Unit: The Characteristics of Life

Lesson Plan 2: Taxa

Objective(s):

Students will be able to:

- Define the following terms: 1) Taxon, 2) Domain, 3) Kingdom, 4) Phylum, 5) Division, 6) Class, 7) Order, 8) Family, 9) Genus, and 10) Species.
- Arrange taxa groups in order from largest to smallest.

Materials:

- PowerPoint: "Organizing Life's Diversity"
- Construction or printer paper
- Tape or glue
- Ruler

Anticipatory Set:

Have you ever tried to create a family tree? If you have, then you know that the tree always starts out very small. You begin with your immediate family; yourself, siblings, and parents. You then branch out to include your grandparents and their children: your aunts, uncles, and cousins. The tree branches out even further as you include your great-grand parents and so forth. The further you go back in your family history, the larger your tree becomes.

By the same token, you'll find that you have more things in common with your immediate family than you do with your distant relatives. The idea is the same in terms of classification. Taxonomists look at the similar qualities different organisms share. The more qualities two species have in common, the closer they would be ranked on the tree of life.

Lesson:

I.   PowerPoint presentation: Part 2 - "How Things are Classified"
II.   Taxa worksheet

Lab:
Making a Dichotomous Key

Evaluation:

- Taxa worksheet
- Quiz

PowerPoint Notes:

Organizing Life's Diversity

How Living Things are Classified
Part 2

Slide Notes:
Taxonomists have the job of organizing biodiversity into groups of similar qualities. In this lesson we will look at the steps and groups that taxonomists use in classification.

- **Taxon-** a group of organisms (taxa- plural).

- Taxonomists rank organisms in taxa that range from very broad to very specific characteristics.

Slide Notes:
Taxa range from very broad groups in which organisms share general characteristics to very small groups in which the characteristics are very specific.

What is it?

- You are a taxonomist and you have just discovered something new. Now you must name it.

Life
Domain
Kingdom
Phylum
Class
Order
Family
Genus
Species

Slide Notes:
Ask students what steps they would take to name a new organism. Based on their response, ask them if the name of their organism will be identifiable in the scientific world.

What is it?

- First you must determine if its living or non-living.
  – Is it made of cells?
  – Is it able to obtain and use energy?
  – Is it able to maintain homeostasis?
  – Is it able to reproduce?
  – Is it able to grow and develop?
  – Is it able to adapt to it's environment?

Life
Domain
Kingdom
Phylum
Class
Order
Family
Genus
Species

Slide Notes:
When something new is discovered, it cannot automatically be assumed that it is living even if it has the appearance of a living organism. The first step to be taken before labeling the new discovery of an organism is to make sure it meets the six characteristics of all living things.

Slide Notes:
The first taxon level an organism is placed in is the domain. The domain is the broadest taxa and holds the most diversity of species. There are only three domains. Every living thing is either classified under the domain <u>Archaea</u>, <u>Bacteria</u>, or <u>Eukarya</u>.

Slide Notes:
Once the domain has been chosen based on the organism's characteristics, the next taxon level can be selected. In the domain Eukarya, there are six different <u>kingdoms</u>.

Slide Notes:
All taxa levels are determined on the organism's structure and behavior. All organisms found in the same taxa can be assumed to have the same determinant characteristics of those taxa.
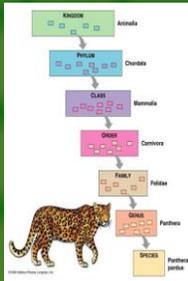

Slide Notes:
Each taxon level becomes smaller and more specific. Once the organism has been placed in the correct genus, taxonomists must then figure out if the organism belongs to an already existing species, or if it is a new one altogether.

What is it?

- *Using binomial nomenclature you are able to give the scientific name of your species.*
- *Panthera pardus*
- Common name: leopard

Slide Notes:
Once the new species has been identified, it can be given a scientific name (if it is a new species), or identified as an already existing species.

KPCOFGS

Kingdom	King
Phylum/Division	Philip
Class	Came
Order	Over
Family	For
Genus	Good
Species	Spaghetti

Slide Notes:
The acronym, King Philip Came Over For Good Spaghetti, is useful in remembering the order of taxonomic ranking from largest taxon to smallest taxon.

Interpreting Graphics – Taxonomy   Name: _____

Date: _____   Class: _____

Write T if the following statements are true.

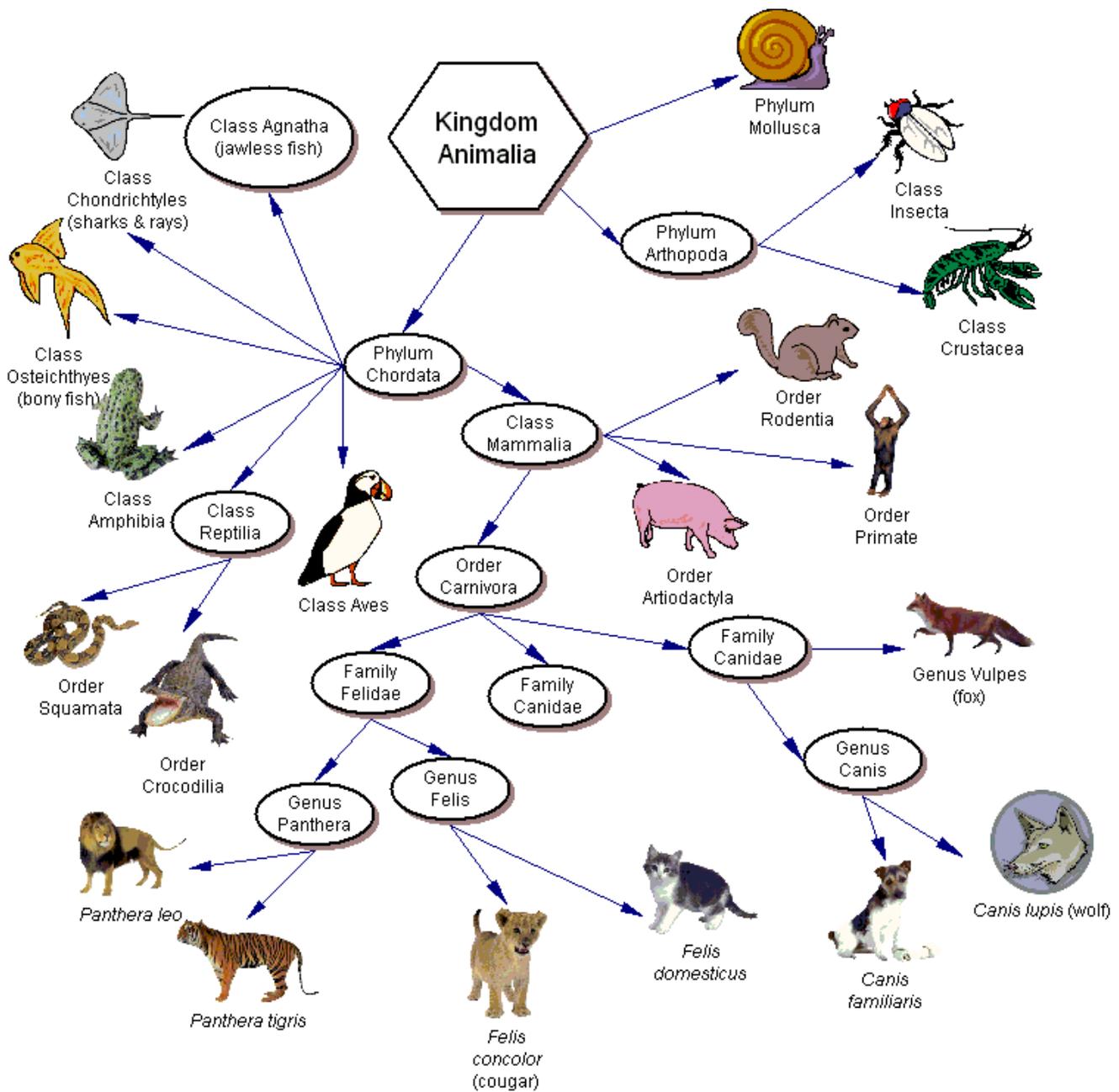**Write F, and make necessary corrections, if the following statements are false.**

_____ 1. Dogs belong to the order Felidae.

_____ 2. A fox belongs to the phylum Arthropoda.

_____ 3. Snakes belong to the phylum Reptilia.

_____ 4. Lions belong to the class mammalian.

_____ 5. All arthropods belong to the class Insecta.

_____ 6. All rodents belong to the phylum chordata.

_____ 7. All amphibians belong to the class reptilia.

_____ 8. All primates are mammals.

_____ 9. The class mammalia includes dogs, cats, and rats.

_____ 10. A lion belongs to the genus Felis.

_____ 11. All mammals are rodents.

_____ 12. Insects and lobsters are arthropods.

In each set, circle the pair that is most closely related.

13. snakes & crocodiles | snakes & frogs

14. rats & cats | cats & dogs

15. insects & lobsters | insects & birds

16. lions & tigers | lions & cougars

17. foxes & rats | foxes & dogs

18. cats & dogs | cats & lions

17. List (use species name) all the animals pictured that belong in the Felidae family.

18. List all the animals pictured that belong to the Carnivora order.

Adapted from biologycorner.com

Interpreting Graphics – Taxonomy   Name: **Key**

Date: _____   Class: _____

Write T if the following statements are true.
Write F, and make necessary corrections, if the following statements are false.

F   1. Dogs belong to the order ~~Felidae~~. Carnivora
F   2. A fox belongs to the phylum ~~Arthropoda~~. Chordata
F   3. Snakes belong to the ~~phylum Reptilia~~. Class Reptilia or Phylum Chordata
T   4. Lions belong to the class mammalian.
F   5. All ~~arthropods belong to the Class Insecta~~.
           Class Insecta belongs to Phylum Arthropoda
T   6. All rodents belong to the phylum chordata.
F   7. All ~~amphibians belong to the class reptilia~~.
           Class Amphibia belongs to Phylum Chordata
T   8. All primates are mammals.
T   9. The class mammalia includes dogs, cats, and rats.
F   10. A lion belongs to the genus ~~Felis~~. Pantheria
F   11. All ~~mammals are rodents~~.
           Rodents are mammals
T   12. Insects and lobsters are arthropods.

In each set, circle the pair that is most closely related.

13. snakes & crocodiles | snakes & frogs
14. rats & cats | cats & dogs
15. insects & lobsters | insects & birds
16. lions & tigers | lions & cougars
17. foxes & rats | foxes & dogs
18. cats & dogs | cats & lions

17. List (use species name) all the animals pictured that belong in the Felidae family.
Pantheria lio, Pantheria tigris, Felis concolor, and Felis domesticus

18. List all the animals pictured that belong to the Carnivora order.
Pantheria lio, Pantheria tigris, Felis concolor, Felis domesticus, Canis familiaris, Canis lupis, and Genus vulpes (all species of fox)

Lab: Making a Dichotomous Key   Name: _____

Date: _____   Class: _____

Objective:

      The purpose of this lab is to develop a dichotomous key in which you will classify organisms based on their structural characteristics.

Materials:

      Construction or printer paper
      Tape or glue (to fasten multiple papers together if needed)
      Metric ruler

Introduction:

      Do you remember the first time you saw a beetle? Chances are you had no idea what you were looking at. The question in your mind surely must have been, "What is it?" Taxonomists ask themselves the same question when they discover new species. To help them identify organisms, they have developed what is called a *dichotomous key*. A dichotomous key is a set of paired statements that helps to identify an organism. When using a dichotomous key, you choose one of the paired statements that best describes the organism in question. At the end of each statement, you are directed to the next pair of statements to use until you arrive at the name of the organism or the group to which it belongs.

Procedures:

1. Study the numbered drawing of beetles.
2. Choose one characteristic of the beetles, and classify the beetles into two groups based on that characteristic. Length or width of the beetle may be used.
3. Record the chosen characteristic on a diagram and write the number of each beetle in each group. An example diagram is shown.
4. For each group, create subgroups based on different characteristics. Record the characteristics and number of the beetles in your diagram until you have only one beetle in each group.
5. Using the diagram you have just made, create a dichotomous key for the beetles. Remember that each numbered step should contain two choices for classification. Begin with 1A and 1B. For help, see examples provided by your teacher.
6. Exchange your dichotomous key with that of another student. Use the borrowed key to identify the beetles.

Lab: Making a Dichotomous Key   Name: _____

Date: _____   Class: _____

Data Analysis:

1. Was the dichotomous key you constructed exactly like those of your classmates? Why do you think they might be different?

2. Was your classmate able to successfully use your dichotomous key to find the beetles? Why or why not?

3. What characteristics do you think were most useful in creating your dichotomous key? Which do you think were least useful?

4. Why do keys typically offer only two choices and not more?

5. Find the following information for beetles. Use the internet if necessary.

Order: _____

Class: _____

Phylum: _____

Making a Dichotomous Key

Classify the beetles in the chart below and then create a dichotomous key.

Biggs, Alton, et al. *Biology: The Dynamics of Life*. Ohio: McGraw-Hill, 2004. Page 461

Lab: Making a Dichotomous Key   **Name: Key**

Date: _____   **Class: _____**

Data Analysis:

1. Was the dichotomous key you constructed exactly like those of your classmates? Why do you think they might be different?
Open-ended

2. Was your classmate able to successfully use your dichotomous key to find the beetles? Why or why not?
Open-ended

3. What characteristics do you think were most useful in creating your dichotomous key? Which do you think were least useful?
Open-ended

4. Why do keys typically offer only two choices and not more?
Given only two choices, the organism can only fall into one category. Given multiple choices, the organism may fall into several different categories.

5. Find the following information for beetles. Use the internet if necessary.

Order: Coleoptera

Class: Insecta

Phylum: Arthropoda

Adapted from: Biggs, Alton, et al. *Biology: The Dynamics of Life*. Ohio: McGraw-Hill, 2004. Page 460

Quiz: Taxa   **Name:** _____

Date: _____   **Class:** _____

Matching:

_____1. Taxon   a) a group of similar species

_____ 2. Domain   b) a group of similar families

_____ 3. Genus   c) one of three kingdoms

_____ 4. Phylum   d) a group of organisms

_____ 5. Family   e) a group of similar classes of animals

_____ 6. Order   f) a group of similar classes of plants

_____ 7. Class   g) a group of similar phyla

_____ 8. Kingdom   h) organisms that can interbreed

_____ 9. Species   i) a group of similar orders

_____ 10. Division   j) a group of similar genus

Place the following in order from greatest to least

Phylum, Order, Class, Kingdom, Species, Family, Genus

Quiz: Taxa   **Name: Key**

Date: _____   **Class: _____**

Matching:

d   1. Taxon   a) a group of similar species

c   2. Domain   b) a group of similar families

a   3. Genus   c) one of three kingdoms

e   4. Phylum   d) a group of organisms

j   5. Family   e) a group of similar classes of animals

b   6. Order   f) a group of similar classes of plants

i   7. Class   g) a group of similar phyla

g   8. Kingdom   h) organisms that can interbreed

h   9. Species   i) a group of similar orders

f   10. Division   j) a group of similar genus

Place the following in order from greatest to least

Phylum, Order, Class, Kingdom, Species, Family, Genus
Kingdom
Phylum
Class
Order
Family
Genus
Species