

9th Grade Biology:
Classifications of Organisms

April 27 – May 1

Time Allotment: 40 minutes per day

Student Name: _____

Period: _____

Teacher Name: *Ms. Carstens*

Packet Overview

Date	Objective(s)	Pg. #
Monday, April 27	1. Identify methods of classification, including systems from Aristotle and Carolus Linnaeus. 2. Identify the levels of classification and how organisms are named.	2
Tuesday, April 28	1. Describe organism relationships in a phylogenetic tree. 2. Identify the significance of cladistics when classifying organisms.	5
Wednesday, April 29	1. Identify and describe the three domains in modern classification.	8
Thursday, April 30	1. Identify and describe the six kingdoms. 2. Compare and contrast the six kingdoms.	15
Friday, May 1	1. Review main concepts: taxonomy, classification, phylogeny, cladistics, domains, kingdoms.	17

Additional Notes: Hi all! I hope you are doing well and adjusting to our new learning avenues! Remember, I am here for you—through email (kelly.carstens@greatheartsnorthernoaks.org) and also my Zoom Guided Instruction. The times are listed below:

- 1st Period – Mondays, Wednesdays from 10:00-10:50 am
- 3rd Period – Mondays, Wednesdays from 1:00-1:50 pm
- 4th Period – Tuesdays, Thursdays from 10:00-10:50 am
- 6th Period – Tuesdays, Thursdays from 1:00-1:50 pm

Per usual, your weekly minor assessment is found on pgs. 20-21 of this packet. **At the end of your lesson on Friday, you will complete this minor assessment.** You may use your notes from the week. It should take approximately 15 minutes.

*****NOTE:** For a little bit of fun and to stretch those creative muscles, this week I've included an activity as a supplemental material on Google Classroom. If you are not using Google Classroom and wish to do the activity, email me and I will send it to you.

In the activity, you get to take on role of explorer by naming and creating a picture of a “newly-discovered” species! This activity is NOT required, but I would love to see some of your creations! Feel free to upload the scan of your organism as another file in the Week 5 Daily Work Submission assignment!

Academic Honesty

I certify that I completed this assignment independently in accordance with the GHNO Academy Honor Code.

Student signature:

I certify that my student completed this assignment independently in accordance with the GHNO Academy Honor Code.

Parent signature:

Unit Overview:

As organisms evolved, the earth became home to what scientists today estimate to be about 8.7 million species, with about 6.5 million land-dwelling species and approximately 2.2 million ocean- and water-dwelling species. But, although scientists estimate that the earth is home to nearly 9 million different species of organisms, only about 1.7 million have been officially named and classified.

In this unit, we will explore systems of classification, how organisms are named, the identification methods showing related species, and how organisms are grouped together.

I. Monday, April 27

Unit – Chapter 17: Classification of Organisms

Lesson 1: Biodiversity and Taxonomy

Lesson 1 Socratic Guiding Questions: Keep this in mind as you study!

How do scientists classify organisms? Why is this important?

Objectives: Be able to do this by the end of this lesson.

1. Identify methods of classification, including systems from Aristotle and Carolus Linnaeus.
2. Identify the levels of classification and how organisms are named.

Introduction to Lesson 1:

Lesson 1 introduces us to **early beliefs on how organisms were related**, how our **modern method of classification** evolved, and the **levels of classification** that help scientists to identify organisms universally.

Read pp. 337-339 in your text. After reading, complete the tasks on the following pages.

Concept and Vocabulary Review:

✓ **Tell the difference** between these terms:

a) **taxonomy, phylogeny**

✓ **Binomial nomenclature** is _____

“Bi-” means two, and “nomen” means name. Why is **binomial nomenclature** an appropriate name to describe an organism’s identification?

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. Aristotle classified animals on the basis of
- a. their size.
 - b. their evolutionary history.
 - c. where they lived.
 - d. what they ate.
- _____ 2. The main criterion used in Linnaeus's system of classification is an organism's
- a. evolutionary history.
 - b. morphology.
 - c. taxonomy.
 - d. hierarchy.
- _____ 3. Each subset within a class of organisms is called a(n)
- a. order.
 - b. family.
 - c. genus.
 - d. phylum.
- _____ 4. In the scientific name of an organism, the first part is the
- a. species identifier.
 - b. variety.
 - c. subspecies.
 - d. genus.
- _____ 5. The species name of the pangolin is
- a. *Manis temminckii*.
 - b. *manis temminckii*.
 - c. *Manis temminckii*.
 - d. *Manis Temminckii*.

Short Response.

- ✓ How did Aristotle classify organisms? How did he further classify animals? Give an example of an animal that would pose a problem in classifying using Aristotle's method.

- ✓ Describe Carolus Linnaeus's method of classifying organisms. How is our modern system different?

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Directions: Examine the table below showing the classification of four organisms. Then answer the questions.

Taxon	Green Frog	Mountain Lion	Domestic Dog	Human
Kingdom	Animalia	Animalia	Animalia	Animalia
Phylum	Chordata	Chordata	Chordata	Chordata
Class	Amphibia	Mammalia	Mammalia	Mammalia
Order	Anura	Carnivora	Carnivora	Primates
Family	Ranidae	Felidae	Canidae	Hominidae
Genus	<i>Rana</i>	<i>Felis</i>	<i>Canis</i>	<i>Homo</i>
Species	<i>Rana clamitans</i>	<i>Felis concolor</i>	<i>Canis familiaris</i>	<i>Homo sapiens</i>

1. Which taxon includes the most specific characteristics? _____
2. Which taxon includes the broadest characteristics? _____
3. Which taxon includes more species, an order or a family? _____
4. Which taxon includes only organisms that can successfully interbreed? _____
5. If two organisms belong to the same family, what other taxonomic groups do the organisms have in common?

6. Which two organisms in the chart are most closely related? Explain.

7. To which taxa do all four organisms belong?

8. Which class does not include animals that have hair or fur? _____
9. What is the order, family, and genus of a human?

10. In the space below, draw a diagram showing the levels of classification in the Linnaean system. Remember the phrase, “**King Philip Came Over For Good Soup!**” This will help you remember the levels in order from largest (most diverse – Kingdom) to most specific (a single genetic organism in a population – species)!

II. Tuesday, April 28

Unit – Chapters 17: Classification of Organisms

Lesson 2: Phylogenetics and Cladograms

Lesson 2 Socratic Guiding Questions: Keep these questions in mind as you study!

How do scientists show ancestral relationships among organisms?

Objectives: Be able to do this by the end of this lesson.

1. Describe organism relationships in a phylogenetic tree.
2. Identify the significance of cladistics when classifying organisms.

Introduction to Lesson 2

Today’s lesson presents two modern ways scientists classify and organize relationships among organisms. You’ll learn about phylogenetics and how information from phylogenetics produces a map, of sorts, that helps to classify other organisms.

Read pp. 341 - 343 in your text. After reading, complete the tasks on the following pages.

Concept and Vocabulary Review:

1. Distinguish between the vocabulary pairs below:

a) **phylogenetics, cladistics**

b) **shared character, derived character**

2. In cladistics, what term is used for a group of organisms that includes an ancestor and all of its descendants?

- a. class
- b. clade

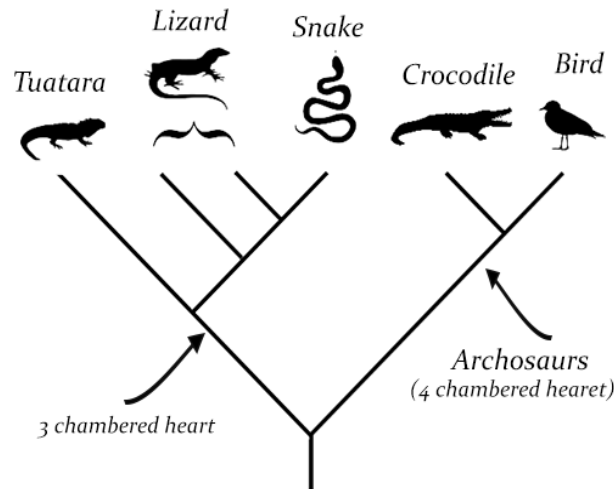
- c. phylum
- d. species

3. How do derived characters help cladistic taxonomists determine phylogenetic relationships?

What is a Cladogram?

A **cladogram** is a diagram that shows relationships between species. These relationships are based on observable physical characteristics. Cladograms show the relationships in a graphic that looks like a tree, with branches connected to a common ancestry. Each branch represents a new distinct trait that was not seen in the group lower on the tree. These distinct traits are called derived characteristics.

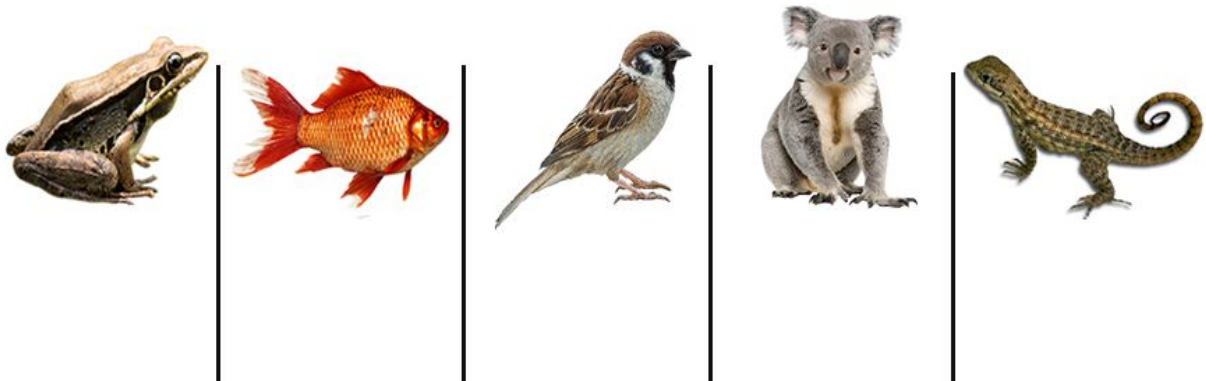
The groups on the diagram are organized into clades, each clade shares distinct traits. For example, in the cladogram shown, birds and crocodiles are grouped into a clade called archosaurs, which share characteristics such as a 4 chambered heart and socketed teeth.



1) Examine the cladogram above and suggest a trait that lizards and snakes share, but is not shared by individuals of other groups.

Activity 1: Create an Animal Cladogram

2) For each animal shown, list as many characteristics as you can. You can also include traits that aren't apparent from the photo, such as reproductive strategies or unique behaviors. Try to come up with traits that are shared by multiple animals and at least one trait that is unique for each animal.



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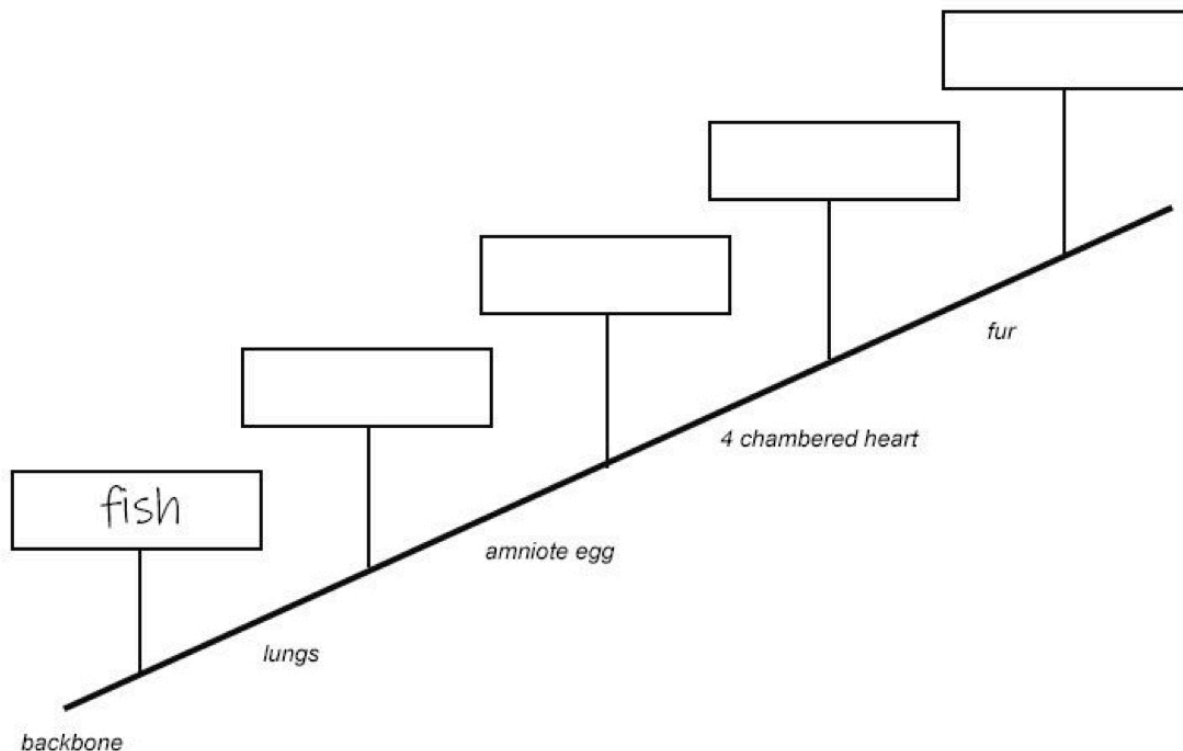
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3) Complete a characteristics chart. Place an **X** for features that each animal has, and a **O** for features not exhibited in the animal. All of these animals have backbones, the first column is completed for you.

	Trait 1	Trait 2	Trait 3	Trait 4	Trait 5
	Backbone	Lungs	Amniote Egg	4 chambered heart	Fur
Fish	X				
Frog	X				
Lizard	X				
Bird	X				
Koala	X				

4) The chart is then converted to a cladogram. Each group, called a CLADE, has the traits below it on the diagram. When a group doesn't have a trait, it is called an OUTGROUP. The first outgroup is fish, because it is the only one that doesn't have lungs.



III. Wednesday, April 29

Unit – Chapter 17: Classification of Organisms

Lesson 3: Modern Classification

Lesson 3 Socratic Guiding Question: Keep this question in mind as you study!

What is the tree of life and how does it relate all living things?

Objective: Be able to do this by the end of this lesson.

1. Identify and describe the three domains in modern classification.

Introduction to Lesson 3:

In Lesson 3, we learn of the largest scientific sorted groups, domains. There are three main domains—Bacteria, Archaea, and Eukarya—that form the largest, most diverse groupings of organisms within the classification system.

Read pp. 346-348 in your text. Then, complete the tasks below.

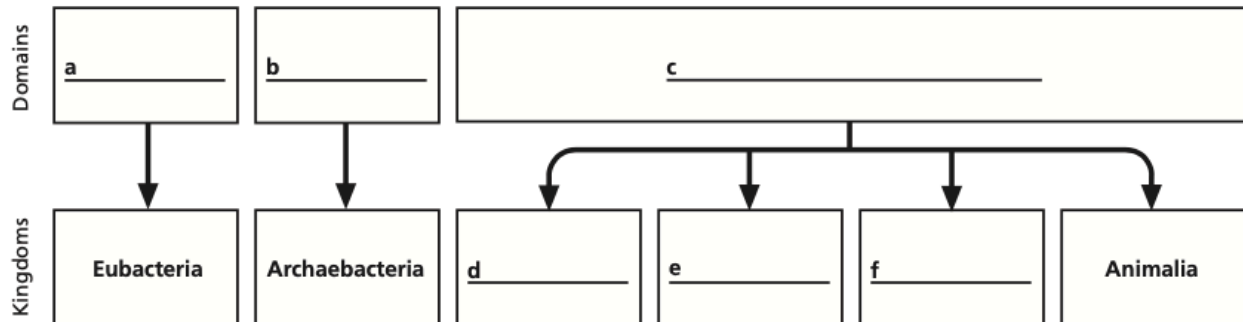
Concept and Vocabulary Review:

1. What led scientists to develop the three-domain system of classification?

2. Use the chart below to compare the three domains. (You may also reference p. 1078-1080 for reference.)

	Bacteria	Archaea	Eukarya
Multicellular? (yes, no, some)			
Pro- or Eukaryotic (pro, euk)			
Description of Other Characteristics			
Kingdoms Included			

STRUCTURES AND FUNCTIONS The diagram below represents the relationship between the three-domain system and the six-kingdom system of classifying organisms. Label each box in the diagram with the correct domain or kingdom name.



Constructing a Phylogenetic Tree

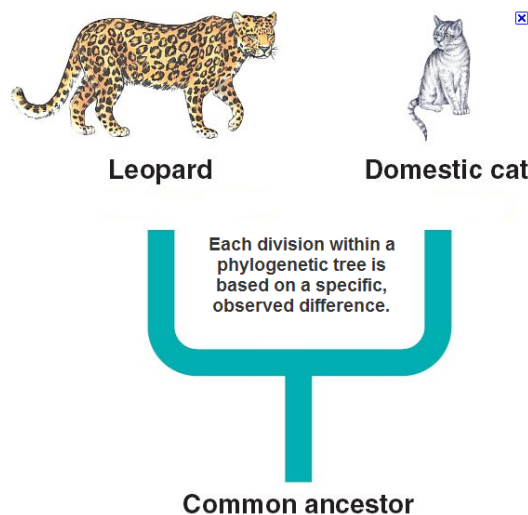
Introduction

According to the theory of evolution, all organisms can be traced back to a common ancestor. Scientists can determine how closely related two organisms are by studying:

1. **Physical Characteristics** – Bone structure, body shape, musculature.
2. **Genetics** – Number of similar DNA base pairs.
3. **Behavior** – Social structure, personality traits.

The Tree of Life

One method commonly used to display evolutionary relationships is by constructing a **phylogenetic tree**. These diagrams are meant to show how closely related different species are in comparison to each other. The base or “trunk” of the tree begins to divide into smaller and smaller branches. Each division separates the organisms into smaller groups based on observed physical characteristics, genetics, or behavior. Take the leopard and domestic cat as an example. What specific characteristic might be used to separate them?

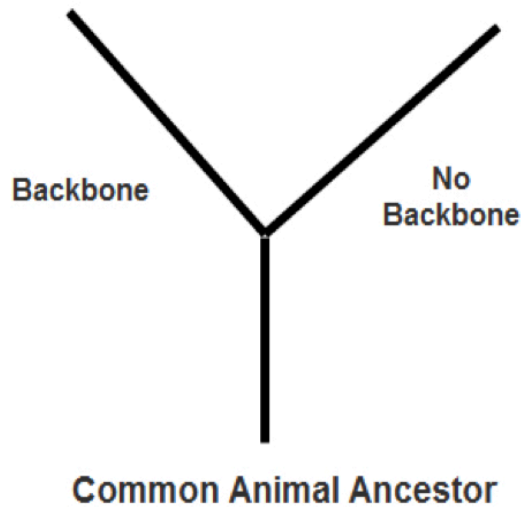


For this assignment, you will take a diverse group of animal species and attempt to make a phylogenetic tree showing their evolutionary relationships. This tree should be primarily based on **physical characteristics**, such as:

- Presence of a backbone
- Cold or warm blooded
- Presence of hair/fur
- Breath air or water
- Carnivore, herbivore, or omnivore
- Any other external structures such as horns

The Tree of Life

1. Detach the following page of animals from this assignment.
2. Individually cut out each animal, including the name.
3. Lay all the animals out on your desk and separate them into two groups by **presence of a backbone**.
4. On a separate sheet of paper, start drawing your phylogenetic tree like this:



5. Continue separating the animals into smaller and smaller groups. Draw each division into your tree.
6. When an animal occupies its own branch, glue it to the end of that branch on your tree.
7. Repeat for all the other animals in your collection.

****NOTE: The organisms to cut out are found on page 13. Pages 12 and 14 intentionally left blank to allow for cutting organism out.**

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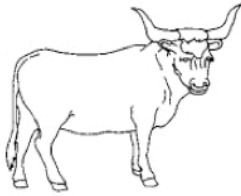
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Animals



Bull



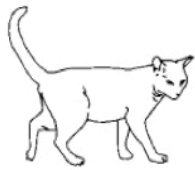
Panda



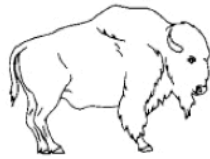
Kiwi



Sea star



House cat



Bison



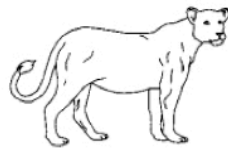
Sea turtle



Moth



Cocker spaniel



Lion



Frog



Spider



Duck-billed platypus



Large-mouth bass



Coral snake



Cockroach



Koala bear



Hermit crab



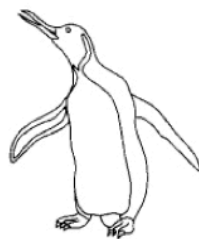
Shrimp



Jellyfish



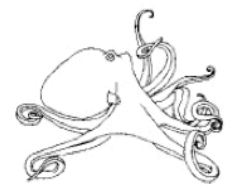
Zebra



Penguin



Walrus



Octopus

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IV. Thursday, April 29

Unit – Chapter 17: Classification of Organisms

Lesson 4: Six Kingdoms

Lesson 4 Socratic Guiding Question: Keep these questions in mind as you study!

How are the three domains divided?

Objectives: Be able to do this by the end of this lesson.

1. Identify and describe the six kingdoms.
2. Compare and contrast the six kingdoms.

Introduction to Lesson 4

In this lesson, we will **explore the six kingdoms found within the three domains.**

Read pp. 348-350. After reading, complete the following tasks.

1. List and briefly describe the six kingdoms in the chart below. (See pp. 1078-1084 for reference.)

Kingdom	Description	Examples of organisms in this kingdom

2. What is problematic about defining the kingdom Protista?

VOCABULARY REVIEW For each of the kingdoms listed below, state the cell type (prokaryotic or eukaryotic), number of cells (unicellular, multicellular, or both), and form of nutrition (autotrophy, heterotrophy, or both).

1. Archaeobacteria _____
2. Eubacteria _____
3. Protista _____
4. Fungi _____
5. Plantae _____
6. Animalia _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. The organisms that live in hostile environments that cannot support other forms of life are members of the domain
a. Bacteria. b. Archaea. c. Eukarya. d. None of the above
- _____ 2. Amoebas and paramecia belong to the kingdom
a. Fungi. b. Plantae. c. Protista. d. Archaea.
- _____ 3. Mushrooms, puffballs, mildews, and some molds belong to the kingdom
a. Fungi. b. Plantae. c. Protista. d. Eukarya.
- _____ 4. The domain that includes the oldest known fossil cells is called
a. Eukarya. b. Archaea. c. Bacteria. d. Eubacteria.
- _____ 5. The domain that includes organisms with true nuclei and membrane-bound organelles is called
a. Bacteria. b. Archaea. c. Animalia. d. Eukarya.
- _____ 6. The domain Eukarya includes
a. archaea, protists, fungi, and plants.
b. protists, fungi, plants, and animals.
c. protists, fungi, eubacteria, and archaea.
d. fungi, eubacteria, plants, and animals.

SHORT ANSWER Answer the questions in the space provided.

1. What characteristics distinguish archaea from bacteria? _____

2. What characteristics distinguish fungi from plants? _____

3. Which kingdoms include multicellular heterotrophic organisms? _____

V. Friday, May 1

Unit – Chapter 17: Classification of Organisms

Lesson 5: Chapter Review

Lesson 4 Socratic Guiding Question: Keep these questions in mind as you study!

What do I understand about how living things are identified and classified.

Objectives: Be able to do this by the end of this lesson.

1. Review main concepts: taxonomy, classification, phylogeny, cladistics, domains, kingdoms.

Introduction to Lesson 4

In this lesson, we will review the topics from this week. You will NOT have a reading today.

Examine the information in the table below showing the classification of 4 different animals. Use the table below to answer the following questions.

Classification Level	Rattlesnake	Elephant	Bald Eagle	Human
Kingdom	Animalia	Animalia	Animalia	Animalia
Phylum	Chordata	Chordata	Chordata	Chordata
Class	Reptilia	Mammalia	Aves	Mammalia
Order	Squamata	Proboscidae	Falconiformes	Primates
Family	Viperidae	Elephantidae	Accipitridae	Hominidae
Genus	<i>Crotalus</i>	<i>Loxadonta</i>	<i>Haliaeetus</i>	<i>Homo</i>
Species	atrox	africana	leucocephalus	sapiens

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1. What is the most specific level of classification to which all four animals belong?

2. Give at least two characteristics that these four animals share.

3. Which level of classification includes the most specific characteristics and only one type of organism? _____

4. Would you find more species in a family or in an order? Why?

5. What is the scientific name (correctly written) of the elephant?

6. Which two organisms are the most closely related?

7. If two organisms belong to the same order, to what other groups must they also belong?

8. What can you conclude about an organism whose scientific name is *Crotalus transversus*?



The following pages contain your minor assessment for the week and should be completed on Friday only AFTER you have completed all previous work in this packet. You may use your notes and text in this packet to support your answers. It should take you approximately 15-20 minutes.

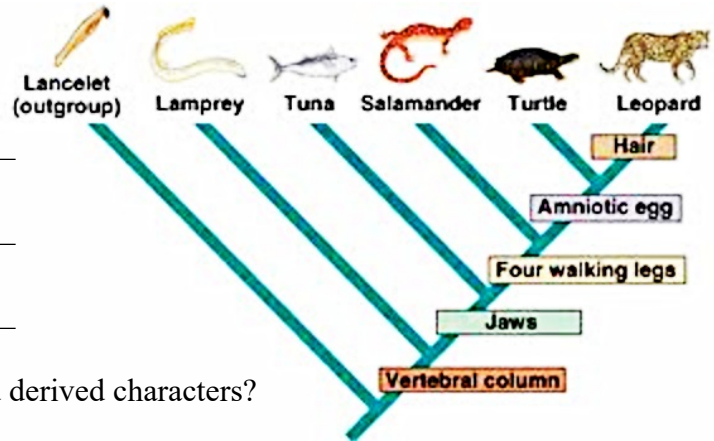
Quiz: Chapter 17

Directions: Complete the following.

CLADOGRAM

Use the cladogram to the right to answer the following questions.

1. What are the derived characters shown in this cladogram?



2. Which two groups have the most shared derived characters?

3. Does a lamprey have jaws? _____

4. Does a tuna have jaws? _____

4. Which group on the cladogram arose first? _____

6. List all the organisms shown in the cladogram that have four walking legs.

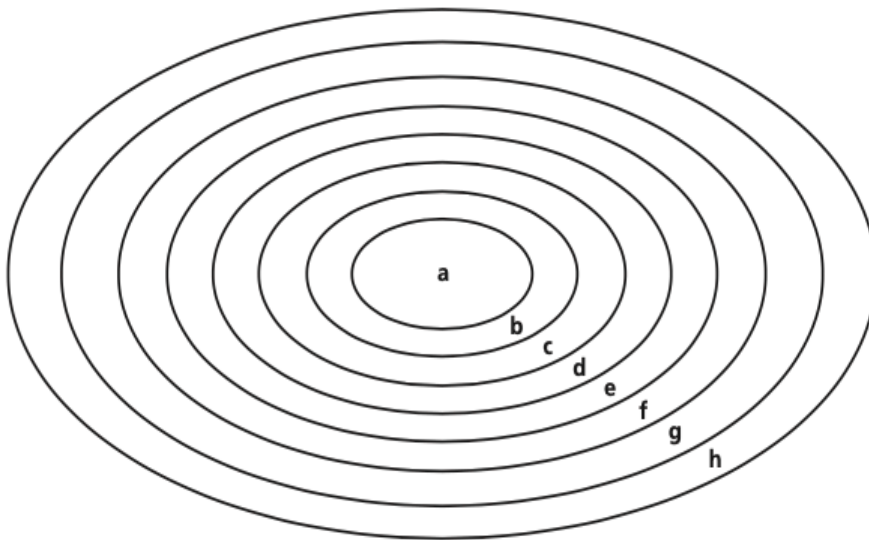
SHORT ANSWER

- _____ 7. On what basis did Aristotle classify living organisms?
- _____ 8. What is the system of naming that involves giving an organism a two-part name?
- _____ 9. What are the two parts to this scientific name?
- _____ 10. In what language is the scientific name written?

11. How are Aristotle's and Linnaeus's classification systems similar?

12. Which of the following is the correctly written scientific name for the lion?
(a) *Panthera leo* (b) panther leo (c) *Panthero leo* (d) *Panthero Leo*
13. Which of the following would be an example of a derived character?
(a) the legs of insects (b) hair in mammals (c) the eyes of a fish (d) the chromosomes in a horse.
14. In cladistics, the evolutionary relationship between two organisms is determined by:
(a) analogous structures (b) shared derived characters (c) homologous structures
(d) embryological relationships (e) structural similarity.
15. In cladistics, the evolutionary relationship between two organisms is determined by:
(a) analogous structures (b) shared derived characters (c) homologous structures
(d) embryological relationships (e) structural similarity.

STRUCTURES AND FUNCTIONS Use the figure to fill in the names of the seven levels of organization in the modern Linnaean system of classifying organisms, with *a* representing the smallest category and *h* the largest category.



- a _____
- b _____
- c _____
- d _____
- e _____
- f _____
- g _____
- h _____