

## Student packet session #3

### DISCOVERY EDUCATION EXPLORATION: CAT CLASSIFICATION

**Big Idea 15:** Diversity and Evolution of Living Organisms

**Benchmark: SC.6.L.15.1** Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.

#### QUESTIONS:

1. What does each living thing shown at the end of the Exploration have in common with a house cat?  
Answer: They are organisms with cells that have nuclei and other membrane-bound organelles.

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2. Write the levels of classification in the correct order from largest to smallest. Answer: Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species

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3. Why do scientists use the classification system? Answer: to organize and study organisms

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#### DISCUSSION QUESTIONS:

Ask the students which of the eight organisms in the Exploration has the most in common with the house cat and how they came to that conclusion.

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#### Extension: Classifying Life

Scientists organize all of Earth's life forms into a hierarchy that begins with kingdom and works down into phylum, class, order, family, genus, and species. (To remember these categories, think "**King Philip Crossed Over For Gold and Silver**—a mnemonic referring to 16th-century Spanish exploration.) In this feature, step into the shoes of a taxonomist and classify three forms of life: a plant, an animal, and a...well, you'll need to figure that one out for yourself.

#### Introduction:

1. See if you can classify these three living organisms without making any mistakes. The description for each provides all the information you will need to select the right classifications. (Sometimes you will need to pick the classification that seems most right). Classification begins at KINGDOM and ends at SPECIES.

2. Enter your responses on the Data Table provided


## Data Table

<b>Level Name</b>	<b>Group Name for Cat</b>	<b>Common Characteristics</b>	<b>Other Organisms in this Level</b>
Domain	Eukarya	Organisms with cells that have nuclei	Mushroom, sunflower, fish, dolphin, eagle, butterfly, lion zebra, wolf


## Classifying Life Cards

### CLASSIFYING LIFE


[START OVER](#)   [ABOUT](#)



**BEAR**  
Score: \_\_\_\_\_



**GREEN ID**  
Score: \_\_\_\_\_



**SEA CUCUMBER**  
Score: \_\_\_\_\_

**TOTAL SCORE:**  
\_\_\_\_\_

**KINGDOM:**

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**PHYLUM:**

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**CLASS:**

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**ORDER:**

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**FAMILY:**

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**GENUS:**

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**SPECIES:**

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### { INTRODUCTION }

See if you can classify these three living organisms without making any mistakes. The description for each provides all the information you will need to select the right classifications. (Sometimes you'll need to pick the classification that seems "most" right.) Classification begins at KINGDOM and ends at SPECIES.


**SCORING:** A point will be added to your score every time you make a choice, whether it's right or wrong. Seven points for an organism means you made no mistakes; ten points means you made three mistakes. **A perfect score for the entire game is 21 points.**

**TO BEGIN:** Select one of the three organisms above.

### { KINGDOMS }

- Animalia:** Organisms that get their energy by ingesting other organisms. Commonly multi-celled.
- Bacteria:** Single-celled organisms that do not have an enclosed nucleus.
- Fungi:** Single-celled and multi-celled organisms that get their energy mainly by absorbing nutrients from their surroundings and not through photosynthesis.
- Plantae:** Organisms that get their energy through photosynthesis. Commonly multi-celled.
- Protocista:** Multi-celled organisms that are not animals, plants, or Fungi.

**SUBMIT**



The meat-eating organism spends a great deal of time alone on the ice. Its coat of white fur keeps it warm when it is in the water. Its length, measured from the tip of its nose, down its spine, and to the end of its short tail is seven feet. It uses its five-digit, non retractable claws to kill its prey.



## { PHYLA *within Animalia* }

- Chordata: Animals with a notochord (a rodlike structure) at some stage of development that sometimes develops into a backbone.
- Echinodermata: Animals with five-part symmetry and an internal skeleton made from calcium carbonate.
- Arthropoda: Segmented animals consisting of a head, thorax, and abdomen. Bodies are covered with an exoskeleton.
- Crustacea: Segmented animals with 16 to 20 segments, two pairs of antennae, and compound eyes that are usually on stalks.

**SUBMIT**



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## { CLASSES *within Chordata* }

- Ascidiaceae: Cold-blooded marine animals that have neither a brain nor a skull and live inside a sac.
- Aves: Warm-blooded animals with beaks and light bones that are hollow in areas.
- Mammalia: Warm-blooded animals covered with fur or skin that may grow hair. Females have mammary glands.
- Reptilia: Cold-blooded animals with scaly skin and either short legs or no legs at all.

**SUBMIT**



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## { ORDERS *within Mammalia* }

- Artiodactyla: Two- or four-toed mammals that are usually found in groups or herds.
- Carnivora: Meat-eating mammals, though some supplement their diet with fruits, plants, and insects.
- Diprotodonts: Mammals in which two of the four digits of their hind legs are fused together up to the base of their claws.
- Primates: Mammals with opposable thumbs and hands that are able to grasp.

**SUBMIT**



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## { FAMILIES *within Carnivora* }

- Felidae: Carnivores that have retractable claws and can either purr or roar.
- Mustelidae: Carnivores that typically have long tails. All have especially well-developed anal glands.
- Procyonidae: Small- to medium-sized mammals with short to long tails. Found only from Canada to Argentina.
- Ursidae: Small-to-large mammals with large ears and short tails.

**SUBMIT**



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## { GENERA *within Ursidae* }

- Melursus: Bears with long narrow snouts, which look similar to an anteater's snout. They have small teeth and no incisors.
- Helarctos: Small bears that stand only about 30 inches to the shoulder.
- Ursus: Bears whose fur is typically uniform in color.
- Tremarctos: Large bears with white fur circling or almost circling its eyes. Feeds mostly on fruit.

**SUBMIT**



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## { SPECIES *within Ursus* }

- arctos: Large bear known for its brown coat. Eats mostly vegetation.
- americanus: Medium to large bear known for its typically black or dark brown coat.
- maritimus: Large, aquatic bear adapted to a cold climate.
- ursinus: Small to medium bear with black fur, though sometimes with gray and brown fur mixed in.

**SUBMIT**

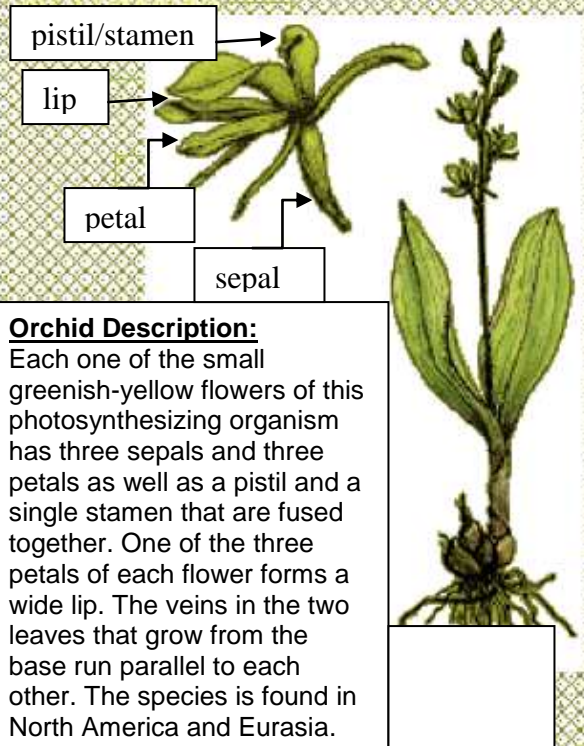


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## { KINGDOMS }

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- Protocista: Multi-celled organisms that are not animals, plants, or fungi.

**SUBMIT**

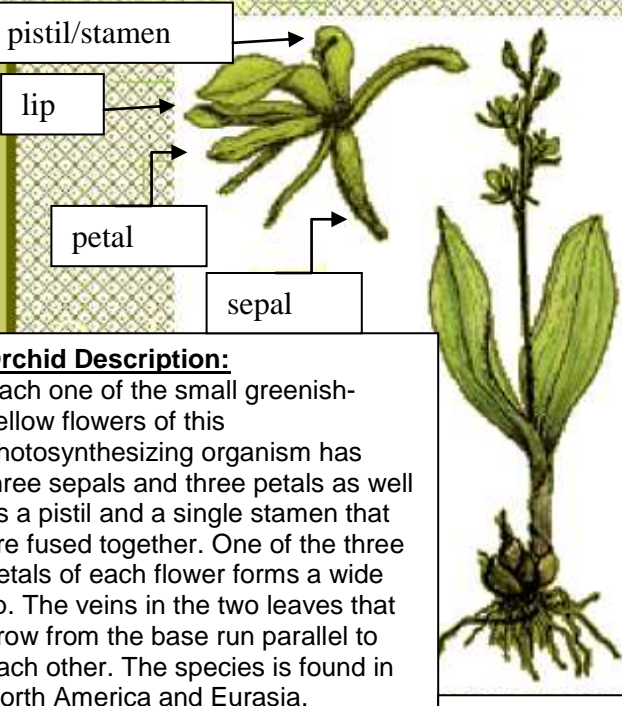


North America and Eurasia.

## { PHYLA *within Plantae* }

- Magnoliophyta: Plants that produce flowers and seeds.
- Pinophyta: Cone-bearing plants, mostly trees.
- Lycopodiophyta: Evergreen plants that include club and spike mosses. These plants do not produce flowers.
- Equisetophyta: Plants that have hollow, jointed stems with rough ribs.

**SUBMIT**



North America and Eurasia.

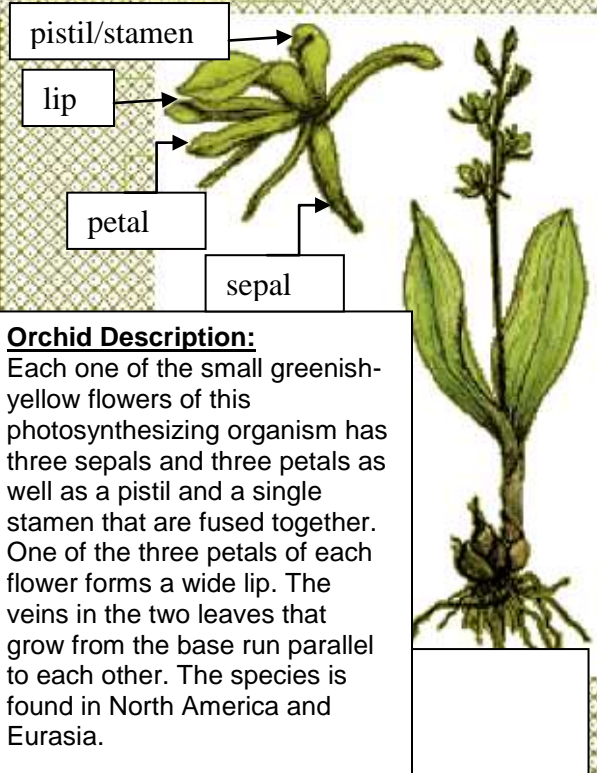


## { CLASSES *within Magnoliophyta* }

- **Magnoliopsida:** Plants that sprout with two leaves. Veins in leaves have a branching structure (dicots).
- **Liliopsida:** Plants that sprout with one leaf. Veins in leaves are typically parallel to each other (monocots).

**SUBMIT**

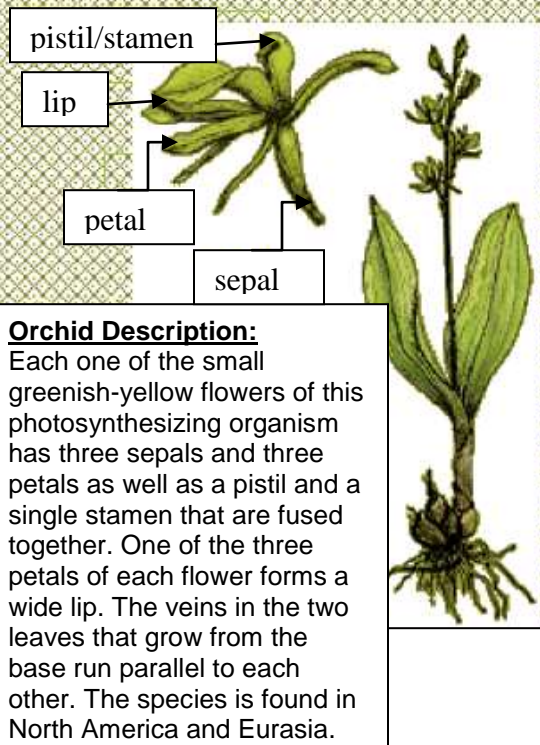
Throughout this feature, only four subcategories out of the many that may fall within a broader category are presented as choices. Magnoliophyta, however, is traditionally divided into the two classes listed above (though recent challenges to the traditional view are calling for four to eight classes within the phylum).



## { ORDERS *within Liliopsida* }

- **Alismatales:** Liliopsida plants that live submerged or mostly submerged in freshwater and marine environments. Flowers are pollinated by wind or water.
- **Poales:** Grass-like Liliopsida plants with green sepals and petals that are bract-like (look like leaves or scales).
- **Liliales:** Liliopsida plants with flowers that have three sepals and three petals that are so similar that they cannot be distinguished from one another.
- **Asparagales:** Liliopsida plants with flowers in which the sepals and petals are often distinguishable.

**SUBMIT**

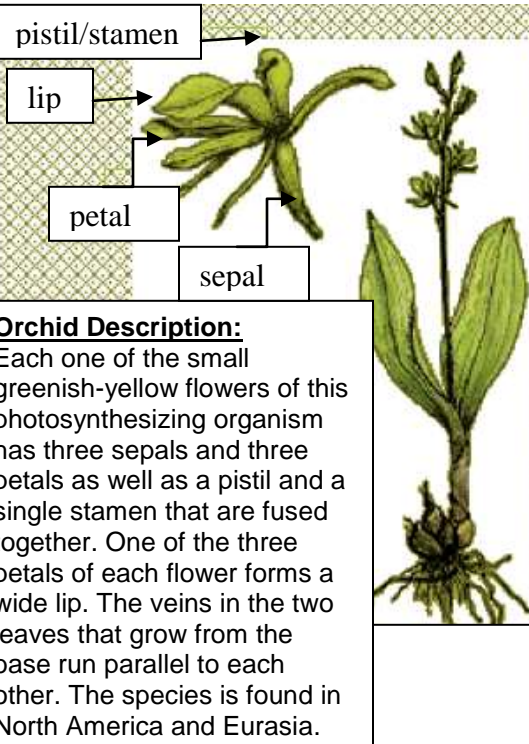




## { FAMILIES *within Asparagales* }

- Alliaceae: Asparagales plants with an onion-like odor, small flowers, and six stamens.
- Agavaceae: Asparagales plants with large flowers and six stamens.
- Orchidaceae: Asparagales plants with small to large flowers and one stamen.
- Iridaceae: Asparagales plants with small to large flowers and three stamens.

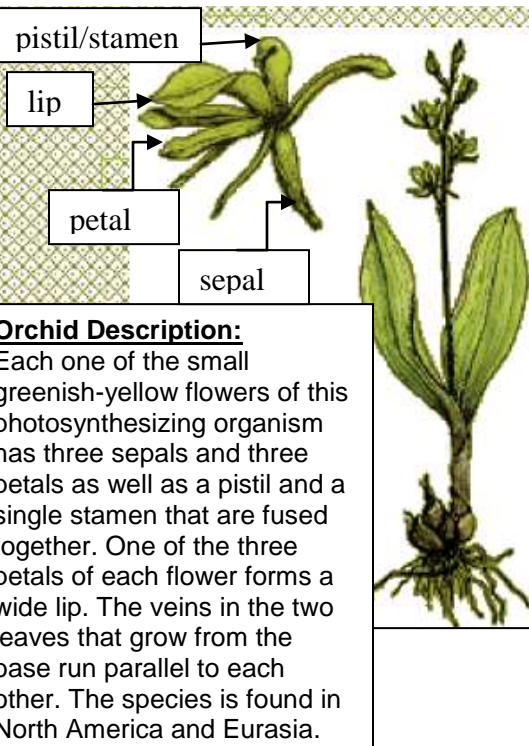
**SUBMIT**



## { GENERA *within Orchidaceae* }

- Goodyera*: Long-stemmed orchids with small flowers. Within each flower's lip is a single patch of "hair" (papillae).
- Platanthera*: Orchids with green, white, or yellow flowers that have a small lobed or fringed lip.
- Liparis*: An orchid with one to a few leaves at its base and very small flowers. Each flower has a wide lip.
- Spathoglottis*: The flower's lip has a callous-like growth near its base.

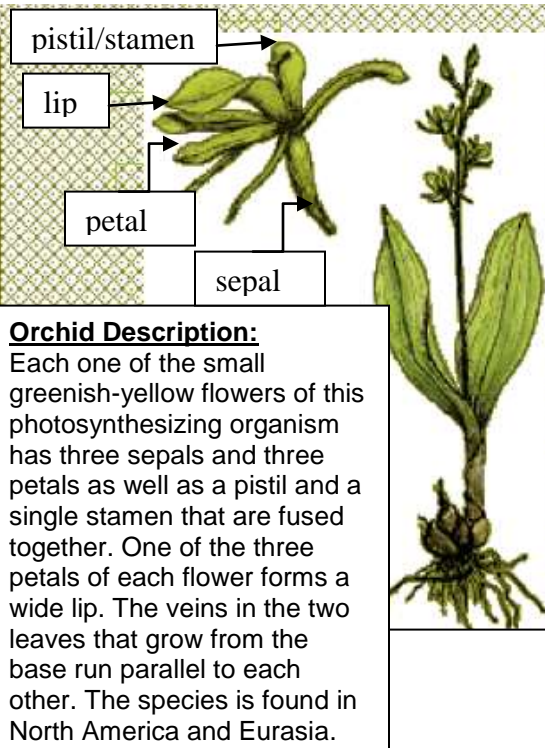
**SUBMIT**



## { SPECIES *within Liparis* }

- hawaiiensis*: A species of wide-lipped orchid with green flowers that grows only in Hawaii.
- lillifolia*: A species of wide-lipped orchid with brown flowers.
- loeselii*: A species of wide-lipped orchid with green or greenish-yellow flowers.
- vexillifera*: A species of wide-lipped orchid found in the Caribbean and Central and South America.

**SUBMIT**



## { KINGDOMS }

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**SUBMIT**



### **Sea Cucumber Description:**

The sea cucumber captures food on its 10 branching tentacles, which it then wipes off in its mouth. Waste is ejected from its anus. It has five-part symmetry, a flat underside, and three rows of tube feet. It does not have a backbone but it does have fleshy skin with low papillae (nipple-like projections) and embedded calcium carbonate crystals.



## { PHYLA *within Animalia* }

- Chordata: Animals with a notochord (a rodlike structure) at some stage of development that sometimes develops into a backbone.
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## { CLASSES *within Echinodermata* }

- Asterozoa: Echinoderms that are often shaped like a star, though they can be nearly circular in shape.
- Crinozoa: Echinoderms that can have the appearance of a simple bush with a stalk that attaches to the seafloor.
- Echinozoa: Echinoderms with a hard shell covered by spines.
- Holothurozoa: Echinoderms that are shaped like a cylinder and have a mouth at one end and an anus at the other end. Outer surface is soft.

**SUBMIT**



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## { ORDERS *within Holothuroidea* }

- Apodida: Worm-like sea cucumbers that lack tube feet and have a thin outer covering that is often transparent.
- Aspidochirotida: Sea cucumbers with 15 to 30 short tentacles that are shaped like shields or mops.
- Dendrochirotida: Sea cucumbers with 10 to 30 highly branched tentacles.
- Molpadiida: Sea cucumbers with 15 short, stubby tentacles and no tube feet. Bodies taper toward the anus, forming a tail.

**SUBMIT**



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## { FAMILIES *within Dendrochirotida* }

- Cucumariidae: Sea cucumbers with 10 branching tentacles that are used to capture particles from the surrounding water.
- Phyllophoridae: Sea cucumbers with more than 10 branching tentacles. The shorter tentacles are used for cleaning.
- Psolidae: Sea cucumbers covered on the top side by plates made of calcium carbonate.
- Sclerodactylidae: Sea cucumbers with 10 to 20 tentacles and scattered tube feet.

**SUBMIT**



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## { GENERA within Cucumariidae }

- Pentacta:** Sea cucumbers with a flat underside and three distinct rows of tube feet, a firm body wall, and low papillae on the dorsal side.
- Pseudocolochirus:** Sea cucumbers with three rows of tube feet on the bottom and large obvious papillae on the top.
- Stolus:** Small sea cucumbers with tube feet that are distributed throughout the body.
- Thyone:** Sea cucumbers with tube feet scattered equally over the body.

**SUBMIT**



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## { SPECIES within Pentacta }

- anceps:** Yellow and pink sea cucumbers, with stiff, fleshy skin, low papillae on the body, and prominent papillae near the anus.
- australis:** Sea cucumbers with a squarish body that are grey to orange in color.
- crassa:** Grey sea cucumbers with a pink underside that are typically found on mud.
- quadrangularis:** Grey sea cucumbers with prominent tapering papillae along the corners of their squarish bodies.

**SUBMIT**



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**DATA TABLE: Classifying Life - Classification of Organisms**

<b>Organism</b>	<b>Domain</b> Bacteria, Archaea, or Eukarya	<b>Kingdom</b> Eubacteria, Archaea, Protist, Fungus, Plant, or Animal	<b>Phylum</b>	<b>Class</b>	<b>Order</b>	<b>Family</b>	<b>Genus</b>	<b>Species</b>
<b>Bear</b>								
<b>Orchid</b>								
<b>Sea Cucumber</b>								



# ASSESSMENT

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Big Idea 15: Diversity and Evolution of Living Organisms

**Benchmark: SC.6.L.15.1** Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.

### Multiple Choice

*Identify the choice that best completes the statement or answers the question.*

- 1. Why are organisms classified into kingdoms, phylum, class, order, family, genus, and species?**
  - A. so that students can learn each group in school
  - B. to determine which habitats are most suitable for organisms
  - C. so biologists will know which animals can live together safely
  - D. to identify organisms and determine how groups are related
  
- 2. Which of the following correctly describes the modern six-kingdom classifications?**
  - A. Bacteria, Monera, Protist, Fungus, Plant, and Animal
  - B. Eubacteria, Archaea, Protist, Fungus, Plant, and Animal
  - C. Eubacteria, Archaea, Plant, Animal, Birds, and Fish
  - D. Fungus, Plant, Animal, Bacteria, Archaea, and Eukarya
  
- 3. According to the modern classification system, which list is written correctly from least specific to most specific?**
  - A. species, genus, family, order
  - B. phylum, class, genus, order
  - C. class, order, genus, species
  - D. phylum, order, species, family
  
- 4. In the modern classification system, what category has the most organisms?**
  - A. family
  - B. order
  - C. kingdom
  - D. phylum

**5. A biologist believes that two organisms are of the same species, even though they look different from one another. What would cause the biologist to come to this conclusion?**

- A. They live in the same habitat.
- B. They do not eat each other.
- C. They are similar in size and both have fur.
- D. They mate and have fertile offspring.

**6. A biologist discovers a new organism. What helps the biologist classify the new organism into a specific group?**

- A. how long the organism lives
- B. where the organism lives
- C. common traits with other organisms
- D. how recently the organism was discovered

**7. What is the main benefit of using scientific names instead of common names for organisms?**

- A. Scientific names have been around for much longer than common names have.
- B. Scientific names give everyone a shared terminology while common names can vary around the world.
- C. Scientific names include a code for classification while common names do not.
- D. Scientific names are more descriptive than common names for an organism.

**8. Which of the following are the three main classification domains?**

- A. Fungus, Plants, and Animals
- B. Bacteria, Archaea, and Eukarya
- C. Protist, Fungus, and Plants
- D. Bacteria, Virus, and Eukarya