

STAAR Science Tutorial 46 **TEK 7.12B: Human Organ Systems**

TEK 7.12B: Identify the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, excretory, reproductive, integumentary, nervous, and endocrine systems.

- The five organizational levels of the human body are (1) cell, (2) tissue, (3) organ, (4) organ system, and (5) organism.
- **Cells**, the smallest functional units in an organism, take in raw materials and make proteins and other products through chemical reactions.
- Cells are organized into **tissues**, groups of similar cells that do the same sort of work.
- Tissues are organized into **organs**, structures made up of different types of tissue that work together.
- Organs are organized into **organ systems**, groups of organs working together to do a particular job. There are 11 different organ systems in the human body. These include the (1) Integumentary (Skin); (2) Muscular; (3) Skeletal; (4) Nervous; (5) Endocrine; (6) Circulatory; (7) Lymphatic; (8) Respiratory; (9) Digestive; (10) Urinary/Excretory; and (11) Reproductive. These are described in more detail below:
- The organ systems together make up the whole **organism**.
- **Integumentary System** – This system includes skin and hair as organs. The skin protects all of the other organs of the body from attack by germs and viruses, and helps the body to minimize water loss. Hair helps to protect the body from heat loss and protects the skin from ultraviolet rays (sunburn).
- **Muscular System** – This system includes muscles as an organ. There are three kinds of muscle tissue: skeletal muscles that move the skeleton, smooth muscles are provide control and movement in other organs, and cardiac muscles that pump blood through the heart. In addition, the connective tissue (tendons) connects muscles to bones.
- **Skeletal System** – This system includes bones and joints as organs. This system protects vital organs of the body, such as the lungs, heart, brain and spinal cord, and provides support for all of the organ systems. By working with the muscular system, it also allows the body to move, secure food and protect itself.

- **Nervous System** – This system includes the brain, spinal cord and nerves as organs. It receives information from all the other body organs and then directs each organ how to operate as a team.
- **Endocrine System** – This system includes the pancreas and pituitary gland. It controls homeostasis (under direction from the nervous system) by releasing hormones that control chemical reactions in the body.
- **Circulatory System** – This system includes the heart, veins and arteries as organs. Its function is to deliver oxygen from the lungs, nutrients from the digestive system, and chemical messages (hormones) from the endocrine system, and the carry away waste such as carbon dioxide.
- **Lymphatic System** – This system includes the spleen and thymus. It removes dead cells and foreign bodies from body fluids.
- **Respiratory System** – This system includes the lungs and trachea as organs. It takes oxygen from the air and transfers it into the blood stream, and takes carbon dioxide from the blood stream and exhales it out of the body.
- **Digestive System** – This system includes the stomach, small intestines and large intestines as organs. It processes food into glucose, minerals and amino acids, which it passes to the circulatory system for delivery.
- **Urinary / Excretory System** – This system includes the kidneys and bladder as organs. It maintains a proper balance of water and chemicals in the blood filters out waste products from the blood and flushes the waste products out of the body.
- **Reproductive System** – This system includes the ovaries and testes. It allows for the continued survival of the species by creating new organisms.
- **Cooperation Between Systems** – All of the organ systems help one another to keep the body functioning as a whole. For example, the digestive system processes food into glucose that every cell of the body uses as food, and the respiratory system processes air and filters out the oxygen that every cell of the body needs to “burn” the glucose to create energy. Neither system could complete their jobs without the circulatory system delivering the glucose and oxygen to each cell, or without the nervous system (brain) directing and coordinating all of these jobs.
- **Homeostasis** is the process by which the organism maintains a stable internal environment, such as proper levels of chemicals in the blood and proper body temperature. The primary control process used in homeostasis is **negative feedback**, where any parameter controlled by the body is brought back to an ideal level—if that parameter is too high, it is lowered, and if too low, it is raised, much like a thermostat controls temperature.

Practice Questions

1. The five organizational levels of the human body, from smallest to largest, are (1) _____; (2) _____; (3) _____; (4) _____ and (5) _____.
2. _____ is the process by which the organism maintains a stable internal environment.
3. The organ system that breaks down food into nutrients is the _____ system.
4. The organ system that delivers oxygen, nutrients and chemical signals to every cell of the body, and carries away waste from those cells, is the _____ system.
5. The organ system that collects information from the outside environment, makes decisions on how to maintain homeostasis, and directs the actions of all other organ systems, is the _____ system.
6. The organ system that allows for movement of the organism as a whole and for internal movement of food through the digestive system, is the _____ system.
7. The organ system that protects the body's internal environment from bacteria and other foreign bodies, and helps maintain stable body temperature, is the _____ system.
8. The organ system that obtains oxygen from the air and disposes of waste carbon dioxide back into the air is the _____ system.
9. The organ system that gives structure to the human body, and protects vital organs such as the brain, spinal cord, heart and lungs, is the _____ system.
10. The organ system that helps maintain homeostasis by sending chemical signals to other organ systems is the _____ system.
11. The organ system that help filter out waste from the blood, maintain chemical balance in the blood, and dispose of waste is the _____ or _____ system.