

# Organ Systems

Grade 5 – Science and Technology



## Lesson Details

<b>Grade Level:</b>	5	<b>Curriculum Links:</b>	Science and Technology	<b>Time Needed:</b>	45 minutes
<b>Learning Goal</b>	To become familiar with the various organ systems within a turtle and compare this knowledge to the human organ systems.				
<b>Success Criteria</b>	By the end of this lesson, students will understand how the turtle organ systems function and be able to correctly label a diagram of a turtle.				
<b>Specific Expectations</b>	<p><i>Understanding Life Systems: Human Organ Systems</i></p> <ul style="list-style-type: none"> <li>• Use appropriate science and technology vocabulary, including: circulation, respiration, digestion, organs, and nutrients, in oral and written communication;</li> <li>• Identify major systems in the human body and describe their roles and interrelationships;</li> <li>• Describe the basic structure and function of major organs in the respiratory, circulatory, and digestive systems.</li> </ul>				
<b>Materials Needed</b>	Worksheet (attached), Pencil, Pencil Crayons, Markers, Crayons.				

## Lesson Description

<b>Overview</b>	Students will read about the organ systems of a turtle, appropriately label and colour a diagram of a turtle, and compare this knowledge to their current understanding of the human organ system.
<b>Activity</b>	<ol style="list-style-type: none"> <li>1. Begin by discussing the various human organ systems (E.g. Digestive System, Excretory System, Reproductive System, Respiratory System, Circulatory System, Nervous System, Locomotion).</li> <li>2. Next, introduce the class to the activity. Students will complete a reading about the various turtle organ systems and answer questions following the reading. Students will also correctly label and colour a diagram of a turtle.</li> <li>3. Optional: Take up the worksheet as a class and further discuss any questions the students may have.</li> </ol>
<b>Background Information</b>	Just like humans, turtles also have various organ systems to keep them alive; such as the skeletal system, the circulatory system, excretory system, reproductive system, respiratory system, digestive system, and nervous system.
<b>Blacklist Masters</b>	<ul style="list-style-type: none"> <li>• Classroom worksheet (attached)</li> <li>• For more information, please visit <a href="https://www.turtleguardians.com/sample-page/id-turtles/">https://www.turtleguardians.com/sample-page/id-turtles/</a></li> </ul>
<b>Place-Based Learning</b>	Students will become aware of the various organ systems within a turtle and become aware of how environmental factors can impact their health. Having this knowledge will allow students to become more conscious about environmental impacts on turtle health, such as pollution.
<b>Inquiry-Based Learning</b>	<p>Using <b>Structured Inquiry</b>, students will complete the worksheet and investigate the similarities and differences between the turtle and human organ systems.</p> <p>Ask the students:</p> <ul style="list-style-type: none"> <li>• What are the various organ systems in a human? In a turtle?</li> </ul>

## Lesson Description

<b>Inquiry-Based Learning</b>	<ul style="list-style-type: none"><li>• How are the organ systems in a human similar or different to a turtle?</li><li>• What environmental factors can impact a turtle's health by affecting their organ systems?</li></ul>
<b>Turtle Stories</b>	How are the organ systems of a turtle similar or different to a human's? Try creating a model of a turtle's organ system using materials such as molding clay. Students are encouraged to share their experiences, pictures, and worksheets on the Turtle Stories website, found here: <a href="https://www.turtlestories.ca/">https://www.turtlestories.ca/</a>
<b>Turtle Guardian Program Links</b>	In <b>Level 1</b> (Ontario Turtle Identification) of the <b>Turtle Guardian Program</b> , students will learn how to identify all 8 species of Ontario's turtles and more information about their lifestyle and health. For more information, please visit <a href="https://www.turtleguardians.com/what-is-a-turtle-guardian/">https://www.turtleguardians.com/what-is-a-turtle-guardian/</a>

## My Notes

**Answer the following questions based on the previous reading:**

**Q1. What is the purpose of an endoskeleton and exoskeleton in a turtle?**

The endoskeleton is very similar to a human's as it is within the body and contains a spongy marrow within the bone. The exoskeleton is made up of a hard, bony shell surrounding the body (also known as the carapace).

**Q2. What is the scientific name for a cold-blooded animal and what does it mean? How does a turtle "warm-up" their blood?**

Turtles are cold-blooded (or endothermic). This means they need to seek an external heat source (like basking in the sun) to keep their body within an optimum temperature range, enabling their vital organs to function properly. Similar to our own heart, a turtle's heart pumps blood to all the vital organs and muscle groups, but a large amount of blood is also sent underneath the carapace to "warm-up" before continuing to circulate the body.

**Q3. What is one difference between a human excretory system and that of a turtle's?**

One difference is that turtles who live in drier conditions are able to split up their urinary waste in the kidneys, storing valuable water in the bladder and only expelling the waste product in the form of insoluble uric acid crystals. OR Another difference is that instead of the urethra, which is located in a human, the turtle has a cloaca which disposes of waste while also taking in oxygen and other nutrients.

**Q4. What is the difference between a human and a turtle's reproductive system?**

In turtles, the eggs are stored in their cloaca as well as their ovaries.

**Q5. Why is a turtle able to inhale less frequently?**

Normally when humans hold our breath, the CO<sub>2</sub> in our blood makes us want to start breathing again, but turtles are much more tolerable of this, allowing them to inhale less frequently. As the volume of CO<sub>2</sub> a turtle can contain in their blood is different than a human.

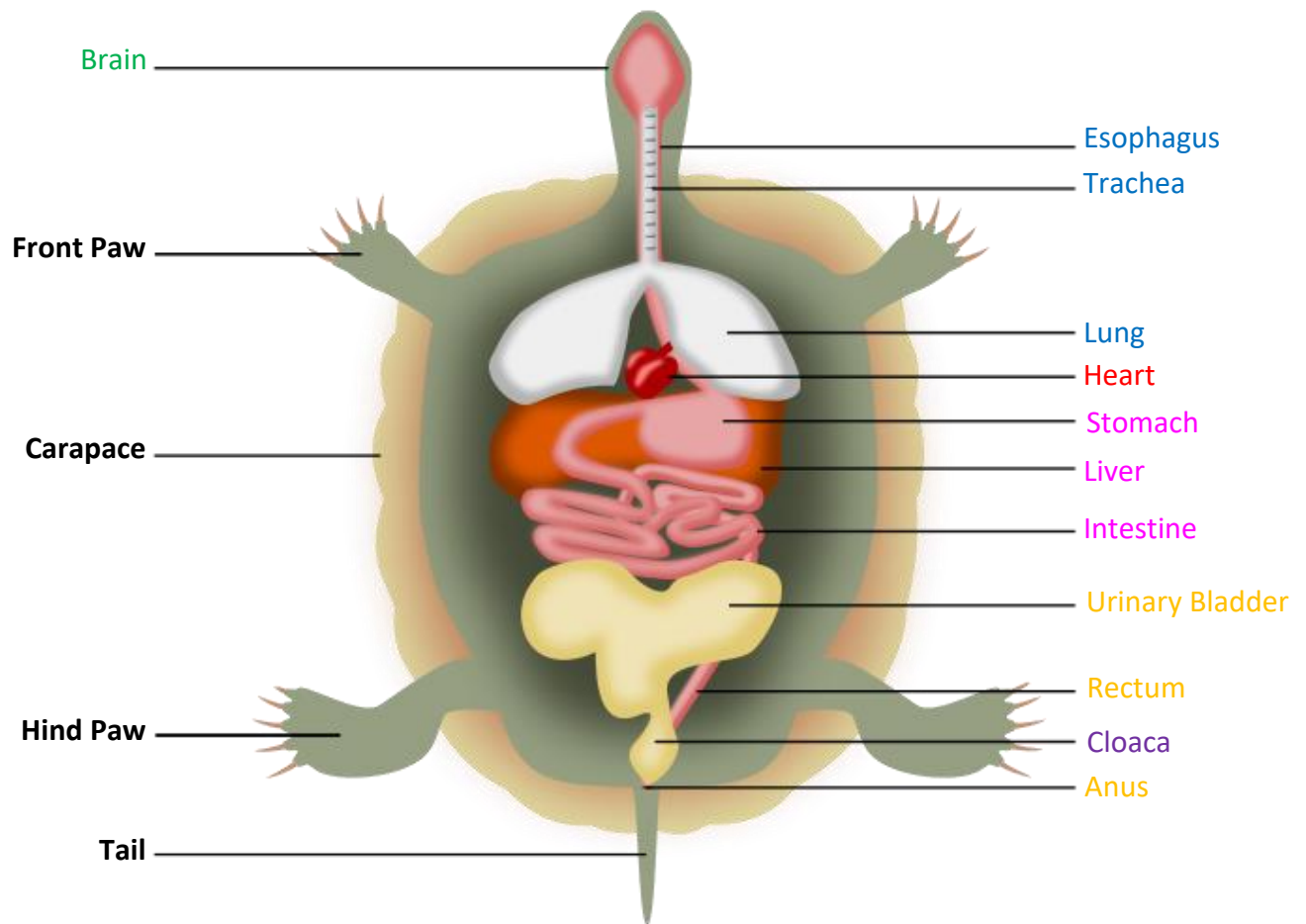
**Q6. What is the purpose of a turtle's slow digestive process?**

The purpose of the slow digestion is to allow time for the microbial digestion of the plant cell walls to release the nutrients within and the production of additional nutrients by the microbes themselves for absorption in the colon.

**Q7. What is a turtle's nervous system comprised of? What is a neuron?**

The nervous system of the turtle is composed of the brain, nerves and spinal cord. Similar to a human, specialized cells called neurons are the signal transmitters throughout the system. The brain is the center of a turtle's nervous system and it is there that the impulses carried by the nerves from the sensory organs are processed. The spinal cord of the turtle extends down its back and is protected by the exoskeleton.

Correctly label the parts of the turtle and identify which system it is from.



### Word Bank

Intestine	Lung
Carapace	Stomach
Trachea	Brain
Heart	Rectum
Tail	Cloaca
Urinary Bladder	Liver
Hind Paw	Esophagus
Anus	Front Paw

Underline the part of the turtle that you just labeled in the colour of its associated system. For example, the **lungs** should be underlined in **BLUE** to represent the respiratory system.

Skeletal System → **BLACK**

Reproductive System → **PURPLE**

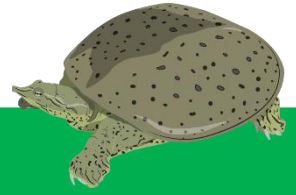
Nervous System → **GREEN**

Circulatory System → **RED**

Respiratory System → **BLUE**

Excretory System → **ORANGE**

Digestive System → **PINK**



# Turtle Organ Systems

**There are 7 different systems within a turtle's body. As you complete this reading try to find the similarities and differences between a turtle's organ system and that of a human. Then complete the following questions about the reading.**

## Skeletal System

The human body contains an endoskeleton, while the skeletal system of a turtle contains an endoskeleton and an exoskeleton. The endoskeleton is very similar to a human's as it is within the body and contains a spongy marrow within the bone. The exoskeleton is made up of a hard, bony shell surrounding the body (also known as the carapace).

## Circulatory System

Turtles are cold-blooded (or endothermic). This means they need to seek an external heat source (like basking in the sun) to keep their body within an optimum temperature range, enabling their vital organs to function properly. Similar to our own heart, a turtle's heart pumps blood to all the vital organs and muscle groups, but a large amount of blood is also sent underneath the carapace to "warm-up" before continuing to circulate the body. The circulatory system of a turtle also differs from a human circulatory system because the heart of a turtle contains three chambers to tolerate the carbon dioxide build up in their bloodstream from infrequent respiration.

## Excretory System

The excretory systems of humans and turtles are very similar. One difference is that turtles who live in drier conditions are able to split up their urinary waste in the kidneys, storing valuable water in the bladder and only expelling the waste product in the form of insoluble uric acid crystals. Another difference is that instead of the urethra, which is located in a human, the turtle has a cloaca which disposes of waste while also taking in oxygen and other nutrients. In other words, turtles are able to breathe through their butts (during hibernation)!

## Reproductive System

Both the reproductive systems of female humans and turtles contain ovaries. In turtles, however, the eggs are stored in their cloaca as well.

## Respiratory System

Turtles breathe air but must also go to anaerobic metabolism which is one way that the human respiratory is different than that of a turtle. Turtles are also able to alter the pressure in their lungs by moving their limbs in and out of their shells. The trachea of a turtle is much longer than a human's and their lungs have adapted to avoid trapping gases during long swims under water. The main difference between a turtles' respiration and a human's is the volume of CO<sup>2</sup> they can contain in their blood. Normally when we hold our breath, the CO<sup>2</sup> in our blood makes us want to start breathing again, but turtles are much more tolerable of this, allowing them to inhale less frequently.

## Digestive System

According to multiple sources, there is no significant difference between the digestive systems of turtles and humans. They function the same way and contain the same organs. The digestive system of a turtle is just much smaller and the trachea where food enters the stomach is elongated in turtles. Although the turtle has the same digestive organs as most other vertebrates, it has adapted to cope extremely well when food and water is limited. Turtles, in general, have a rather slow digestive process. The purpose of the slow digestion is to allow time for the microbial digestion of the plant cell walls to release the nutrients within and the production of additional nutrients by the microbes themselves for absorption in the colon.

## Nervous System

The nervous system of a turtle is considerably less complex than that of a human. The nervous system of the turtle is composed of the brain, nerves and spinal cord. Similar to a human, specialized cells called neurons are the signal transmitters throughout the system. The brain is the center of a turtle's nervous system and it is there that the impulses carried by the nerves from the sensory organs are processed. The spinal cord of the turtle extends down it's back and is protected by the exoskeleton. Turtles are extremely sensitive creatures and can feel things that come in contact with their carapace because they have nerve endings there.

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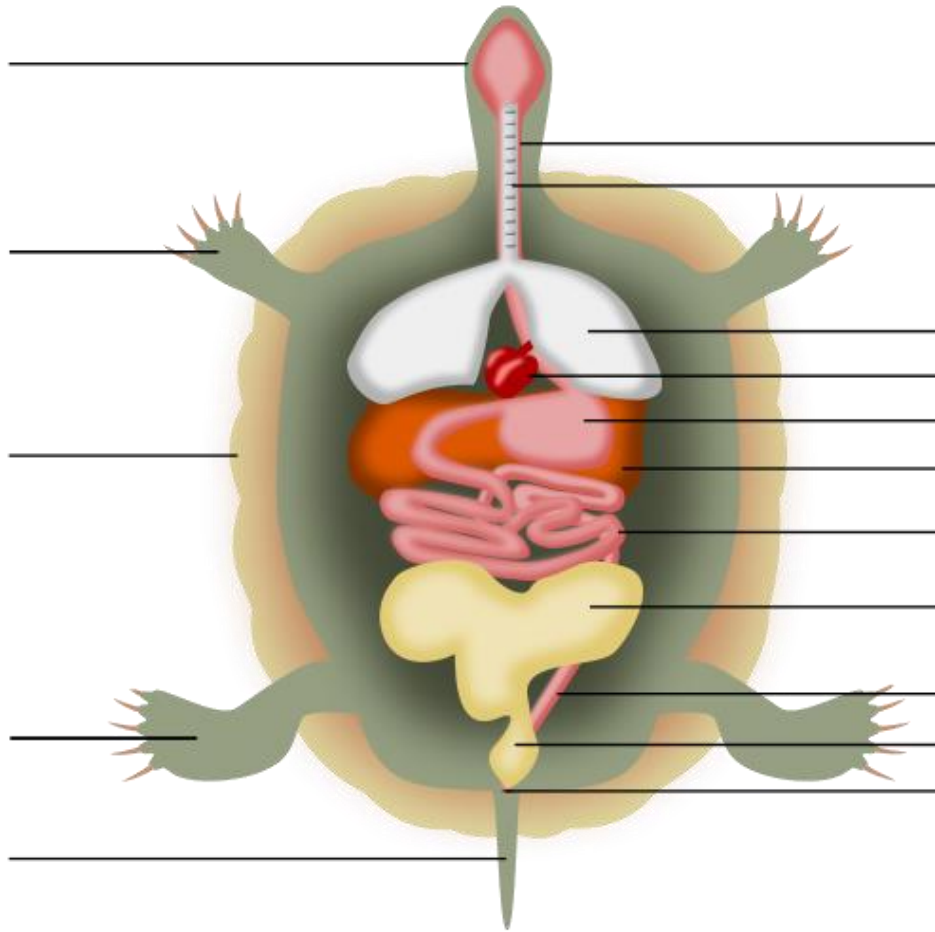
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