



S.E.A. AQUARIUM EDUCATOR RESOURCES

PRIMARY SCHOOL

Major Groups of Vertebrates

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This **Major Groups of Vertebrates** resource aims to support educators teaching Science at Primary 3 and 4 levels. The topic of this resource is *Diversity of living and non-living things*, and the aim is to supplement student's understanding of the characteristics of the 5 major groups of vertebrates.

This resource extends from the concept of classifying animals into invertebrates and vertebrates, and focuses on introducing 5 major groups of vertebrates. At the end of the lesson, students should be able to list the main differences between invertebrates and vertebrates, and identify characteristics of the 5 major vertebrates groups.

Target Group: Primary 3 & 4

Duration: 35 – 45 minutes

Learning Objectives:

- Recall the importance of classification
- Identify characteristics of the 5 major vertebrates groups

Required Resources:

- Corresponding *Major Groups of Vertebrate* slides
- 1 set of clue slips (*To be printed and cut out*)
- Flipchart papers
- Markers

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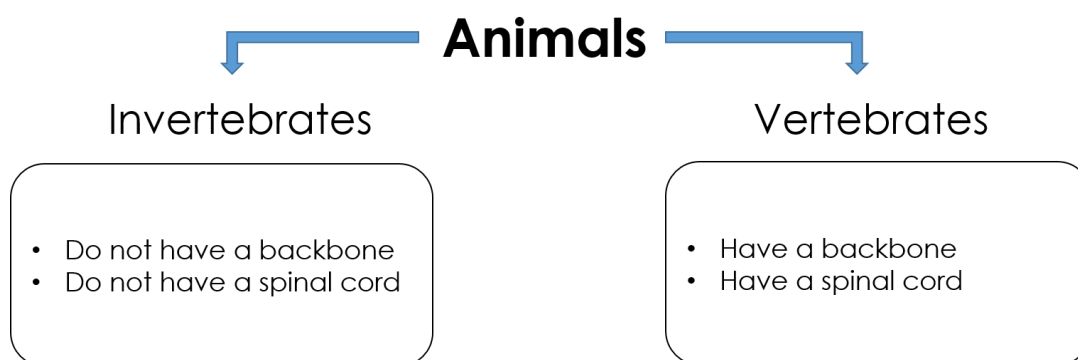


Introduction

Slides 2 – 5:

Begin the lesson by giving a recap on the importance of classification. Classification allows us to better understand the relationships among things, thus helping us to make sense of the world around us. It also allows us to study and share information about living things. There are many ways to classify things and it depends on the information that we need to find out.

Proceed to state that living things can be classified into two categories – Plants and Animals. Each category can be further classified, for example animals can be further classified into invertebrates and vertebrates. Educators should proceed to explain the differences between invertebrates and vertebrates. Educators may choose to have students identify the vertebrates from the animals that are shown on slide 4.



The vertebral column, also known as the backbone, is made up of vertebrae, intervertebral discs and the spinal cord. The main function of the vertebral column is to protect the spinal cord. The spinal cord is a complex organisation of nerve cells that relays messages from the brain to different parts of the body. Its function is important for the transmission of signals for movement and sensation.

Educators should proceed to state that there are many vertebrates in the world. In order to study them further, vertebrates can be further classified into 5 major groups – **Mammals**, **Reptiles**, **Fish**, **Amphibians**, and **Birds**. Using slides 6 – 10, educators are to share and explain the characteristics of each vertebrate groups with the students.



Group Activity: What am I?

Educators will need to print and cut out clue slips provided at the end of this segment. Additional information on the animals can be found in the *Appendix*.

Preparation

Divide the class into 5 different groups, each of which will be representing 1 of the 5 vertebrate groups. Distribute flipchart paper, markers, and 1 set of clue slips to each group.

Each set of clues consists of 4 to 6 different characteristics of the respective vertebrate groups that the students are representing -- **Mammals, Reptiles, Fish, Amphibians,** and **Birds**. Educators should encourage students to study the clues given and deduce the animal group that they are representing before starting the activity.

Activity Details

Using the clue slips given, students are required to correctly identify animals that belong to their assigned animal group.

Educators are to show pictures of animals provided in slides 12 to 16. Educators are encouraged to give each group 1 minute per slide to identify and write down the names of animals that belong to their assigned animals group on the flipchart paper. Students should use the clues given to assist in identification.

End of Activity

Have 1 or 2 representatives from each group to share and explain their answers. Answers may vary, and educators should reveal and explain the correct answers at the end of the sharing session.



Clue slips (To be printed and cut for distribution to students)

Mammals

Gives birth to young

Has hair on their body



Nurses young with milk

Breathes through lungs

Warm-blooded

Reptiles

Lays eggs

Has scales or hard outer covering



Uses lungs to breathe

Cold-blooded

Birds

Lays eggs

Has feathers and wings



Has a pair of legs

Warm-blooded



Fish

Lays eggs

Has scales on body

Uses fins to swim



Uses gills to breathe

Cold-blooded

Lives in water

Amphibians

Lays eggs

Webbed feet

Has moist skin



Cold-blooded

Able to live on land and water



Appendix

Additional Information for Educators

Ectotherms and Endotherms

Animals can also be classified based on how they regulate their body temperature – endotherms and ectotherms.

Endotherms (“Warm-blooded”) generate most of the heat they need internally. When the environment is cold, they will increase their metabolic heat production to keep their body temperature constant. Thus, the internal body temperature of endotherms are independent of the surrounding temperature.

The body temperature of ectotherms (“Cold-blooded”) depends on the temperature of their environment. Therefore, their body temperatures rise and fall along with the surrounding temperature. Ectotherms can generate some metabolic heat but they cannot increase this heat production to maintain internal temperatures.

Group Activity: What am I?

Animals in each vertebrates group:

Mammals	Reptiles	Fish	Amphibians	Birds
Dolphin	Crocodile	Manta Ray	Tadpole	Seagull
Sperm Whale	Snake	Alligator Gar	Newt	Penguin
Orca	Sea Turtle	Blue Tang	Poison Arrow Frog	Pelican
Sea Lion	Chameleon	Hammerhead Shark	Salamander	Crane



Animals Information:

Tadpole



Tadpoles are the young of frogs and toads. Therefore they are part of the amphibian animal group. Tadpoles have some features that are not present in adult frogs such as gills and tails. Though fully aquatic, they will undergo metamorphosis to become adult frogs and toads.

Dolphin

Dolphins are mammals, even though they possess fins and live in water. Just like all mammals, dolphins are warm-blooded animals and need to surface to take breaths of air. They also nurse their young with milk. Newly born dolphins have hair on the rostrum that fall off as they mature.



Manta Ray

Manta rays are fish due to the presence of fins, scales and gills. They have an added layer of mucus on their body that provides as protection from infections. Manta rays have enlarged pectoral fins, which resemble wings. These “wings” enable them to swim in the water column.

Sperm Whale

Sperm whales, just like all species of whales, are mammals. Named after a waxy substance in their foreheads, sperm whales possess spermaceti, an organ that aids in echolocation and maintaining buoyancy. Like all mammals, they breathe using lungs and do so through a blowhole located at the top of its head.



Sea Turtle



Sea turtles are reptiles. Although a large part of their lives are lived out in the ocean, they return to land to lay their eggs, which will be buried in the sand. Their bodies are covered in scales, and they have a shell, which they are unable to retract their heads into. They can spend 5 to 40 minutes underwater before surfacing to breathe.

Moray Eel

Despite their snake-like appearance, moray eels are a type of fish. Moray eels do not have scales, instead they have a layer of mucus as an outer covering that allows them to easily move through small crevices. Like all fishes, they possess fins and breathe using their gills. Their dorsal and anal fins are fused together, forming a single fin that runs along its back.



Orca



Orcas are often mistaken for whales because of their name “killer whales”. In reality, orcas are the largest species of dolphins. They were given the name “killer whales” by ancient sailors who observed them hunting larger whale species.

