

SNC2D BIOLOGY

TISSUES, ORGANS & SYSTEMS OF ...
☛ Animal & Plant Organ Systems
(P.64-72)

Organ Systems

*Regardless of their appearance, behaviour, or environment, all organisms – whether it is a dragon fly or a salamander or a sunflower plant – must carry out the same basic life functions such as growth, repair, reproduction, ... These are the responsibility of **organ systems**.*



Organ Systems

NOTE!

Just as cells that work together form tissues and tissues that work together form organs, organs that work together to perform a vital body function form organ systems. Some examples of animal organ systems include the nervous system and the muscular system.



Organ Systems

Biologists categorize organ systems according to their main functions. There are 11 main organ systems in the human body and 2 in the plant body.

ORGAN SYSTEM

- ❖ one or more organs that work together to perform a major vital body function such as reproduction

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Activity: Animal Organ Systems

INTRODUCTION

We can think of an organ system as being similar to a potluck dinner. Just as every person contributes something to the dinner, each organ performs a function in an organ system.

INSTRUCTIONS

- Read/listen to each organ system presentation.
- Make and complete a chart similar to the one below listing the organ system and its basic function.

Animal Organ System	Basic Function

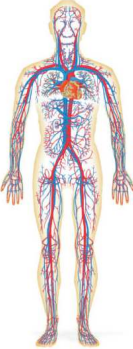
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Activity: Animal Organ Systems

The **circulatory system** is the blood's transportation system. The circulatory system includes the heart, blood, and blood vessels. The heart acts as a pump to transport and regulate the flow of blood through a series of blood vessels: arteries, veins, and capillaries.

NOTE!

Arteries are thick-walled vessels that carry blood away from the heart to the tissues. Veins, which have thinner walls, carry blood back to the heart. Capillaries are the smallest blood vessels in your body; they are about one cell thick. Oxygen and carbon dioxide flow in and out of capillaries by the process of diffusion.



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Activity: Animal Organ Systems

Animal Organ System	Basic Function
circulatory	transports oxygen, nutrients, wastes, ... within the body

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Activity: Animal Organ Systems

The **digestive system** is essentially a tube that extends from the mouth to the anus. The digestive system transports nutrients through the body. In humans, the food passes from the mouth, down the esophagus, into the stomach, through the small and large intestine, to the rectum. The major function of the digestive system is the absorption of nutrients.



NOTE!
Absorption takes place mainly in the small intestine.

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Activity: Animal Organ Systems

Animal Organ System	Basic Function
circulatory	transports oxygen, nutrients, wastes, ... within the body
digestive	digests food ; absorbs nutrients ; eliminates wastes

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Activity: Animal Organ Systems

The **endocrine system** is the system of glands (pituitary, hypothalamus, thyroid, pancreas, ovaries and testes) each of which secretes a type of hormone directly into the bloodstream. Hormones regulate various human functions, including metabolism, growth and development, tissue function, and mood.



NOTE!
The endocrine system is an information signal system like the nervous system. However, it's effects are slow to initiate, and prolonged in their response, lasting from a few hours up to weeks.

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Activity: Animal Organ Systems

Animal Organ System	Basic Function
circulatory	transports oxygen, nutrients, wastes, ... within the body
digestive	digests food ; absorbs nutrients ; eliminates wastes
endocrine	controls growth, development, & metabolism

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Activity: Animal Organ Systems

The **excretory system** consists of the kidneys, ureters, urinary bladder, urethra, and skin. This system filters waste products from the blood and maintains the proper levels of water and electrolytes in the body. As blood flows through your kidneys, wastes such as urea, carbon dioxide, and water are removed by filters called nephrons. These wastes form a fluid called urine. The urine moves out of the kidneys down the ureters to the urinary bladder, where it is stored until it can be eliminated.



NOTE!
The skin is considered to be part of the excretory system because it excretes water, salts, and urea in sweat.

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Activity: Animal Organ Systems

Animal Organ System	Basic Function
circulatory	transports oxygen, nutrients, wastes, ... within the body
digestive	digests food ; absorbs nutrients ; eliminates wastes
endocrine	controls growth, development, & metabolism
excretory	filters waste products from the blood

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Activity: Animal Organ Systems

The most visible organ system is the **integumentary systems**. It is made up of skin (epidermis and dermis) and accessory structures. Accessory structures include horns, antlers, hooves, quills, claws, hair and nails. Various glands, including sweat glands, sebaceous (oil) glands, and scent glands are also part of the integumentary system.



NOTE!
Skin glands produce fluids that serve different purposes. For example, sweat glands secrete sweat. Evaporation of sweat cools the body when it is overheated. Sebaceous glands produce oil that lubricates, waterproofs, and helps prevent skin infections.

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Activity: Animal Organ Systems

Animal Organ System	Basic Function
circulatory	transports oxygen, nutrients, wastes, ... within the body
digestive	digests food ; absorbs nutrients ; eliminates wastes
endocrine	controls growth, development, & metabolism
excretory	filters waste products from the blood
integumentary	covers & protects the body


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Activity: Animal Organ Systems

The **lymphatic system** is part of the circulatory system, comprising a network of conduits called lymphatic vessels that carry a clear fluid called lymph (essentially recycled blood plasma) toward the heart.

NOTE!
The lymphatic system has multiple interrelated functions including:

- absorbing and transporting fatty acids and fats from the digestive system
- transporting white blood cells to and from the lymph nodes into the bones
- transporting antigen-presenting cells (APCs) to the lymph nodes where an immune response is stimulated



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Activity: Animal Organ Systems


Animal Organ System	Basic Function
circulatory	transports oxygen, nutrients, wastes, ... within the body
digestive	digests food ; absorbs nutrients ; eliminates wastes
endocrine	controls growth, development, & metabolism
excretory	filters waste products from the blood
integumentary	covers & protects the body
lymphatic	protects the body from disease

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Activity: Animal Organ Systems

The **muscular system** consists of skeletal, smooth, and cardiac muscles. It works with the skeletal system to permit movement of the body, maintain posture, and circulate blood throughout the body.

NOTE!
The muscular system in vertebrates is controlled through the nervous system, although some muscles (such as the cardiac muscle) can be completely autonomous (i.e. involuntary).



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Activity: Animal Organ Systems

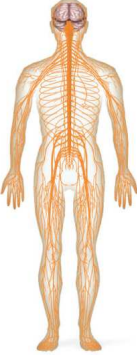
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endocrine	controls growth, development, & metabolism
excretory	filters waste products from the blood
integumentary	covers & protects the body
lymphatic	protects the body from disease
muscular	provides movement & blood circulation

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Activity: Animal Organ Systems

The **nervous system** consists of a network of specialized cells called neurons that controls body functions and coordinates responses and activities. In most animals the nervous system contains the brain, spinal cord, nerves, and retina.

NOTE!
Neurons send signals to other cells as electrochemical waves travelling along thin fibers called axons, which cause chemicals called neurotransmitters to be released at junctions called synapses. A cell that receives a synaptic signal may be excited, inhibited, or otherwise modulated.



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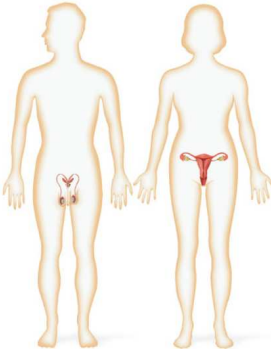
Activity: Animal Organ Systems

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excretory	filters waste products from the blood
integumentary	covers & protects the body
lymphatic	protects the body from disease
muscular	provides movement & blood circulation
nervous	controls & coordinates body functions

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Activity: Animal Organ Systems

The **reproductive system** is a system of organs within an organism which work together for the purpose of reproduction. The major organs of the reproductive system includes, the external genitalia (penis and vulva) as well as a number of internal organs including the testicles and ovaries.



NOTE!
Many non-living substances such as fluids, hormones, and pheromones are also important accessories to the reproductive system.

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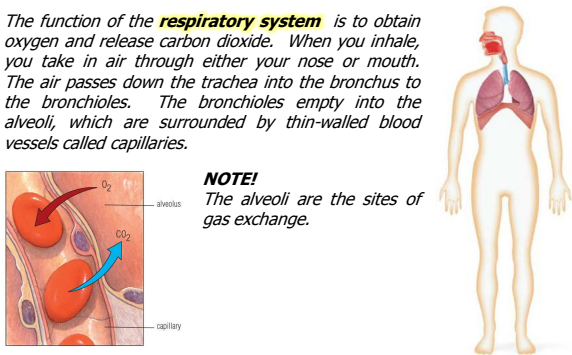
Activity: Animal Organ Systems

Animal Organ System	Basic Function
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digestive	digests food ; absorbs nutrients ; eliminates wastes
endocrine	controls growth, development, & metabolism
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integumentary	covers & protects the body
lymphatic	protects the body from disease
muscular	provides movement & blood circulation
nervous	controls & coordinates body functions
reproductive	reproduction

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Activity: Animal Organ Systems

The function of the **respiratory system** is to obtain oxygen and release carbon dioxide. When you inhale, you take in air through either your nose or mouth. The air passes down the trachea into the bronchus to the bronchioles. The bronchioles empty into the alveoli, which are surrounded by thin-walled blood vessels called capillaries.



NOTE!
The alveoli are the sites of gas exchange.

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Activity: Animal Organ Systems

Animal Organ System	Basic Function
circulatory	transports oxygen, nutrients, wastes, ... within the body
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endocrine	controls growth, development, & metabolism
excretory	filters waste products from the blood
integumentary	covers & protects the body
lymphatic	protects the body from disease
muscular	provides movement & blood circulation
nervous	controls & coordinates body functions
reproductive	reproduction
respiratory	gas exchange (O ₂ in & CO ₂ out)

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Activity: Animal Organ Systems

The **skeletal system** consists of both fused and individual bones supported and supplemented by ligaments, tendons, muscles, and cartilage. It serves as a scaffold which supports organs, anchors muscles, protects organs such as the brain, lungs, and heart, and allows movement.



NOTE!
At birth, a newborn baby has over 300 bones, whereas on average an adult human has 206 bones. The difference comes from a number of small bones that fuse together during growth

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Activity: Animal Organ Systems

Animal Organ System	Basic Function
circulatory	transports oxygen, nutrients, wastes, ... within the body
digestive	digests food ; absorbs nutrients ; eliminates wastes
endocrine	controls growth, development, & metabolism
excretory	filters waste products from the blood
integumentary	covers & protects the body
lymphatic	protects the body from disease
muscular	provides movement & blood circulation
nervous	controls & coordinates body functions
reproductive	reproduction
respiratory	gas exchange (O ₂ in & CO ₂ out)
skeletal	supports & protects the body ; allows movement

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Activity: Animal Organ Systems

QUESTIONS

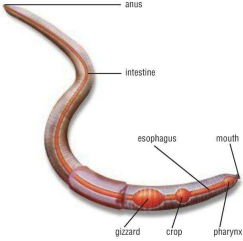
1. Look at the animal organs given. To which system do each belong?

- heart **circulatory**
- teeth **digestive**
- intestines **digestive**
- skin **integumentary & excretory**
- kidney **excretory**
- esophagus **digestive**
- bladder **excretory**
- brain **nervous**
- lungs **respiratory**

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Earthworm Digestive System – DYK?

Earthworms do not have a digestive system that is similar to humans. As an earthworm moves through the soil, it takes in dirt through its mouth. The food is pushed by muscular contractions through the esophagus to the crop. The food then moves into the muscular gizzard, which grinds the food into smaller pieces. The food is then pushed into the intestines, where digestion and absorption of nutrients occur. Waste material is expelled through the anus.



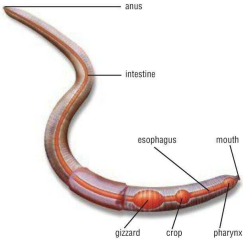
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Earthworm Digestive System – DYK?

PRACTICE

1. Explain why the crop and gizzard are important parts in the digestive system of the earthworm.

the crop is where the food is stored before it travels to the gizzard where it is ground up (which makes the digestion and the absorption of nutrients easier)



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Earthworm Digestive System – DYK?

PRACTICE

2. Explain how an earthworm digestive system works.

- ① mouth (food enters)
- ② esophagus (pathway)
- ③ crop (stores food)
- ④ gizzard (grinds food)
- ⑤ intestines (digestion/absorption of nutrients)
- ⑥ anus (expels waste material)



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Activity: Plant Organ Systems

INSTRUCTIONS

A. Read/listen to each organ system presentation.

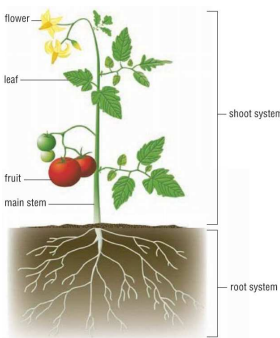
B. Make and complete a chart similar to the one below listing the organ system and it's basic function.

Plant Organ System	Basic Function

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Activity: Plant Organ Systems

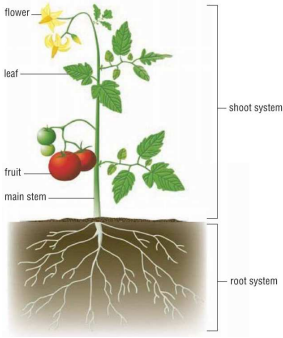
As was stated earlier, the plant body can be divided into two main organ systems – the root system and the shoot system. The **root system** is everything underground, as well as aerial roots even though they are above ground. The root system anchors the plant, absorbs water and minerals from the soil, and stores food. Most of the water and minerals obtained by the plant are absorbed by root hairs: fine extensions of dermal tissue cells.



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Activity: Plant Organ Systems

NOTE!
A plant's root system can spread underground to cover a very large area. Some roots even appear above ground or above water. Other roots, such as radishes and carrots, are specialized for nutrient storage. Different types of plants have tremendous variation in their tissues and organs according to the environment in which they live.



Labels in diagram: flower, leaf, fruit, main stem, shoot system, root system.

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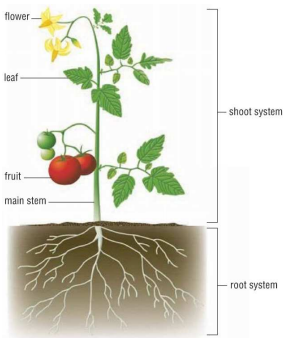
Activity: Plant Organ Systems

Plant Organ System	Basic Function
root	everything under the ground • anchors the plant • absorbs water and minerals from the soil • stores food

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Activity: Plant Organ Systems

The **shoot system** is everything that is above the ground: the stem, the leaf, and the flower or fruit. The shoot system is specialized for two main functions: to conduct photosynthesis and to produce flowers for sexual reproduction.




Labels in diagram: flower, leaf, fruit, main stem, shoot system, root system.

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 **Activity: Plant Organ Systems**

Plant Organ System	Basic Function
root	everything under the ground <ul style="list-style-type: none"> anchors the plant absorbs water and minerals from the soil stores food
shoot	everything above the ground (stem, leaf, flower and fruit) <ul style="list-style-type: none"> conducts photosynthesis produces flowers for sexual reproduction


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 **Activity: Plant Organ Systems**

QUESTIONS

- Use an example to explain the links between organs and organ systems in a plant.
 - consider how water is transported through a plant – both the roots and the shoots play a role in moving water through a plant
 - consider how a plant survives changes in the environment – some specialized cells record changes in the exposure to light and when the length of daylight increase, chemical messages are delivered to tissues to stimulate the production of a flower

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 **✓ Check Your Learning**

TEXTBOOK
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