

# Dichotomous Keys

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**Subject:** Science

**Skills:** observing, comparing, communicating, ordering, and categorizing

**Duration:** one hour (unless a beach trip is included)

**Group size:** one class

**Setting:** classroom or beach

**Vocabulary:** bivalve, univalve, mollusk, dichotomous key,

**SC Science Standards:** Grade 7-8 –

Inquiry: IA1a1,2, IA1b2, IA1c1,2. Grade 7 – IIA3e.

- shell field guide
- a variety of native shells
- mollusk reference books
- dictionary or printed glossary from <http://oceanica.cofc.edu/shellguide.htm>
- dichotomous keys for other species (skulls, trees, etc.)

## Links for other keys:

[www.sciencespot.net/Pages/sillysci.html](http://www.sciencespot.net/Pages/sillysci.html)

[www.park.edu/bhoffman/courses/bi225/labs/Dichotomous%20Keys%202.htm](http://www.park.edu/bhoffman/courses/bi225/labs/Dichotomous%20Keys%202.htm)

<http://ekcsk12.org/science/lelab/dichotomouskeys.html>

## Objectives

Students will learn:

- 1) what dichotomous means;
- 2) to use a **dichotomous key**;
- 3) to identify different **mollusks**; and
- 4) the different parts of a mollusk.

## Background

Dichotomous means a division or the process of dividing into groups. A dichotomous key guides you through a series of steps leading you to the correct identification. Dichotomous keys can be used for shapes, wildflowers, trees, animal skulls, birds, and a variety of other objects. In this activity, a dichotomous key will be used to identify mollusks. A key will also be created by the class identifying each individual person in the class. Not only will the use of a key be taught here, but students will also learn the basic structure of mollusks and will learn the common names of these animals as well.

## Materials

- copies of the dichotomous key (available to print from <http://oceanica.cofc.edu/shellguide.htm>)

## Procedure

Have the students define the word dichotomous and explain why a dichotomous key is a useful tool in identifying different species. Ask the students with what objects could you use a dichotomous key? Show examples of dichotomous keys and pass out the keys for identifying mollusks to each student or group of students. Dictionaries should be available for students to look up words they are unfamiliar with or mollusk reference books so students can learn the names of mollusk parts, which will help them through the key. You could also print out the glossary that is available online which includes all the words in the key that students may have problems with. Give each student or group of students a shell, particularly one they are not familiar with. Have them try to figure out what shell they have. If some get it wrong, have them

go back to see where they went wrong and if they agree with the steps to be taken. If there are any disagreements or questions with the key, feel free to visit Project Oceanica's site at <http://oceanica.cofc.edu/shellguide.htm> and find the questionnaire for educator's link. There will be a place at the bottom of the questionnaire for questions, suggestions, and comments, which will be submitted to Project Oceanica. Have the students exchange shells with other students to practice using the dichotomous key. Or, if you would like, divide the class into teams and make it a game to see which group can name the shell the quickest while documenting the process they used to get there. After the students feel comfortable with using the keys, as a class, make a dichotomous key using the people in the class. The first step could be dividing girls and boys. The next step could be dividing both the boys and girls into different hair color groups, and so on. Use names, names beginning with a certain letter, or birthdays to narrow your class key down until each person has their own endpoint. Make copies for each student to keep.

high winds cause strong waves which cause shells from deeper water to get washed onto the beach)

Instead of doing this activity in the classroom, a field trip could be taken to the beach to collect shells to use for the dichotomous key. After collecting the shells, use the dichotomous key to identify what you have collected. Take a field guide with you to the beach to check the identification. A lesson on using dichotomous key may need to be taught before going to the beach. After identifying the species collected, ask these questions: What species were most common? Were there any rare finds? Why? When do you think more of a variety of species would wash up on shore? (after storms) Why? (because

From Commonly Found Marine Mollusks of the Southeastern United States. By Sara K. Saksewski,  
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In order to identify accurately, please choose the most obvious option in each grouping.

## Bivalves

- 1a) Edge opposite hinge is rounded  Go to 2  
1b) Each half is longer than it is wide  Go to 3  
1c) Triangular shell with rounded corners  Go to 14
- 2a) Ridges extend from hinge to outer edge  
(perpendicular to hinge) Go to 4  
2b) Ridges circle shell (parallel to hinge) Go to 5
- 3a) Shell is rough (ribs, spines) Go to 6  
3b) Shell is smooth Go to 7
- 4a) Hinge with ears **Atlantic Calico Scallop**  
4b) Hinge without ears Go to 8
- 5a) Thin, fragile, lightweight Go to 10  
5b) Thick and heavy shell **Northern Quahog**
- 6a) Fan-shaped Go to 11  
6b) Not fan-shaped Go to 12
- 7a) Shell is slender, 6 times longer than wide **Atlantic Jackknife**  
7b) Shell is rectangular, 3 times longer than wide **Stout Tagelus**
- 8a) Piano hinge (teeth-like) **Incongruous Ark**  
8b) No piano hinge Go to 9
- 9a) Ribs covered with raised scales (prickly) **Florida Prickly Cockle**  
9b) No raised scales on ribs **Atlantic Giant Cockle**
- 10a) Almost translucent, paper thin **Common Jingle**  
10b) Not translucent Go to 13
- 11a) Approximately 30 ribs covered with small spines **Saw-toothed Penshell**  
11b) Fewer than 20 ribs, some with large spines **Stiff Penshell**

12a) Angel-wing shaped	Go to 15
12b) Not angel-wing shaped	Go to 16
13a) Beak curves forward	<b>Disk Dosinia</b>
13b) Beak does not curve forward	<b>Cross-hatched Lucine</b>
14a) Crisscross pattern of ridges	<b>Cross-barred Venus</b>
14b) No crisscross pattern	Go to 17
15a) Approximately 30 sharply beaded ribs covering whole surface	<b>Angel Wing</b>
15b) Strong ribbing only on one end of shell	<b>False Angel Wing</b>
16a) Triangular shell with wing-like extensions	<b>Atlantic Wing Oyster</b>
16b) Oval or circle-shaped; no wing-like extensions	Go to 19
17a) One end of shell pointed, other end rounded	<b>Channeled Duckclam</b>
17b) Both ends pointed	Go to 18
18a) Beak central	<b>Atlantic Surfclam</b>
18b) Beak towards one end of shell	<b>Variable Coquina</b>
19a) Strong radial ribbing	<b>Ribbed Mussel</b>
19b) No distinct ribbing	<b>Eastern Oyster</b>

## Univalves

- 1a) Large aperture (opening) compared to shell  
(1/3 of the shell size or larger) Go to 2
- 1b) Small aperture (opening) compared to shell  
(less than 1/3 of the shell size) Go to 3
- 2a) Has a pointed shell Go to 4
- 2b) Does not have a pointed shell Go to 5
- 3a) Has a pointed shell Go to 6
- 3b) Does not have a pointed shell **Atlantic Deer Cowrie**
- 4a) Opens on left (hold with aperture  
facing you and the spire pointed up) **Lightning Whelk**
- 4b) Opens on right (hold with aperture  
facing you and the spire pointed up) Go to 7
- 5a) Has a shelf inside **Slippersnail**
- 5b) Does not have a shelf inside Go to 19
- 6a) Pure white **Angulate Wentletrap**
- 6b) Colors exist on shell Go to 10
- 7a) Knobs Go to 8
- 7b) No knobs Go to 9
- 8a) Knobs on each whorl and along back, running  
from top of spire to lower canal Go to 15
- 8b) Knobs only on each whorl Go to 16
- 9a) Visible bands (but not rough); bands circle shell Go to 12
- 9b) Rough grooves circle shell Go to 13
- 9c) No visible bands or rough grooves Go to 14
- 10a) Top-shaped Go to 11
- 10b) Longer shell than wide Go to 20
- 11a) Outer lip thin and smooth **Eastern Mudsnail**
- 11b) Outer lip thick and smooth **Marsh Periwinkle**

12a) Thin, dark brown lines spiraling around shell do not run into aperture	<b>Banded Tulip</b>
12b) Brown, spiral bands and many broken spirals running into aperture	<b>True Tulip</b>
13a) Rounded body; short spire; large as fist	Go to 17
13b) Has extended spire; small in size	Go to 18
14a) Flat, channeled whorls	<b>Channeled Whelk</b>
14b) Large, pointed spire	<b>Horse Conch</b>
15a) Large, pointed spines	<b>Giant Eastern Murex</b>
15b) Short, rough spines	<b>Apple Murex</b>
16a) Knobs pointed straight	<b>Knobbed Whelk</b>
16b) Knobs curved; swelling near lower part of body whorl	<b>Kiener Whelk</b>
17a) Thick, toothed outer lip	<b>Scotch Bonnet</b>
17b) Thin, slightly flared outer lip	<b>Giant Tun</b>
18a) Outer lip thick and toothed	<b>Thick-lipped Oyster Drill</b>
18b) Outer lip thin and not toothed	<b>Atlantic Oyster Drill</b>
19a) More flat than tall	<b>White Baby's Ear</b>
19b) Not flat; very round	<b>Moon Snail (Shark-eye)</b>
19c) Has a keyhole in the top	<b>Keyhole Limpet</b>
20a) Zigzag markings	<b>Lettered Olive</b>
20b) Round aperture (opening)	<b>Brown-striped Wentletrap</b>
20c) Canal at bottom of aperture	<b>Eastern Auger</b>