

Classification

Author: Alexa Rezelman Sabanegh
 Date Created: 2007
 Subject: Earth Science, Classification
 Level: Grades 3-5
 Standards: *New York State- Elementary Science (www.emsc.nysed.gov/ciai/)*
 Standard 1- Analysis, Inquiry and Design
 Standard 4.1- Living things are both similar and different
 from each other and from nonliving things.
 Standard 7- Interdisciplinary Problem Solving
Schedule: One 60-minute class period

<p>Objectives:</p> <p>Learn how to use some of the tools of classification in order to more easily understand the relationships between groups of objects.</p>	<p>Vocabulary:</p> <p>Classification Property Dichotomous Flowchart</p> <p>Organism</p>		
<p>Students will:</p> <ul style="list-style-type: none"> Classify objects into groups according to their similar properties Create a flow chart or key for classifying objects Identify objects using a dichotomous key Classify aliens, rocks, beans, and pasta using the handouts provided 	<p>Materials:</p> <table border="0"> <tr> <td data-bbox="812 1071 1071 1617"> <p>For Each Class: Assorted Pasta Assorted Dry Beans (packaged 12+ bean soup) Sets of assorted rocks (galena, hematite, pyrite, magnetite, white marble, quartz, talc, granite, and pumice)* Sets of Alien Cards Glass microscope slides* Black construction paper Magnets Answer Keys</p> </td> <td data-bbox="1071 1071 1435 1617"> <p>For Each Student: Activity Sheets 1 & 2: <i>Creepy Critters</i> Activity Sheet 3, 4 & 5: <i>Rock Classification</i> Activity Sheet 6 : <i>Bean Dichotomous Chart</i> Activity Sheets 7 & 8: <i>Bean Classification</i> Activity Sheet 9: <i>Pasta Dichot. Chart</i> Activity Sheet 10: <i>Pasta Key</i> Scissors</p> </td> </tr> </table> <p>*Depends on # of students (see 'Classroom Procedure' for more specifications)</p> <p>Safety:</p> <p>This activity does not contain any safety concerns.</p>	<p>For Each Class: Assorted Pasta Assorted Dry Beans (packaged 12+ bean soup) Sets of assorted rocks (galena, hematite, pyrite, magnetite, white marble, quartz, talc, granite, and pumice)* Sets of Alien Cards Glass microscope slides* Black construction paper Magnets Answer Keys</p>	<p>For Each Student: Activity Sheets 1 & 2: <i>Creepy Critters</i> Activity Sheet 3, 4 & 5: <i>Rock Classification</i> Activity Sheet 6 : <i>Bean Dichotomous Chart</i> Activity Sheets 7 & 8: <i>Bean Classification</i> Activity Sheet 9: <i>Pasta Dichot. Chart</i> Activity Sheet 10: <i>Pasta Key</i> Scissors</p>
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Science Content:

Scientists have organized living things into large groups called kingdoms based on natural relationships. Early classification systems were based only on structural similarities. Today, we consider similarities in cell make-up, genetics, and more when classifying organisms. Plants make up one kingdom, and animals another. Protists, bacteria, and fungi make up still more kingdoms. Things are placed into a kingdom based on their similarities. The kingdoms are then divided into smaller and smaller groups. The more similar living things within a kingdom, the more closely they are grouped. The smallest group within a kingdom is a species. Members of different species cannot interbreed. This whole organizational system for living things is called “classification.”

It works like this: Suppose you wanted to classify a car. See Figure 3.

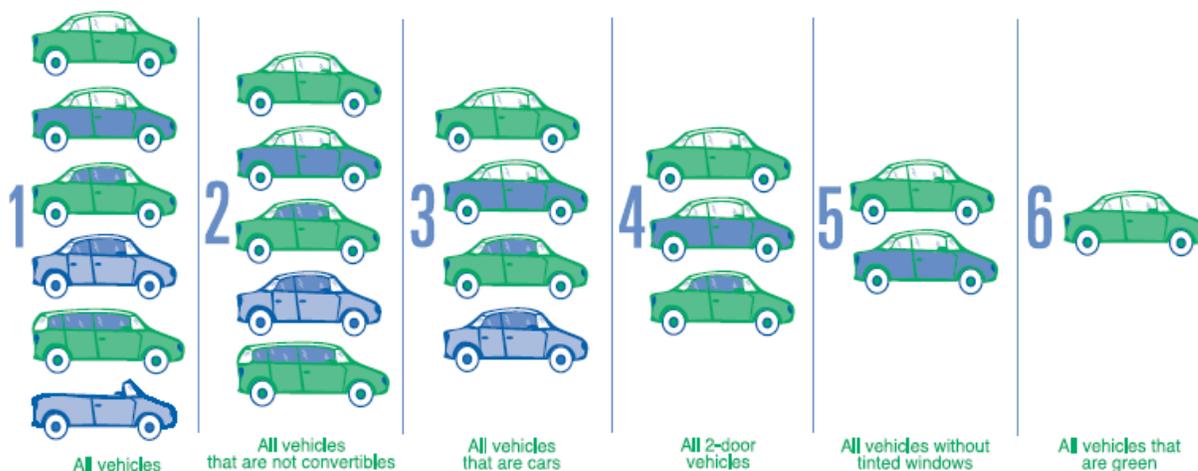


Figure 3. One way to classify cars.

The first group, or kingdom, would all be cars. That would exclude trucks, school buses, and RVs. The kingdom of cars would be further divided into all sedans. Now we’ve excluded all convertibles and station wagons. The third group would be all 2-door sedans. That eliminates all the 4-door models. The fourth group would be all 2-door sedans with tinted windows. The fifth group would be all 2-door sedans with tinted windows and stick shifts. The sixth group would be all green, 2-door sedans with tinted windows and stick shifts. And the last group would be all green, 2-door sedans with tinted windows, stick shifts, and CD players. Each group contains fewer cars than the one before because additional requirements were added. Classification of living organisms works in the same way. Each group within a kingdom has fewer members than the group before.



Many times, different scientists classify organisms differently. For example, another scientist might classify the car in the example above like this. The first group would be all cars. The second group would be all cars made in the United States. The third group would be all cars made by General Motors. The fourth group would be all Pontiacs. The fifth group would be all sports cars. And the last group would be all convertible Trans Ams. Again, each group contained fewer cars than the one before a the system went from general to more specific.

Preparation:

1. Photocopy print materials (*Activity Sheets 1-10*) for each student.
2. Distribute materials evenly to each student.



Classroom Procedure:

Engage (Time: 10 mins)

Instruct the class to line up around the room in order of their birthdays, without speaking to one another. Discuss the following as a class:

- The class has been organized into groups according to birthday. How else could the class have been divided into groups?
- Why might you want to group or classify objects?
- Why might it be important to pick one way of classifying something, like the Kingdoms as a classification scheme for living organisms?

Explore (Time: 40 mins)

Divide the class into groups of two (you might want to choose a classification scheme to do this, like shirt color). Distribute Activity Sheets 1 and 2. Have the pairs play a “Who is it?” game using the alien cards. One student chooses an alien from the deck and the other student asks yes or no questions about the aliens until he/she can identify which alien the other student had picked.

Students should record how many questions they had to ask in order to identify the alien. Each student should have a turn picking an alien. After two games, bring the students back into a class discussion and have them explain and defend their classification system. Pose the following questions:

- If a new alien was introduced into the pack of cards, how might you determine to whom it was related? How would you narrow it down? What kind of questions would you ask?

Explain that there are a number of ways to group objects using a dichotomous key or a flowchart. A dichotomous key separates objects into two groups at a time until only one object fits in a category.

Divide the class into groups of four. Hand out a set of rocks, black construction paper, a glass microscope slide, and Activity Sheets 3 and 4 to each group. Groups should follow the key to determine the name of each rock. Streak tests are done by scraping the rock gently along the black construction paper. Once the students are finished, they can compare their rock key to Activity Sheet 5, the answer key.



Hand out the beans and Activity Sheets 6 and 7. Students should work in pairs within their foursome. Each pair of students should divide their beans into two groups by a characteristic of their choosing. Have students write down the characteristic (example: white or not white) on the flow chart and circle which beans are in that category. They should continue to divide each group into two and write down the defining characteristic of each group until each bean is in its own group. Once the beans are characterized, have another pair “test” the classification scheme to see if it is repeatable—an essential characteristic of a good classification scheme. Once the students are finished, they can compare their bean key to Activity Sheet 8, the answer key.

Students should work in pairs to classify the pasta using Activity Sheets 9 and 10. Students should use the same strategy as they used for the beans—dividing the pasta into two groups until each type of pasta is in its own group. Again, have the pairs switch schemes with another group to test the clarity of their flowchart. Pairs should modify their charts as necessary until the classification is repeatable.

Explain (Time: 10 mins)

Engage the students in a discussion about the factors that are most important when classifying objects and why it is important. Ask them to explain why it is important that the classification be repeatable.



Assessment:

The following rubric can be used to assess students during each part of the activity. The term “expectations” here refers to the content, process and attitudinal goals for this activity. Evidence for understanding may be in the form of oral as well as written communication, both with the teacher as well as observed communication with other students. Specifics are listed in the table below.

- 1= exceeds expectations
- 2= meets expectations consistently
- 3= meets expectations occasionally
- 4= not meeting expectations

	Engage	Explore	Explain
1	Shows leadership in the activity and offers creative ideas reflecting a good understanding of classification.	Completes work accurately while providing an explanation for what is observed. Works very well with partner.	Provides an in-depth explanation of findings. Makes excellent and thoughtful comparisons to real-life situations. Fills out worksheet clearly.
2	Participates in the activity and shows an understanding of classification.	Completes work accurately and works cooperatively with partner.	Provides clear explanation of findings. Makes good comparisons to real-life situations. Fills out worksheet clearly.
3	Contributes to the activity, but shows little understanding of classification.	Works cooperatively with partner, but makes some mistakes with the procedure.	Provides a limited explanation of findings. Struggles to make comparisons to real life. Fills out some of the worksheet.
4	Does not participate in activity. Shows no understanding of classification.	Has trouble working with partner. Does little to complete the procedure.	Is not clear in explanation of findings. Does not make comparisons to real life. Does not fill out worksheet.



Creepy Critters Assessment:

What did you find out by doing the activity?

Before doing “Creepy Critters,” did you know:

- That not all animals have the same characteristics?
- What the standard classification scheme for an organism is?
- How animals are separated into different groups?
- If how an animal looks has an effect on how it is classified?
- Why scientists classify organisms?
- That the basic food groups are another form of classification?

Form this activity, did you discover:

- How organisms are classified?
- What factors are most important in classification?
- What benefits come from classifying organisms?
- The major factor that differentiates one species from another?
- How you would further classify yourself as an individual, and what traits would be important in that classification?
- Where you would begin if you had to classify an unknown plant?

Extension Activities:

- Challenge students to think of other methods of classification
- Encourage students to think about examples of classification schemes (i.e. for species of animals, for materials, etc.)

Safety:

- This activity does not contain any safety concerns.

Acknowledgments:

Kevin Dilley, Educational Programs Manager, Cornell University

