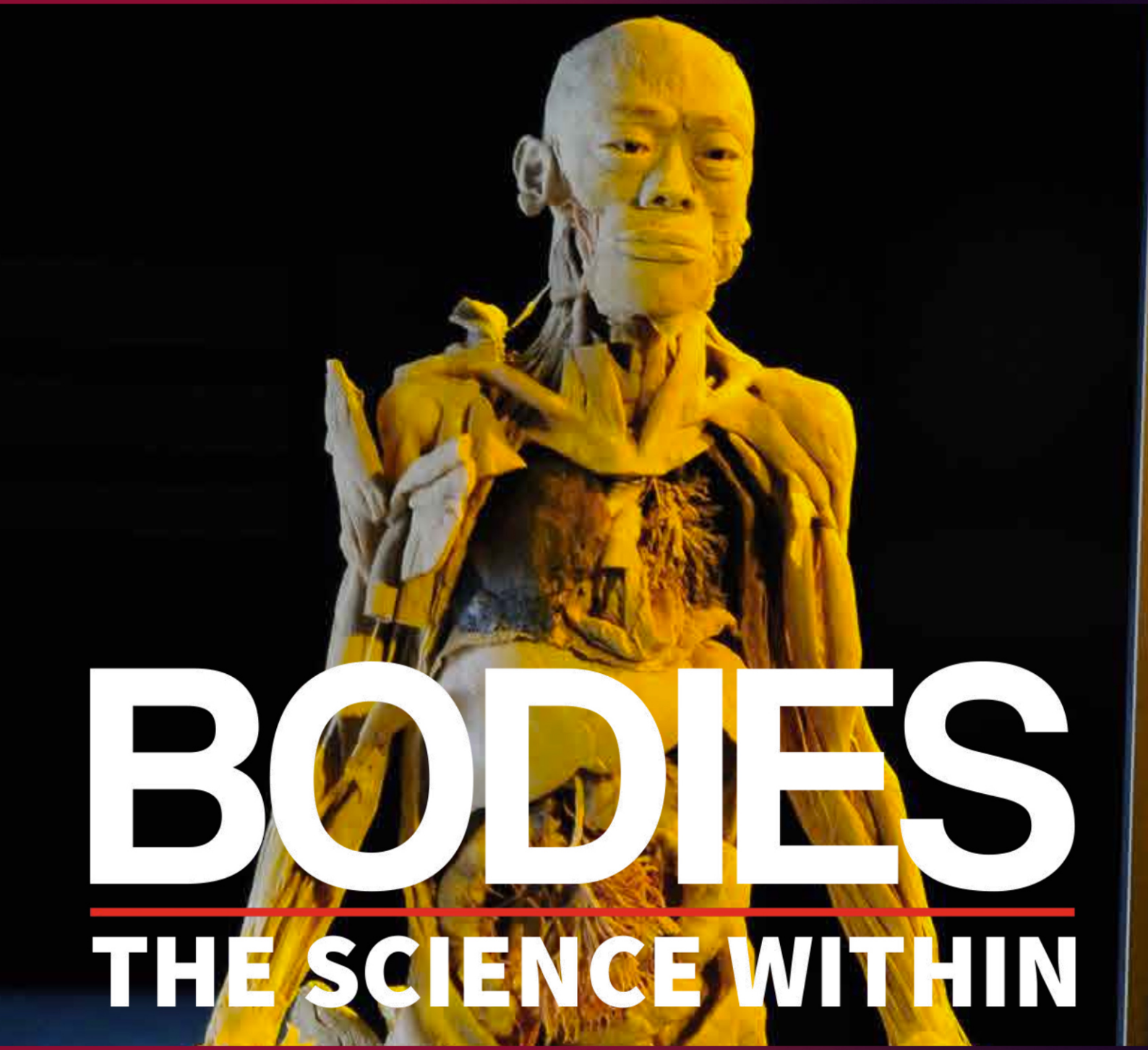
TEACHING GUIDE

Eleven years and older

AUREA EXHIBITIONS



BODIES

THE SCIENCE WITHIN

LEARNING GOAL

Identify the anatomy and functions of the heart and its physiological relationship with other systems.

1. Complete the following diagram indicating the names of the parts of the heart

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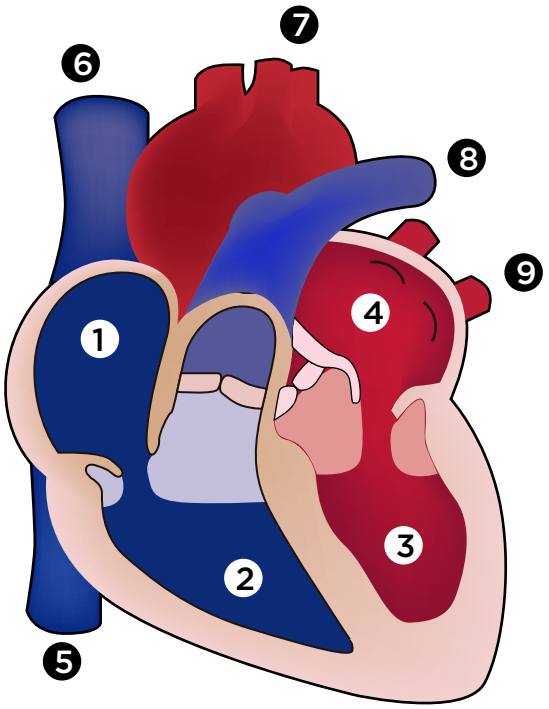
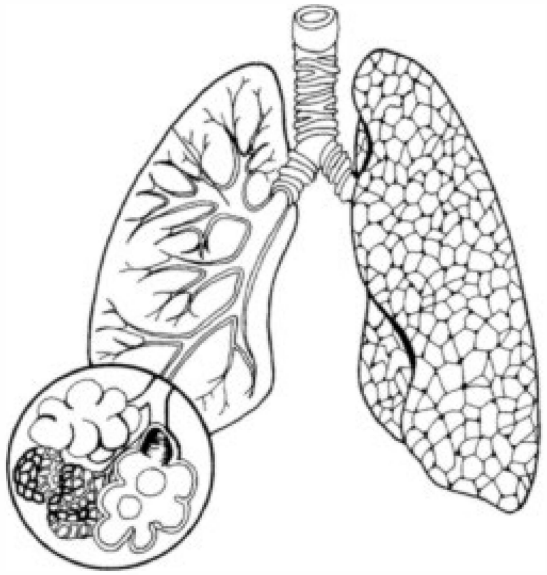


2. What is the function of the Circulatory System?

3. How would you relate the function of the Circulatory System to the process of Nutrition?

4. Why does the aorta artery present the largest diameter among the arteries of the organism?

5. In what physical condition does the heart and respiratory rate increase?



6. What is atherosclerosis, arterial hypertension and acute myocardial infarction and how do they occur?

Look at the image and then answer

1) What process occurs within the circle indicated?

2) Which organs are involved in this process?

3) With which system is the respiratory system associated in this process?

4) What changes does the air undergo in the nostrils? What structures are involved?

LEARNING GOAL

Recognize and explain that living things are made up of one or more cells and that these cells are organized into tissues, organs and systems.

1. The human digestive system starts at _____. From there the food passes through the _____ and the _____ where digestion takes place towards chemistry in an acidic environment.

2. What is the alimentary bolus and which accessory glands of the digestive system participate in its formation?

3. What are the functions of the teeth and tongue?

What is the name of the functional unit of the respiratory system where gas exchange occurs?

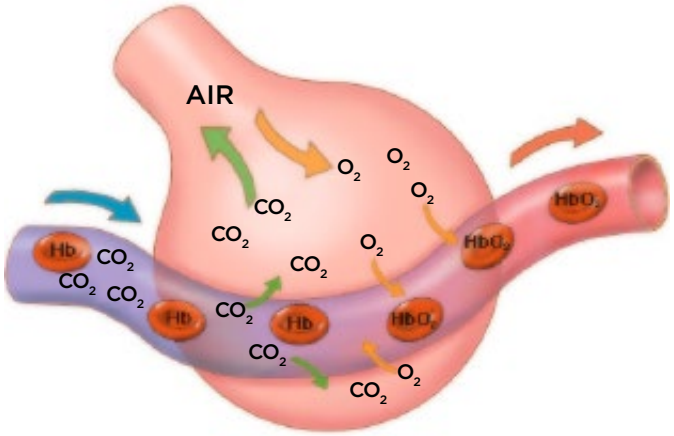
5. Discuss with your classmates the effects of cigarette smoke on the respiratory system.

6. Research the following respiratory diseases: Pharyngitis, Laryngitis, Pneumonia and Bronchitis. Then indicate which structures of the respiratory system are affected by each of these pathologies.

7. Arteries are blood vessels that carry blood rich in _____ , as opposed to the veins that carry blood loaded with _____

The heart beats between 60 and 100 times per minute in an adult person. One of the ways to evaluate it is by taking the pulse by placing the index and middle fingers on an artery.

Note the drawing of an alveolus that is in close proximity to a blood capillary and investigate -



1. If the alveoli are structures found inside the lungs, in which direction does oxygen move?

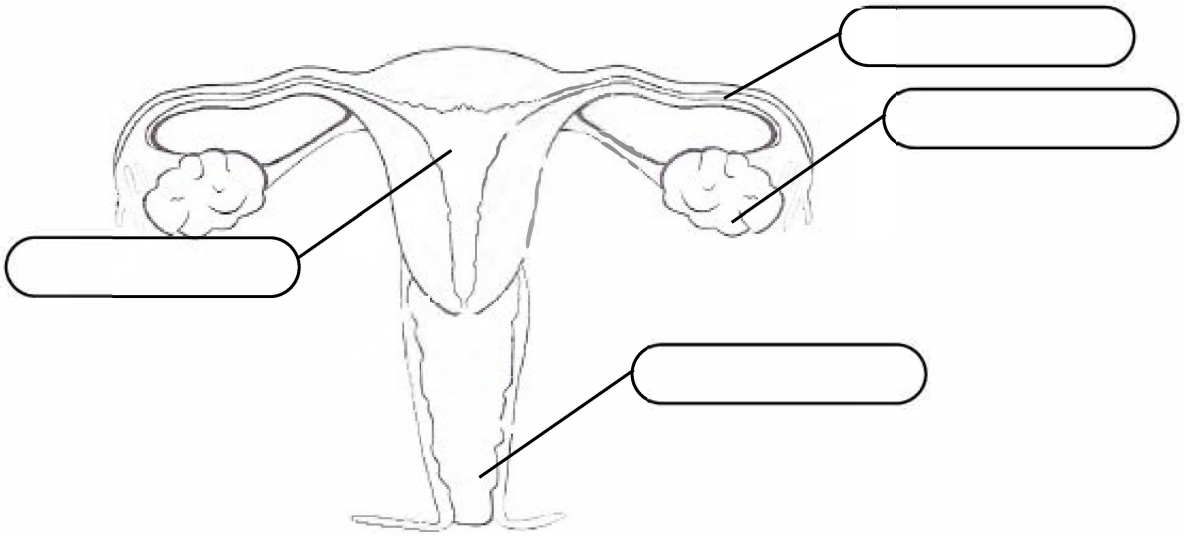
2. In which direction does CO2 (carbon dioxide) move?

3. Look carefully at the drawing and determine how oxygen appears to travel.

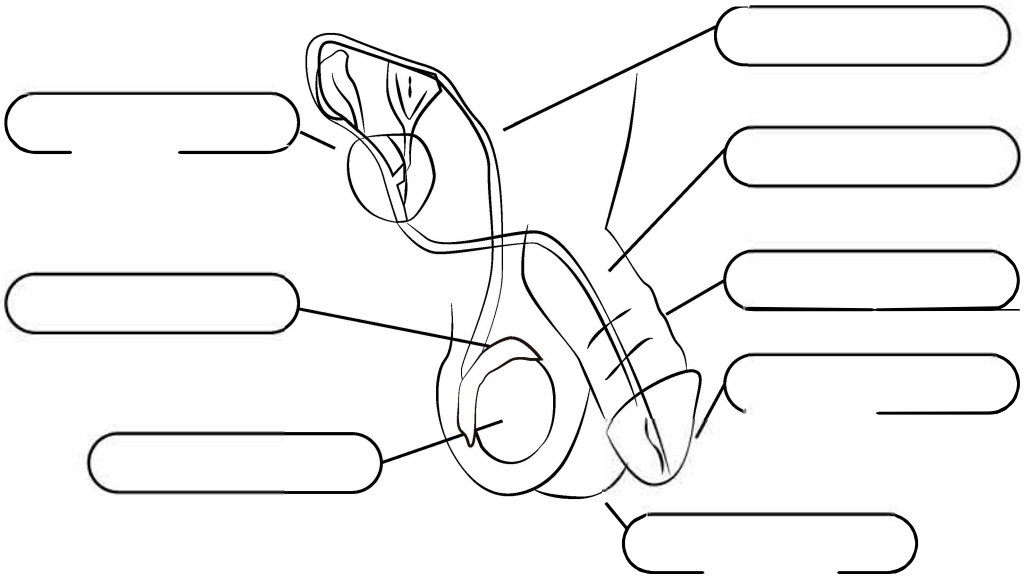
LEARNING GOAL

To understand that sexuality and reproduction constitute one of the most relevant dimensions of human life.

1. Complete the following diagram with the internal organs of the female reproductive system.



2. Complete the following diagram with the names of the corresponding organs



Discuss with your peers and respond:

3. What is the function of the reproductive system in the human being?

_____

_____

4. Point out which of the structures of the female reproductive system are external and which are internal:

INTERNAL STRUCTURES

EXTERNAL STRUCTURES

5. Describe the characteristics of the female and male gamete.

6. Is there a common function between the testicle and the ovary? What is it?

7. What is the path that the spermatozoon follows after leaving the testicle?
Write the names of the structures through which the spermatozoa pass during this journey.

Reflect and respond to the following situations regarding the menstrual cycle.

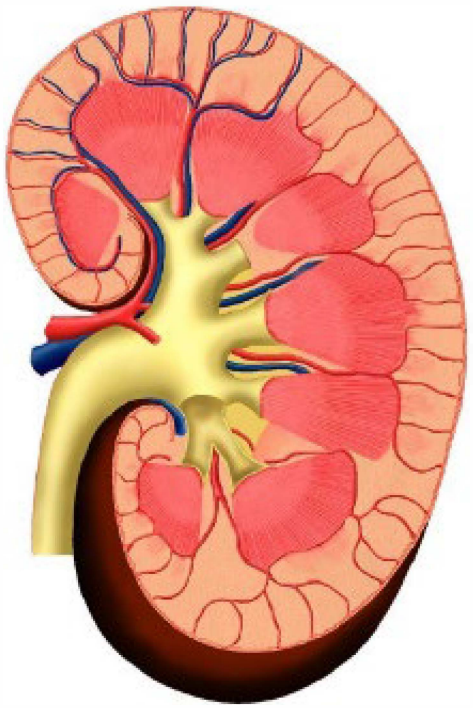
8. What could have happened if a woman who was supposed to menstruate on the 8th day of the month did not menstruate on the 13th day of the month?

9. On what day can a woman with a 40-day cycle have ovulation?

LEARNING GOAL

Observe the structure of the nephron and relate it to its function in urine formation.
Explain hormonal regulation of urine volume and concentration as an example of feedback control.

Considering the following structures: renal cortex, renal capsule, papilla pyramids, renal columns, kidney parenchyma, papillary ducts, major and minor calyces, renal pelvis.



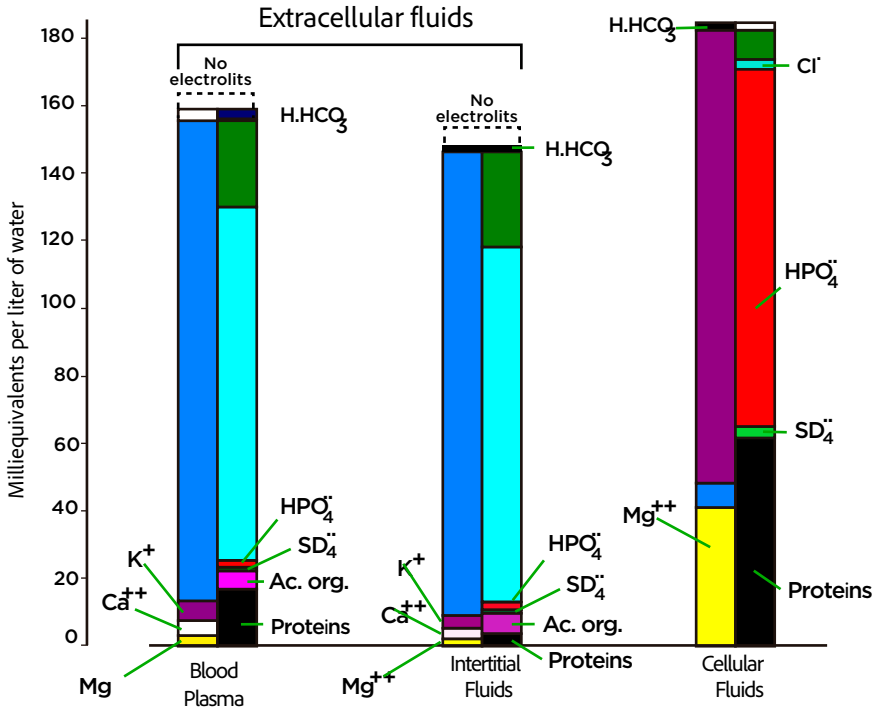
1. Describe the internal anatomy of the kidney.

2. Indicate in the following diagram the structures you can recognize

Investigates how it is innervated and irrigated.

Investigate where the ions are going

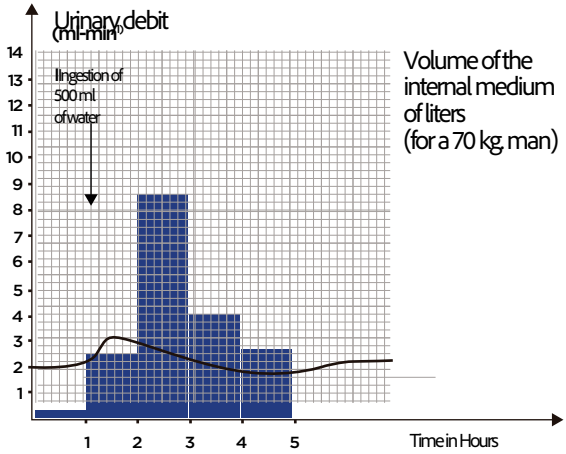
In the series of graphs, the concentrations of the main constituents present in the internal medium, with respect to the intracellular medium, are indicated. Study the graphs carefully.

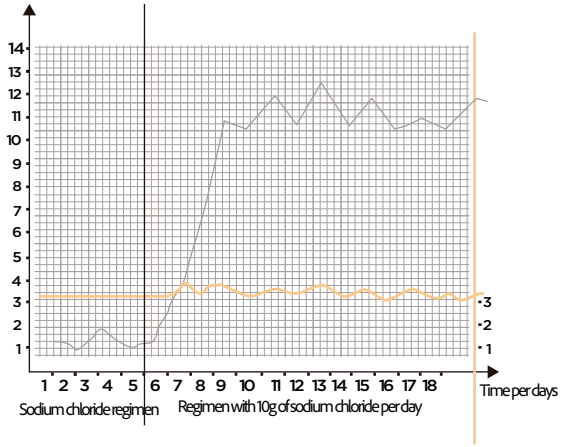


4. Point out which is the direction of the gradient across plasma membranes of the ions: sodium, potassium, chloride and phosphate.

5. If there is a higher concentration of ions inside cells than in the interstitium or plasma, why don't cells tend to burst with water?

1. Complete the following diagram with the internal organs of the female reproductive system.





6. Which ion seems to be the most relevant in the regulation of osmotic flux? Justify

Urine excretion plays a fundamental homeostatic role.

The role of urine in hydrosaline regulation can be seen in the graphs in figure a and b. Figure a shows two physiological effects after artificially increasing a person's water intake. Graph b, on the other hand, shows the variations in plasma and urinary NaCl while maintaining a high salt regimen.

a) b)

Are two experiments enough to validate kidney function? Research

7. What is the normal amount of urine produced by a person, according to graph a? And what is the normal amount of Nacl excreted daily by a person, according to graph b?"

8) In the first experiment, the only variable that was modified was water intake (it would be the experimental variable). Which variables should have been kept constant for the results to be valid? What about the graph in figure b?

9) If it seems that the organism always returns to normal after the experimental procedures, why take care of the intake of salt or other substances?

LEARNING GOAL

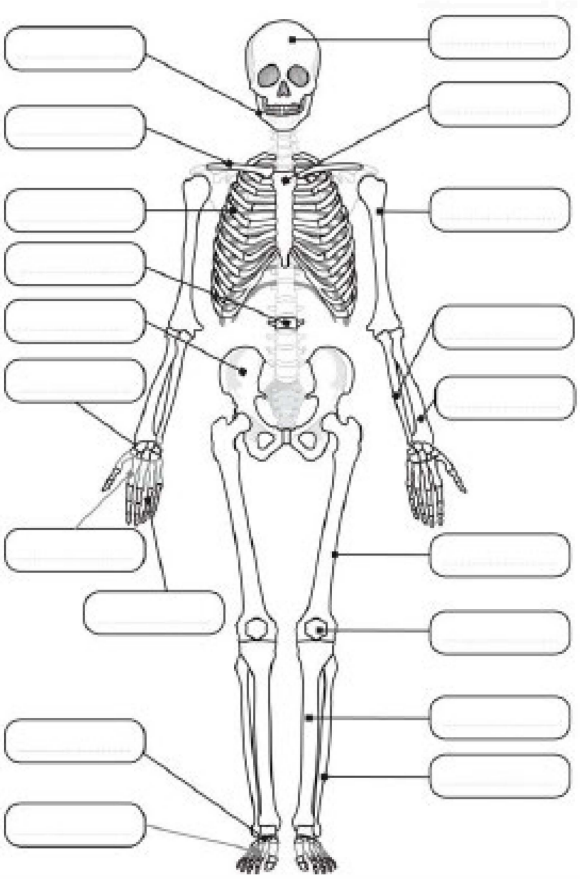
Recognize and explain that living beings are made up of one or more cells and that these are organized into tissues, organs and systems and their integration with the nervous system.

Look up information and answer:

What is the skeletal system?

Name and explain the functions of the skeletal system.

Recognize the following structures.



What is the science that studies muscles?

What are muscles?

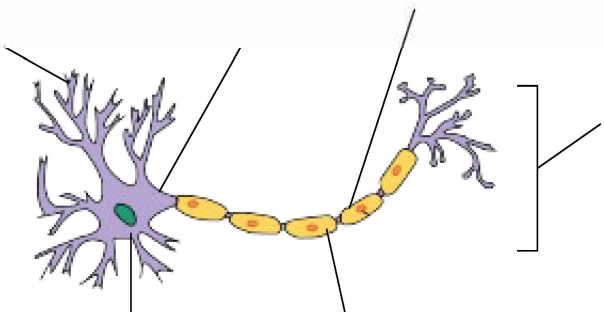
What is the function of the muscular system?

COMPLETE THE FOLLOWING TABLE

MUSCLE TISSUE TYPE	TYPE OF SHRINKAGE	MUSCLE EXAMPLE

What is the nervous system? What organs or tissues make it up? What is its main function?

Define Neuron, explaining the function of each of its parts and identify them in the following diagram:



NUMBER	STRUCTURE	FEATURE
	Spinal Cord	Reflex control of limb and trunk movement. Receives and integrates sensory information from the skin, joints and muscles of the limbs and trunk.
	Brainstem	Control centers of autonomic vital functions, such as digestion, respiration and heart rate.
	Medulla oblongata	It sends information about movement from the cerebral hemispheres to the cerebellum.
	Diencephalon, Thalamus, Hypothalamus	Processing of the information that reaches the cerebral cortex from the rectum of the Central Nervous System (CNS). Regulation of autonomic, endocrine and visceral functions.
	Cerebral hemispheres, cerebral cortex and deep centers (basal ganglia, hippocampus)	Sensory and motor versus lateral processes, memory, language, coordination of autonomic and endocrine responses in relation to emotional states.

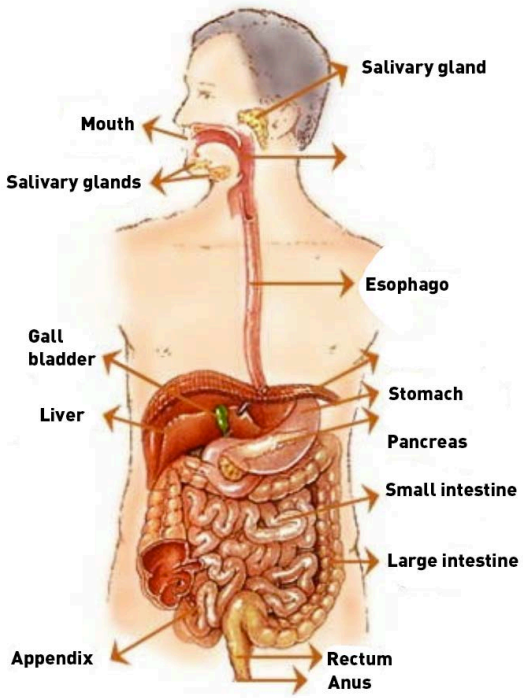
IDENTIFY THE FOLLOWING STRUCTURES:

LEARNING GOAL

Explain the relationship between the functioning of certain organs and tissues and the specialized cells that compose them (intestinal cell, secretory cell, muscle cell, renal epithelial cell, blood cell).

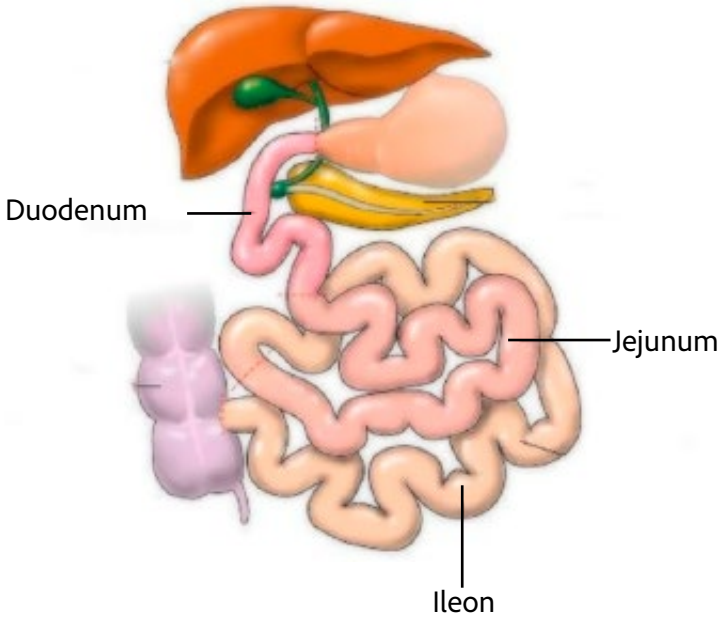
DIGESTIVE SYSTEM

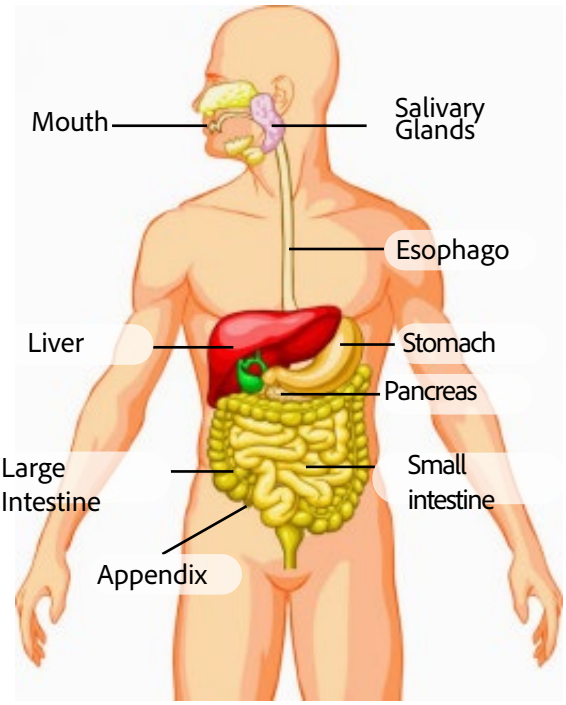
The digestive system is the set of organs (mouth, pharynx, esophagus, stomach, small intestine and large intestine) in charge of the digestion process.
Digestion is the process of transformation of food so that it can be absorbed and utilized by the cells of the organism. The function it performs is that of transport (food), secretion (digestive juices), absorption (nutrients) and excretion (through the process of defecation).
In the digestion process, carbohydrates, lipids and proteins are transformed into simpler units, thanks to digestive enzymes, so that they can be absorbed and transported by the blood.



Fundamental organs

Mouth: This is a hollow cavity in which the teeth, which are responsible for crushing food, are located. The teeth can be classified into canines, incisors, premolars and molars.
Pharynx: A tube-shaped muscle that aids breathing and is located in the neck and lined with mucous membrane; it connects the nose and mouth with the trachea and oesophagus respectively, and through it both air and food pass, making it part of the digestive system as well as the respiratory system.
respiratory
Oesophagus: This is a part of the digestive tract of human beings, consisting of a muscular tube of about 30 centimetres, which connects the pharynx with the stomach.
Stomach: This could be described as a temporary reservoir for the swallowed food bolus until it is transited through the intestine, once it has been well mixed in the stomach.

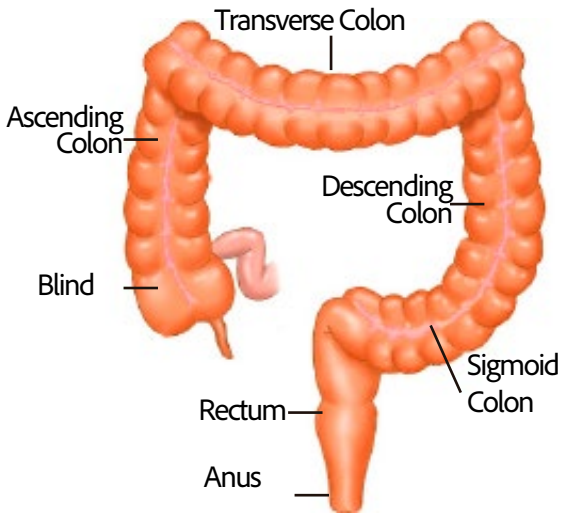




Small intestine: The part of the digestive tract that starts after the stomach and ends at the cecum of the colon. It is divided into three portions: duodenum, jejunum, and ilium.

Large intestine: This is the penultimate portion of the digestive tract, formed by the cecum, colon, rectum and anal canal.

Anus: Located at the end of the digestive tract, this is where gas and faeces are eliminated. It is located next to the genitals, in the perineal area.



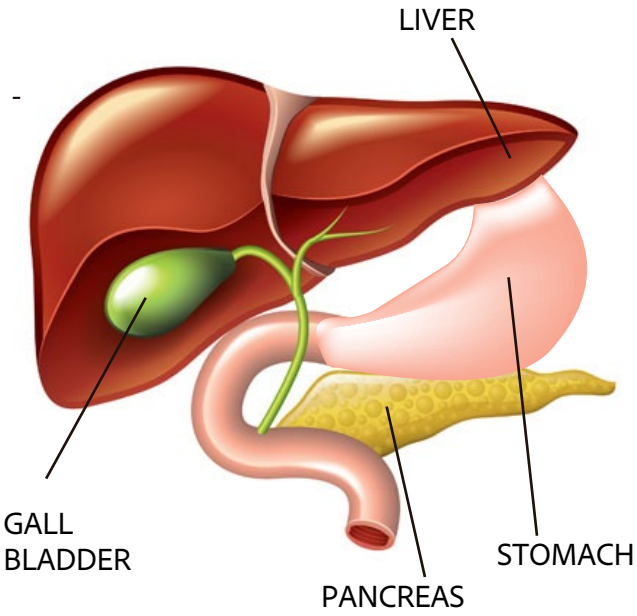
The adnexal glands

The adnexal glands are organs that secrete digestive fluids capable of transforming the simplest foods to facilitate their digestion.
These liquids contain substances called enzymes, which are responsible for simplifying food.
The main glands involved in digestion are the following:

Salivary glands: they secrete saliva, which serves to moisten the food inside the mouth and thus facilitate digestion.

Gastric juices: secrete gastric juice.

Liver: The liver is the largest gland in the body.
and has several important functions:
- Bile production (necessary for digestion and absorption of fats), detoxifying function,



- It is also responsible for removing toxic substances from the blood - It has an additional organ, the gallbladder, which is where bile is produced. It weighs about 1.5 kg, is dark red in colour and is located in the upper right part of the abdominal cavity, just below the diaphragm.

Pancreas: The pancreas is a large lobe-shaped gland that has the function of secreting the hormone insulin and an alkaline fluid that aids the process of digestion. Insulin is important in the utilisation of blood sugar and a lack of this hormone leads to diabetes mellitus. Digestive fluid is secreted directly into the duodenum, just below the stomach in the digestive tract.

For more information: https://www.youtube.com/watch?v=L39-OeQ_mXg

RESPOND:

1. What is the path of the food once it enters the mouth?

2. Describe the main functions of the liver and its importance for the absorption of nutrients into the body.

3. What diseases are caused by an imbalance in the transformation of nutrients?

Research and analyse in class with your teacher.