Organization of Multicellular Organisms

All organisms are systems.

All the parts work together to help them live, grow, and reproduce.

Each of the parts has a structure that helps carry out its function.

The simplest level is the cell, while the most complex is the individual organism.



Cells and Tissues

* Cells are tiny systems with organelles and membranes that carry out life processes.
* The individual cell in a multicellular organism does not carry out every life function of the organism.
* Different cells perform different jobs.
* They are ***differentiated*** or specialized to do different functions.
* In mammals, red blood cells are specialized to deliver oxygen to body tissues.
* Red blood cells are small, round disks that are thin and flexible allowing them to move easily through even the narrowest blood vessels.



* Nerve cells have long thin branches that extend from the main part of the cell.
* These structures help them deliver information from one part of the body to another part.



* Cells form Tissues.
* A tissue is a group of similar cells that share a structure and function.

Ex. Muscle cells are made up of very long, thin cells that can contract (shorten) to allow movement. Groups of all muscle cells work together to move the body.

There are three main types of muscle cells:

Skeletal- found in the arms

Cardiac- found in the heart muscle

Smooth – found in the intestines.

* Epithelial tissue cover body surfaces in animals.
* The outer layer of skin is Epithelial tissue made of small, flat interlocking cells.
* This Epithelial tissue encloses and protects the organism.
* Connective tissues hold organs in place and attach Epithelial tissue to other tissues.



**Organs and Systems**

Different types of tissues can form organs.

For example: the stomach is an organ that digests or breaks down food.

Muscle tissues in the stomach help mix food with gastric juices.

Epithelial tissues in the inner lining secrete acidic fluids that aid in digestion.

Other tissues secrete mucus to protect the stomach lining.

Blood supplies oxygen to the stomach tissue.

* An organ system is a group of organs that work together to perform a specific function.
* Nervous Digestive
* Endocrine Urinary
* Skeletal Reproductive
* Muscular
* Integumentary
* Immune
* Circulatory
* Respiratory
* The human digestive system includes the mouth, esophagus, stomach, intestines, gallbladder, liver, and pancreas.
* After eating blood vessels in the intestines absorb useful molecules. These molecules are transported to every part of the body, where they are used for energy and as raw materials to repair and build new cells.
* **Functions of the organ system include:**
* Exchanging materials with the environment.
* Transporting materials to and from cells.
* Allowing movement.
* Storing nutrients for later use.
* Responding to stimuli.
* The mouth moistens and breaks down ingested food, which is carried to the stomach by the esophagus. In the stomach it is broken down by stomach acids and released into the small intestine to help complete digestion. The digested nutrients are absorbed into the body by the small intestine. Any undigested material passes into the large intestine, where water is reabsorbed and bacteria convert some of the waste to vitamins.



* An organ system may be dedicated to a single function or share multiple functions with other systems.
* The respiratory system’s main function is to bring oxygen into the body and remove the CO2 produced by cells from the body.
* The organs of the respiratory system work together to accomplish these functions.
* The diaphragm contracts to expand the lungs, causing air to move through the nose and mouth and into the trachea and bronchi.
* The bronchi branch into smaller tubes that lead to microscopic sac-like alveoli in the lungs.
* Oxygen moves from the alveoli into the surrounding capillaries.
* At the same time, carbon dioxide moves from the capillaries into the alveoli and is exhaled.
* This process is called gas exchange.
* Capillaries are part of the circulatory system, which also includes the heart, blood, arteries, and veins.
* This system transports oxygen, nutrients, carbon dioxide and metabolic wastes throughout the body.
* All veins carry blood towards the heart. All arteries carry blood away from the heart.
* The Muscular system consists of muscles, organs that can contract in response to a nerve signal.
* Contracting muscles can exert forces on the bones they are attached to, allowing the organism to move.
* Muscle work in opposing pairs.
* One muscle in a pair causes motion in one direction around a joint, its partner causes motion in the opposite direction.
* Structure and Function in plants
* The structures of plant cells, tissues, and organs help them to carry out specific functions.
* Plant vascular tissues are made of differentiated cells that stack together to form tube-like structures.
* This structure allows them to transport food, water and minerals throughout the plant body.
* In the plant leaf, the inner mesophyll cells carry out Photosynthesis.
* The upper layer of the leaf is transparent, so light can pass through them to the cells beneath.
* The wax cuticle keeps water in the leaf.
* The underside of the leaf consists of the stomata, openings that allow water vapor and other gases ( such as oxygen and carbon dioxide) in and out of the plant.
* Guard cells on either side of the stoma regulate the size of the opening.
* The prefix *Meso*- means middle
* Photosynthesis is the process of using the energy from the sunlight to convert water and carbon dioxide to glucose and oxygen.