

Biology: Life processes are performed at the cellular level

- What is life? What are its applications?
- What is the relationship between micro-organisms and macro-organisms?

Student Objectives

Statement	Beginning	Approaching	Meeting	Succeeding	Exceeding
I can explain the 5 characteristics of life					
I can explain the cell theory					
I can distinguish between prokaryotic and eukaryotic cells					
I can draw, label and describe the parts of a plant and animal (eukaryotic) cell					
I can compare and contrast photosynthesis and cellular respiration					
I know the 4 methods of transmission of infections					
I know the difference between the innate and acquired immune response					
I can explain a known disease					
I can explain disorders in the immune system (allergies + AIDS)					
I can distinguish between vaccinations and antibiotics					
I can explain the impact of epidemics and pandemics on human populations					

Summary of key points:

- Characteristics of Living things: they respire, grow, take in nutrients, produce waste, respond to stimuli and reproduce
- Cell Theory states: the cell is the basic unit of life, all cells come from pre-existing cells, living things are made of one (uni-cellular) or more (multi-cellular) cells
- Cells can be divided into two main groups: pro-karyotic (without membrane bound structures) and eu-karyotic (with membrane bound structures)
- Bacteria are examples of pro-karyotic cells
- Plant and animal cells are examples of eu-karyotic cells
- Organelles are membrane bound structures found in plant and animal cells that carry out specific cellular functions
- Mitochondria undergo cellular respiration and are found in both plant and animal cells
- Chloroplasts undergo photosynthesis and are found in plant cells
- The humans are multi-cellular organisms. We have eleven body systems; one of which is the immune system
- While the cell is the basic unit of life, cells working together make up tissue and an organ consists of several types of tissues working together to perform as specific task
- Organs working together make up a body system
- The Immune System is the body system that provides a barrier to infections and a number of non-specific responses to fight infections
- Different populations have greater immunity to certain infections compared to other populations ie First Nations and Small Pox, African populations and Malaria
- A vaccination can prevent the spread of viral infections
- Antibiotics are only affective against living organisms that cause infections (bacteria)
- An epidemic is a regional outbreak of a specific infection: small pox, measles etc
- A pandemic is a global outbreak of a specific infection: Spanish flu, SARS etc

Biology:

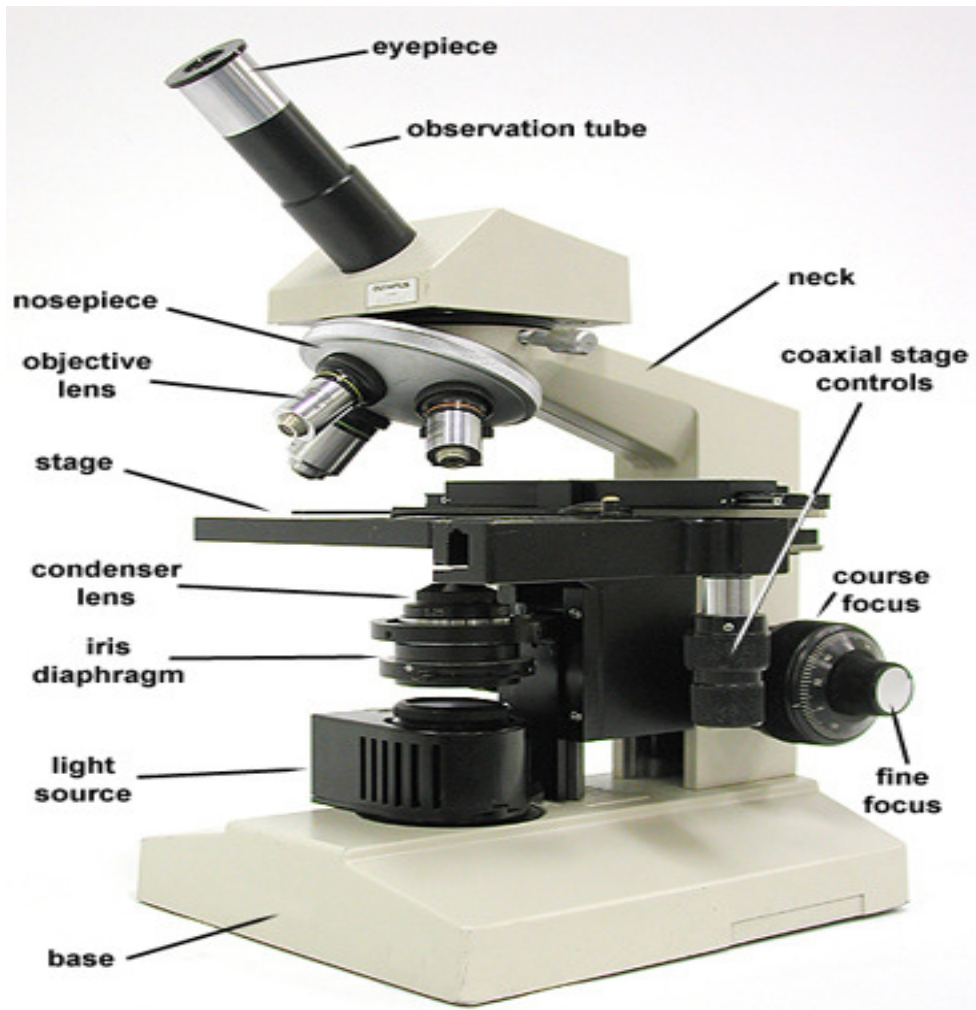
There are 5 characteristics of living things:

1. Living things respond to their environment
2. Living things need energy
3. Living things grow
4. Living things reproduce
5. Living things must get rid of waste

Looking at living things:

- The microscope is used by scientists to observe very small unicellular and multicellular living things.
- Early microscopes were built in the late 1600's.
- **Anton van Leeuwenhoek** was one of the first people to build a microscope.
- He could magnify up to 250x, and used it to observe microscopic living things.
- The compound light microscope has two sets of lenses that magnify an image.
- Each of the objective lenses has a different magnification power.
 - Low power = 4x objective
 - Med power = 10x objective
 - High power = 40x objective
- Multiply the objective by the eyepiece for total magnification.
 - Example: High Power = 40 x 10 = 400 x

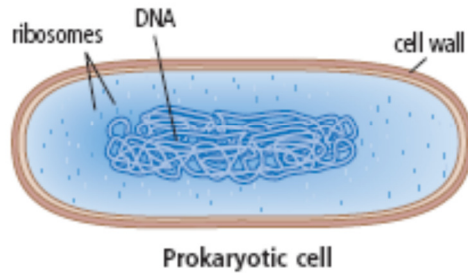
The compound light microscope:



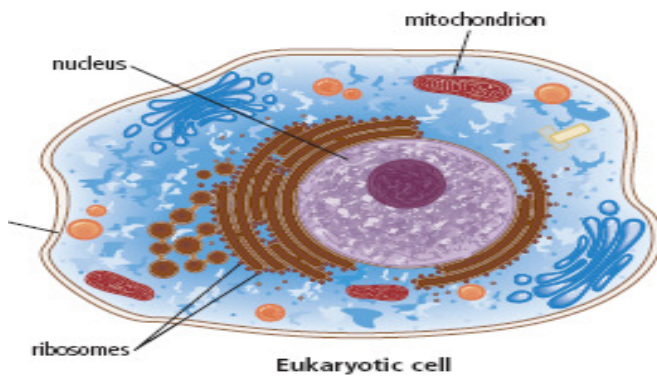
Cell Theory:

1. The cell is the basic unit of life.
2. All organisms are composed of one or more cells.
3. All cells come from other living cells.

Prokaryotic Cell: organelles that are not surrounded by membranes



Eukaryotic Cell: organelles are surrounded by membranes.
Eukaryotic cells are usually larger than prokaryotic cells.



Both animal cells and plant cells are classified as Eukaryotic Cells:

All Eukaryotic cells all have the following structures:

Cell membrane

Cytoplasm

Nucleus

Ribosomes

mitochondria

Endoplasmic reticulum

Vesicles

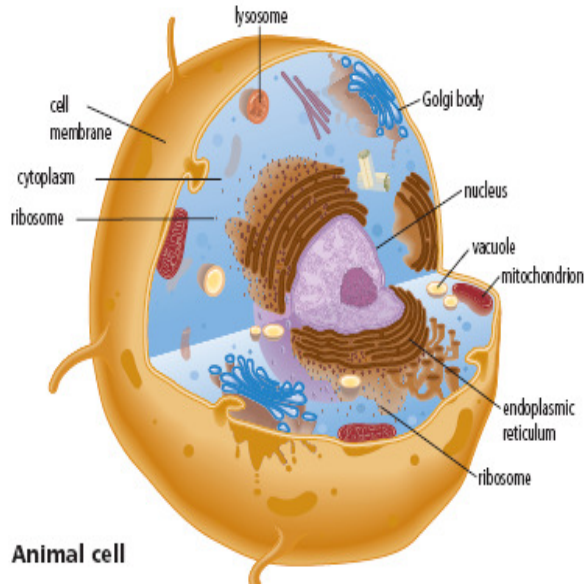
Vacuoles

lysosomes

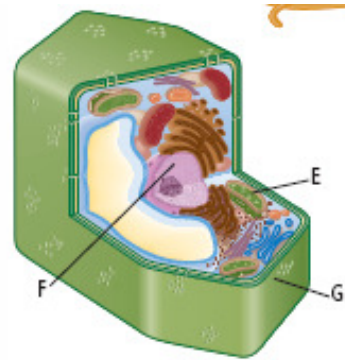
Golgi body

Only Plant cells have:

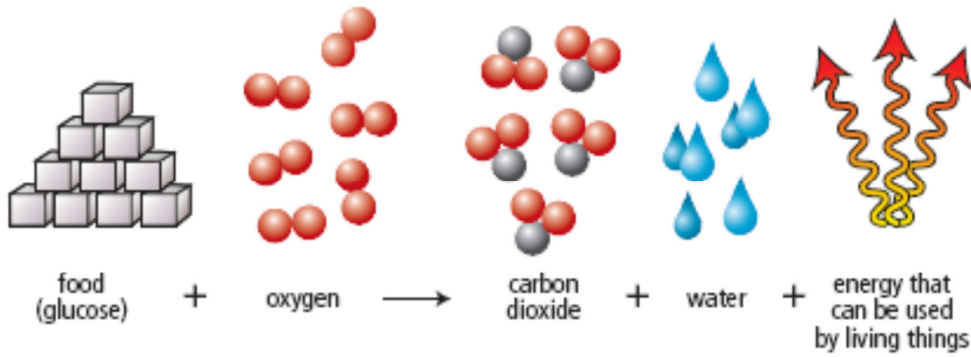
- cell walls and chloroplasts



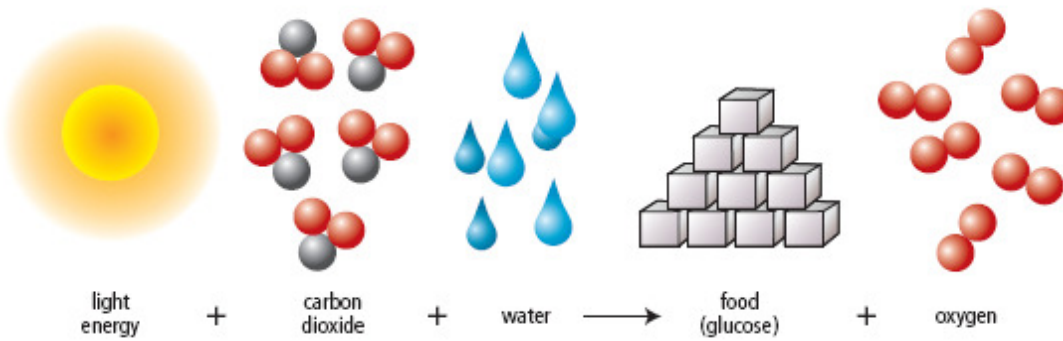
Animal cell



Cellular Respiration: (mitochondrion)



Photosynthesis: (chloroplast)



Diffusion in action:



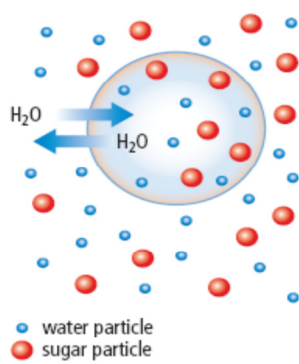
Diffusion vs Osmosis:

Diffusion is the movement of particles from an area of higher concentration to an area of lower concentration

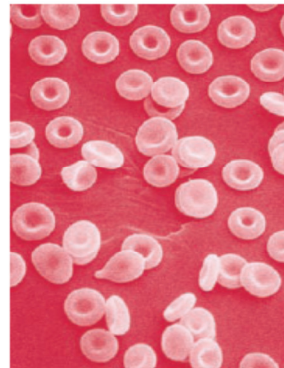
Osmosis is the movement of water particles from an area of higher water concentration to an area of lower water concentration

Example 1

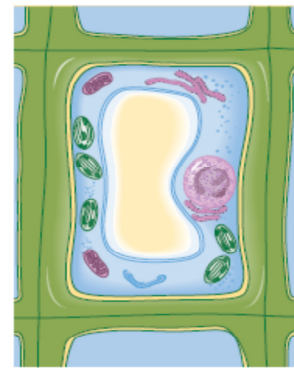
Water particles move in and out of the cell at the same rate (A), and the cell retains its normal shape. Notice the bowl-like shape of the red blood cells (B). The plant cell is in its normal state (C).



A



B

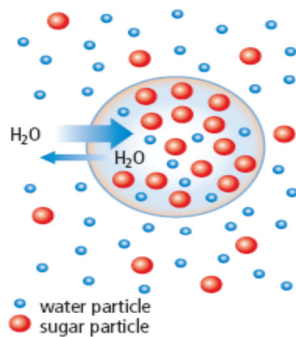


C

● water particle
● sugar particle

Example 2

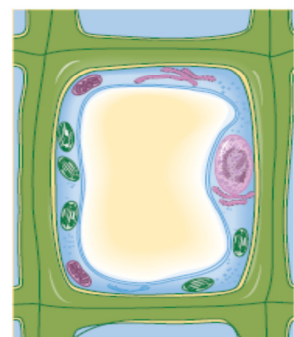
Water particles move in and out of the cell by osmosis (A), causing the cell to swell. Red blood cells may continue to swell (B) and eventually may burst. The plant cell swells beyond its normal size (C).



A



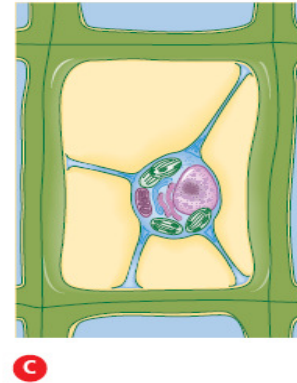
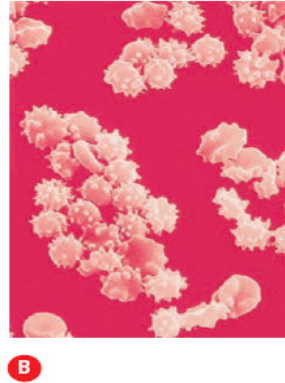
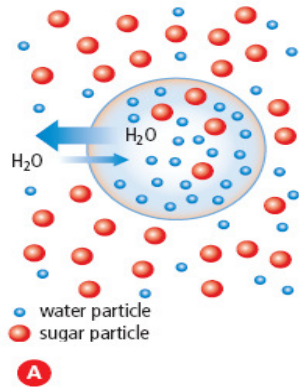
B



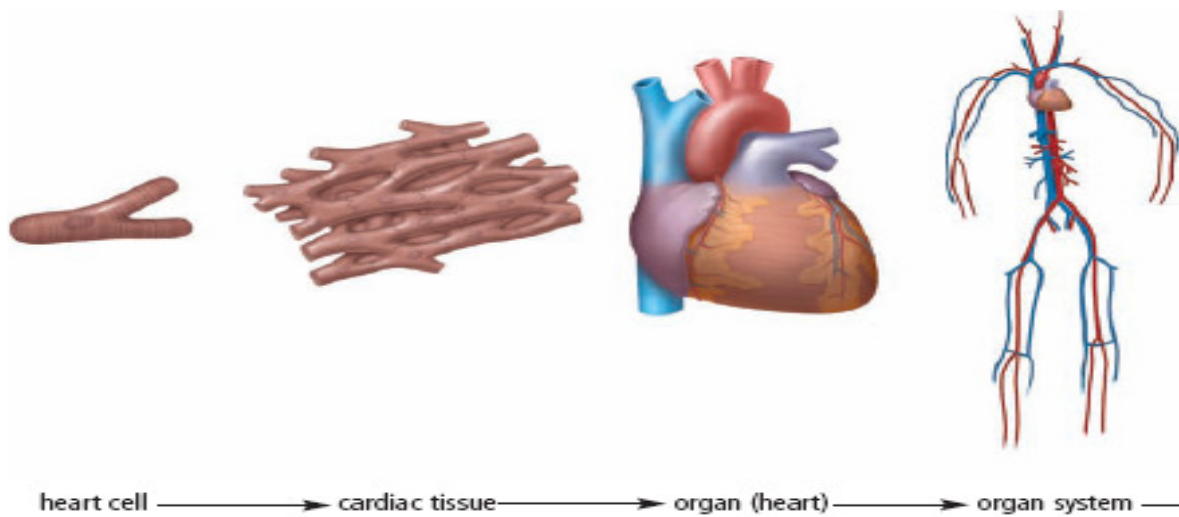
C

● water particle
● sugar particle

Example 3
 Water particles leave the cell by osmosis (A), causing the cell to shrink. Red blood cells shrivel up as they lose water (B). The plant cell membrane shrinks away from the cell wall (C).



Body Systems:



THE IMMUNE SYSTEM

How do we get sick?

Four ways to transmit infectious diseases:

1. **DIRECT CONTACT** ex: coming in contact with an infected person through touch or bodily fluids. For example: someone sneezes on you and a few days later you catch a cold.

2. **INDIRECT CONTACT** ex: being near an infected person. For example: someone coughs and does not cover their mouths- virus can move around a room.

3. **WATER AND FOOD** ex: infected food, unclean water. For example getting food poisoning

4. **ANIMAL BITES** ex: animals transfer the pathogen to you. For example: **Malaria** is transferred to people when they are bitten by an infected mosquito.

Table 3.1 Four Ways to Transmit Infectious Diseases

Transmission Method	Example
Direct contact	Shaking hands or sharing drinking containers or bodily fluids with an infected person (Figure 3.2).
Indirect contact	Being near an infected person who sneezes without covering his or her mouth. Some pathogens can travel up to 5 m and infect people within that range.
Water and food	Eating foods, such as eggs and some meats, that are infected with <i>Salmonella</i> bacteria. Drinking water infected with <i>E. coli</i> bacteria can also result in serious illness.
Animal bites	Being bitten by an animal carrying the rabies virus.

How your body protects you

A healthy immune system **ATTACK** and **DESTROY** invaders.

These invaders may be:

1. **PATHOGEN** an organism (living thing) or a substance that causes disease. For example: Salmonella bacteria causes food poisoning.

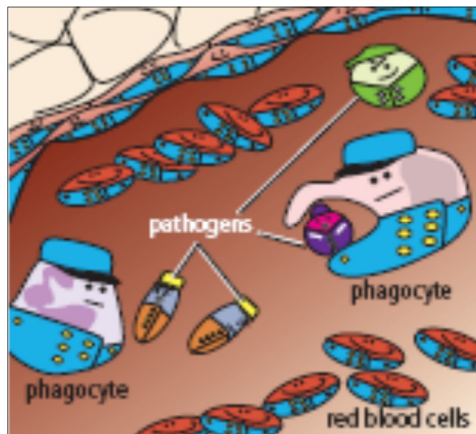
2. **ANTIGEN** any substance that the body does not recognize; usually a non-living particle. For example:

We have **TWO LINES OF DEFENCE** against invaders:

FIRST LINE OF DEFENCE:

The skin and the linings of all internal body systems.

1. **THE SKIN** is a physical barrier
2. **SWEAT AND OIL** are slightly acidic to prevent pathogens from growing
3. **GASTRIC JUICE** can kill bacteria
4. **MUCUS AND CILIA** in the respiratory system catch foreign particles



SECOND LINE OF DEFENCE:

If the invader gets passed the first line of defence the body can mount other defences.

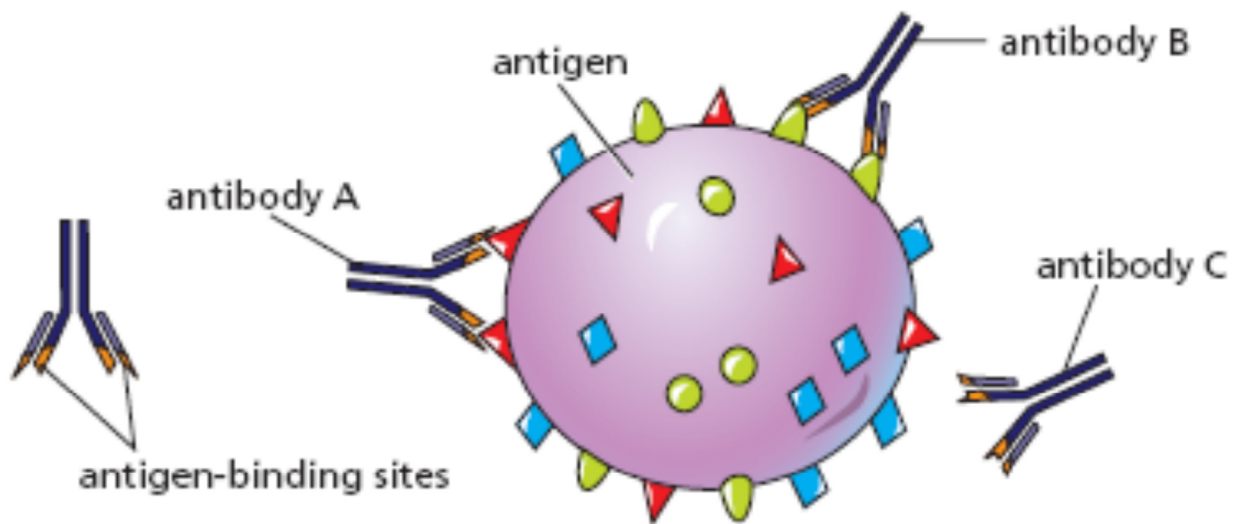
I. THE INNATE RESPONSE:

- **QUICK** and **GENERAL (non-specific)**

- Body makes more **WHITE BLOOD CELLS** that are called **PHAGOCYTES** to fight the infection
- Causes **FEVER** and **INFLAMMATION**(swelling and redness)

II. ACQUIRED IMMUNE RESPONSE:

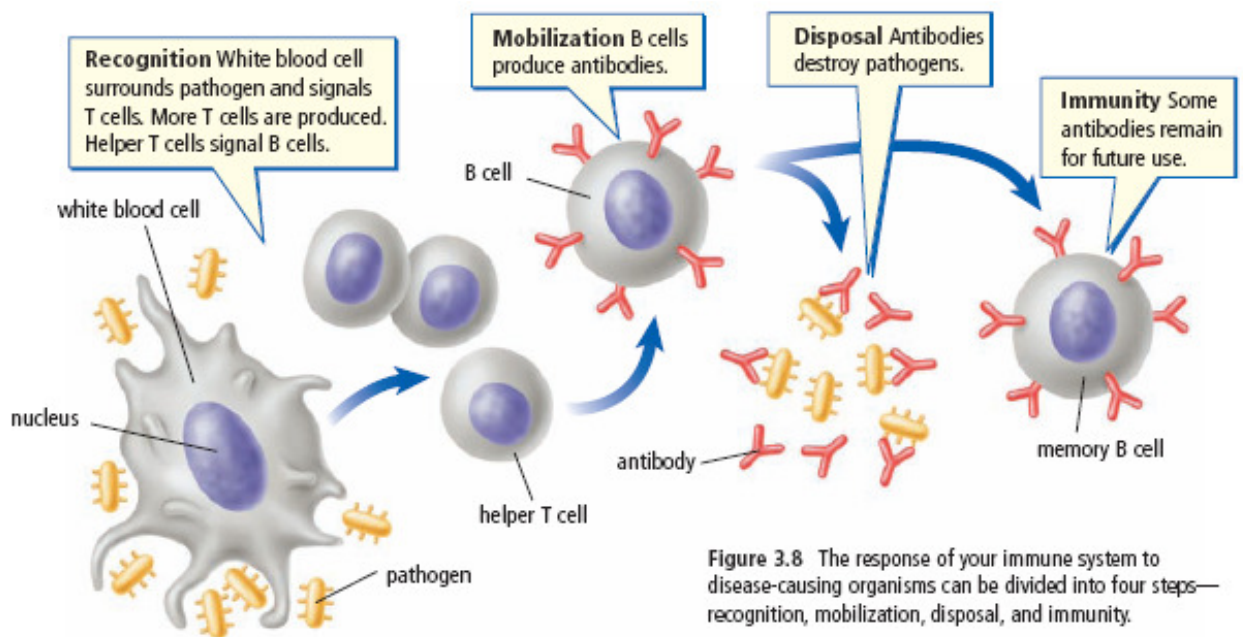
- **SLOW** and **SPECIFIC**
- Two different types of acquired immune responses: both ways involve **WHITE BLOOD CELLS** called **T** cells and **B** cells
- **B CELLS** – recognize antigens and then produce **ANTIBODIES** to fight them
- Antibodies bind to antigens to make them harmless
- **T CELLS** - **KILLER T cells** work on their own to kill pathogens
- **HELPER T cells** activate B cells and Killer T cells



When antigens are destroyed, some of the antibodies stay in the body. The antibodies provide **ACTIVE IMMUNITY**.

They can protect the body from FUTURE INFECTIONS.

VACCINES “boost” your immune system after it has been some time since your last vaccination. In grade 9 you will receive these shots.



All acquired immune responses help give you active immunity.

- ◆ This means your body remembers how to fight a pathogen that has infected it before.
- ◆ This is why you get diseases such as measles only once.

Immune Disease Project:

Immune System Project

Your task is to pick and research a **viral or bacterial (or other) disease or disorder**. You need to answer the questions and gather information as listed below in relation to your disease. See below for the details you must report about your disease and how your project will be.

You will present your information in a visual way using one of the following methods. We will be doing a gallery walk of each other's projects and it should speak for itself with the information.

- Poster
- Brochure

- Flip book
- Interactive fold out book
- Other ideas → ask me

The following information is needed on your final disease project:

Presentation of a Viral/Bacterial Disease (Your RESEARCH)	Your mark	Out of
Bacterial or Viral or Other (Both?)		/2
Symptoms		/3
Who can catch this? –Age/ Groups of People in World		/2
Found in Regions of the World (Specific Places?)		/2
Visuals (Looks Like) -Use Discretion for Pictures		/3
Transmitted How?		/3
Treatment/Cure/Any?		/3
Contagious/Non Contagious		/2
Fatal-Causes Death		/2
Current-Statistics		/3
Creative-Overall presentation of information Clear and Informative All information present Images of virus/bacteria Colourful, clear titles, font and graphics		/10
Bibliography listing the websites used ****must be credible sites****		/5
Overall total		/40 marks

FACTORS AFFECTING THE IMMUNE SYSTEM

Vaccines:

- Are **altered versions** of a disease pathogen
- They are given to people either by mouth or needle
- Once a vaccine is in the body, the immune system starts making **ANTIBODIES** against the antigens
- Some vaccines are given multiple times to extend the immune system's memory for that antigen: **"BOOSTER"** shots

Allergies:

- Are an **UNUSUALLY HIGH SENSITIVITY** to a substance
- The substance that causes the reaction is called the **ALLERGEN**
- Common allergies include: **foods, pollen, dust, and animals**
- **HISTAMINES** are chemicals released by the body to fight the allergens. They cause **runny nose and watery eyes** (antihistamines in allergy medicines reduce the effects of histamines)
- **ANAPHYLACTIC SHOCK** is a **SEVERE** allergic reaction that can cause **swelling, breathing difficulty and sometimes death.**

AIDS:

ACQUIRED IMMUNODEFICIENCY SYNDROME

- Caused by HIV: **human immunodeficiency virus**
- HIV attacks: **the immune system**, therefore, killer T cells and B cells are not **activated when a foreign substance is present.**
- HIV is contracted mainly by bodily fluids: **SEMEN & BLOOD**
- There is **NO KNOWN CURE** for HIV and developing a vaccine is difficult since HIV **keeps changing its structure**, making it difficult to recognize its antigens.

