# Body Systems

Teacher's Guide

SASKATOON ZOO SOCIETY

saskatoonzoosociety.ca

# BODY SYSTEMS

## OVERVIEW:

This introductory program dives into the mechanics of human body systems and compares them with the remarkable adaptations found in the animals around us. We'll begin with an interactive presentation, followed by a lively body-system challenge. To wrap up, we'll explore some fascinating animal features and discover just how incredible their body systems can be.

## OBJECTIVES:

1. Students will identify the major human body systems (circulatory, respiratory, digestive, nervous, muscular, skeletal, etc.) and describe the main function of each.
2. Students will compare human body systems with those of selected animals, highlighting similarities, differences, and unique adaptations.
3. Students will apply their knowledge by participating in a hands-on activity that utilizes a scenario to decide which body system is at work.

**SUBJECT:**
**Science**

**GRADE:**
**5**

**CURRICULUM CONNECTIONS:**

**Grade 5:**
**Life Science:**
**Body Systems**

## KEY VOCABULARY:

**Circulatory System:** supplies oxygen and nutrients to your whole body and removes waste through your blood. It includes the heart, blood & lymph vessels.

**Skeletel System:** your body's support system including bones, muscles, cartilage and connective tissue.

**Muscular System:** muscle cells and tissues that brings about movement of an organ or body part.

**Digestive System:** group of organs that work together to digest and absorb nutrients from the food you eat for energy, growth & tissue repair.

**Respiratory System:** network of organs & tissues that enables breathing, smelling and speaking.

**Nervous System:** body's control and communication network, made up of the brain, spinal cord, and nerves

**Integumentary System:** body's outer protective layer, composed of the skin, hair, nails, and glands

**Absorption:** nutrients being taken into the body from the digestive system (biological definition)

**Mechanical vs Chemical Digestion:**
mechanical digestion is the physical breakdown of food (chewing) whereas chemical digestion uses enzymes to break down food into something that is useful for the body (sugars, amino & fatty acids)

## BACKGROUND INFORMATION

Respiration can work differently in amphibians. They use cutaneous respiration as well. Their wet, thin & permeable skin combined with a lot of surface blood vessels makes for a natural oxygen and waste swap. The key to this is moist skin!

# PRE-VISIT ACTIVITY

## Bio-delivery Race (gym activity)

Objective: To physically model the flow of materials (Oxygen/Fuel) and the disposal of waste ($CO_2$) and understand why the heart must speed up.

Set-Up:

- Start/Finish Line: A cone or marker labeled "THE HEART (The Pump)".
- Supply Stations: Two hula hoops or mats labeled "LUNGS (Oxygen Pick-up)" and "DIGESTIVE SYSTEM (Fuel Pick-up)". Spread these two out so they are not close to each other.
- Delivery Zones: Two areas labeled "MUSCLES" and "BRAIN".
- DIVIDE CLASS INTO: two teams + four students that are the cell blockers (2 for each team)

Materials:

- Red Chips: (Oxygen) – Placed in the LUNGS zone.
- Yellow Chips: (Fuel/Sugar) – Placed in the DIGESTIVE SYSTEM zone.
- Blue Chips: (Carbon Dioxide/Waste) – Placed in the MUSCLES/BRAIN zones.

The Roles:

- Blood Cells (the runners): Their job is to run the route and carry materials.
- Cell Blockers (the waste load): Their job is to delay the route to the heart (1 stationed at muscles and one at the brain.

The Game:

- The two teams line up at the heart.
- Then runners sprint to LUNGS (grab Red Oxygen chips) and DIGESTIVE SYSTEM (grab Yellow Fuel chips).
- Runners then sprint to MUSCLES/BRAIN where they must must drop the Red/Yellow chips (delivery) and pick up two Blue Chips (waste/$CO_2$) BUT...
- They will encounter CELL BLOCKERS: one cell blocker player at the muscles & one at the brain. The runner drops a yellow chip at muscles but, they must wait for a cell blocker to go pick up a blue chip in a designated area of the gym and give to the runner. Then the runner drops off a red chip at the brain & once again waits for the cell blocker to come back with blue chip. Once the runner has both blue chips (from muscle and brain cell blocker), then...
- Runners sprint to LUNGS to drop off the Blue Chips (waste disposal/exhaling).
- Race back to the HEART to tag the next runner! (First team to go through all their players wins).
- NOTE: cell blockers can not leave to get blue chip until a runner comes to their station (either muscle or brain)

Discussion:

Ask the students: What made the race fast/slow? (The constant need to deliver supplies and get rid of the $CO_2$ waste!) This shows how their heart rate speeds up to quickly move blood and clear waste. Ask students how the delivery systems in the human body could slow down. (A: if the heart isn't beating strong or fast enough to pump blood (in the game this may be demonstrated by a faster/slower runner) or blood vessels may be blocked restricting blood flow (like how the cell blockers blocked the game for a time)).

You can try the race again and see how much faster it goes without the cell blockers (the runners would just pick up their blue chips at the muscle/brain stations and run to deposit at lungs before going back to heart and tagging next runner).

# POST-VISIT ACTIVITY

## Activity One:

Objective: Students synthesize observations from the zoo with their knowledge of human body systems to explain how a non-human animal's specific body parts (structures) are better adapted for its environment (function).

# POST-VISIT ACTIVITY CONTINUED

Set-Up/Materials:

Divide the class into groups with 3 students in each
Animal Selection: Have each group choose one animal they found particularly interesting at the zoo
Worksheet: Each group receives a worksheet with the three major body systems covered (printable on the following page). Access to the internet/library for research.

Procedure:

1. Recall: Ask students to recall the chosen animal. What was it doing? How did it move? What habitat would it live in based on what you saw at the Zoo? Group makes notes on their sheet.
2. Students complete the worksheet, filling in the boxes for the chosen animal.
    - Focus on the last column: This is the critical thinking part. They must explain why the animal's structure (like the eagle's hollow bones or the snake's spine) is superior to the human equivalent for the animal's habitat.
3. Option: Have the groups present their reasons for why their animal is better suited for survival in their habitat than humans. The rest of the class votes on whether the animal is more successfully adapted for its environment.

**Sample to do with class before groups do their own:**

**ANIMAL:** Bald Eagle (groups can't choose this animal)

1. **Recall:** Ask students to recall the chosen animal. What was it doing *(sitting on a branch)*? How did it move? (flies around) What habitat would it live in based on what you saw at the Zoo? (a coastal forest or grasslands near open water - just a guess based on what they saw)
2. **Worksheet:**

| BODY SYSTEM | STRUCTURE/ ADAPTATION | FUNCTION | ARGUMENT |
|---|---|---|---|
| **SKELETAL/MUSCULAR** | Hollow bones<br>Large Keel bone | The structure is lightweight for flight, and the keel anchors pectoral muscles needed for the flapping/flying. | Our bones are dense and heavy, which is great for walking but would make us too heavy to fly like an eagle. |
| **CIRCULATORY/ RESPIRATION** | Four-Chambered Heart that is very large relative to its body size, and specialized air sacs connected to the lungs. | The large heart functions as a powerful pump to ensure rapid and continuous oxygen delivery to flight muscles, and the air sacs allow for efficient, continuous breathing at high altitudes. | A human heart isn't large enough to power sustained, high-altitude flight, and our lungs are less efficient at extracting the amount of oxygen needed for that energy output. |
| **DIGESTION/FEEDING** | A specialized muscular stomach called the Gizzard and the process of Pellet Formation. | The gizzard grinds up food and filters out indigestible materials (bones, fur, and feathers). These materials are compacted into a pellet and then regurgitated (coughed up). | Large chunks of their prey is swallowed whole, requiring the gizzard to make pellets to cough up. Our digestive system cannot handle whole bones and fur |

**Names of students in group:** _____

**Animal Selection:** _____

**A. Reflection:** recall your chosen animal.

1. What was it doing?
2. How did it move?
3. What habitat would it live in based on what you saw at the Zoo?

1. _____

2. _____

3. _____

**B. Fill in the chart below:**

| **BODY SYSTEM** | **STRUCTURE/ADAPTATION** (What does it look like?) | **FUNCTION** (What job does it do?) | **ARGUMENT** (Why is it better than a human's system?) |
|---|---|---|---|
| **SKELETAL/MUSCULAR** | | | |
| **CIRCULATORY/RESPIRATION** | | | |
| **DIGESTION/FEEDING** | | | |