

University of Mary Division of Education Instructional Sequence for:

## Classification of Organisms and Dichotomous Keys

By: Ann Balster

Grade Level: 7<sup>th</sup> Grade

Subject(s) Area: Life Science

Materials Needed: 4-square notes, stapler, taper dispenser, markers and white board, Create your Adventure Story, Dichotomous key PowerPoint, Dichotomous Key worksheet, specimens, professional dichotomous key

Note: This will be the 1<sup>st</sup> lesson on classification. The students will have a 4-square assignment that they have completed about vocab, so that they are familiar with some terminology. The last unit was on Natural selection. The students will need this information in order to understand related character traits and dichotomous keys.

Key:

The red topics follow the objectives specifically. These are very important topics, and so it is necessary to cover these completely.

### Standard:

MS-LS4-2: Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

### Objectives:

Students will be able to:

1. Define classification and understand its importance
2. Identify the genus and species name in binomial nomenclature
3. Use a Dichotomous Key to identify species and make distinctions between characteristics

### Learning Activities:

- I. Initially ask the students if they have their 4-square notes done, and if not, then make sure that they get their notes out and work along with the lesson. All students should have their notes out regardless so that they can participate in the discussion.
- II. As an introduction to the lesson today, discuss classification in general. Teacher

will pick up a stapler and tape dispenser and then she will ask the students if they are the same thing. Ask students what we mean by classification and why we classify things. For example, why do we classify certain objects as tools, others as food, and so on? **Establish that classification—the arrangement of objects, ideas, or information into groups—makes things easy to identify.**

- III. As background information, let students know that, beginning in ancient times, scientists tried to develop a system of classifying animals and plants. The Swedish naturalist, Carolus Linnaeus (1707-1778) created the system that we use today. He separated animals and plants according to certain physical similarities and gave identifying names to each species.
- a. He came up with 2 very important concepts:
    - i. Determined the 7 taxonomical names of every living species: Kingdom, Phylum, Class, Order, Family, Genus, Species
    - ii. **Binomial Nomenclature (2 names)- Each organism has a 2 word scientific name**
      1. Ex: Homo sapiens, Ursus arctos, Feline domestica
      2. However, we do not use these names, we use their common names in our regular day life.
  - b. Scientific names are used because:
    - i. Each name is special for a different species
    - ii. There are common names that are similar
    - iii. There are common names that are different
- IV. Brainstorm session: Teacher asks “Who here has been snorkeling? Suppose that you see fish swimming about, and you don’t what the species is. How would you figure out what type of fish you are looking at?”
- i. Possible answers include:
    1. The web, phones!
    2. Teachers!
  - ii. What about dichotomous keys?
    1. **Dichotomous Keys- series of descriptions arranged in pairs that leads the user to the identification of an unknown organism**
    2. The format of a dichotomous key is sort of similar to an adventure story.
- V. Attention getter: Who has read a “Choose your own adventure story?” How does it work?
- a. There is a passage and then you pick what you want to happen next, and then you follow those directions so somewhere else in the book.
  - b. Lets read one!
  - c. The Mystery of the Haunted House, by Paul Channel
    - i. Page 1
      1. It is summertime again, vacation time. You go to your uncle's house. He takes you on a tour around the city. There are many old buildings, but the oldest of all is on Main Street. The address is 880. He says that it is haunted, but you don't believe him.

- a. Choice: Do you go inside? (turn to page 2)
    - b. Or: Do you stay there? (go to page 3)
  - ii. Page 2
    - 1. You say, "I will go inside." He says, "I want to watch you." You start up the stone steps of the old haunted house. You open the door and step inside and suddenly a sharp arrow streaks across in front of you! But it misses you.
      - a. Choice: Do you go up the staircase? (turn to page 4)
      - b. Or: Do you go through the swinging doors? (go to page 5)
  - iii. Page 3
    - 1. You stay there. Then you decide to go home, have an ice cream, and go to bed. THE END
  - iv. Page 4
    - 1. You go up the stairs. You lean against the railing and it breaks. You fall and that's the end of you. THE END
  - v. Page 5
    - 1. You go through the swinging doors. You walk through the room.
      - a. Choice: Do you go into the closet? (go on to page 6)
      - b. Or: Do you go into a passageway under the house? (go to page 7)
  - vi. Page 6
    - 1. You go into the closet. You fall through a trapdoor and break your leg. The walls are too smooth to climb. There is no other way up. THE END
  - vii. Page 7
    - 1. You go into a passageway under the house. You make your way along and it leads to a trapdoor that takes you back to where you started. You meet a policeman at the top and he says to you, "You were lucky to get out of there. Don't ever go in there again!" You go home and have some ice cream. THE END
  - d. Analogy: Just as you started with the beginning of the story and found the ending, so do you start with an unknown organism, and then you find your answer, the binomial name
- VI. PowerPoint on Dichotomous Keys
  - a. Change slide- **Dichotomous Keys, which are a series of descriptions arranged in pairs that leads the user to the identification of an unknown organism**
  - b. Change slide- **How to read a dichotomous key:**
    - i. **First look at the specimen/ organism and notice particular qualities**
    - ii. **Then start with number 1 and follow directions**
    - iii. **Finally, if you reach a number that gives you the binomial nomenclature of the individual, you have identified the individual**
  - c. Change slide - Work on practice problem in the PowerPoint. Answer is

- Platyspiza.
- d. Hand out smiley face worksheet, and change slide to the Smiley face Dichotomous rules.
    - i. Give the students about 5 minutes to fill this out. More if the students need help. Circle the room to see if students need private help and to keep them focused and on task.
    - ii. If the students don't understand, go through one together.
  - e. Correct the worksheet once everyone one is done.
- VII. Professional Scientists Activity
- a. Depending on the time, the teacher will either allow the students to participate or just have them watch as she demonstrates professional dichotomous key usage with actual specimens.
    - i. It is important to tell the students that the dichotomous key only classifies it up to the Class or Phylum of the individuals. IF it when down to the species, it would take hours to classify one individual.
    - ii. Depending on time, only a few animals will be classified.
    - iii. Highlighted words are the ones that I will be doing for sure.
  - b. The first unknown organism will be the flatworm, starfish, and /or sea urchin
    - i. Follow the steps of dichotomous keys!
    - ii. Students can hold all open specimens, but are instructed to be very careful. You do not have to wash you hands after touching these.
    - iii. Flatworm pathway= 1(b)→4(b)→5(b)→16(a) Phylum Platyhelminthes
    - iv. Starfish pathway on dichotomous key= 1(b)→4(b)→5(a)→6(b)→11(b)→13(b)→14(a) Class Asteroidea
    - v. Sea urchin pathway= 1(b)→4(b)→5(a)→6(a)→11(a)→12(a) Class Echinoidea
  - c. The next class will do the horseshoe crab, tick and scorpion specimens in formaldehyde.
    - i. Horseshoe crab, scorpion, and tick pathway= 1(b)→4(b)→5(a)→16(b)→23(b)→24(b)→30(b) Phylum Arthropoda
  - d. The squid can be last.
    - i. Squid pathway= 1(b)→4(b)→5(b)→15(b)→38(b)→39(a)→40(b) Subphylum Cephalochordata
- VIII. If there is time left: The last couple minutes can be time for question and answers from the students about the specimens, lesson topic, and homework. Also students who have to wash their hands should go and do that now.
- IX. Class dismissal, thank the students for listening and wish them a good weekend.

**A**ssessment: Throughout the whole lesson I was constantly using Formative assessment, such as fist-five or thumbs-up/thumbs-down. I also had the student preform the dichotomous key to see if they could apply the information that I was giving them on

their own. Finally at the end of the lesson, I had the student follow the dichotomous steps and find the classification and name of actual specimens, showing that not only did the students understand the concepts and methods of dichotomous keys, but could apply them in a real world situation.

## Reflection

Overall, I thought it went really well! All of my lessons, 1<sup>st</sup> hour, 2<sup>nd</sup> hour, and 4<sup>th</sup> hour, were very different atmospheres, but I felt that I adjusted really well. The 1<sup>st</sup> hour was energetic, but patient. My 2<sup>nd</sup> class was goofy but studious, and my 3<sup>rd</sup> class (4<sup>th</sup> hour) was kind of all over the place. This is good thing to point out because every class has a character, and once I figure out what the character is, the easier I will be able to grasp the classes attention. Maybe a class needs to move around. Maybe a class needs to be asked questions in order to get the brains running. Little differences can really influence the dynamic of the class.

I wasn't able to do as much with the specimens that I would have liked, because I ran out of time in all three of my classes. I wasn't able to work through the dichotomous keys on all the individuals, which is fine. I realized by my second lesson that all of the students understood how dichotomous keys worked by then, and that they didn't need further examples. Therefore I just let them look at the specimens giving them interesting tips about the species and how they were all related.

Something that I decided to do on the spot was have the students come up and present a smiley face on their own. A select few had to walk up in of the class and describe how they found the name of the smiley face. That way I was able to see if they understood how to use a dichotomous key on their own, and they could also feel proud of themselves for standing up and presenting. I also went through one of the smiley faces initially, so that they got used to the process.

I also found that I rarely lost the attention of the students. This is probably my acting side coming through, but whenever the students got side tracked, I was easily able to refocus them. Either my raising my voice a little higher than everyone to draw their attention back to me, or by seeming energetic with the next point, I was able to reel in the student and move onto the next material. I also think that part of their cooperation was due to the fact that they wanted to impress me, or they thought I was really weird, but however it works is fine with me!

I learned the formative assessment is the easiest and most crucial aspect of a lesson. Just little thumbs up/ thumbs down exercises allow me to make sure that people are grasping it. Also having the students work out their problems on the board, showing that they understood, was a great method as well. Another form of formative assessment was walking around the room during their worksheet time. I was checking to see if any student had any problems, or if they understood it by looking at their progress on the page. This is a crucial aspect of teaching.

# Classifying Living Things

Textbook Pages 19-25

Name: \_\_\_\_\_

Date Due: \_\_\_\_\_

<h2>CLASSIFICATION</h2>	Definition:
What scientist developed the classification system that organized living organisms into <b>Kingdoms</b> ?	Why is classification important?

<h2>BINOMIAL NOMENCLATURE</h2>	Definition:
List some rules for this naming system:	Write 3 names and their common names: (Example: <i>Ursus arctos</i> - Brown bear)

<h2>SPECIES</h2>	Definition:
How is <i>species</i> different from <i>genus</i> ?	Draw your favorite species:

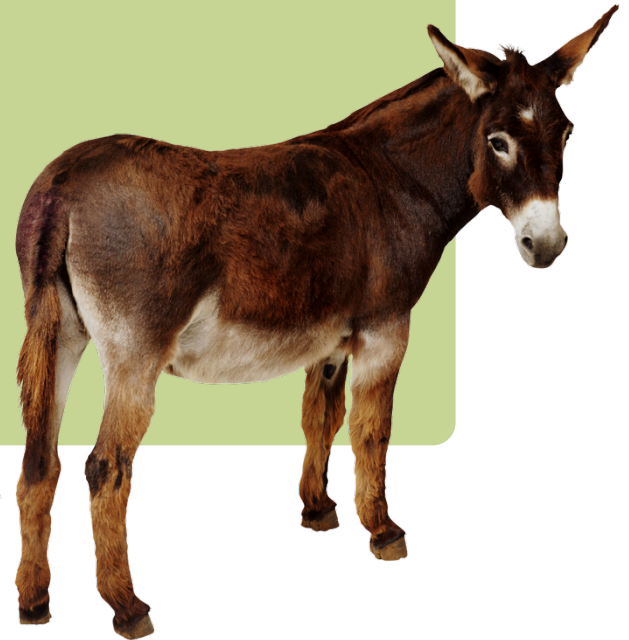
# DICHOTOMOUS KEY

Definition:

What is another tool you can use to identify an unknown organism?

Why is a dichotomous key useful?

# DICHOTOMOUS KEYS







## Definition:

a series of descriptions arranged in pairs that leads the user to the identification of an unknown organism



## RULES/ METHODS

- Look at specimen/ individual
- Start with number one, and then follow directions
- Finally, if you reach a number that ends with the **Binomial Nomenclature**, you know the individual's scientific name



# PRACTICE



Bird W



Bird X



Bird Y



Bird Z

## Dichotomous Key to Representative Birds

1. a. The beak is relatively long and slender.....*Certhidea*  
b. The beak is relatively stout and heavy.....go to 2
2. a. The bottom surface of the lower beak is flat and straight .....*Geospiza*  
b. The bottom surface of the lower beak is curved .....go to 3
3. a. The lower edge of the upper beak has a distinct bend .....*Camarhynchus*  
b. The lower edge of the upper beak is mostly flat .....*Platyspiza*

1. Teeth visible... go to 2  
Teeth not visible... go to 4

2. Has a wide, toothy smile... *Smilus toothyus*  
Is not smiling... go to 3

3. Visibly crying... *Smilus dramaticus*  
Frowning... *Smilus upsettus*

4. Eyes are symmetrical .... go to 5  
Eyes not symmetrical .....go to 8

5. Eyes shaped like hearts... *Smilus Hearticus*  
Eyes are shaped as ovals or circles... go to 6

6. Smiling, happy face... *Smilus traditionalis*  
Not happy, frowning or other... go to 7

7. Mouth curved down, frowning...*Smilus saddus*  
Mouth is a small circle... *Smilus surprisus*

8. Has a pirate eye patch... *Smilus piratus*  
Does not have eye patch... go to 9

9. One eye is much larger than the other eye... *Smilus mutatus*  
One eye is winking... *Smilus winkus*



TRY IT YOURSELF!!!

SMILEY FACE  
DICHOTOMOUS KEY



# References

- <https://www.tes.com/lessons/r1ZYADDFAOzZbA/dichotomous-key>
- [http://www.biologycorner.com/worksheets/dichotomous\\_key\\_smilies.html](http://www.biologycorner.com/worksheets/dichotomous_key_smilies.html)



# Dichotomous Keys Using Smiley Faces

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Using the Dichotomous Key, match the names with the Smiley face.

