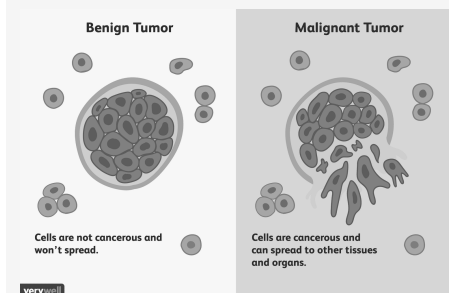


### Tumours

**Benign Tumour** - Does not affect the surrounding tissue, simply takes up space. These are non cancerous.

**Malignant Tumour** - Spreads into, or invades nearby tissues and can travel to distant places in the body to form new tumours. (*Metastasis*)

### Tumours



### Cell Differentiation

As organisms grow, they need **specialized cells** to perform certain life functions.

Cell differentiation refers to the stage of development where specialized cells are formed.

All cells in the body are made through **Mitosis** and they start off as identical cells called **stem cells**

Each stem cell has the ability to become a specialized cell.

### Organs

**Organ:** A part of the body that is made up of cells and tissues that perform a specific function.

### Stem Cells

Stem cells can be harvested from an umbilical cord or placenta after birth.

Larger amounts of stem cells can be obtained from unused fertilized embryo.

Stem cells can be used to repair damaged tissue or organs.

### Digestive system

The digestive system is an organ system that takes in food, digests it, and excretes the remaining waste. It is made up of the **digestive track & accessory organs**.

### Digestive track

Stomach, - Mouth, esophagus, small intestine, large intestine, anus

The entire track is lined with epithelial tissue, and **goblet cells** are present. (*They secrete mucus*)

**Functions of the mucus:** Protects digestive track from digestive enzymes and allows the material to pass smoothly along.

### 3. Stomach

The stomach is a major organ in the digestive system.

Its main function is to hold & churn food to continue digestion. The stomach lining contains cells that produce digestive enzymes & acids.

The stomach is supplied with nerves that signal when we have had enough to eat.

### The Circulatory System

The circulatory system's main function is to transport substances throughout the body.

It moves nutrients from the intestines to the body's cell.

Blood flows through the lungs to pick up oxygen and delivers it to cells.

### Blood Vessels

#### 3 Types of blood vessels:

**Arteries:** Carry **oxygenated** blood *away* from the heart.

**Veins:** Carry **oxygen-poor** blood towards the heart.

**Capillaries:** Tiny blood vessels that connect veins & arteries. They have thin walls to allow substances to diffuse between blood and surrounding tissues. **Oxygen & nutrients** diffuse from blood into tissue, **carbon dioxide & waste** pass from tissues into blood to be disposed of.

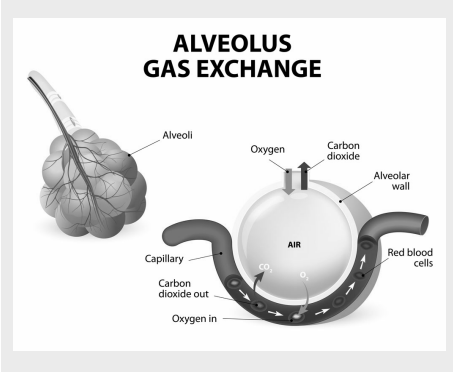
### Gas Exchange

- Capillary walls are thin

- Oxygen diffuses through capillaries in alveoli into blood.

- Carbon dioxide in bloodstream diffuses into alveoli

### Gas Exchange



### Tissues in Plants

**Dermal Tissue** → Covers outer surface of plant.

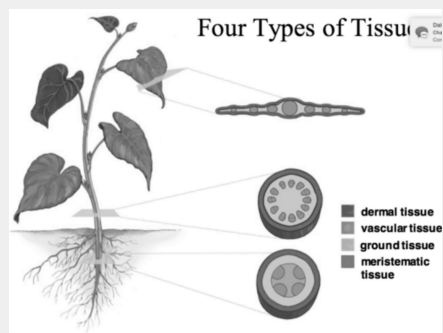
**Vascular Tissue** → Conducts materials within plant.

**Ground Tissue** → All tissue other than dermal or vascular.

### Two types of vascular tissue

Xylem:	Phloem:
Elongated cells that transport water & minerals up from the roots	Transport sugars throughout the plant

### Tissues in Plants



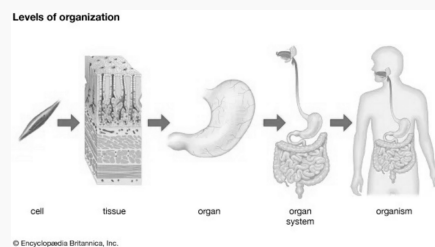
### Metastasis

**Metastasis** - The development of secondary malignant tumours at a distance from an original tumour. Cells from the original tumour break through blood vessel walls to travel to other areas of the body.

### Causes

- DNA mutation
- Cell avoids **apoptosis** (*the process of programmed cell death*)
- Hereditary
- Environmentally triggered: **Carcinogens** (*Environmental factors that cause cancer such as radiation, chemicals, and tobacco*)

### Levels of Organization



### Levels of organization

Multicellular organisms are made of many types of cells.

Each cell is specialized; specialized cells cannot survive on their own.

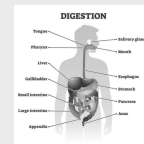
Cells work together as a part of a larger group of cells that collectively make up an organism.

### Specialized Cells

Cells specialize by producing different proteins.

Even though all the cells have the same genes in their DNA, not all the genes are 'turned on', allowing the cells to be different.

### Digestive System



### 1. Mouth

The mouth begins the process of breaking down food.

It breaks down food in 2 ways: **mechanically** (*using teeth and tongue*) and **chemically** (*using enzymes to break apart carb molecules*)

Once the food is broken up & softened with saliva, it is swallowed and passed to the esophagus.

### 4. Intestines

The intestine connects the stomach to the anus. the intestine lining has cells that produce mucus & contains many blood vessels.

#### Small Intestine

About 6 m long & narrow  
Nutrients diffuse through the intestinal wall & into the bloodstream

#### Large Intestine

About 1.5 m Long  
Lining absorbs water from indigestible food.

### Parts of the Circulatory System

**Blood-** Blood is a type of connective tissue that circulates throughout the body.

**The Heart-** Pumps oxygen rich blood to the body & pumps oxygen poor blood to the lungs for oxygenation.

**Blood Vessels-** The blood vessels form a network throughout the body to transport blood.



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### The Respiratory System

The respiratory system provides oxygen for the body and removes carbon dioxide through a process called **gas exchange**.

### Respiratory System

**Nose & mouth:** Openings to body. They warm, moisten, and filter air.

**Pharynx:** Throat - pathway for air to travel to trachea.

**Trachea:** Wind pipe - pathway for air to travel to lungs

**Bronchi:** Two tubes that branch off from the trachea. They deliver air to lungs.

**Bronchioles:** Responsible for gas exchange inside alveoli

**Alveoli:** Small air sacs at the end of bronchioles; responsible for gas exchange.

**Lungs:** Two balloon like structures, they release  $\text{CO}_2$  and take in  $\text{O}_2$

**Diaphragm:** Large sheet of muscle that moves up and down to aid in breathing.

### Plant Cell Differentiation

Plant cells undergo cell differentiation to become specialized.

Cells that are not specialized are called **meristematic cells**.

They are found at the tip of the plant.

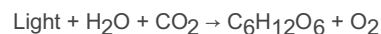
### Plant Growth

**Apical Meristems:** Tips of plant roots & shoots - allow plants to grow longer and develop specialized tissues.

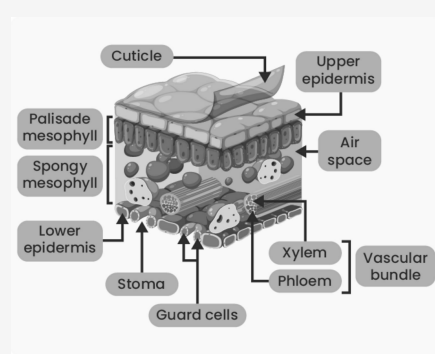
**Lateral Meristems:** (side to side) Under bark in stems and roots of woody plants. Allows plants to grow wider and develop specialized tissues.

### Role of a Leaf

**Photosynthesis occurs in leaves.**



### Leaf Structure



### Diagnosing Cancer

**Imaging tests:** Create pictures of the inside of the patient's body. They help doctors detect tumors or abnormalities that could be cancer.

**Biopsy:** A small sample of tissue is taken from a suspicious area and examined under a microscope to check for cancer cells.

**Laboratory Tests:** Urine and blood tests help doctors identify abnormalities that can be caused by cancer.

### Cancer Treatements

**Chemotherapy:** Using powerful drugs to destroy cancer cells or stop their growth

**Radiation therapy:** Using high-energy rays to target and kill cancer cells.

**Surgery:** Removing the tumour of affected tissue from the body.

### Tissues

**Tissue** - Collection of similar cells that perform a function

**4 Major types of tissue:** Epithelial, Connective, Muscle, Nerve.

### Nerve Tissue

Long, thin cells with fine branches at the ends capable of conducting electrical impulses.

**Function:** Sensory, communication in the body, coordination of body functions.

### Muscle Tissue

Bundles of long cells called **muscle fibres** that contain specialized cells capable of shortening or contracting.

**Function:** Movement.

### Epithelial Tissue

Thin sheet of tightly packed cells covering surfaces and internal organs.

**Function:** Protection from dehydration and creates low friction surface.



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### Connective Tissue

Various cells and fibres held together by a liquid, solid, or gel matrix.

**Function:** Support and insulation

### 2. Esophagus

The esophagus is a muscular tube that connects the mouth to the stomach.

It is made of smooth **muscle tissue**, which can contract and relax without conscious thought. This movement is controlled by **nerve tissue**.

### Accessory Organs

The **liver**, **pancreas**, & **gallbladder** assist in digestion by supplying **digestive enzymes**.

The **liver** produces **bile**, a fluid that helps break down fats in food.

The **pancreas** produces **insulin**, an enzyme that regulates **blood glucose levels**.

The **gallbladder** stores the bile that the liver produces.

### Blood

Blood has 4 components:

**Red blood cells:** Make up almost half of the blood's volume and contain **hemoglobin** which gives the cells a red colour and allows them to **transport oxygen**.

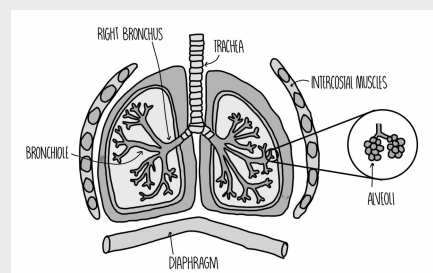
**White blood cells:** Make up less than 1% of blood's volume. They **recognize & destroy bacteria and viruses**.

**Platelets:** Make up less than 1% of the blood. They help with **blood clotting**.

### Blood (cont)

**Plasma:** Makes up over half of the blood's volume. It is a protein-rich liquid that **carries the blood cells**.

### The Respiratory System



### Plant Functions

- Exchange gases with their surroundings
- Transport water and nutrients around within their bodies
- Reproduce

### Hierarchy of Plant Body

Plant body is divided into two parts; roots & shoot systems

The root system is made up of roots

The root system is responsible for anchoring the plant and absorbing water & minerals from soil and to store them.

### Shoot System

**Stem** → Supports, transports material, stores food, protects.

**Leaf** → Supports, protects, is the site of photosynthesis, and reproduction.

**Flower** → Responsible for sexual reproduction, and stores food.

### Upper Epidermis

Contains cuticle

**Cuticle:** waxy noncellular top coat of leaf that prevents water loss and controls gas exchange.

### Palisade Layer

Major site of photosynthesis

Cells are tall and packed closely together

Cells help capture as much light as possible.

### Spongy Mesophyll Layer

Loosely packed cells

Large air spaces between cells allow for gas exchange during photosynthesis.

### Lower Epidermis

Contains stomata

**Stomata:** Pores surrounded by guard cells which regulate its opening.

Stomata open during the day and close at night.



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