

Constructing and Testing a Dichotomous Key Model for Fruit

A Carolina Essentials™ Investigation

Student Worksheet



Overview

Humans have categorized substances in nature throughout history. The Greeks categorized known elements as air, earth, fire, and water. The Periodic Table characterizes metals, metalloids, and nonmetals. A produce manager at the grocery store separates fruits and vegetables. How are these categories determined? Scientists construct models using the characteristics of substances and use them as tools for identification of known and unknown substances. In this investigation, you will develop a classification model based on characteristics of common fruit. You will then convert the model to a dichotomous key, which will be used to classify new fruit samples.

Essential Question

How are observable physical properties used to classify living things?

Investigation Objectives

1. Use common fruit to construct a dichotomous key for fruit types.
2. Classify fruits using the constructed dichotomous key.

Safety Precautions

Tell your teacher about food allergies you may have prior to the investigation. Be careful using the plastic knife. All incisions should be done away from the body. Wear safety glasses and gloves. Do not eat the fruit.

Procedure

1. Cover the workspace with butcher paper or craft paper before observing the fruit.
2. Observe the exterior of all pieces of fruit.
3. Group the fruit into 2 groups by similar characteristics.
4. Record the reason(s) for your fruit groupings.
5. Keep the fruit in groups and use the knife or nutcracker to dissect the fruit. Slice through the fruit, beginning from where the fruit was attached to the stem. Make observations.
6. Remove the outside layer from one half of the fruit. Make observations.
7. Remove any seeds from the fruit. Make observations.
8. Use the dissection observations to classify the fruit into specific categories. Depending on the detail, you should have 6 to 8 categories.
9. Sketch your final fruit classification model below.
10. Convert the classification model into a dichotomous key by asking yes or no questions for each category on the model. Each question should reflect an identifying fruit characteristic.

Model Assessment

1. Switch dichotomous keys with another group.
2. Obtain the fruit for testing the dichotomous key.
3. Identify the fruit type for the test fruits.

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SAFETY REQUIREMENTS



MATERIALS

- 1 corn kernel (frozen)
- 1 grape (any variety)
- 1/4 orange, lemon, lime, or other citrus fruit
- 1 cherry (any variety)
- 1 blueberry
- 1/4 apple (any variety)
- 1/4 pear (any variety)
- 1 blackberry
- 1 snow pea pod
- 1 green bean pod
- 1 pecan or walnut
- 1 pint-size resealable bag
- 1 plastic knife
- 1 nutcracker or small rock hammer
- Butcher paper or craft paper to cover desks

FOR DICHOTOMOUS KEY TESTING

- 1/4 banana
- 1 raspberry

Disposal

Make sure all the fruit is on the butcher or craft paper. Fold the ends of the paper over the fruit to contain it. Place the paper with the fruit in the classroom trash. Wash the plastic knife. Return the nutcracker and the plastic knife to the designated area.

Data and Observations

Fruit	Observation 1	Observation 2
Corn kernel		
Grape		
Citrus fruit		
Cherry		
Blueberry		
Apple		
Pear		
Blackberry		
Snow pea pod		
Green bean pod		
Pecan or walnut		

Analysis and Discussion

1. Sketch the final classification scheme your group used. Include the fruit names for each classification.

2. Turn your classification scheme into a dichotomous key by writing questions that have yes or no answers that correspond to the characteristic you used to group the fruit. Example: Are multiple seeds visible on the inside of the fruit?

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3. What are the fruit classifications for the banana and raspberry?

4. Compare your group's identification model to other groups' models. Describe differences. Did the differences change the classification of the banana and raspberry?

5. How did your group's model and dichotomous key compare to the partial key the teacher provided?

6. Identify 3 other groups of living things for which you could construct a taxonomy.

7. Select one group from question 4 and describe the properties or characteristics you would use to build a taxonomic model.