

## An Introduction to Dichotomous Keys

### **Purpose / Rationale:**

This lesson serves to familiarize students with the basics of a dichotomous key. This includes understanding how a dichotomous key is organized as well as how it can be useful. This lesson also serves as a “hypothetical” real-world application of shark classification and allows students to hypothesize and then defend their scientific viewpoints.

### **VA SOLs:**

**BIO. 1.** The student will plan and conduct investigations which meet the following criteria:

- b. Hypotheses are formulated based on observations and information from the scientific literature.
- m. A scientific viewpoint is constructed and defended (the nature of science).

**BIO. 4.** The student will investigate and understand relationships between cell structure and function. Key concepts include the following:

- b. Exploring the diversity and variation of eukaryotes

**BIO. 7.** The student will investigate and understand bases for modern classification systems.

Key concepts include the following:

- a. Structural similarities in organisms.

### **Materials and Resources:**

“Using and Making A Biological Key” Activity sheet

PowerPoint including shark photos

Internet/Laptops

### **Class Management and Safety Issues:**

Students should follow the Acceptable Use Policy for using school computers and Internet.

### **Procedures:**

*Engage* (5 minutes)

1. Scenario: You are a shark biologist employed by the National Oceanic and Atmospheric Administration (NOAA). You have just been flown into the coastal city of Sao Luis in Brazil because locals have noticed an unidentified shark at their beaches. They are worried this shark species may be dangerous. You have been given the following assignment:
  - a. Use the dichotomous key to become familiar with different shark species. You must correctly identify each one. After you have done this, you can now consider yourself an expert on sharks!

- b. Looking at the photos provided to you by the locals (see PowerPoint), you are to identify the unknown shark species.
- c. Using the Internet as a resource, decide what you would tell the locals about your finding. Report your findings to them in a short paragraph.

*Explore* (15-20 minutes)

2. Students will complete the “Using and Making a Biological Key” activity sheet by identifying the fourteen shark species using the attached dichotomous key.

*Explain* (5 minutes)

3. Throughout the activity, students will be collaborating to correctly identify the shark species. Once completed, students will answer corresponding questions on the activity sheet. Additionally, the teacher will ask a few wrap-up/review questions to make sure students understand the organization and usefulness of dichotomous keys.

*Elaborate* (15-20 minutes)

4. Now that students have become shark experts, they are to compare their shark outlines and/or dichotomous key to determine if they can properly identify the shark in the photos. Various views will be provided so as to aid in this process. They may or may not correctly identify the shark but the process of identifying is the important part (Answer = Rhinocodontidae, Whale shark). Once identified, they need to do a brief Internet search in order to figure out what they are going to tell the locals about the potential danger of the identified shark (1 paragraph).

*Evaluate*

5. Students will hand in the activity sheet w/ completed identifications and follow-up questions. Additionally, students will hand in the 1-paragraph conclusion given to the locals. The following rubrics will be used for grading:

Activity Sheet

<b>Section</b>	<b># Questions</b>	<b>Points Each</b>	<b>Points Possible</b>
Sharks identification	14	1	14
Follow-up questions	2	2	4
<b>Total</b>			<b>18</b>

Shark ID Conclusion

<b>Criteria</b>	<b>Evidence</b>	<b>Scoring</b>
Shark identification	Shark spp name (hopefully Whale Shark)	1
Verdict	Not dangerous	1
Explanation	Planktonic feeder, No human attacks	3
Consistent w/ identification	Consistent w/ shark behavior/characteristics	2