



Classification Station [Grades 6-8]

Georgia Standards of Excellence Addressed:

S7L1. Obtain, evaluate, and communicate information to investigate the diversity of living organisms and how they can be compared scientifically.

- a. Develop and defend a model that categorizes organisms based on common characteristics.
- b. Evaluate historical models of how organisms were classified based on physical characteristics and how that led to the six kingdom system (currently archaea, bacteria, protists, fungi, plants, and animals).

Enduring Understandings:

- 🔍 Classification is system for organizing things by common characteristics.
- 🔍 Chordata, Echinodermata, Mollusca and Arthropoda are phylums that can be found in the kelp forest ecosystem.

Objectives:

- 🔍 Students will classify animals living in the kelp forest.

Time Frame:

- 🔍 45-60 minutes

Vocabulary:

- 🔍 Classification
- 🔍 Kingdom
- 🔍 Phylum
- 🔍 Mollusca
- 🔍 Echinodermata
- 🔍 Chordata
- 🔍 Arthropoda
- 🔍 Kelp Forest

Materials:

- 🔍 One copy of 12 animal descriptions per group of students
- 🔍 One copy of 12 animal pictures per group of students
- 🔍 Copies of the 2 Classification of Animals worksheets for each student
- 🔍 24 large index cards (per group)

Background:

Scientists use a **classification** system to organize living things into groups based on common characteristics. By doing this, scientists are better able to understand how certain animals are related to one another. All animals are classified into the **kingdom** Animalia. Animals that share the same basic characteristics are classified in the same **phylum (Mollusca, Echinodermata, Chordata and Arthropoda)**. Other classification levels are (in order of most general to most specific): class, order, family, genus, and species.

Chordata is the phylum people are probably most familiar with. Most chordates are vertebrates (animals with backbones), but the phylum also includes some small marine invertebrate animals. Just like all other phyla, you can break the phylum chordata down into smaller and more specific categories. Pinnipeds, like California sea lions and harbor seals, require you to break down their taxonomy to the family level before they separate.

Phylum: Chordata

Class: Mammalia

Order: Carnivora

Family: Otariidae, Phocidae

For the California sea lions, they are scientifically referred to as *Zalophus californianus* (by their genus and species).

The name “**mollusca**” comes from the Latin word meaning “soft.” All mollusks have soft bodies, which may or may not be covered by a shell. Mollusks have highly variable body plans. Some move across the floor of the ocean by sliding with a single foot. Others have highly developed brains and eyes similar to our own, and swim freely and have tentacles. Mollusks include snails, slugs, squid, octopuses, nudibranchs, clams and oysters.

Echinoderms have a hard skeleton that gives the body a spiny appearance. Their appropriate Latin name means “spiny-skinned.” Most of the animals have bodies arranged in five parts of equal size. Most have hundreds of tube feet that are used for locomotion. The tube feet are similar to suction cups and move the animal across the bottom of the ocean or help them to capture food. Echinoderms include sea stars, sea cucumbers, sand dollars and sea urchins.

The **arthropods** are the largest and most diverse group of animals. The Latin word “arthropod” means “jointed leg.” All arthropods have many jointed legs and bodies with distinct, segmented sections. Another feature of the arthropods is their exoskeleton, which is a hard outer skeleton. They may also have antennae. Arthropods include insects, crabs, spiders, lobsters, shrimp and barnacles.

So where can these animal be found? Everywhere in the ocean, but one particular habitat is the **kelp forest**. Kelp forests are found along west coast of North America and are made of up of large brown algae. These giant algae grow 18 inches per day and provides food and shelter for thousands of fish, invertebrate, and marine mammal species. Kelp forests harbor a great variety and high diversity of plants and animals.

Procedure:

1. Prep: Make copies of animal descriptions and pictures (1 per group). Students may work in groups of four to five students. Cut out the 12 animal descriptions and paste them onto index cards. Cut out the 12 animal pictures and paste them onto another set of index cards. Prepare copies of the two student worksheets, to be handed out to the students during the second part of the activity.
2. Discuss with students the concept of classification - what is its purpose? A system of organizing things by their common characteristics. Have students brainstorm ways we classify things in our everyday lives (foods, drinks, types of clothes, types of books - fiction, nonfiction, etc.) Write ideas on the board.
3. Inform the students they will be classifying 12 animals by putting them in groups according to their physical characteristics and common traits. Hand out a set of descriptions and picture cards to each group. Have students identify the 12 animals according to the descriptions.
4. Next, have students classify the 12 animals using their own methods of classification into groups according to the characteristics that the students can see. Allow students to use their own observational skills. They may choose to classify the animals by shape, presence of tentacles, presence of eyes, etc.
5. Hand out the two student worksheets and review the scientific classification system – kingdom, phylum, class, order, family, genus and species using California sea lions as an example. Discuss the characteristics of the following four phyla: **Chordata**, **Arthropoda**, **Mollusca** and **Echinodermata**. Have the students re-classify the animals on index cards according to these groups that scientists use. Point out to the students that they will need to understand the characteristics of each group and then be able to identify these characteristics in the individual animals.
6. Share results and have students compare their own classification system with the system used by scientists. Were there many differences between the system they used and the system used by scientists?

Answer Key:

| Groups | Which animals belong to this group? |
|-------------------------|--|
| Mollusks | Octopus and abalone |
| Echinoderms | Sea star, sea cucumber and sea urchin |
| Arthropods | Lobster and crab |
| Chordata - Pinnipeds | California sea lions and northern elephant seals |
| Chordata - Elasmobranch | Great white shark |
| Chordata - Bony fish | <i>Mola mola</i> and rockfish |

Assessment:

- ◆ Check that each group of students has correctly classified 90% of the animals in the table.
- ◆ Have students classify the following animals into the same four groups: harbor seal (Chordata), squid (Mollusca), bat star (Echinodermata), shrimp (Arthropods), leopard sharks (Chordata - elasmobranch) and mackerel (chordata – bony fish)

A **sea star** is an animal with five arms. It can be found on the ocean floor where it moves very slowly in search of food. Most sea stars are carnivorous and eat other animals such as clams, oysters or decaying matter. When the sea star eats, it pushes its stomach out of its mouth, and digests its prey on the outside of its body. The sea star moves and clings to its prey with hundreds of tube feet, which provide suction for the sea star to grip.



The **sea cucumber** is a long, cylinder-shaped animal that lives in the sand on the sea floor. It eats by taking in the sand, filtering out small plants and animals and then forcing out the sand. The animal uses tube feet for locomotion and the head is sometimes surrounded by tentacles. The body has five parts, but the animal has no arms. The largest sea cucumber can reach a length of 6 feet. Predators include sea turtles, some fish, and humans. Some sea cucumbers can give off a toxin that can deter predators.



Northern elephant seals, like all true seals (phocids), lack external ear flaps and crawl on land with rhythmic belly flops. To find food and avoid white sharks, a major predator, elephant seals dive deep—usually to about 1,700 feet (519 m). Elephant seals dive for up to 30 minutes at a time, seldom staying at the surface for more than a few minutes. Their favorite foods are octopuses, skates, small sharks and ratfish



The **California sea lion** is a type of pinniped found in the Eastern North Pacific from Alaska to Mexico. The diet of the California sea lion consists of squid, fish, and octopuses. They eat approximately 8% of their body weight at a day to maintain their high metabolism due to the cold water - for an adult bull that could mean 62 lbs. of food in a single feeding! Sea lions also stick their flippers out of the water to help regulate their body temperature.



The ***Mola mola***, or ocean sunfish, is a type of open water fish. They get their name because they bask in the sun near the surface of the water. The diet of sunfish consists mainly of jellies and other zooplankton, squid, fish, crustaceans, and brittle stars. Sunfish can grow as large as 11 feet in length and weighs more than 2,000 lbs. They are the heaviest species of bony fish. Sunfish have lobe-shaped paddle like fins both above and below to help them navigate through the water.



A **lobster** has a hard, segmented exoskeleton on the outside of its body. Some species of lobster have pincers which are used for protection. All lobsters have antennae and 5 pairs of jointed legs (including pincers). Lobsters are *nocturnal*, active at night and at rest during the day. They are eaten by many animals, including fish, octopuses, other lobsters, and humans.



A **crab** is a round-bodied animal with a hard skeleton on the outside of its body. It has well-developed claws that can be used for protection and feeding. It also has four pairs of legs which are used for movement. There are many species of crabs, and they have varied diets; some eat plants, some eat animals, and some eat both plants and animals. Some crabs live in water and others live on land.



Rockfish include more than 100 species and come in many different shapes, sizes and color patterns. Colors vary from black and drab green to bright orange and red, and some rockfishes wear stripes or splotches. Their heads feature large eyes and thick, broad mouths that dip downward at the corners. Rockfishes are known for the bony plates on their heads and bodies and the heavy spines on their fins. Their diet consists of plankton, small crustaceans and fish. In giant kelp forests, rockfish hover motionless under the kelp canopy, buoyed by their air bladders and rest on rocks at the bottom of the kelp forest, with creatures like sea cucumbers and abalone.



The **white shark** is perhaps the most famous shark. They use quick bursts of speed to ambush their favorite prey: seals and sea lions. White sharks are highly migratory animals, found throughout the world's ocean. They have an array of keen senses—including organs that can detect the faint electrical fields given off by the bodies of potential prey.



The **octopus** has a soft body and eight arms. There are many species of octopus, and the biggest can grow up to 25 feet from the arm tip to arm tip. Octopuses have good eyesight and will hunt many food items including crabs, snails and fish. When threatened, an octopus can squirt dark ink into the water, allowing it to escape. In addition, the octopus can change its skin color to blend into its background, using camouflage to hide from its predators.



Mostly sedentary, an **abalone** clings to rocks while waiting for a piece of kelp to drift nearby. The abalone clamps down on the kelp with its foot and then munches on the seaweed with its radula—a rough tongue with many small teeth.



A **sea urchin** is a round animal with many spines. The spines are attached to its outer skeleton. Its mouth is located on the bottom of the body, and it possesses a set of five teeth which it uses to eat by scraping algae off of rocks. The sea urchin moves very slowly with the use of tube feet, which act like suction cups to grip the rocks.



CLASSIFICATION OF ANIMALS

Student Worksheet

Scientists use a **classification** system, which helps them understand how certain animals are related to one another. For example, two animals that are very closely related might be classified in the same **family**. A group of animals that shares the same basic characteristics are classified in the same **phylum**. See if you can classify the 12 animals in the attached table into the following four phyla (groups) of animals:

Arthropods

The arthropods are the largest and most diverse group of animals. The word “arthropod” means “jointed leg.” All arthropods have many jointed legs and bodies with distinct, different skeletons. Another feature of the arthropods is their exoskeleton, which is a hard outer skeleton. They may also have antennae.

Chordata

Chordata is the phylum people are probably most familiar with. Most chordates are vertebrates (animals with backbones), but the phylum also includes some small marine invertebrate animals. Just like all other phyla, you can break the phylum Chordata down into smaller and more specific categories. Pinnipeds, like California sea lions and harbor seals, require you to break down their taxonomy to the family level before they separate. California sea lions are in the phylum Chordata, class Mammalia, order Carnivora, and family Otariidae. California sea lions are scientifically referred to as *Zalophus californianus* (by their genus and species).

Echinoderms

Echinoderms have a hard internal skeleton that give the body a spiny appearance. Most of the animals have bodies arranged in five parts of equal size. Most have hundreds of tube feet that are used for locomotion. The tube feet are similar to suction cups and move the animal across the bottom of the ocean or help them to capture food.

Mollusks

The name “mollusk” comes from the Latin word meaning “soft.” All mollusks have soft bodies, which may or may not be covered by a shell. Mollusks have highly variable body plans. Some move across the floor of the ocean by sliding with a single foot. Others have highly developed brains and eyes similar to our own, and swim with the help of tentacles.

CLASSIFICATION OF ANIMALS
Student Worksheet

Classify the 12 animals into the following four phyla (groups) according to the scientific classification system. List the defining characteristics of each animal phylum and compare them to the characteristics of each of the animals that were identified. Then, sort each of the 12 animals into the appropriate phylum.

| Animal Phylum | Main Characteristics of this Phylum | Which animals belong to this phylum? |
|----------------------|--|---|
| Arthropods | | |
| Chordata | | |
| Echinoderms | | |
| Mollusks | | |