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The Classification of Living Things

An original lesson by Jessica Vergara

Focus on Inquiry

The student will explore various types of organisms, and collaborate with peers to create a system (model) of classifying those organisms. Students will use scientific models and tools to organize, classify, and identify organisms.

Lesson Content Overview

Students will identify methods of classification used for living things by sorting and classifying everyday objects, exploring organisms through a digital scavenger hunt, creation of a graphic organizer, and through collaborative engagement. Students will understand that all organisms are classified based on shared characteristics.

Duration	Setting	Grouping	PTI Inquiry Subskills
Approximately 90 minutes	Classroom	Pairs/Fours	2.5, 3.1, 3.3, 3.4, 3.5, 3.6, 4.2, 5.8, 7.2, 7.3

Lesson Components	Estimated Time	Inquiry Subskills Used	Technology Used	Level of Student Engagement	Brief Description
Engage	45 min	2.5, 3.1, 3.3, 3.4, 3.5, 3.6, 4.2, 7.2, 7.3	None	3	Students will use a class group of shoes to begin thinking about classification systems. Students will collaborate in small teams to create their own system of organizing and classifying the shoes.
Explore	20 min	2.5, 3.1, 3.5, 4.2	Smart Devices	3	Students will work in collaborative groups to scan QR codes and explore different eukaryotic organisms and their characteristics. Students will make observations of the unique characteristics of each organism.
Explain	15 min	3.3, 3.4, 3.6, 4.2, 7.2, 7.3	None	2	Students will use the information that they have gathered from their research to work collaboratively to create a graphic organizer that organizes their organisms by shared characteristics.
Expand	20 min	3.3, 3.4, 5.8	Smart Devices	3	Students will use a dichotomous key to identify an organism based on its characteristics. Students will compare their mystery organism to the other organisms that they have learned about to identify which Kingdom their organism belongs to. Students will also reflect on the importance of models as tools in classification.
Evaluate	N/A	7.2	None	1	Graphic Organizers/ Formal Summative Assessment

Level of Student Engagement

1	Low	Listen to lecture, observe the teacher, individual reading, teacher demonstration, teacher-centered instruction
2	Moderate	Raise questions, lecture with discussion, record data, make predictions, technology interaction with assistance
3	High	Hands-on activity or inquiry; critique others, draw conclusions, make connections, problem-solve, student-centered

Next Generation Science Standards – Inquiry

NGSS Practice 3: Planning and Carrying Out Investigations
NGSS Practice 4: Analyzing and Interpreting Data
NGSS Practice 6: Constructing explanations
NGSS Practice 7: Engaging in arguments from evidence

Next Generation Science Standards – Life Science  HS-LS4-1: Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
Florida Science Standards – Nature of Science  SC.6.N.3.4: Identify the role of models in the context of the sixth grade science benchmarks.
Florida Science Standards – Life Science  SC.6.L.15.1 Analyze and describe how and why organisms are classified according to shared characteristics with an emphasis on the Linnaean System combined with the concept of domains.

Materials and Advance Preparation

Class set:

- Masking Tape
- Permanent Marker
- Organism Research Cards (1 set)
- Extra shoes (as desired)
- Directions Sheets (one per student)
- Clipboards (optional)

Student materials:

- Shoes (amount will vary according to number of students)
- Pencil/Pen and Paper (or Interactive Science Notebook)
- Directions Sheet **[Blackline Master 1]**
- Blank Research Sheet **[One of the Blackline Master 2 sheets]** (1 per student, there are 4 different version that must be divided evenly.)
- Mystery Organism Sheet (1 per group)
- Dichotomous Key **[Blackline Master 5]** (1 per student)
- Dichotomous Key Reflection Sheet **[Blackline Master 6]** (1 per student)
- Smart Devices (may be shared between students)
- Large Chart Paper (2 sheets per Group)
- Markers

Additional Resources

1. Directions Sheet **[Blackline Master 1]**
2. Blank Research Sheet **[Blackline Masters 2]**
3. Organism Research Cards [**Blackline Masters 3]**
4. Mystery Organism QR Codes **[Blackline Master 4]**
5. Dichotomous Key **[Blackline Master 5]**
6. Dichotomous Key Reflection **[Blackline Master 6]**
7. Formal Evaluation **[Blackline Master 7]**
8. Answer Keys **[Blackline Master 8]**

Advance Preparation

1. Print, cut, and laminate the organism cards. (lamination optional)
2. Place cards around the room. (recommended to tape in place)
3. Optional- assign students to teams of four.
4. Survey the number of students with smart-device access and encourage them to bring these devices on the day of the lab. (Also encourage them to download a free QR-code-reader app if possible.)
5. Make copies of needed student materials **(Blackline Masters 1-7)**

Lesson Information

Learning Objective

1. The student will be able to research organisms to correctly describe how and why they are classified according to shared characteristics and place them in groups based on similarities.
2. The student will be able to identify how the classification model that they create is important and useful to the study of taxonomy.
3. The student will be able to accurately use a dichotomous key to identify an unknown organism and will compare their mystery organism to the other organisms they have researched.

Prior Knowledge Needed by the Students

- Basic cellular structure - the difference between unicellular and multicellular.
- Autotrophs vs. heterotrophs & basic vocabulary such as omnivore, herbivore, carnivore, producer, & consumer.
- How to operate a smart device, specifically scanning with a QR-code reader app, or looking up information using the internet.
- Previous learning connected to classification according to the 3rd and 5th grade standards; (SC.3.L.15.1, SC.3.L.15.2, & SC.5.L.14.2.)

Background Information

Classification is a necessary procedure for daily life, and especially for scientists. Sorting items by similar traits increases organization and improves communication. Scientists classify organisms according to similar traits. Carolus Linnaeus is considered the "Father of Taxonomy." He tried to classify all living things that were known at his time. He grouped together organisms that shared obvious physical traits, such as number of legs or shape of leaves. The Linnaean system of classification consists of a hierarchy of groupings, called taxa**.** Taxa range from the domain to the species. The domain is the largest and most inclusive grouping and includes the kingdom classifications. It consists of organisms that share just a few basic similarities. Examples are the Eukarya domain which includes all organisms with a membrane bound nucleus. The species is the smallest and most exclusive grouping. It consists of organisms that are similar enough to produce fertile offspring together. The taxa in order from most general classification to most specific classification include domain, kingdom, phylum, class, order, family, genus, and species.

CK-12. (2016) Linnaean Classification. Retrieved from http://www.ck12.org/biology/Linnaean-Classification/lesson/Linnaean-Classification-BIO/

Lesson Procedure

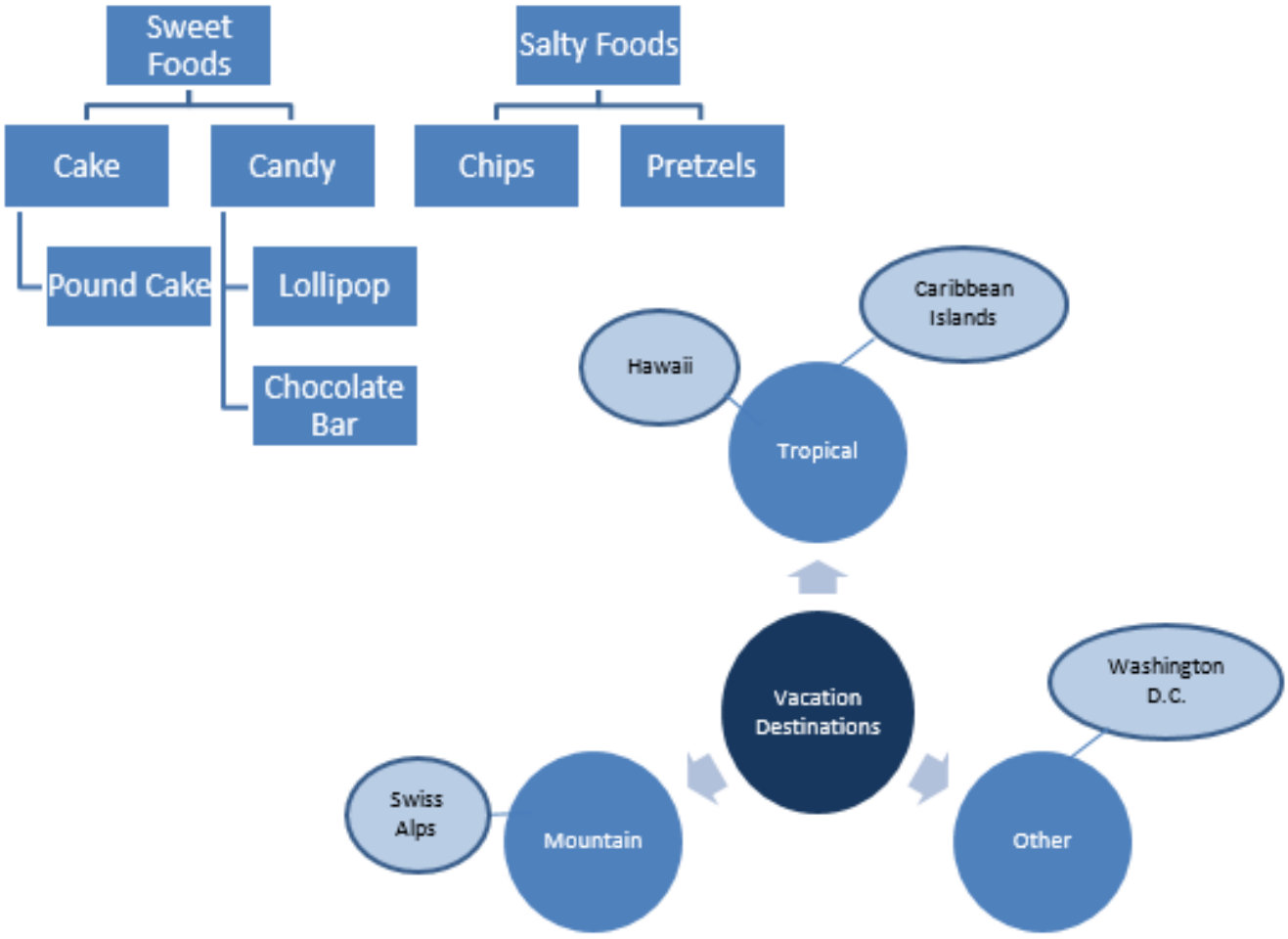
Engage

1. **Prepare for this lesson by placing a variety of shoes on a table in the front of the room. Shoes should represent a variety of colors, shapes, functions, sizes, quality, etc. (The number of shoes will vary depending on class size, and student ability level. The more shoes you add, the more complicated the activity will be.)**
   Teacher Notes:
   - To add personal meaning to this lesson, and increase student investment, invite students to contribute their own shoes to this collection. (One shoe per student.)
   - Be sure to review safety procedures for students missing a shoe and adhere to all school and county regulations.
   - Optionally, bring a few "wild card" shoes to increase variety. Ex: baby shoe, men's work boot, high-heel, bedroom slipper, etc…
2. **Place a piece of masking tape on each shoe, and number the shoes for identification purposes.**
   Teacher Notes:
   - Write as many numbers on the masking tape ahead of time as possible so you can "peel and stick" the numbers to save time.
   - Continue with instructions while you are labeling the shoes so you don't lose time.
3. **Instruct the students to recognize how the shoes all have different characteristics, and**

ask them to consider how they would sort these shoes into different groups.
Teacher Notes:

- This time should serve as "think time" for students to observe and consider the various traits of each shoe.
- There should not be any "sharing-out" at this point, and students should be individually considering traits.

4. **Explain to students that they will be sorting, or classifying these shoes according to similar traits. In small groups they will be responsible for creating a visual representation of the shoes being grouped, and then each group being divided, until each shoe is in its own, specific, category with a specific description.**
Teacher Notes:
   - Review with students various options for graphic organizers so that groups may have a way to organize their thoughts as the shoes are classified.
   - On the board, draw examples of possible formats students could use
   - For example, a "T-Chart", "Mind-Map", or "Tree" format may all be successful options.
   - Make an effort to not give specific examples of traits students could use to divide the shoes, to ensure students are organically developing their own system for classification.
   - Below are some Teacher Examples of potential formats students could use to sort (classify) the shoes.
   - You may wish to draw similar examples on the board to help give students an idea of how they can organize their thoughts.
   - Another option would be to show examples of something other than shoes being sorted so that students can have a complete visual of the process.



5. **Divide students into groups of four, and provide each group with a chart paper and markers. Instruct the students to discuss within their group how they would like to sort the shoes. They should sort the shoes according to traits, and continue to sort each group into smaller and smaller categories until each shoe is by itself.**
   Teacher Notes:
   - This is an opportunity for students to collaborate, discuss, and even explore! Allow them to make mistakes, and to push one another so long as they are working respectfully and collaboratively.
   - You may want to gently direct groups who are struggling.
6. **Allow students to begin recording the shoes assigned numbers according to where they would be appropriate. This will allow students to keep their "specimens" (shoes) organized and dissuade any confusion that could arise when speaking about sorting a specific shoe.**
   Teacher Notes:
   - *Questions you may ask as you guide students through the classification process may include*
     - *"What makes the shoes in your two groups different from each other?" Student responses will vary.*
     - *"What similar characteristic to all these shoes in this group share?" Student responses will vary.*
7. **When all the teams are done dividing one of their shoe groups for a second time, come together as a whole-group again for students to share-out their classification process. This will help you check for comprehension of the directions, and allow students to brainstorm different ideas for characteristics they could use for classification.**
   Teacher Notes:
   - Students should have continued dividing all the groups, until they are left with each individual shoe being clearly recognized by its description.
   - Make sure that students are showing their thought-process on their papers, by showing the shoes and the labels for each shoe-group's characteristic.
8. **Depending on time, allow each group to share their overall classification process, following the path of one shoe, and discuss their sorting methods.**
   Teacher Notes:
   - Some ideas for guiding questions during the share-out discussion:
     - *"What made you choose to divide the groups this way?*
     - *"What would you have done if there was a shoe that was_____?*
     - *"If we removed all of the numbers from the shoes, would someone be able to use your paper to determine which shoe belonged to which number?"*
     - *Student responses to these questions will vary.*
9. **WRAP-UP Day1:** Remind students that while there were a lot of shoes to be classified, there are *millions* of living organisms that scientists are responsible for studying, recording, and organizing. Explain that one way scientists classify organisms is by their cellular structure. Organisms with nuclei are put into one group, or "Domain", called "Eukaryotes". Tomorrow they will be researching some Eukaryotes, and creating their own system to classify them.
   Teacher Notes:
   - If you have not used qr codes in your classroom before, it would be in your best interest to ask students to download a qr code reader on their smart device as soon as possible to save time tomorrow.
   - You may wish to have students practice scanning qr codes in a prior lesson to help the explore portion of this lesson go as smoothly as possible.
   - Remind students they will need to bring their smart devices tomorrow!
   - Remember to place the qr codes around the room prior to class beginning. Tape them securely to where you want them to go. (consider student ability level to help you determine whether they should be hidden or in plain-sight.)

Explore

1. Take the total number of students in your class, and divide that number by four to determine how many teams you will have.
   Teacher Notes:
   - You may ask students to sit in groups of four as they choose, but assigning groups ahead of time will save time and ensure that you have desirable group-dynamics.
   - A Teacher Sample of a QR code has been provided- to use as an example of how students should scan the codes, and what it should look like on their smart devices after they do so.
2. Provide each student with a clipboard that has a directions sheet (**Blackline Master 1**), and a blank Research Sheet (**Blackline Masters 2-5**).
   Teacher Notes:
   - All the students in each team should have the same letter on their Research sheet. (EX: group 1 should all have "A" on their research sheets, group 2 should all have "B" etc…)
   - You will want to make sure that there is a minimum of one smart device with a QR code reader app downloaded per team.
   - You may wish to show students the sample QR code, and explain to them how they might fill-out their Research sheet according to what they see on the smart device once they have scanned the code.
3. Once students have received their materials, they may begin moving around the room, using their smart devices to scan the QR codes on the Organism Research Cards **(Blackline Masters 6 – 11)**.
   Teacher Notes:
   - Allow students who do not have smart devices to work with a partner who does. (Each student should still be completing their own Research sheet.)
   - If students are unable to download a QR scanning app, but still have access to a smart device, they may use the internet to research the organisms.
5. Students should be filling-out their Research Sheets with the information they learn about their five assigned organisms through their QR code scans, and then choosing a sixth organism of their choice from the cards around the room to complete their Research Sheet.
   Teacher Notes:
   - Observe students throughout the research process.
   - Assist in technical difficulties.
   - Encourage students to make additional "notes" about the organisms, other than just what is required on their Research Sheet.
6. When students complete their Research Sheets, they should form *new* teams of four, (with a team member from each letter group. One "A", one "B", one "C", and one "D") and begin discussing the similarities and differences between all of their organisms. They should have roughly 21-24 organisms to classify, depending on whether or not any of the students in the new team selected the same optional sixth organism.
   Teacher Notes:
   - Remind students to pay special attention to whether organisms are unicellular or multicellular, and whether they are heterotrophs or autotrophs.
7. Provide each new team with a sheet of chart paper, and allow the new teams to create a graphic organizer, demonstrating how they would like to classify their Eukaryotes into four groups. (You may wish to encourage students to sketch some rough drafts of their graphic organizers on the back of their Research Sheet before using their chart paper.)
   Teacher Notes:
   - Allow students to form their own groups based on their research and reasoning, do not provide them with the qualities each group should have.
   - Students should naturally arrive at the qualities that separate the four kingdoms of the domain Eukarya (Plant, Animal, Fungus, Protist), but they may not. Encourage them to consider characteristics they overlook.
8. The graphic organizer should be clear, with labels or titles describing the shared characteristics of

each group. Students should explain their classification process to you, or out-loud to the class as time allows.

Teacher Notes:

- You may wish to allow for a "gallery-walk" of classification posters the following day, or display the posters around the room for students to refer back to throughout the unit.

9. Reveal the four official kingdoms found through the Linnaean system within the domain Eukarya, according to the Linnaean System; and the characteristics of each.

Teacher Notes:

- Encourage students to compare these four groups with the groups they developed in their teams.

Explain

1. Some questions you might ask students include,
   - What are some of the characteristics your organisms share?
     - *These ones are all autotrophs.*
     - *These ones are all heterotrophs.*
     - *These ones are unicellular.*
   - What are some of the differences between your organisms?
     - *These organisms get their energy differently.*
     - *These organisms are all plants, and these are animals.*
     - *These organisms are large, and these are very small (unicellular).*
   - Do any of your team member's organisms have characteristics in common with some of your organisms' characteristics?
     - *I have an autotroph and so does everyone else. We can combine them!*
     - *We have a few reptiles, we can group them all together.*
     - *I see a lot of plants in our group, we could place them in one category.*
   - Do any of your team member's organisms have characteristics different from some of the other organisms?
     - *They have an organism that is unicellular.*
     - *They have one that is complete different from any of the ones we have.*
     - *Each of us has an organism that is different from everyone else's.*
   - What characteristics do you want to consider when grouping all the organisms from your team together?
     - *We could group our organisms by how they eat, autotrophs or heterotrophs.*
     - *We could group our organisms by whether they are unicellular or multicellular.*
     - *We could group our organisms by physical characteristics, and how they look.*
   - Did anyone else in your team choose the same "your choice" organism as you?
     - *Yes, two of us both chose _____.*
     - *Yes, three/four of us all chose _____.*
     - *No, we all chose different "your choice" organisms.*
   - Did you record any optional characteristics in the "notes" section of your Research Sheet?
     - *Yes, I recorded some of the facts I learned about on the website.*
     - *Yes, I recorded some background knowledge I already knew about this organism.*
     - *No, I just recorded what was required.*
   - Why did you choose to group your organisms into kingdoms in this way?
     - *We chose to group our organisms in the way that one of our team members suggested.*
     - *We discussed how to group our organisms together.*
     - *We grouped our organisms based on shared characteristics.*
   - Is there anything else you wish you knew about the organisms before classifying them?
     - *I think it would be cool to know where each organism lived, and what their habitat is like.*
     - *I would like to know how each organism reproduces.*
     - *There's nothing else I'd like to know.*

- How would you classify another organism you know of, that wasn't included in your research?
  - *I would use the same system we used for these organisms.*
  - *I would classify them based on their physical appearance.*
  - *I would group them according to how they eat.*

Expand

1. Students will be given another QR code that leads them to a "mystery" **organism (Blackline Master 4)**.
2. Students will use their dichotomous key **(Blackline Master 5)** to identify the mystery organism, identify its characteristics, and compare it to the other organisms they have already identified and classified to explain how it may be related on their Dichotomous Key Reflection **(Blackline Master 6)**.
3. Students will further reflect on the models that they have created and how models are important tools in the study of classification **(in Blackline Master 6).**

Evaluate

***FORMAL EVALUTION* (Blackline Master 7)**
See Attached

INFORMAL or OPTIONAL EVALUTIONS

1. Anecdotal notes
2. Contributions during discussions
3. Research Sheets/ Team graphic organizers

WRAP UP.

Bring the lesson to a conclusion by holding a discussion comparing the official Linnaean system for classifying organisms from the domain Eukarya into the four Kingdoms: Plant, Animal, Fungus, & Protist.

Supplementary Resources

Teachers

Vergara, J. (2016). Eukaryotic Classification. Retrieved from http://eukaryoticclassification.weebly.com/

Luontoportti. (n.d.). Nature Gate Mobile. Retrieved from http://www.luontoportti.com/suomi/en/

National Geographic. (n.d.). Images of Animals, Nature, and Cultures. Retrieved from http://www.nationalgeographic.com/

Students

Vergara, J. (2016). Eukaryotic Classification. Retrieved from http://eukaryoticclassification.weebly.com/

Citation of Sources

CK-12. (2016) Linnaean Classification. Retrieved from http://www.ck12.org/biology/Linnaean-Classification/lesson/Linnaean-Classification-BIO/

Luontoportti. (n.d.). Nature Gate Mobile. Retrieved from http://www.luontoportti.com/suomi/en/

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Vergara, J. (2016). Eukaryotic Classification. Retrieved from http://eukaryoticclassification.weebly.com/

Vergara, J. (2016). Mystery Organisms. Retrieved from http://eukaryoticclassification.weebly.com/mystery-organisms.html

✓ Yes, I cited all materials and resources used in this lesson.

Jessica Vergara
Lesson author signature

Blackline Master 1

Directions

Scientists research organisms all across the world and learn all kinds of amazing facts about them. With so much information, it is necessary to have a system of classification to keep all their research organized.

1. **Today you will be researching six organisms from the domain Eukarya, and collaborating with other scientists to share what you learned.**
2. **You were assigned five organisms on your research sheet. Search for them around the room and record the necessary data. (You will need a smart device and may work with a partner if you do not have one.)**
3. **You may choose any other organism you find for your sixth organism.**
4. **After you have filled-out your research sheet, work as a group of four (A, B, C, & D) and collaborate to create a graphic organizer that shows all of your organisms classified into six kingdoms.**

Field Notes

Domain and Kingdom:

- All organisms are divided into three groups called “Domains”.
- These Domains are divided into six smaller groups called “Kingdoms”.
- The Domain “Eukarya” contains all organisms with nuclei. (Eukaryotes)

Cellular Structure:

- Organisms made of ONE CELL are called UNICELLULAR.
- Organisms made of more than one cell are called MULTICELLULAR.
- If the cell of an organism has a nucleus, it is EUKARYOTIC.
- If the cell of an organism does NOT have a nucleus, it is PROKARYOTIC.

Diet:

- Organisms that can generate their own energy from the sun through photosynthesis are called AUTOTROPHS. (i.e.: Producers/Plants)
- Organisms that must acquire energy from an outside source are called HETEROTROPHS. (i.e.: Consumers/Carnivores/Herbivores)

Blackline Master 2

Research Sheet A

Organism	Diet	Cellular Structure	Notes
Jaguar	Heterotroph/Autotroph	Unicellular/Multicellular	
Red-Eyed Tree Frog	Heterotroph/Autotroph	Unicellular/Multicellular	
Sporozoan	Heterotroph/Autotroph	Unicellular/Multicellular	
Aloe Vera	Heterotroph/Autotroph	Unicellular/Multicellular	
Yeast	Heterotroph/Autotroph	Unicellular/Multicellular	
(Your Choice)	Heterotroph/Autotroph	Unicellular/Multicellular	

Blackline Master 2

B

Research Sheet B

Organism	Diet	Cellular Structure	Notes
Perigold Black Truffle	Heterotroph/Autotroph	Unicellular/Multicellular	
Anglerfish	Heterotroph/Autotroph	Unicellular/Multicellular	
Bald Eagle	Heterotroph/Autotroph	Unicellular/Multicellular	
Bell Pepper Plant	Heterotroph/Autotroph	Unicellular/Multicellular	
Paramecium	Heterotroph/Autotroph	Unicellular/Multicellular	
(Your Choice)	Heterotroph/Autotroph	Unicellular/Multicellular	

Blackline Master 2

Research Sheet C

Organism	Diet	Cellular Structure	Notes
Stingray	Heterotroph/Autotroph	Unicellular/Multicellular	
Puffball	Heterotroph/Autotroph	Unicellular/Multicellular	
Zooflagellate	Heterotroph/Autotroph	Unicellular/Multicellular	
Green Iguana	Heterotroph/Autotroph	Unicellular/Multicellular	
Basil	Heterotroph/Autotroph	Unicellular/Multicellular	
(Your Choice)	Heterotroph/Autotroph	Unicellular/Multicellular	

Blackline Master 2

Research Sheet D

Organism	Diet	Cellular Structure	Notes
Emperor Penguin	Heterotroph/Autotroph	Unicellular/Multicellular	
Golden Algae	Heterotroph/Autotroph	Unicellular/Multicellular	
Chanterelle	Heterotroph/Autotroph	Unicellular/Multicellular	
Noble Fir Tree	Heterotroph/Autotroph	Unicellular/Multicellular	
King Cobra	Heterotroph/Autotroph	Unicellular/Multicellular	
(Your Choice)	Heterotroph/Autotroph	Unicellular/Multicellular	

Blackline Master 3

Organism Research Cards

Aardvark Anglerfish Bald Eagle	Aloe Vera Atlantic Puffin Basil	American Alligator Baboon Bell Pepper Plant

Blackline Master 3

Organism Research Cards

Black Rhinoceros Boa Constrictor Chanterelle	Blue Jay Cane Toad Clownfish	Blue Whale Cardinal Dynamite Crepe Myrtle

Blackline Master 3

Organism Research Cards

Eastern Diamondback Rattlesnake Golden Algae Great White Shark	Emperor Penguin Golden Eagle Green Iguana	Galapagos Tortoise Golden Poison Dart Frog Iris

Blackline Master 3

Organism Research Cards

Jaguar Leopard Seal Mudpuppy	King Cobra Mongoose Musk-Ox	Komodo Dragon Morning Glory Naked Mole Rat

Blackline Master 3

Organism Research Cards

Noble Fir Pansy Perigold Black Truffle	Leopard Paramecium Puffball	Ostrich Pink Dogwood Tree Pufferfish
		
		
		

Blackline Master 3

Organism Research Cards

Pumpkin Vine Ring-Tailed Lemur Seahorse	Raven Rosemary Snow Leopard	Red-Eyed Tree Frog Sandtiger Shark Sporozoan

Blackline Master 3

Organism Research Cards

Spotted Salamander Warty Newt Yeast	Stingray Web-footed Gecko Zooflagellate	Sunflower White-Tailed Deer Teacher Example Tile
		SAMPLE For Teacher Demonstration!

Jessica Vergara

Blackline Master 4

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Mystery Organism QR Codes

Mystery Organism #1	**Mystery Organism #2**	**Mystery Organism #3**
Mystery Organism #4	**Mystery Organism #5**	**Mystery Organism #6**
Mystery Organism #7	**Mystery Organism #8**	**Mystery Organism #9**
Mystery Organism #10	**Mystery Organism #11**	**Which mystery organism will you choose?**

Dichotomous Key

1a	Organism has feet/legs	Go to 2
1b	Organism does not have feet/legs	Go to 3
2a	Organism has 4 or less legs	Go to 4
2b	Organism has more than 4 legs	Go to 5
3a	Organism is green and leafy	Kelp (Protist)
3b	Organism is not green and leafy	Go to 6
4a	Organism has 4 legs	Go to 7
4b	Organism has 2 legs	Blue Footed Boobie (Animal, Vertebrate, Bird)
5a	Organism has wings	Butterfly (Animal, Invertebrate, Insect)
5b	Organism does not have wings	Praying Mantis (Animal, Invertebrate, Insect)
6a	Organism is orange and dotted	Slime Mold (Fungus)
6b	Organism is not orange and dotted	Garter Snake (Animal, Vertebrate, Reptile)
7a	Organism has a visible tail	Go to 8
7b	Organism does not have a visible tail	Go to 9
8a	Organism is orange and spotted	Newt (Animal, Vertebrate, Amphibian)
8b	Organism is not orange and spotted	Red Panda (Animal, Vertebrate, Mammal)
9a	Organism has a hard outer shell	Tortoise (Animal, Vertebrate, Reptile)
9b	Organism does not have a hard outer shell	Go to 10
10a	Organism has antlers	Moose (Animal, Vertebrate, Mammal)
10b	Organism does not have antlers	Toad (Animal, Vertebrate, Amphibian)

Dichotomous Key Reflection

1. Use your dichotomous key to identify your mystery organism. What is your mystery organism? _____
2. What are some of the characteristics of your mystery organism? _____
   _____
   _____
   _____
3. How is your mystery organisms similar to or different than one of the organisms that you've already researched?

Ways they're similar	Ways they're different

4. Which of the organisms that you've already researched do you think is most closely related to your mystery organism? _____
5. What evidence do you have that supports that these two organisms are the most closely related? _____
   _____
   _____
6. The graphic organizer you used to classify and organize your organisms is considered a "model." Why do you think this tool is considered a model?
   _____
   _____
   _____
7. How is your model (graphic organizer) helpful in learning about the classification of organisms? _____
   _____
   _____
8. A dichotomous key is also considered a "model." Why do you think this tool is considered a model?
   _____
   _____
   _____
9. How is your model (dichotomous key) helpful in learning about the classification of organisms? _____
   _____
   _____

Classification Learning Check

1.) Organisms are classified together in Domains and Kingdoms based upon: *(SC.6.L.15.1)*

A.) Their name
B.) Random selection
C.) Similar Characteristics
D.) The Scientist who discovered them

2.) When classifying organisms, all of the following are important *except*: *(SC.6.L.15.1)*

A.) The organism's age
B.) The organism's diet
C.) The organism's movement
D.) The organism's cellular structure

3.) What combination of shared characteristics would all plants have in common? *(SC.6.L.15.1)*

A.) Autotrophic and unicellular
B.) Autotrophic and multicellular
C.) Heterotrophic and unicellular
D.) Heterotrophic and multicellular

4.) What combination of shared characteristics would all animals have in common? *(SC.6.L.15.1)*

A.) Autotrophic and multicellular
B.) Autotrophic and unicellular
C.) Heterotrophic and multicellular
D.) Heterotrophic and unicellular

5.) How are models useful to the study of classification? *(SC.6.N.3.2)*

A.) Models help you see objects that are too small.
B.) Models allow you to work with dangerous objects
C.) Models allow you to show mathematical relationships.
D.) Models let you see the relationships between organisms.

6.) Use the dichotomous key below to identify the mystery organism to the right.
(SC.6.N.3.2)

1a	leaf has 3 or less lobes	Aspen
1b	leaf has more than 3 lobes	Go to 2
2a	Leaf has sharp, pointed edges	Maple
2b	Leaf has smooth, rounded edges	Go to 3
3a	Leaf is long and narrow	Oak
3b	Leaf is short and fat	Hawthorne

Photo Credit: https://pixabay.com/en/sheet-oak-leaf-yellowed-sheet-1029164/

The identified leaf is:

A.) Aspen
B.) Hawthorne
C.) Maple
D.) Oak

Blackline Master 8 – ANSWER KEYS

Dichotomous Key Reflection ANSWER KEY

1. Use your dichotomous key to identify your mystery organism. What is your mystery organism? *student responses will vary*

2. What are some of the characteristics of your mystery organism? *student responses will vary*

3. How is your mystery organisms similar to or different than one of the organisms that you've already researched?

Ways they're similar	Ways they're different
student responses will vary	*student responses will vary*

4. Which of the organisms that you've already researched do you think is most closely related to your mystery organism? *student responses will vary*

5. What evidence do you have that supports that these two organisms are the most closely related? *student responses will vary but should include that they have shared characteristics.*

6. The graphic organizer you used to classify and organize your organisms is considered a "model." Why do you think this tool is considered a model? *student responses will vary but should include that it is a model because it diagrams or shows how the different organisms are related.*

7. How is your model (graphic organizer) helpful in learning about the classification of organisms? *student responses will vary but should include that it helps you organize the organisms so that you can group them according to shared characteristics and lets you see which organisms are more closely related.*

8. A dichotomous key is also considered a "model." Why do you think this tool is considered a model? *student responses will vary but should include that the dichotomous key models the process of organizing organisms according to similarities and differences in physical characteristics.*

9. How is your model (dichotomous key) helpful in learning about the classification of organisms? *student responses will vary but should include that a dichotomous key allows you to classify and identify new organisms based on the characteristics of known organisms.*

Classification Learning Check ANSWER KEY

1.) Organisms are classified together in Domains and Kingdoms based upon: *(SC.6.L.15.1)*

A.) Their name
B.) Random selection
C.) Similar Characteristics
D.) The Scientist who discovered them

2.) When classifying organisms, all of the following are important *except*: *(SC.6.L.15.1)*

A.) The organism's age
B.) The organism's diet
C.) The organism's movement
D.) The organism's cellular structure

3.) What combination of shared characteristics would all plants have in common? *(SC.6.L.15.1)*

A.) Autotrophic and unicellular
B.) Autotrophic and multicellular
C.) Heterotrophic and unicellular
D.) Heterotrophic and multicellular

4.) What combination of shared characteristics would all animals have in common? *(SC.6.L.15.1)*

A.) Autotrophic and multicellular
B.) Autotrophic and unicellular
C.) Heterotrophic and multicellular
D.) Heterotrophic and unicellular

5.) How are models useful to the study of classification? *(SC.6.N.3.2)*

A.) Models help you see objects that are too small.
B.) Models allow you to work with dangerous objects
C.) Models allow you to show mathematical relationships.
D.) Models show you the relationships between organisms.

6.) Use the dichotomous key below to identify the mystery organism to the right. *(SC.6.N.3.2)*

1a	leaf has 3 or less lobes	Aspen
1b	leaf has more than 3 lobes	Go to 2
2a	Leaf has sharp, pointed edges	Maple
2b	Leaf has smooth, rounded edges	Go to 3
3a	Leaf is long and narrow	Oak
3b	Leaf is short and fat	Hawthorne

Photo Credit: https://pixabay.com/en/sheet-oak-leaf-yellowed-sheet-1029164/

The identified leaf is:

A.) Aspen
B.) Maple
C.) Oak
D.) Hawthorne