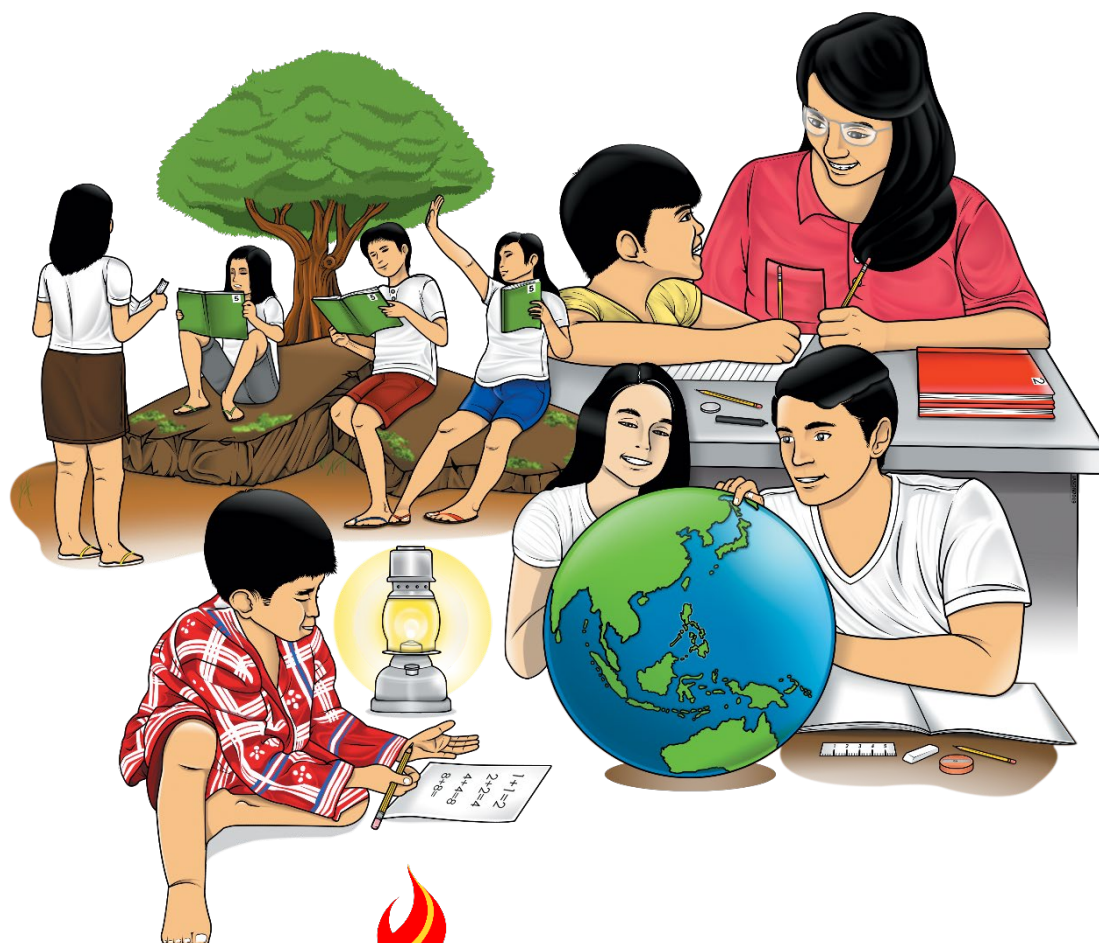


Senior High School

Earth and Life Science

Quarter 2 – Module 6:

Organ Systems of Representative Animals



Earth and Life Science
Alternative Delivery Mode
Quarter 2 – Module 6: Organ Systems of Representative Animals
First Edition, 2021

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Earth and Life Science

Quarter 2 – Module 6:

Organ Systems of Representative Animals

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.



What I Need to Know

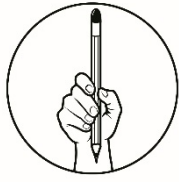
This module was designed and written with you in mind. It will help you master the nature of Animal Organ Systems. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

The module is divided into three lessons, namely:

- Lesson 1 – Characteristics of Different Organ System of representative animals.

After going through this module, you are expected to:

1. identify the different organ systems of representative animals;
2. describe the characteristics of different organ systems of representative animals.



What I Know

Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. What organ system are lungs, nose, and trachea part of?
 - A. Circulatory
 - B. Digestive
 - C. Muscular
 - D. Respiratory
2. Which system supports and protects the body while giving it shape and form?
 - A. Circulatory
 - B. Integumentary
 - C. Muscular
 - D. Respiratory
3. Where does most of the nutrient absorption take place during digestion?
 - A. Esophagus
 - B. Large intestine
 - C. Liver
 - D. Small intestine
4. What transport nutrients, gases, hormone, and wastes through the body?
 - A. Circulatory system
 - B. Digestive system
 - C. Muscular system
 - D. Respiratory system
5. What system filters out wastes, toxins and excess in the circulatory system?
 - A. Digestive system
 - B. Excretory system
 - C. Integumentary system
 - D. Respiratory system
6. Which body system is responsible for taking in oxygen and getting rid of carbon dioxide?
 - A. Digestive system
 - B. Excretory system
 - C. Integumentary system
 - D. Respiratory system
7. Which of the following shows the correct order from smallest to largest?
 - A. cell- organ- tissue- system
 - B. cell- tissue-organ- system
 - C. system- tissue- cell- organ
 - D. tissue- organ- system- cell

8. What system allows motion in the body?
 - A. Circulatory system
 - B. Digestive system
 - C. Muscular system
 - D. Respiratory system
9. What system breaks food down into energy for the body?
 - A. Circulatory system
 - B. Digestive system
 - C. Muscular system
 - D. Respiratory system
10. What system controls voluntary and involuntary life functions?
 - A. Circulatory system
 - B. Digestive system
 - C. Nervous system
 - D. Muscular system
11. What two organs make up the central nervous system?
 - A. brain and spinal cord
 - B. neurons and receptors
 - C. cerebrum and cerebellum
 - D. somatic nerves and autonomic nerves
12. The wall of the alveoli is what kind of tissue?
 - A. muscle tissue
 - B. nervous tissue
 - C. epithelial tissue
 - D. connective tissue
13. What is the relationship between tissues and organs?
 - A. organ develop into tissues
 - B. organs are made up of tissues
 - C. organs are endorsed by tissues
 - D. tissues contain one or more organ
14. Which pair of organs includes only the endocrine glands?
 - A. Adrenal and ovary
 - B. Parathyroid and adrenal
 - C. Pancreas and parathyroid
 - D. Thymus and testes
15. Which of the following are proteins that fight off diseases?
 - A. antibodies
 - B. B- cells
 - C. antigens
 - D. memory cells

Lesson

1

Describe the General and Unique Characteristics of the Different Organ Systems in Representative Animals.

What happens when organisms become more complex? How do organisms built of billions, or even trillions of cells get the raw materials needed to each and every cell? The answer is body systems. Large, complex organisms need many levels of organization to ensure all cells get what they need to perform life functions.

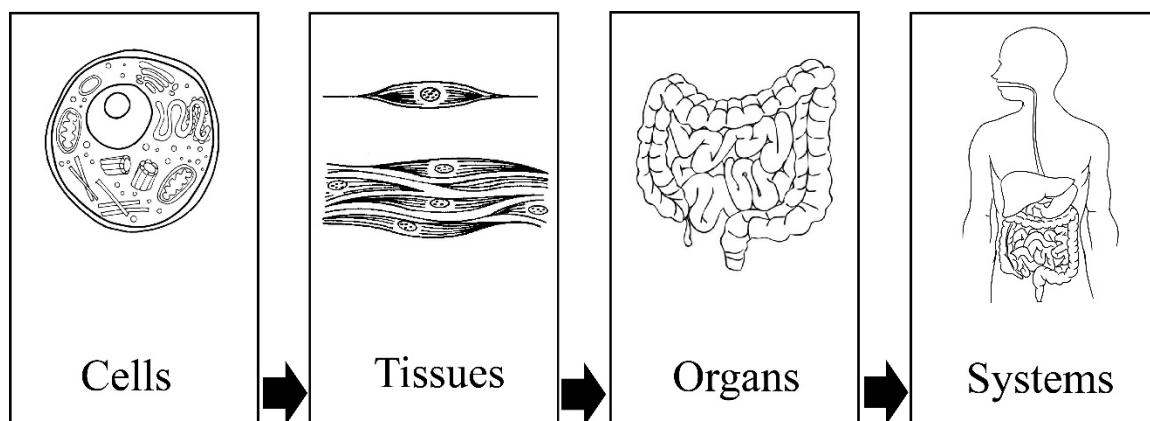
The body of an animal is like a well- organized machine capable of performing different task. The ability of the body to do all the things it can do is due to the special structures both inside and outside that work together in an orderly manner.



What's In

Animals are arguably the most complex organism on this planet. The body is made up of many, many millions of cells which you cannot see unless you use a microscope. Special cells come together to make an organ.

Table 1
Cellular Organization



An organ is a complex structure within the body. It has a special job or jobs to do. The body system is a group of parts that work together to serve a common purpose. Each individual body system works in conjunction with other body system. It relies on the other systems to work well to maintain internal stability and balance, otherwise known as homeostasis.



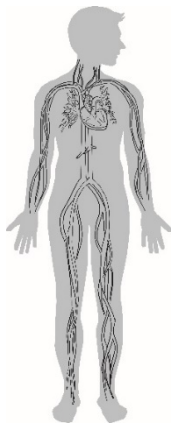
What's New

We are the most amazing organism of all living things who carry out some functions. The Organ Systems are interdependent, interconnected, and packaged together in a relatively small space. Animals are complex organisms with systems and processes that allow them to carry out activities to remain in the living condition.

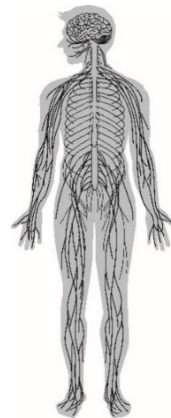
Activity 1

Name what kind of organ system is in the picture. Choose your answer in the box below.

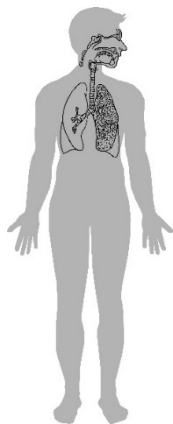
Muscular system	Respiratory system	Digestive system
Skeletal system	Nervous system	Circulatory system
Endocrine system	Immune system	Urinary system



1. _____



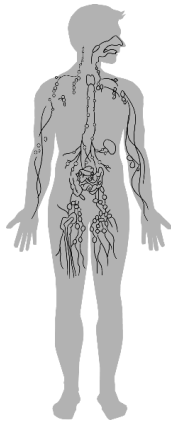
2. _____



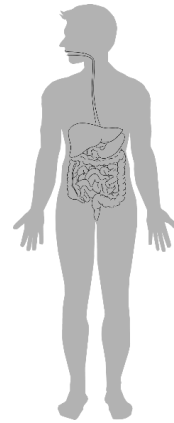
3. _____



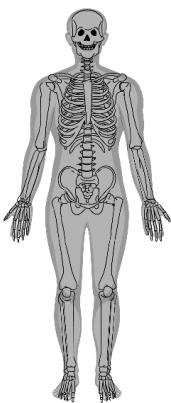
4. _____



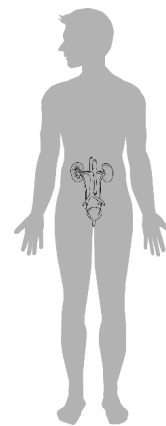
5. _____



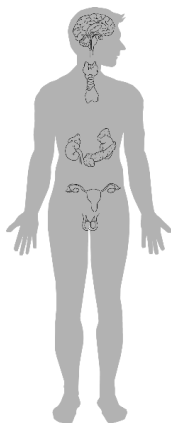
6. _____



7. _____



8. _____

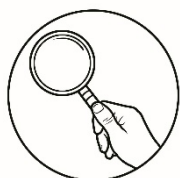


9. _____

Questions:

1. What do you think is the most important organ system in the body? Why?

2. Do all animals have the same organ systems?



What is It

The human body and even the simplest animal is made up of several organ systems that work as one unit. The major organ systems of the body work together, either directly or indirectly, to keep the body functioning normally. The body is a chemical and physical machine. As such, it is subject to certain laws. These are sometimes called natural laws. Each part of the body is engineered to do a particular function necessary for everyday living.

The Animal Organ Systems

1. Digestive System

Animal nutrition is the process of taking in, taking apart and taking up the nutrients from the food source. Food processing has four main stages: Ingestion, Digestion, Absorption, and Elimination or Egestion.

In animals with complete digestive system, where the entrance and exit of food and waste are different, they have different kind of mechanisms of ingestion depending on their evolutionary adaptation to their food.

In other animals like cnidarians (jellyfish, anemone, coral) where the entrance and exit of food and waste is the same, the region where this occurs is called the gastrovascular cavity.

2. Respiratory System

The respiratory system facilitates breathing. In the alveoli tissue of the lungs, the exchange of oxygen and carbon dioxide molecules between the air and the bloodstream occurs by passive transport, so that the oxygen is taken in and carbon dioxide and water are removed. Gas exchange is very important to animals, as they require oxygen in the production of higher amount of energy compared to process of production of energy without oxygen.

Air as a respiratory medium- As air is lighter and has more oxygen content compared to the same volume of water, ventilation is not much of a problem of terrestrial organisms.

The tracheal system of insects- It has a branched network of tracheal tube which responds to the problem of decreased surface area in the respiratory structure.

The tracheal system opens externally through the side of the insect through a structure called a spiracle. Air enters and exit through the spiracles. As the respiratory system of insects are independent from their circulatory system, gases are directly exchanged through tracheoles which have extensions that are directly connected to the cells. Air sacs act like aspirator which takes in and push out air out of the body of the insects.

The mammalian respiratory system- Compared to insects, mammals and other organisms have respiratory system that work together with their circulatory system. Gases are transported via bloodstream and are exchanged via diffusion.

3. Circulatory System

There are different ways in which animals transport substances across their body. In animals with closed circulatory system, the circulatory fluid does not go out of the vessel. Exchange occurs through diffusion via thinner vessels called capillaries across the interstitial fluid.

Different animals, have adapted different mechanisms in transport such as in fishes where a single circulation is enough. Compared to cnidarians, the gastrovascular cavity of flatworms have extensions in order to reach areas of the body far from the axis. Without these extensions of the gastrovascular cavity, diffusion might not be enough in the transport of substances.

Amphibian double circulation differs from mammalian, crocodilian and avian as blood is mixed. The presence of one ventricle does not prevent the mixing of blood, unlike in the four-chambered heart of a mammal, crocodilian and an avian where the ventricle is divided into two. Mixing of blood does not have major implication on amphibians as:

- 1) They have low metabolic rate, thus, less need for energy.
- 2) They have the ability to respire through their skin, thus not needing to fully oxygenate the blood through the lungs.

4. Urinary System

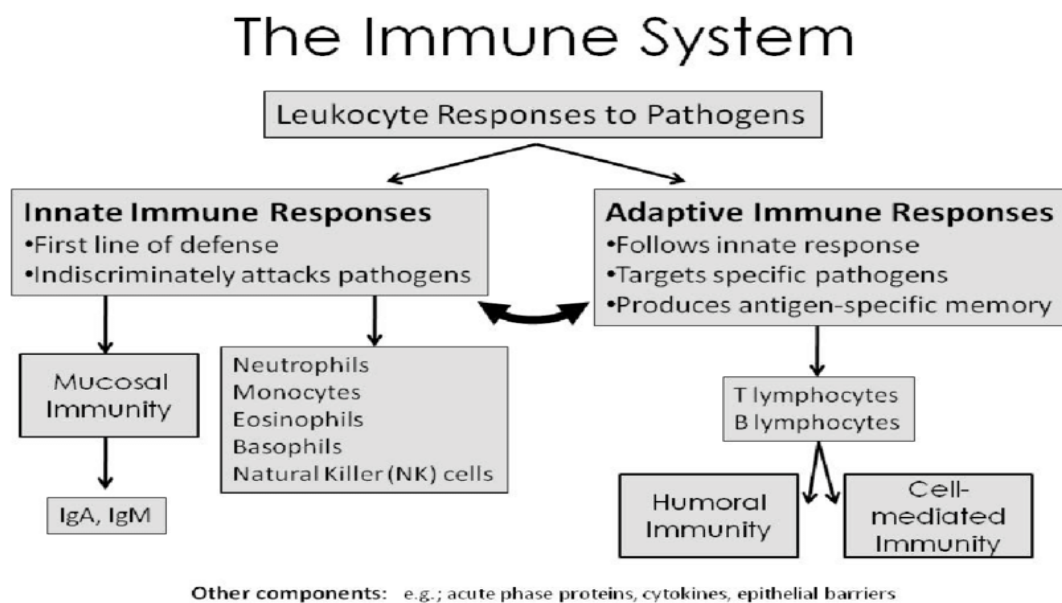
In order to remove wastes, animals have the excretory system, which enables it to remove excess salt or water in the body. Waste removal follows the following processes, 1.) Filtration- the mass movement of water and solutes from plasma to the renal tubule that occurs in the renal corpuscles. 2.) Reabsorption- the movement of water and solutes from tubule back into the plasma. 3.) Secretion- the continuous secretion of additional substances into the tubular fluid, and 4.) Excretion- it is what goes to the urine.

Organisms have different wastes in the form of nitrogenous wastes which they need to excrete. Different organisms have different excretory systems, such as the protonephridia of flatworms where a network of dead-end tubules lacking internal openings, metanephridia of annelids which consist of ciliated funnel opening into the body cavity connected to a duct which may be variously glandularised, folded or expanded and which typically opens to the organisms exterior, malpighian tubules of insects, any of the excretory organs that lie in the abdominal body cavity and empty into the junction between midgut and hindgut and the nephrons of humans

and mammals which actually removing waste and excess substances from the blood through urination.

5. Immune System

The immune system is a complex network of cells and protein that defends the body against infection. It defends the internal environment from invading microorganisms and viruses, as well as cancerous cell growth. The immune system provides cells that aid in protection of the body from disease via antigen/antibody response. A variety of general responses are also part of this system.



6. Endocrine System

The integral parts of the endocrine system include the hypothalamus, pituitary gland, pineal body, thyroid and parathyroid gland, thymus, adrenal glands, pancreas and ovary that make hormones. Hormones are substances which can cause a reaction to a cell, in Greek it literally means to excite. It is secreted into extracellular fluid such in blood or lymph and transported to target cells to elicit a specific response, which can be rapid or slow. The growth and development of the body are examples of slow and long- term effect of a hormone while circadian rhythm which is responsible for the sleep and-wake cycles respond to a more rapid response to a hormone. In an endocrine pathway, the reaction involves an endocrine cell, which releases the hormone to the bloodstream or the lymphatic system, which can attach to receptors of a target cell.

7. Nervous System

The central nervous system is composed of the brain and spinal cord, while the peripheral nervous system is composed of corresponding structures outside of these two organs of the nervous system. The central nervous system is responsible for data/information processing which is gathered by the peripheral nervous system. Upon processing, the CNS transmit the message again to the PNS, which then convey the message for the appropriate response.

The nervous system has evolved in increasing complexity throughout the different groups of animals. Connections among the neurons has increased, as seen in the development of the nervous system from a simple nerve net to a system with ganglia (group of neuron) to encephalized organisms where concentration of neurons are centered in a head. Below shows the changes in the nervous system of organisms:

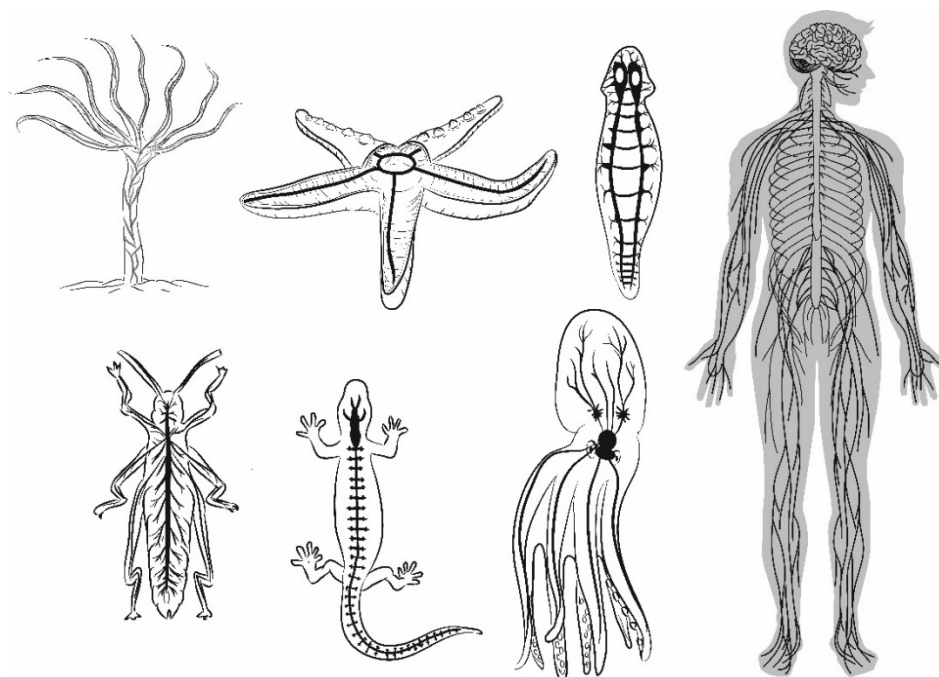


Figure 1. Nervous System of some living things

8. Muscular System

The muscular system is an organ system consisting of skeletal muscles which are composed of muscle cells called the muscle fiber, the cardiac muscle or the heart muscle with involuntary kind of movement, and the smooth muscle which is controlled directly by the autonomic nervous system. The skeletal muscle is organized from its largest structure (the muscle tissue itself) to its functional unit (the sarcomere) as a repeating longitudinal structure that is bound together. Contraction is possible because of the structural organization of protein molecules that makes up the sarcomere. When contraction occurs, the sarcomere shortens, and this is reflected in the contraction of a muscle (tell the students to flex their biceps and ask them if their muscle shortened). In terms of the molecular and physiological process of contraction, nerve impulse transmission is needed to depolarize the cell membrane of the muscle to stimulate contraction.

9. Skeletal System

It provides support and protection, and attachment points for muscles. The skeletal system provides rigid framework for movement. It supports and protects the body and its parts, produces blood cells, and stores minerals.

A clam's shell is an example of an exoskeleton and the bones and cartilage in a human is an example of an endoskeleton. An endoskeleton should not be misconceived to be only made up of bones, as even in humans, our skeletons are made up of cartilage and bones, while shark's endoskeleton is made up of cartilage. We have different bones which our muscles can pull to create movement, and the different types of joints are responsible for different movement that our body can create.

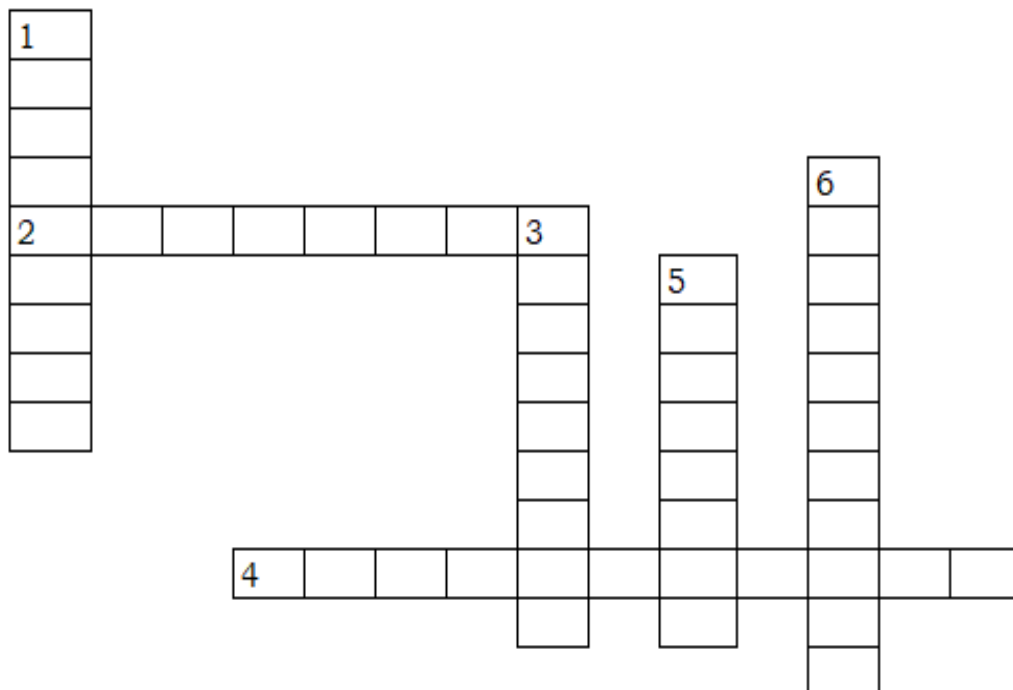


What's More

Activity 1.1:

Directions: Complete the crossword puzzle

Organ System of an Animal Body



Across

- 2. creates red blood cell
- 4. removes carbon dioxide from the body

Down

1. breaks down food chemically and mechanically
3. collects and transport clear fluid
5. provides movement inside and outside our body
6. moves blood around the body

Activity 1.2

Tissues, Organs, & Systems

Multi-cellular organisms have many cells that work together in specific ways, each group performing certain functions. When each group does its part, the organism gets everything that it needs. A **Tissue** is a large group of cells that all have the same purpose or function. Each kind of cell has unique characteristics such as shape, size, flexibility, color and texture. Nerve cell combined with other nerve cell to make nerve tissue. Muscle cell combined with other muscle cell to make muscle tissue. Bone cell combine with other bone cell to make bone tissue. An **Organ** is a group of tissues that work together to do a certain job for the body. Some of the human body's organs include the stomach, lungs, heart, kidneys, brain and liver. Some of a plant's organs include roots, stems, fruit and leaves. When several different organs join to meet the organism's needs, they are working together in an organ system.

There are several different organ systems constantly working in most multi-cellular organisms. You are probably familiar with some of the human body systems. The respiratory system includes the lungs and all the body parts that allow us to breathe in oxygen and exhale carbon dioxide. The circulatory system includes the heart and all the body parts that help move blood around the body. The blood, in turn, carries nutrients and oxygen to all the cells of the body. The respiratory and circulatory systems work very closely together. The digestive system helps to get nutrients from the food that we eaten and stored energy for future use. The excretory system helps remove waste product that would otherwise harm the body. Each of the body's systems is necessary for the overall health of the body. As the body's building blocks, cells join to make tissues. Tissues join to make organs. Organs join to make systems. They are all arranged to ensure the organism's survival.

Answer the following questions based on the reading passage. Don't forget to go back to the passage whenever necessary to find or confirm your answers.

- 1) Which statement supports the fact that bone cells are smaller than bone tissue?

2) What is an organ? Give an example of an organ.

3) Which organ system do you think is the most interesting? Why?

Activity 2.1

Direction: Match the body function with the body system.

<u>Body System</u>	<u>Function</u>
_____ 1. Circulatory System	A. Takes food into the body
_____ 2. Digestive System	B. Makes body move
_____ 3. Endocrine System	C. Serves as the chemical messenger system of the body
_____ 4. Urinary System	D. Removes wastes
_____ 5. Immune System	E. Supports body
_____ 6. Muscular system	F. Carries blood through the body
_____ 7. Nervous System	G. Fights diseases
_____ 8. Respiratory System	H. Maintains homeostasis
_____ 9. Skeletal System	I. Bring oxygen, eliminate carbon dioxide

Activity 2.2

Direction: Group the words where they belong.

Joints	Spinal cord	Pharynx	Tendons	Stomach	Testes
Trachaea	Cartilage	Thymus	Heart	Bone marrow	Lungs
Bladder	Brain	Muscles	Bones	Ovaries	Large intestine
Ureter	Lymph nodes	Kidneys	Pituitary gland	Blood	Vessels

Skeletal	Muscular	Nervous	Respiratory	Digestive
Endocrine	Urinary	Immune	Circulatory	

Questions:

1. What will happen to the body if one organ system malfunctions?

2. What do you think are the functions that are necessary for life?

Activity 3

Directions: Match column A with column B. Write the letter of the correct match on the space provided. Use **CAPITAL** letter

COLUMN A	COLUMN B
_____ 1. Skeletal System	A. Gas exchange occurs via movement of air from the external environment and is exchanged via a dead-end of clusters of thin epitheliums of the walls of air sacs called alveoli.
_____ 2. Muscular System	B. Removes excess salt and water in the body.
_____ 3. Nervous System	C. Formation of antibodies
_____ 4. Respiratory System	D. The growth and development of the body
_____ 5. Digestive System	E. Responsible for data/ information processing which is gathered by the peripheral nervous system
_____ 6. Endocrine System	F. Movement is the reaction of the contraction of muscle.
_____ 7. Urinary System	G. Framework of the body
_____ 8. Immune System	H. Heart is the main organ for this system
_____ 9. Circulatory System	I. Allows the animal to acquire the necessary energy, organic molecules and essential nutrients from the digested foods.



What I Have Learned

Body Systems Work Together

You know that your body is made of cells. When groups of cells do the same kind of work, they are called tissues. The word tissue comes from a Latin word meaning to "weave." Cells that make up tissues are sometimes "woven" together.

You have four main types of tissues: epithelial, nervous, muscle, and connective tissue. Epithelial tissue covers the outside of the body. It also lines organs and cavities. Nervous tissue sends electrical signals. Muscle tissue helps you move. Connective tissue joins bones and cushions organs.

When groups of tissues work together, they are called organs. Some examples of organs are the heart, lungs, skin, and stomach. When organs work together, they are called systems. For example, your heart, lungs, blood, and blood vessels work together. They make up the circulatory system.

We have various systems in our body: muscular system, respiratory system, digestive system, skeletal system, circulatory system, immune system, endocrine system, nervous system and urinary system. Each system has a special job.

Activity 1

Directions: Indicate which organ system will be primarily used in the following situation. Write the beginning letter of correct organ system on the blank.

- | | | |
|---------------------------------|------------------------------------|------------------------------------|
| <u>M</u> muscular system | <u>D</u> digestive system | <u>C</u> circulatory system |
| <u>S</u> skeletal system | <u>R</u> respiratory system | <u>N</u> nervous system |
| <u>U</u> urinary system | <u>I</u> immune system | <u>E</u> endocrine |

- ____ 1. Prepare for a 5km run and eat lots of carbohydrates like rice to give you more energy.
- ____ 2. You lift your feet and move your legs as fast as you can.
- ____ 3. But you have to go to the bathroom because you drank too much water before the run.
- ____ 4. Your breathing is getting faster and faster.
- ____ 5. The heart is pumping fast as you sprint for the final 1km.
- ____ 6. You enjoy attending the Zumba activities
- ____ 7. Your body temperature increase because of the virus
- ____ 8. The class play "pass the message."
- ____ 9. You can move your arms in a full range of motion.
- ____ 10. Female tends to have a mood swing during the period.

Activity 2

In the space provided, explain how the terms in each pair differ in meaning.

1. Gastrovascular cavity, Digestive tract

2. Gills, Lungs

3. Open circulatory system, Closed circulatory system

4. Exoskeleton, Endoskeleton

5. Urination, Digestion

Activity 3

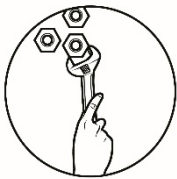
Fill in the chart with purpose of the Human Body System

Animal Body System	Purpose of Animal Body System
Respiratory System	
Immune System	
Circulatory System	
Nervous System	
Digestive System	
Skeletal System	
Endocrine System	
Muscular System	
Urinary System	

Questions:

1. How do they all function together?

2. Which two organ systems bear major responsibility for ensuring homeostasis of the internal environment?

***What I Can Do***

You have probably heard the saying “no man is an island,” This saying means that each person depends on others for many reasons. Inside the human body, this is also true. When you look at an object, what organ systems are making your action possible? Make a list of the organ systems involved when you eat, sleep and run.



Assessment

Choose the letter of the correct answer. Write the chosen letter on a separate sheet of paper.

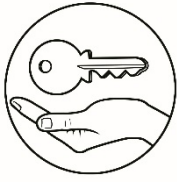
1. The urinary system gets rid of
 - A. Cartilage
 - B. Nutrients
 - C. Oxygen
 - D. Waste
2. Which system delivers oxygen and nutrients to every cell in the body?
 - A. Circulatory
 - B. Integumentary
 - C. Muscular
 - D. Respiratory
3. What can you infer about carbon dioxide from the function of the respiratory system?
 - A. It helps you breathe
 - B. It is more common than oxygen
 - C. It is harmful to your body
 - D. It is not found in the body
4. The circulatory system and the nervous system both:
 - A. Deliver blood to vital organs
 - B. Extend throughout the body
 - C. Send electrical signals to the brain
 - D. Guard the body against infections
5. What is the main function of your stomach?
 - A. To hold food
 - B. To mix food with digestive juices
 - C. To absorb food into the blood stream
 - D. To hold waste materials
6. Which body system is responsible for taking in oxygen and getting rid of carbon dioxide?
 - A. Digestive system
 - B. Excretory system
 - C. Integumentary system
 - D. Respiratory system
7. Which system of the body uses veins, blood, and arteries?
 - A. Circulatory system
 - B. Digestive system
 - C. Muscular system
 - D. Respiratory system
8. Which system includes brain, spinal cord, and neurons?
 - A. Circulatory system
 - B. Digestive system
 - C. Nervous system
 - D. Respiratory system

9. What body parts are made of tissues that can contract and then relax back to normal size?
- A. Bones
 - B. Cartilage
 - C. Muscles
 - D. Tendons
10. What body system does a turtle's shell belong to?
- A. Circulatory
 - B. Digestive
 - C. Muscular
 - D. Skeletal
11. Blood is pumped separately to pulmonary and systemic circuits; true for amphibians, reptiles, birds, and mammals.
- A. Double circulatory system
 - B. Open circulatory system
 - C. Systemic circuit
 - D. Pulmonary circuit
12. Which of the following are proteins that fight off diseases?
- A. antibodies
 - B. B- cells
 - C. antigens
 - D. memory cells
13. What organ/s do amphibians commonly use to breathe?
- A. only through skin
 - B. both lungs and gills as adults
 - C. with lungs as larvae and with gills as adults
 - D. with gills as larvae and with lungs as adults
14. Which of the following statements about muscles and the muscular system is true?
- A. Smooth muscle moves food through the digestive system.
 - B. Muscles always work independently to move parts of the body.
 - C. All muscle action is voluntary, or able to be consciously controlled.
 - D. The three types of muscle tissue are skeletal muscle, smooth muscle, and involuntary muscle.
15. Identify the feedback mechanism that maintains your body temperature when your surroundings are very hot.
- A. The brain sends a message to the skin. The muscles in the skin contract, or shiver, to cool the body.
 - B. The skin starts sweating. The sweat sends a message to the brain, which sends a response to stop sweating.
 - C. Heat receptors in the skin send a message to the brain. The brain sends a response to start sweating, which cools the body.
 - D. The muscles in the skin contract, which sends a message to the brain that you feel hot. The brain sends a message to the skin's heat receptors.



Additional Activities

REFLECTION: What are your thoughts about your place in the environment?



Answer Key

What's More				
Activity 2.2				
Skeletal	Muscular	Nervous	Respiratory	Digestive
joints	tendons	Spinal cord	pharynx	pharynx
bones	muscles	brain	lungs	stomach
cartilage			trachea	Large intestine
Endocrine	Urinary	Immune	Circulatory	
testes	bladder	thymus	heart	
Pituitary gland	ureter	Bone marrow	Blood vessels	
ovaries	kidneys	Lymph nodes	blood	

What's More

Activity 2.2

Activity 3

1. G
2. F
3. E
4. A
5. I
6. D
7. B
8. C
9. H

What I Have Learned

1. D
2. M
3. U
4. R
5. C
6. M
7. I
8. N
9. S
10. E

Assessment

1. D
2. A
3. C
4. B
5. B
6. D
7. A
8. C
9. C
10. D
11. B
12. A
13. D
14. A
15. C

What I Know

1. D
2. C
3. D
4. A
5. B
6. D
7. B
8. C
9. B
10. C
11. A
12. C
13. B
14. D
15. A

What's More

1. Digestive
2. Lymphatic
3. Muscular
4. Circulatory
5. Across
6. Skeletal
7. Respiratory

Activity 1.2

1. Bone cells combine with other bone cells to make bone tissue
2. An organ is a group of tissue that work together to do the job in the body
3. Student's choice

Activity 2.1

1. F
2. A
3. C
4. D
5. G
6. B
7. H
8. I
9. E

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