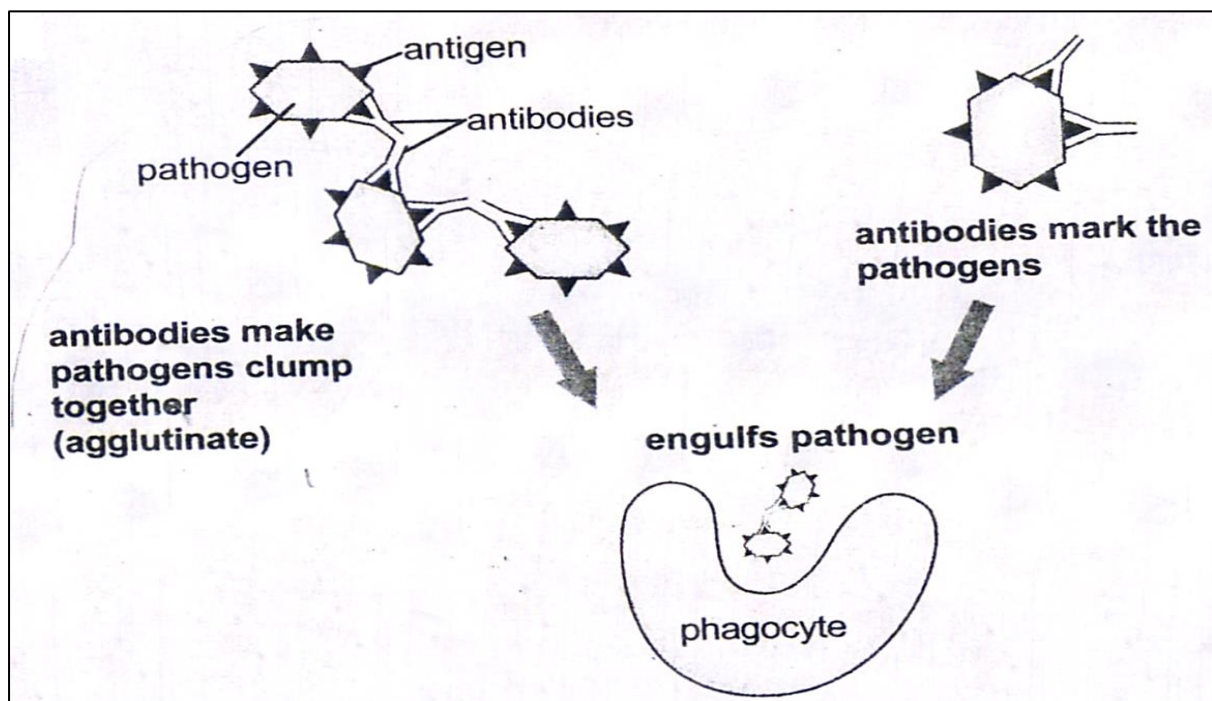
When the body is infected by the \_\_\_\_\_ pathogen, the memory cells will \_\_\_\_\_ and \_\_\_\_\_ more antibodies.

This response will be \_\_\_\_\_ than the original infection and more \_\_\_\_\_.

The pathogen will be killed \_\_\_\_\_ infection and the person is now \_\_\_\_\_ to that specific pathogen.

**PHAGOCYTES:**

- Large white blood cells that can \_\_\_\_\_.
- Are produced in the \_\_\_\_\_.
- The cells \_\_\_\_\_ pathogens by the process of phagocytosis.
- Antibodies, produced by B-lymphocytes, facilitate the process of phagocytosis.



## END OF DAY 9

HOW DO YOU FEEL ABOUT THE WORK OF DAY 9? 😊 or 😞

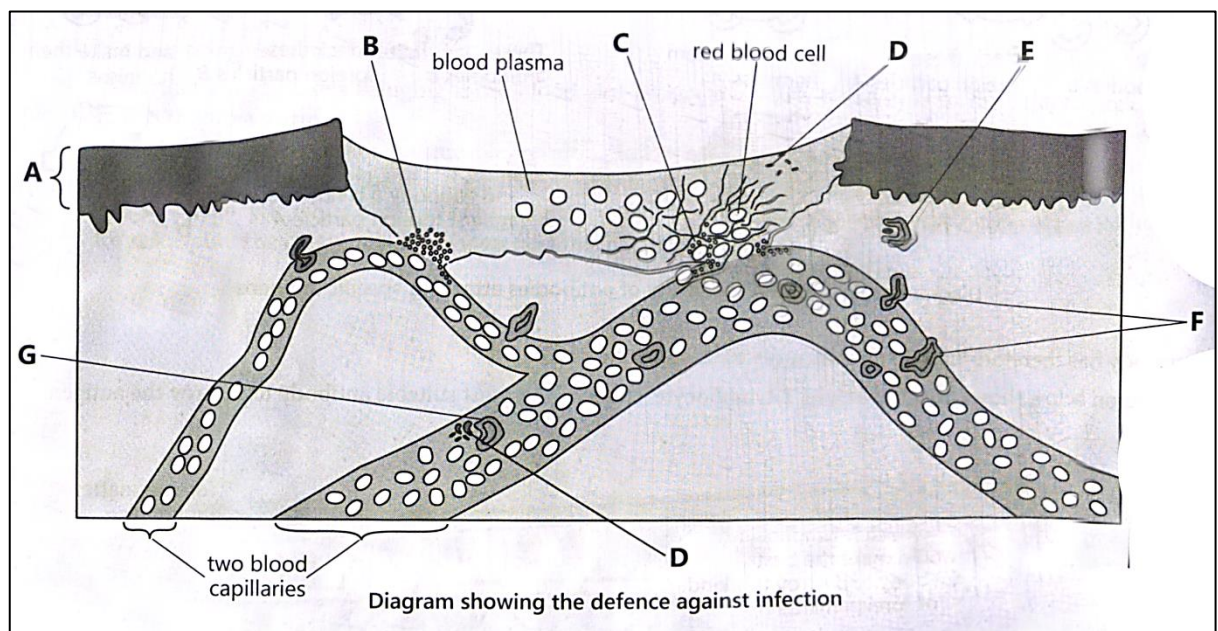
IF YOU DO NOT FEEL COMFORTABLE WITH THE WORK, CONSIDER TO WORK THROUGH THE CONTENT AGAIN.

## DAY 10

DATE:

### »Activity 9: Immune response.

Examine the diagram below which shows an area of skin that has been damaged and two capillaries are broken open and answer the questions that follow.



Match the letters with the statements. Write the letter from the diagram next to the correct statement.

- (1) \_\_\_\_\_ Some bacteria have entered the wound.
- (2) \_\_\_\_\_ Phagocytic cell engulfing a bacterium.
- (3) \_\_\_\_\_ Small wound plugged with platelets clumping together.
- (4) \_\_\_\_\_ Bacteria (clumped together by antibodies) and about to be engulfed by phagocytic cell.
- (5) \_\_\_\_\_ Network of fibres across the wound trapping red blood cells.
- (6) \_\_\_\_\_ Epidermis of skin (first line of defence).
- (7) \_\_\_\_\_ Phagocytic white blood cells escaping from a capillary.

► **Complete page 27 of your Workbook using the Teacher's guidelines slide 45.**

## 6. Treatment and use of micro-organisms

### **Treatment:**

Drugs that are used against micro-organism are called antimicrobial drugs.

Antibiotics are used to treat only:

- Bacterial infections
- Infections caused by Protista for example: Malaria
- Fungal infections

### **Please note:**

Antibiotics are \_\_\_\_\_ and should never be used in the treatment of the common cold or influenza. However, doctors will use antibiotics if there is a secondary bacterial infection.

### **Use of Micro-organisms**

» **Activity 10: (Self Study) Please use your textbook page 83 and 84 to read about the use of micro-organisms.**

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## END OF DAY 10

HOW DO YOU FEEL ABOUT THE WORK OF DAY 10? 😊 or 😞

IF YOU DO NOT FEEL COMFORTABLE WITH THE WORK, CONSIDER TO WORK THROUGH THE CONTENT AGAIN.

### DAY 11:

#### » Activity 11: Test yourself: Biodiversity and classification of micro-organisms.

1. One reason that viruses are considered non-living is that they:

A cannot adapt to changes in their environment  
 B cannot reproduce on their own  
 C lack nucleic acids  
 D have a protein coat  
 E have RNA instead of DNA.

DATE:

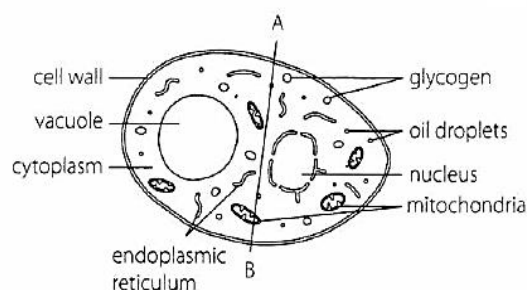
(2)

2. An organism can be placed in the kingdom Monera if it:

A consists of a single cell  
 B has a cell wall  
 C is surrounded by a capsule  
 D lacks a nuclear membrane separating its genetic material from the cytoplasm  
 E causes diseases.

(2)

3. Although fungi were for a long time regarded as plants, biologists now prefer to place them in a separate kingdom. The diagram alongside shows a longitudinal section through a highly magnified yeast cell. Yeast is a fungus and has both plant-like and animal-like features.



- a. Draw a section through the cell at the position of the A-B line in the diagram. Use the same magnification. There is no need to label the parts of the cell.

(2)

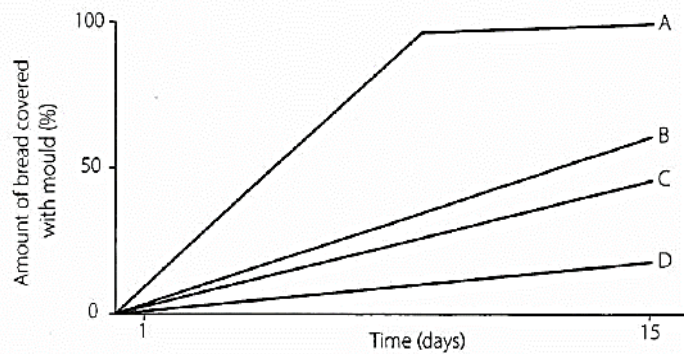
- b. Eight parts are labelled in the diagram. Copy the table below and write the name of the eight parts in the most suitable column.

(8)

Found in both animal and plant cells	Found in plant cells but not in animal cells	Found in animal cells but not in plant cells



4. Joyce left four slices of different kinds of bread uncovered in her cupboard for 15 days. The four breads are: bread made with whole-wheat flour; bread made with rye flour; white bread made with farm flour; and pre-sliced white bread made by a city bakery. All four breads were baked on the same day. Each day, Joyce looks to see how much bread mould is on each of the four slices of bread. Joyce's results are shown alongside. Explain which of the breads A, B, C or D, was the whole-wheat bread and which was the white bread baked at a factory.



5. Describe in detail the effect of one virus-caused disease that you studied, and how it is treated and managed.

(6)

(10)

[Total marks: 30]

Activity 11: My mark \_\_\_\_\_ out of 30

END OF DAY 11

HOW DO YOU FEEL ABOUT THE WORK OF DAY 11? 😊 or 😞

IF YOU DID NOT RECEIVE 50% FOR ACTIVITY 11 CONSIDER WORKING THROUGH THE CONTENT AGAIN.

## **DAY 12:**

**»Use the completed “My workbook”, the Teacher’s guidelines and page 20 – 87 in your textbook to complete the terminology list below.**

- 1.2.1 Very small life forms that cannot be seen with the naked eye.
- 1.2.2 A population of identical micro-organisms all derived by asexual production from a single cell.
- 1.2.3 The process that involves the introduction of a tiny sample of cells into a container of nutrient medium in order to prepare a pure culture.
- 1.2.4 The process of viral multiplication within a host cell.
- 1.2.5 The vegetative filaments found in fungi.
- 1.2.6 The name of the bacterium that causes tuberculosis.
- 1.2.7 Chemicals that activate the immune response.
- 1.2.8 The type of cells that are responsible for antibody-mediated immunity.
- 1.2.9 The type of immunity that is short-lived.
- 1.2.10 An organism that consists of a nucleic acid surrounded by a shield of protein.
- 1.2.11 A disease-causing parasite such as bacteria.
- 1.2.12 A nutritional relationship in which two different organisms live together.
- 1.2.13 The mass of hyphae that constitutes the vegetative part of a fungus.
- 1.2.14 The process by which ammonia and nitrites are converted into nitrates by bacteria.
- 1.2.15 The protein coat of a virus.
- 1.2.16 The cell envelope of a bacterium.
- 1.2.17 The reproductive process in bacteria in which there is partial transfer of DNA from one cell to another.
- 1.2.18 The term used for diseases that are spread from one person or host to another.
- 1.2.19 The term used for a treatment such as an antibiotic that is offered to a person to prevent a disease.
- 1.2.20 The type of immunity that provides protection against a particular pathogen.

DATE:

- 1.2.21** The cells found just below the surface of the skin or membranes in tissues that produce chemicals such as histamines.
- 1.2.22** The type of white blood cells that are involved in specific (acquired) immunity.
- 1.2.23** The type of immunity that is carried out by T-cells.
- 1.2.24** The antibacterial and antiviral substances that are part of immunity in plants.
- 1.2.25** The process that is used on an industrial scale to produce antibacterial drugs.
- 1.2.26** Traditional biotechnology used to produce alcoholic drinks.

**Terminology: My mark \_\_\_\_\_ out of 30**

**END OF DAY 12**

**HOW DO YOU FEEL ABOUT THE WORK OF DAY 12?** 😊 or 😞

**IF YOU DID NOT RECEIVE 50% FOR THE TERMINOLOGY, CONSIDER WORKING THROUGH THE CONTENT AGAIN.**

**END OF TOPIC 1**