

6-8 Classification Keys Activity

Overview

Focus Questions

How is a classification/dichotomous key used? Why is it important to classify organisms?

Activity Synopsis

Students will practice using a classification/dichotomous key to identify shells. Students will then use a variety of mollusc shells (or their pictures) from the South Carolina coast to demonstrate the identification and classification of living things using a classification/dichotomous key.

Time Frame

90 minutes

Objectives

The learner will be able to:

- Successfully use a classification/dichotomous key
- Understand the complexity of classification and taxonomy

Student and Teacher Key Terms

- Classification
- Taxonomy
- Classification key
- Dichotomous key
- Mollusc
- Gastropod
- Bivalve

Standards

South Carolina College- and Career-Ready Science Standards 2021

The new 2021 science standards do not address Taxonomy or Classification Keys.

2014 Academic Standards and Performance Indicators for Science

6th Grade: **6.S.1A.2**, 6.S.1A.6, 6.S.1A.8, **6.L.4A.2**, 6.L.4B.1

7th Grade: **7.S.1A.2**, 7.S.1A.6, 7.S.1A.8, 7.EC.5A.1

8th Grade: **8.S.1A.2**, 8.S.1A.6, 8.S.1A.8

* **Bold standards are the main standards addressed in this activity**

Sixth Grade Performance Indicators

6.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

6.S.1A.6 Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.

6.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support hypotheses, explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language.

6.L.4A.2 Develop and use models to classify organisms based on the current hierarchical taxonomic structure (including the kingdoms of protists, plants, fungi, and animals).

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6.L.4B.1 Analyze and interpret data related to the diversity of animals to support claims that all animals (vertebrates and invertebrates) share common characteristics.

Seventh Grade Performance Indicators

7.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

7.S.1A.6 Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.

7.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support hypotheses, explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language.

7.EC.5A.1 Develop and use models to describe the characteristics of the levels of organization within ecosystems (including species, populations, communities, ecosystems, and biomes).

Eighth Grade Performance Indicators

8.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

8.S.1A.6 Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.

8.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support hypotheses, explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language.

Cross Curricular Standards

South Carolina College and Career Standards for ELA

Communication (C) – 6-1.1, 6-1.2, 7-1.1, 7-1.2, 8-1.1, 8-1.2

Common Core ELA Standards

Speaking/Listening – 6.1, 6.2, 6.4, 7.1, 7.2, 7.4, 8.1, 8.2, 8.4

Language – 6.1, 7.1, 8.1

Background

Key Points

Key Points will give you the main information you should know to teach the activity.

- **Taxonomy** is the **classification** of organisms based on shared characteristics.
- **Classification keys**, or **dichotomous keys**, can be used to identify organisms. Some are very simple and some are very complex.
- **Molluscs** are a group of invertebrate animals including **gastropods** (snails), **bivalves** and cephalopods (squid, octopus) found in the Phylum Mollusca

Detailed Information

Detailed Information gives more in-depth background to increase your own knowledge, in case you want to expand upon the activity or you are asked detailed questions by students.

Taxonomy is the **classification** or grouping of organisms based on shared characteristics. By grouping organisms, relationships can be studied, patterns in nature can be identified and information can be organized for all to use. With conservation being of increased value, understanding the diversity of an area is very important in making informed decisions and taxonomy is very important in discovering diversity.

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In taxonomy, there are 8 main levels or categories, called taxa (singular taxon). The categories in order of most general to most specific are Domain, Kingdom, Phylum (plural phyla), Class, Order, Family, Genus and Species.

A **classification key** or **dichotomous key** is a tool which contains pairs (or occasionally triplets) of descriptive characteristics which enable choices to be made about a particular organism, eventually leading to its specific identity. The term “dichotomous” literally means “divided into two parts”.

An important aspect of educating children is helping them to develop an interest in and appreciation for the world around them. This not only provides tools for exploration and learning on their own but also helps to develop a conservation ethic to enable them to become better decision-makers and more inclined to protect natural resources. There are many popular versions of field guides published for the various groups of organisms (as well as some nonliving things), many of which include dichotomous keys. Enhancing interest in the natural world, combined with the knowledge of how to use such a tool further empowers children to be lifelong learners and conservation-minded citizens.

Molluscs will be used for this activity for several reasons. Most children find the calcium carbonate shells of most molluscs interesting and often choose to collect them from coastal areas. Also, the particular molluscs that were used to create this activity are common and relatively easy to find along most of South Carolina’s coastlines.

The Phylum Mollusca consists of invertebrate organisms with soft bodies, most of which make calcium carbonate shells using special glands and minerals from the water in which they live. Most taxonomists agree on classification of seven classes of molluscs, with the two primary shell-producing classes being Class Gastropoda, **gastropods** (snails and snail-like molluscs) and Class Bivalvia, **bivalves** (clams, oysters, mussels, etc.). Another popular class is the Cephalopods because they include the squid and very intelligent octopus.

Some species of molluscs are managed by the South Carolina Department of Natural Resources due to their use by individuals and commercially as seafood. It is important for people to understand that a mollusc shell should only be collected from the beach when found empty (snail is dead) and then only if used for some purpose. It’s not ok to take lots of shells from the beach and then place them in a box in a garage to never be looked at again. Shells can be used by other animals for shelter (hermit crabs) and they also break down over time and make sand. By taking them off the beach, they cannot do that. It is ok though to collect a few of your most treasured beach finds to display in your house or garden.

Procedures

Materials

Part 1 – Warm up exercise (Shoe classification key)

- Writing utensil (one per student)
- [Classification Key and Pictures for Shoes](#) (one per group of students)
- [Classification Worksheet](#) (one per group)

Part 2 – Shell classification key

- Writing utensil (one per student)
- [Mollusc Classification Key](#) (one for each group of students)
- Set of shells (or [shell photos](#))
- [Classification Worksheet](#) (same as above)
- [Classification Workshop Answer Key](#) (for teacher only)

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- Small metric ruler (one per station)
- Field guide/s to shells (A good one is “A Guide to South Carolina’s Coast”, SCDNR) (optional)

Procedure

Part 1 – Warm up exercise (Shoe classification key)

1. Begin class by reviewing what taxonomy is and how important it is to understand the organisms of the world. They provide us with food, protection, medicines, oxygen and more.
2. Let students know that scientists have created classification keys (or dichotomous keys) to help identify organisms. The keys use characteristics of the organisms to guide them to a single species.
3. Next the students will practice using a classification key to identify different shoes.
4. Have students work in groups of 2-4. Give each group a Classification Key for Shoes, Shoe Pictures and a Classification Worksheet (worksheet will be used again in Part 2).
5. They should identify each shoe letter to a number answer (shoes are lettered, the answer to each will be a number).

Part 2

Preparation: Place 1 shell in each lab station with a Mollusc Classification Key (Shell A-H)

1. Review part 1’s activity by reminding them what a classification/dichotomous key is and how it is used to identify objects or organisms.
2. Discuss the terms Mollusc, gastropod and bivalve so the students are familiar with mollusc shells.
3. Place students in groups of 2-4 students and have each group start at a different station (should stay with same group as Part 1 so they can use the same worksheet).
4. Make sure each group has a writing utensil and their Classification Worksheet (same as Part 1).
5. Practice how to use the key by having one student read the first pair of characteristics aloud. Have each group of students decide which of the 2 characteristics best describes their shell.
6. Explain that they are to work through the key, choosing the correct characteristic in each pair to identify their mollusc shell. They will identify 8 shells (A-H).
7. Now, have them move from station to station until they have identified all 8 mollusc shells.
8. Go through the answers as a class to make sure each group identified them correctly.

*Note: If you have enough shells you could give each group a set of shells or pictures to identify instead of setting it up as stations.

Follow-up questions

- How long do you think it takes for scientists to come up with a classification key?
- What happens to a classification key when a new species is identified?

At-home Learning and Virtual Modifications

At-home Learning: Send this nearpod for students to complete at home. The nearpod will introduce them to the concepts of taxonomy and dichotomous keys and have them use a key to identify mollusc shells.

[Nearpod Classification Key – Molluscs](#)

If you would like to see the results of their nearpod activities, you can set it up as a Student-Paced activity following these directions.

1. Create a free nearpod account (<https://nearpod.com/>)
2. Ask Aquarium to send you the Classification Keys student nearpod links (email education@scaquarium.org)

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3. After you receive Aquarium links, add lessons to your nearpod activities by clicking “Add to My Library”
4. Send to students using Student-Paced option
5. You’ll be able to see their answers and interactions

Virtual: Introduce the concept of classification keys to your class. Let them know that they are going to work through a classification key for molluscs (shells). Make sure your students have the Mollusc Classification Key in front of them. Work together to identify the shells by showing them one at a time through the webcam. Materials you need for this activity are listed below:

[Mollusc Classification Key](#) – email to students ahead of time

[Shell Photos](#) – need one copy for you to hold up to camera during class (if you have the real thing, use those instead)

Metric ruler

Assessment

Give each student a [Classification Assessment Worksheet](#) and have them create their own classification/dichotomous key. Before turning them in, have them trade keys with a classmate to see if they can follow the instructions.

Scoring Rubric out of 100

For creating a classification key that is correct, clear and easy to follow	100 points
For creating a classification key that is mostly correct	80 points
For creating a classification key that is not easy follow	70 points
For not trying or not finishing	0-69 points

Cross-Curricular Extensions

STEAM Extension

Have students design and build a dichotomous key mobile using these animals (snail, oyster, butterfly, fish, duck, owl, alligator, dolphin and mouse). They will have to balance the mobile and make sure each arm goes down to one animal.

STEAM Extension

Have students create 5 different organisms out of materials in the classroom and then create a dichotomous key for identifying them.

Resources

Teacher Reference Books

Raven, Peter H. and George B. Johnson. *Biology: Sixth Edition*. McGraw-Hill Companies. New York. 2002.

Teacher Reference Websites

How Stuff Works

<http://science.howstuffworks.com/life/biology-fields/taxonomy-info2.htm>

Website for basic taxonomy information as well as a list of each Kingdom and the Phyla that are within each.

National Center for Biotechnology Information

<http://www.ncbi.nlm.nih.gov/taxonomy>

Database for the taxonomy of most organisms

Online Activities

Clemson Extension

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<http://www.clemson.edu/extfor/publications/bul117/>

Great tree identification activity using leaves with a dichotomous key.