Biology 4-2: Classification

Assignments:

<table>
<thead>
<tr>
<th>Description</th>
<th>Page(s)</th>
<th>Due Date</th>
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<td>Jan 5</td>
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<td>7</td>
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<tr>
<td><strong>Student Holiday</strong></td>
<td>Microarray Simulation Lab (paper)</td>
<td>Microarray Simulation Lab (wet lab)</td>
</tr>
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<td>12</td>
<td>13</td>
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<td>26</td>
<td>27</td>
<td>28</td>
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<tr>
<td><strong>Test - Evolution</strong></td>
<td>Begin Classification</td>
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<td><strong>Quiz - Classification</strong></td>
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<td><strong>Review for Test</strong></td>
<td><strong>Test - Classification</strong></td>
<td>Begin Animal Systems</td>
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<td><strong>Holiday</strong></td>
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</table>
A group of friends were reading an article about 10 new species of organisms that were discovered and classified in 2014. They were discussing how scientists classified the new organisms. Here is what they said:

Gerald:
I disagree. Remember, organisms are classified by how they move. Trees are in Kingdom plantae because they don't move. I strongly disagree. Organisms are classified based on their physical and structural similarities.

Linaeus:
I agree (mostly). I think how they move is important. All animals move and plants do not. There is more to classification, because humans are not animals.

Caesalpino:
I learned in 2nd grade from Mrs. Smith that organisms are classified based on where they live.

Who do you agree with the most? Explain why you agree with him or her.

Objectives:
- Define taxonomy and recognize the importance of a standardized taxonomic system to the scientific community.
- Categorize organisms using a hierarchical classification system based on similarities and differences shared among groups.
- Compare characteristics of taxonomic groups, including archaea and bacteria, protists, fungi, plants, invertebrate and vertebrate animals.
- Summarize the roles of microorganisms such as bacteria, protists, and fungi and detritivores in both maintaining and disrupting equilibrium including diseases in plants and animals and decay in an ecosystem.

Vocabulary:
- cladogram
- binomial nomenclature
- dichotomous key
- taxonomy
- phylogeny
- pathogen
- endotherm
- ectotherm
- antibiotic
- taxon
- kingdom
- phylum
- class
- order
- family
- genus
- species

Essential Question:
1. What is the benefit of having a universal way of classifying organisms?
2. How is taxonomy used to classify organisms based on observable characteristics?
3. How do cladograms indicate evolutionary relationships between organisms?
4. How are dichotomous keys used to identify organisms?
5. What characteristics are common to all organisms in a particular kingdom?
Section 1: The Linnaean System of Classification

PowerNotes

Taxonomy:

Scientific names

Binomial nomenclature:

Genus:

Species descriptor:

Advantages over common names:

Linnaean classification

How it's organized:

The seven taxa:

1.

2.

3.

4.

5.

6.

7.

Limitations:
Scientific Names
Organisms are universally named based on a two-part system called binomial nomenclature.

* Genus species: Canis familiaris

Binomial Nomenclature Rules
- ____________ is always ______________
- ____________ is always ______________
- Scientific names are either italicized or ______________

What is the scientific name for a lion? ______________

Phylogeny
* Phylogeny – Studying the ________________ between organisms

Organisms are classified based on ________________, or shared lines of evolutionary descent

Evolutionary descent is determined based on – ________________:
new traits that appear as ________________ over time

* Cladograms – ________________ that show ________________

between organisms based on ________________

* DNA – ________________ can help to gauge evolutionary relationships between organisms

DNA is ________________ in more ________________ organisms
Create an Insect Cladogram

**Directions:** Use the cards given to you at the station. Mark an X in the table below if the species has the trait and an O if it does not. Create a cladogram from the information below.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Ant</th>
<th>Butterfly</th>
<th>Dragonfly</th>
<th>Earthworm</th>
<th>Earwig</th>
<th>Housefly</th>
<th>Spider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerci</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Colorful Wing Patterns</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Crushing Mouthparts</td>
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<td></td>
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<tr>
<td>Double Set of Wings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legs</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Segmented Body</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Six legs</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wings</td>
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</tr>
</tbody>
</table>

**Insect Cladogram**
Top 10 New Species in 2014

Use your iPads to look up the Top 10 New Species for 2014. Fill out the following table:

Common Name: What non-scientists call the organism
Scientific Name: Remember the rules!

- ________________ is always __________________
- ________________ is always __________________
- Scientific names are either italicized or ________________

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Description or picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
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<tr>
<td>2</td>
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<td>10</td>
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</table>
CLADOGRAM ANALYSIS

What is a cladogram? It is a diagram that depicts evolutionary relationships among groups. It is based on PHYLOGENY, which is the study of evolutionary relationships. Sometimes a cladogram is called a phylogenetic tree (though technically, there are minor differences between the two).

In the past, biologists would group organisms based solely on their physical appearance. Today, with the advances in genetics and biochemistry, biologists can look more closely at individuals to discover their pattern of evolution, and group them accordingly - this strategy is called EVOLUTIONARY CLASSIFICATION.

CLADISTICS is a form of analysis that looks at features of organisms that are considered "innovations", or newer features that serve some kind of purpose. (Think about what the word "innovation" means in regular language.) These characteristics appear in later organisms but not earlier ones and are called DERIVED CHARACTERS.

PART I - Analyze the Cladogram

Examine the sample cladogram, each letter on the diagram points to a derived character, or something different (or newer) than what was seen in previous groups. Match the letter to its character. Note: this cladogram was created for simplicity and understanding, it does not represent the established phylogeny for insects and their relatives.

1. _____ Wings
2. _____ 6 Legs
3. _____ Segmented Body
4. _____ Double set of wings
5. _____ Jumping Legs
6. _____ Crushing mouthparts
7. _____ Legs
8. _____ Curly Antennae

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**PART II - Create Your Own Cladogram**

To make a cladogram, you must first look at the animals you are studying and establish characteristics that they share and ones that are unique to each group. For the animals on the table, indicate whether the characteristic is present or not. Based on that chart, create a cladogram like the one pictured above.

<table>
<thead>
<tr>
<th></th>
<th>Cells</th>
<th>Backbone</th>
<th>Legs</th>
<th>Hair</th>
<th>Opposable Thumbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slug</td>
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<tr>
<td>Catfish</td>
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<tr>
<td>Frog</td>
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<td>Tiger</td>
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<tr>
<td>Human</td>
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</tbody>
</table>

**DRAWING OF YOUR CLADOGRAM**
Classifying Organisms Notes

* Organisms are divided into ___ domains and ___ kingdoms based on the following characteristics

**Cell Type:**

Prokaryotic – ________________

Eukaryotic – ________________

**Cell Structure:** Cell wall & organelles

**Number of cells:** Unicellular vs. Multicellular

**Nutrition:** Autotrophic vs. Heterotrophic

**Reproduction:** ________________
**Archaebacteria**

Domain – ___________________  
Kingdom – ___________________

* ____________________________

* Cell walls do not contain ____________________________

* ____________________________

* Can be ____________________________ or ____________________________

* ____________________________ reproduction

* Live in ____________________________ environments

  Examples:  Thermophiles – extreme ____________________________

  Halophiles – extreme ____________________________

**Bacteria**

Domain – ___________________  
Kingdom – ___________________

* ____________________________

* Cell walls ____________________________ peptidoglycan

* Unicellular

* Can be ____________________________ or ____________________________

* ____________________________ reproduction

  Examples:  *Streptococcus*, *Escherichia coli*

* Bacteria can be further classified by shape

  - Coccus (cocci): ____________________________
  
  - Bacillus (bacilli): ____________________________
  
  - Spirullus (spirilli): ____________________________
* Bacteria can be helpful

- Help to produce ________________________: yogurt, pickles
- ________________________: recycle nutrients in the environment
- Help organisms ________________________________
- ________________________ bacteria can produce ________________________
- Nitrogen fixation – makes ________________________________

* Bacteria can be harmful

- Pathogens: ________________________________
- Can be treated with an ________________________________
  
  Examples: strep throat, pneumonia

Protists

Domain – ________________________  Kingdom – ________________________
* ________________________
* (some)Cell walls contain ________________________
* ________________________ except ________________________________
* Can be ________________________ or ________________________________
* Mostly ________________________ reproduction
  
  Examples: Paramecium, euglena, algae

* Protist Movement

- ________________________ – whiplike projection
- ________________________ – hairlike projections
- ________________________ – false foot formed when cytoplasm moves into a projection of the cell membrane

* Protists can be helpful

- Help to produce food products: ________________________________
- ________________________ produce the majority of ________________________ on our planet
Protists can be harmful
- __________________________: Agents that cause disease
  Examples: malaria, amoebic dysentery

* Protists can be beneficial, but can be harmful when the microorganisms __________________________ equilibrium.
  Example: sudden decrease in green algae would have severe consequences on organisms that depend on the oxygen produced by them

**Fungi**

Domain – Eukarya  
Kingdom – __________________________

* __________________________

* Cell walls contain _________________
  * __________________________, except yeast
  * __________________________ decomposers – __________________________

* __________________________reproduction
  Examples: Yeast, bread mold, mushrooms

* Fungi can be helpful
  - Decomposers – __________________________
  - Live on plant roots and help plants __________________________
  - Food products: mushrooms, bread, wine, soy sauce
  - Used to produce __________________________: penicillin

* Fungi can be harmful
  - Pathogens: Agents that cause disease
    Examples: athletes foot, ringworm
    __________________________

* Fungi can __________________________ equilibrium.
  Example: The Great Famine of Ireland (mid-1800’s) Lots of humans did not survive the famine and many migrated to escape the famine.
Plants

Domain – Eukarya

* Eukaryotic

* Cell walls contain ______________________

* _________________________________

* _________________________________

* _________________________________ reproduction

Examples: Corn, ferns, pine trees

Animals

Domain – Eukarya

* _________________________________

* _________________________________

* _________________________________

* _________________________________

* _________________________________

* _________________________________

Examples: bees, turtles, fish elephants
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Archaea</th>
<th>Bacteria</th>
<th>Protista</th>
<th>Fungi</th>
<th>Plantae</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prokaryotic or eukaryotic</td>
<td>Prokaryotic or eukaryotic</td>
<td>Prokaryotic or eukaryotic</td>
<td>Prokaryotic or eukaryotic</td>
<td>Prokaryotic or eukaryotic</td>
<td>Prokaryotic or eukaryotic</td>
<td>Prokaryotic or eukaryotic</td>
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<tr>
<td>Has a nucleus</td>
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<td>Has a nucleus</td>
<td>Has a nucleus</td>
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<tr>
<td>Single celled or multicellular</td>
<td>Single celled or multicellular</td>
<td>Single celled or multicellular</td>
<td>Single celled or multicellular</td>
<td>Single celled or multicellular</td>
<td>Single celled or multicellular</td>
<td>Single celled or multicellular</td>
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</tbody>
</table>
Taxonomy & Kingdoms Practice

Scientific Names/Classification Matching and Multiple Choice

1. _____ Cells that contain a nucleus
2. _____ Cells that do not contain a nucleus
3. _____ Organisms that can make their own food
4. _____ Science of classification
5. _____ System of assigning two names to an organism
6. _____ Is credited with developing binomial nomenclature
7. Which of the following classification levels includes all of the others?
   A. family          B. order          C. genus          D. class

8. The largest and most inclusive of Linnaeus’s taxonomic categories is the
   A. phylum          B. kingdom        C. order          D. species

9. The scientific name for the southern leopard frog would be correctly written as:
   A. *rana utricularia*          B. *Rana utricularia*        C. *rana Utricularia*  D. *Rana Utriculari*

10. The bullfrog, *Rana catesbeiana*, is most closely related to the
    A. spotted chorus frog, *Pseudacris clarki*          C. Asian flying frog, *Polypedates leucomystax*
    B. Northern leopard frog, *Rana pipiens*          D. African bullfrog, *Pyxicephalus adspersus*

Comparing Characteristics of Kingdoms:

11. What do organisms in the kingdoms *Protista, Plantae, Fungi, and Animalia* all have in common?

   _______________________________________________________________________________________

12. Which kingdom is the only one that does not have cell walls?

13. Which two kingdoms do not have nuclei?

14. How are organisms in kingdoms *Fungi* and *Animalia* similar?

15. How are organisms in kingdoms *Fungi* and *Plantae* different?

16. Bill Nye, the science guy, collected some salt water from the Dead Sea. He examined a sample of the water under a microscope and found several unicellular organisms without nuclei. The organisms most likely belong to kingdom ________________.

17. A student collects green scum off of a puddle outside the school. Under the microscope, the student sees single green cells each with a nucleus. These organisms most likely belong to the kingdom ________________.
DIRECTIONS: Use the chart below to answer the questions that follow.

18. The broadest or largest category of classification is the __________________________.
19. The smallest or most specific category is the ____________________________.
20. All of these organisms except the __________________________ are in the animal kingdom.
21. Which kingdom is the tree in? __________________________
22. Which kingdom is the lion in? __________________________
23. The second largest category is the phylum. Which phylum are we in? _______________________
24. Which organism(s) is not in the same phylum as humans? __________________________________
25. Which phylum is the tree in? _______________ It means plants that pump water up to its leaves.
26. The third category is class. Which class are mosquitoes in? __________________________
27. Which class are turtles in? _______________________ humans? __________________________
28. Name another organism in the same class as humans. ________________________________
29. Trees are in the class ______________________. This means they produce flowers.
30. The next category is order. Are any of the organisms in the same order? If so, which ones?
   ___________________________________________________________________________________
31. Animals in the order carnivore have large teeth and feed on __________________________
32. Humans are in the order ______________, along with apes. It means animals that stand on two feet.
33. The fifth category is __________________________. Are dogs and cats in the same family? _____
   Are all cats in the same family? _______ Which one? ______________________________
34. The sixth category is genus. Animals in the same genus are very closely related. Which animals share
   the same genus? _________________________________________________________________
35. The last and smallest category is called __________________________. What is the species name for
   humans?
36. The scientific name consists of the genus and species. What is the scientific name for humans? (write it
   correctly). For the mosquito?
   For the lion? For the turtle?
What am I?

Overview: You and your opponent have been given an organism. The organism is from one of the six kingdoms. Your task is to try and guess the type of organism that your opponent has. You are limited to ten questions. Use the ten questions to try and determine exactly which organism your opponent has.

Rules:
1. You may only ask “Yes” or “No” questions.
2. You may only ask questions about characteristics you would be able to see.
3. You will alternate asking questions.
4. Record the questions that you asked in the table below.

<table>
<thead>
<tr>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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<td>2.</td>
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<td>3.</td>
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<td>10.</td>
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</tbody>
</table>
Using and Constructing a Dichotomous Key

Name: ___________________

Introduction

All cultures have developed names for the living things found in their environments. When various everyday names are used for the same organism, confusion is possible. So, scientists have developed an international system for naming and classifying all organisms. Identification guides, called keys, have been developed to help all peoples recognize and identify organisms according to their scientific names.

The word *dichotomous* comes from the word *dichotomy*, meaning “two opposite parts or categories.” A dichotomous key gives the reader a series of opposing descriptions of basic features of an organism. The reader studies the specimen and selects the descriptions that apply to it until reaching a statement that characterizes only one species and names it. In this investigation, you will use a typical dichotomous key to identify the genus and species of several different salamanders. Then, you will create your own dichotomous key to categorize a diverse group of wildflowers.

Problem: How is a dichotomous key used to distinguish among similar organisms?

Pre-Lab Discussion: Read the entire investigation. Then, work with a partner to answer the following questions.

1. How many choices does a dichotomous key provide at each step?

2. What are some of the apparent differences among the fish illustrated?

3. What might be a good strategy for beginning to create a dichotomous key for the six types of wildflowers shown in the diagram for Figure 3 (p. 24)?

4. If you were to use live flowers instead of diagrams, what other characteristics could you use to identify the flowers?

Procedure

Part A: Using a Dichotomous Key

1. Examine the drawings of the fish on the next page. Start with Fish 1 to identify by using the key.
2. Use the Coral Reef Fish dichotomous key to identify the fish. Begin by reading statements 1a and 1b. One of the statements describes the fish; the other statement does not. Follow the directions for the statement that applies to that fish and continue following the correct statements until you have identified it. Record the common name of the fish in the Data Table below.
3. Repeat step 2 for each of the other fish.

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3. Repeat step 2 for each of the other fish.
**Fish Naming**

Write the appropriate name of each fish in the corresponding box.

### Coral Reef Fish Dichotomous Key

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 5</th>
</tr>
</thead>
</table>
| - If fish shape is really long and thin, then go to **Step 2**.  
  - If fish shape is not long and thin, then go to **Step 3**. | - If fish has spots, then go to **Step 6**.  
  - If fish does not have spots, then go to **Step 7**. |

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Step 6</th>
</tr>
</thead>
</table>
| - If fish has pointed fins, it is a *Trumpet Fish*.  
  - If fish has smooth fins, it is a *Spotted Moray Eel*. | - If fish has "chin whiskers", it is a *Spotted Goat Fish*.  
  - If fish does not have "chin whiskers", it is a *Bandtail Puffer*. |

<table>
<thead>
<tr>
<th>Step 3</th>
<th>Step 7</th>
</tr>
</thead>
</table>
| - If fish has both eyes on top of the head, then go to **Step 4**.  
  - If fish has one eye on each side of the head, then go to **Step 5**. | - If fish has stripes, then go to **Step 8**.  
  - If fish does not have stripes, it is a *Parrot Fish*. |

<table>
<thead>
<tr>
<th>Step 4</th>
<th>Step 8</th>
</tr>
</thead>
</table>
| - If fish has a long whip-like tail, it is a *Spotted Eagle Ray*.  
  - If fish has short, blunt tail, it is a *Peacock Flounder*. | - If fish has a v-shaped tail, it is a *Squirrel Fish*.  
  - If fish has a blunt tail, it is a *Glass-Eye Snapper*. |
More Dichotomous Key Practice

Use the key to identify the scientific and common names of Salamanders.

Figure 1: Salamanders
Figure 2: Salamander Dichotomous Key

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>a Hind limbs absent <em>Siren intermedia</em>, siren</td>
</tr>
<tr>
<td></td>
<td>b Hind limbs present Go to 2</td>
</tr>
<tr>
<td>2</td>
<td>a External gills present in adults <em>Necturus maculosus</em>, mud puppy</td>
</tr>
<tr>
<td></td>
<td>b External gills absent in adults Go to 3</td>
</tr>
<tr>
<td>3</td>
<td>a Large size (over 7 cm long in Figure 1) Go to 4</td>
</tr>
<tr>
<td></td>
<td>b Small size (under 7 cm long in Figure 1) Go to 5</td>
</tr>
<tr>
<td>4</td>
<td>a Body background black, large white spots variable in size completely covering body and tail <em>Ambystoma tigrinum</em>, tiger salamander</td>
</tr>
<tr>
<td></td>
<td>b Body background black, small round white spots in a row along each side from eye to tip of tail <em>Ambystoma maculatum</em>, spotted salamander</td>
</tr>
<tr>
<td>5</td>
<td>a Body background black with white spots Go to 6</td>
</tr>
<tr>
<td></td>
<td>b Body background light color with dark spots and/or lines on body Go to 7</td>
</tr>
<tr>
<td>6</td>
<td>a Small white spots on black background in a row along each side from head to tip of tail <em>Ambystoma jeffersonianum</em>, Jefferson salamander</td>
</tr>
<tr>
<td></td>
<td>b Small white spots scattered throughout a black background from head to tip of tail <em>Plethodon glutinosus</em>, slimy salamander</td>
</tr>
<tr>
<td>7</td>
<td>a Large irregular white spots on a black background extending from head to tip of tail <em>Ambystoma opacum</em>, marbled salamander</td>
</tr>
<tr>
<td></td>
<td>b No large irregular black spots on a light background Go to 8</td>
</tr>
<tr>
<td>8</td>
<td>a Round spots scattered along back and sides of body, tail flattened like a tadpole <em>Triturus viridescens</em>, newt</td>
</tr>
<tr>
<td></td>
<td>b Without round spots and tail not flattened like a tadpole Go to 9</td>
</tr>
<tr>
<td>9</td>
<td>a Two dark lines bordering a broad light middorsal stripe with a narrow median dark line extending from the head onto the tail <em>Eurycea bislineata</em>, two-lined salamander</td>
</tr>
<tr>
<td></td>
<td>b Without two dark lines running the length of the body Go to 10</td>
</tr>
<tr>
<td>10</td>
<td>a A light stripe running the length of the body and bordered by dark pigment extending downward on the sides <em>Plethodon cinereus</em>, red-backed salamander</td>
</tr>
<tr>
<td></td>
<td>b A light stripe extending the length of the body without dark pigment on the sides <em>Hemidactylium scutatum</em>, four-toed salamander</td>
</tr>
</tbody>
</table>
**Data Table - Salamanders**

<table>
<thead>
<tr>
<th>Number</th>
<th>Genus and species</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
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<tr>
<td>4</td>
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<td>7</td>
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<td>8</td>
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<tr>
<td>9</td>
<td></td>
<td></td>
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<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Part B. Constructing a Dichotomous Key**
Examine Figure 3, which shows some common North American wildflowers. Note different characteristics in flower shape, number of petals, and leaf number and shape.

**Figure 3: North American Wildflowers**

- Trillium
- May Apple
- Arrowhead
- Clover
- Bellwort
- Violet
2. Use the space below to construct a dichotomous key for the wildflowers in Figure 3. Be sure to use enough pairs of statements to have a final positive statement for each to identify each of the six flowers shown.
3. Check the usefulness of your wildflower key by letting another student see if he or she can use it to identify each pictured flower.

Wildflower Dichotomous Key

Analysis and Conclusions
1. Analyzing Data: What are some examples of basic differences among the fish pictured?

2. Drawing Conclusions: Do the dichotomous keys you have just worked with have any limitations in distinguishing between species?
Virus - NOTES

- Viruses are not considered organisms because they are ___________ and not made of ___
- Viruses are ___________ or _______ surrounded by a _______________ ___________
- Viruses are ______________________, which are disease-causing agents.
  - Examples: Influenza, HIV
- Viruses can only reproduce by inserting their __________________________

Two Methods of Viral Replication

1. Lytic Cycle: __________________________
   - cell reproduces virus __________________ and proteins
   - _______________ and new viruses are released

2. Lysogenic Cycle: __________________________
   - Virus DNA gets incorporated into host DNA
   - Virus DNA gets replicated indefinitely until the lytic cycle begins

Viral infections cannot be cured with medication!
- Medications, like antivirals, can help with the symptoms of a viral infection
- Antibiotics will not ____________________________
- ____________________________ may lessen your chance of acquiring a viral infection

Influenza
- Influenza infects cells of the _______________ ______________
- Influenza Transmission - ____________________________

Human Immunodeficiency Virus (HIV)
- HIV infects _______________ ______________ _____ (____________________)
- This weakens the immune system making a person susceptible to diseases that a healthy immune system could fight off
- When your immune system is weakened a person is diagnosed with ______, _______________ _____ ________________ Syndrome
- HIV Transmission
  - ____________________________
  - ____________________________
  - ____________________________
  - ____________________________
Viruses

Part 1
On your mobile learning device (MLD), use the QR code, and view the video, “Flu Attack! How a Virus Invades Your Body”. You can also access the video at http://tinyurl.com/fluvirusvideo (3:38)

1. Explain how a virus is able to infect its target cell. What do the two have to have on their surfaces for this to happen?

2. Once inside the cell, what does the target cell’s nucleus do for the virus that the virus can’t do for itself?

3. Which of your body systems work to fight a virus?

Part 2

1. Locate the Structures of Viruses and Cells sheet. Carefully examine the structures of the plant cell, animal cell, bacteriophage virus, and influenza virus. Then fill in the Comparing Virus Structures to Cell Structures Venn diagram below.
2. Scientists consider viruses to be nonliving. Based on the information you used to fill in the Venn diagram, would you support or refute this statement? Explain your position in the space below. (Hint: what do living cells need in order to maintain life?)

3. Some disinfectants, like the one pictured below, claim that they are effective at killing viruses. Does your knowledge of the structures and functions of a virus support or refute this claim? Can viruses really be “killed”? Explain your position in detail below.

4. A. Which of the following is NOT a cell, but a virus? (Circle your answer).
B. Can you identify each picture below? Write the name under the picture

Part 3
1. Locate the Lytic Infection Cycle sheet and the envelope containing the Lytic Infection cards. Place the cards in the proper sequence on the Lytic Infection Cycle sheet to represent how a virus can infect a living cell and cause the cell to replicate the virus. Draw the sequence of events below.
Part 4
1. Locate the **Lysogenic Infection Cycle** sheet. Not all viruses replicate through lytic infection. Some viruses replicate by another method, called lysogenic infection.

   a. Just like in the lytic cycle, the virus injects DNA into the host cell. However, what is different about the next step(s) of the lysogenic cycle?

   b. Viruses that replicate using the lysogenic cycle may not cause any damage to the cell for weeks, months, or years. Then the virus DNA begins a process of replication similar to that found in lytic infection and the virus becomes “active”. Can you think of viruses that may linger in a human for years before the person shows symptoms? If so, name the virus(s).

   c. The human immunodeficiency virus (HIV) replicates by the lysogenic infection method, attacking the helper-T cells of our immune system. Why do you think a person infected with HIV has difficulty fighting pathogens, such as the common cold or pneumonia?

   d. Vaccines, deactivated pieces of pathogens, stimulate the immune system to defend against the actual pathogen. Vaccines are used to prevent polio, measles, chicken pox and mumps. Explain why vaccines are not effective in preventing the common cold or HIV viruses. (hint: mutations)

Part 5
Practice Questions

1. Which of the following explains why antibiotics can treat flu-like symptoms caused by bacteria but are ineffective against flu?
   A. Flu is a response to an antigen.
   B. Antibiotics require time to work.
   C. Antibiotics strengthen antibodies.
   D. Flu is caused by a virus.

2. Enzymes allow viruses to insert their genetic material into the host cell's DNA. The virus benefits from this action by —
   A. acquiring the traits of the host cell
   B. causing the host cell to produce viruses
   C. introducing random deadly mutations into the host cell
   D. turning the host cell into a virus

3. Which of these does a virus need in order to multiply?
   A. Chloroplasts from a host cell
   B. A host cell to provide oxygen for the virus
   C. New ADP from a host cell
   D. A host cell to replicate the virus's DNA

4. Many viruses released into the air survive for only short periods of time. Which of the following is the most likely reason for this?
   F. Viruses attract antibodies in the atmosphere.
   G. Viruses require a low atmospheric pressure.
   H. Viruses are hosts for bacteria that eventually destroy them.
   J. Viruses are dependent on host cells of living organisms.
I need to remember...

**Bacteriophage**
A bacteriophage is a virus that attacks and destroys bacteria.

**Lysis**
Lysis is the destruction of a living cell.

**Lysogenic Infection**
Lysogenic infection is one method by which viruses replicate. In lysogenic infection, the virus’s genetic material combines with the DNA of the cell it invades.

**Lytic Infection**
Lytic infection is another method by which viruses replicate. In this method, a virus injects its genetic material into a living cell, causing the cell to make copies of the virus. This method destroys the cell.

**Pathogen**
Any disease causing agent; ex) virus

**Replication**
Replication is the process of making copies or duplicating; viruses increase in numbers through replication.
**Classification Test Review** – Make sure you study your Classifying Organisms Chart!!!

Taxonomy is the science of ____________________________

Below are the taxons for 3 different organisms. List the taxons from most general to most specific in the “Taxon” column and answer the following questions.

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Organism 1</th>
<th>Organism 2</th>
<th>Organism 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plantae</td>
<td>Animalia</td>
<td>Plantae</td>
</tr>
<tr>
<td>1.</td>
<td>Angiosperms</td>
<td>Arthropoda</td>
<td>Angiosperms</td>
</tr>
<tr>
<td>2.</td>
<td>Eudicots</td>
<td>Insecta</td>
<td>Eudicots</td>
</tr>
<tr>
<td>3.</td>
<td>Asterids</td>
<td>Lepidoptera</td>
<td>Rosids</td>
</tr>
<tr>
<td>4.</td>
<td>Asterales</td>
<td>Nymphalidae</td>
<td>Rosaceae</td>
</tr>
<tr>
<td>5.</td>
<td>Mutisieae</td>
<td>Morpho</td>
<td>Fragaria</td>
</tr>
<tr>
<td>6.</td>
<td>Gerbera</td>
<td>Menelaus</td>
<td>Ananassa</td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 8. Which two organisms are most closely related? ____________________________

9. Write the scientific name for the Daisy – ____________________________

10. Butterfly – ____________________________

11. Strawberry – ____________________________

12. What domain do all three organisms belong to? ____________________________

13. Which two organisms would have the most similar DNA? ____________________________

14. Based on the Kingdom, list 4 characteristics that you know about the daisy and strawberry

A. ____________________________

B. ____________________________

C. ____________________________

D. ____________________________
15. What is a pathogen?

16. Explain the differences between the lytic and lysogenic replication of viruses.

17. How are diseases spread?

18. Explain why an antibiotic can’t be used to treat a viral infection.

19. How does HIV affect the body?

20. What is the diagram below called?

21. Which letter designates the most recent common ancestor of the ant and grasshopper?

22. The traits on the lines are called --

23. Give the number of where would you place the trait “doubled wing pairs”

24. Which letter designates the most recent common ancestor of all of the organisms shown?

25. Which organisms would have the most similar DNA? The butterfly and dragonfly or spider and caterpillar?
Dichotomous Key for Leaves
1. Compound or simple leaf
   1a) Compound leaf (leaf divided into leaflets) ........................................... go to step 2
   1b) Simple leaf (leaf not divided into leaflets) ................................................... go to step 4
2. Arrangement of leaflets
   2a) Palmate arrangement of leaflets (leaflets all attached at one central point) ........................................... Aesculus (buckeye)
   2b) Pinnate arrangement of leaflets (leaflets attached at several points) ........................................... go to step 3
3. Leaflet shape
   3a) Leaflets taper to pointed tips ........................................... Carya (pecan)
   3b) Oval leaflets with rounded tips ........................................... Robinia (locust)
4. Arrangement of leaf veins
   4a) Veins branch out from one central point ........................................... go to step 5
   4b) Veins branch off main vein in the middle of the leaf ........................................... go to step 6
5. Overall shape of leaf
   5a) Leaf is heart-shaped............. Ceris (redbud)
   5b) Leaf is star-shaped ........................................... Liquidambar (sweet gum)
6. Appearance of leaf edge
   6a) Leaf has toothed (jagged) edge ........................................... Betula (birch)
   6b) Leaf has untoothed (smooth) edge ........................................... Magnolia (magnolia)

Use the dichotomous key on the left to identify the four leaves

c. ____________________________  b. ____________________________
d. ____________________________  d. ____________________________

It’s A Plant!
Mrs. Hill’s biology students were given an assignment to list as many examples of plants as they could think of. She compiled the following list using the organisms suggested by her class.

Place an X next to all of the organisms that are plants.

___ Grass  ___ Kelp  ___ Seaweed
___ Shrubs  ___ Algae  ___ Flowering Plants
___ Mushrooms  ___ Cyanobacteria  ___ Moss
___ Lichens  ___ Ferns  ___ Pea Plant
___ Ivy  ___ Water lily  ___ Pine Tree

Explain your thinking. What rule or reasoning did you use to determine your answer?