

IDENTIFYING WHALES: CETACEAN DICHOTOMOUS KEY

Oregon Science Content Standards:

- 5.1L.1. Explain that organisms are composed of parts that function together to form a living system
- 5.2L.1. Explain the interdependence of plants, animals, and the environment, and how adaptation influences survival

Ocean Literacy Principle:

- 5. The Ocean supports a great diversity of life and ecosystems

Goals:

- To learn about different kinds of whales
- To learn how to use a dichotomous key to identify organisms

Concepts:

- There is a great diversity of whales.
- Dichotomous keys are valuable tools that can be used to identify organisms.

Materials:

- Whale dichotomous key (provided below), one copy per pair of students
- Unlabeled pictures of whales, one picture per pair of students
- Key to the pictures of whales for the teacher

Prep: Print or project pictures of the following whales, identified by number only (not by name). Keep a key of the names.

1. Fin Whale
2. Humpback Whale
3. Bowhead Whale
4. Northern Right Whale
5. Minke Whale
6. Sei Whale
7. Pygmy Right Whale
8. Gray Whale
9. Beluga Whale
10. Narwhal
11. Killer Whale
12. Hourglass Dolphin

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13. Commerson's Dolphin
14. Common Bottlenose Dolphin
15. Southern Right Whale Dolphin
16. Pantropical Spotted Dolphin
17. Hector's Dolphin
18. Atlantic White-sided Dolphin
19. Dall's Porpoise
20. Blainville's Beaked Whale
21. Spectacled Porpoise
22. Strap-toothed Whale

Background:

This lesson should follow the 'Cetacean Introduction and Feeding' lesson, which teaches students the basics about whales and how they feed. Students should know that there are toothed whales (e.g. killer whale, sperm whale, dolphin, porpoise) and baleen whales (e.g. blue whale, gray whale, humpback whale). They should also know that whales are mammals and have several adaptations to live in the ocean.

A dichotomous key, despite its fancy name, is a simple way to identify organisms by answering a series of yes/no questions about the organism. Dichotomous keys are often found in field guides, since they are a simple way to identify wildlife. Dichotomous means 'two parts,' so a dichotomous key is a series of questions with two answers, often yes or no. In a whale dichotomous key, a sample question might be whether the whale has baleen. Each answer leads you to another question or to the name of the whale.

For this exercise, use several pictures of different whales. Before the lesson, print the pictures and a key. The whale pictures that the students use should not have the name of the whale, as the point of the exercise is for the students to use the dichotomous key to identify the whale in their picture.

Lesson Plan:

1. Start by reviewing the last lesson on whales (Introduction and feeding).
 - Have students explain the two main groups of whales (toothed and baleen).
 - Have students talk about how different types of whales eat.
 - Ask students to list any or all of the whales that they remember from last time.
2. Write the names of whales that students remember up on the board.
3. Explain that today they are going to identify whales based on pictures.
 - Ask how they might identify the whales.
 - Ask the students if they know the name of every kind of whale.
4. Explain that they are going to use dichotomous keys to identify the whales.
 - Describe what a dichotomous key is (see 'background').
 - Give an example question from the dichotomous key (see 'background').

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5. Pass out a whale picture to every pair of students (it is ok if there are duplicates) and have the students take out a piece of paper and pencil.
6. Explain that they should NOT write on the whale picture paper, but only on their own paper. If you want, you can have the students write the name of the whale on the picture AFTER they have identified it using the key.
7. Explain that on their own paper, they should write down each ID step that they take.
 - ex. #1 No baleen, has teeth, #9 Yes, whale is spotted, #10 Yes.....
 - ex. #1 Yes has baleen, #2 No throat grooves, #4 Point back.....
8. Pass out a copy of the dichotomous key to each pair of students.
9. Do the first step together as a group, pointing out which step to go to next, depending on their answer.
10. Students identify their whale.
11. When students are done, have them check their identification against the key. They can then have a new whale picture to identify.
12. Continue like this until there are about 10 minutes left in the class.
13. Have some students report on their whales and the features used to identify it.
14. Spend the last few minutes reviewing:
 - Ask students how dichotomous keys can be useful for identifying organisms.
 - Review anything about whales from the last two lessons.

Assessment: The students' lists of steps taken to identify their whales, and the final identifications. You could also test the students' ability to use dichotomous keys by showing a whale they haven't seen yet and having the whole class identify it with the key. You could also have students try to make a dichotomous key. For example, you could draw four or more organisms of any kind on the board and have individuals or pairs come up with a dichotomous key for these organisms. The more different the organisms are, the easier it is to make a key. For example, if the four organisms on the board are a flower, a cow, a pine tree, and a cat, it would be simple. The first question could be 'is it a plant?' Follow-up questions could be 'does it have hooves?' and 'does it have needles?' in order to finish the key.

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DICHOTOMOUS KEY for Whales

1. Does the whale have baleen?
 - a. Yes—go to question #2
 - b. No—go to question #9

2. Does the whale have throat grooves?
 - a. Yes—go to question #3
 - b. No—go to question #4

3. Are the pectoral fins one color?
 - a. Yes—go to question #6
 - b. No—go to question #7

4. Do the pectoral fins point down or to the back?
 - a. They point down—go to question #8
 - b. They point back—go to question #5

5. Does the whale have a dorsal fin?
 - a. Yes—your whale is the Pygmy Right Whale
 - b. No—your whale is the Bowhead Whale

6. Is there a sharp notch in the fluke?
 - a. Yes—your whale is the Fin Whale
 - b. No—your whale is the Sei Whale

7. Is the underside of the whale white from head to fluke?
 - a. Yes—your whale is the Minke Whale
 - b. No—your whale is the Humpback Whale

8. Is there a white patch on the belly of the whale?
 - a. Yes—your whale is the Northern Right Whale
 - b. No—your whale is the Gray Whale

9. Is your whale spotted?
 - a. Yes—go to question #10
 - b. No—go to question #12

10. Is there a tooth sticking out of the head (look closely)?
 - a. Yes—go to question #11
 - b. No—your whale is the Pantropical Spotted Dolphin

11. Is the tooth on the head long and skinny like a unicorn horn?
 - a. Yes—your whale is the Narwhal
 - b. No—your whale is the Blainville's Beaked Whale

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12. Does the whale have a dorsal fin?
 - a. Yes—go to question #13
 - b. No—go to question #18

13. Does the dorsal fin come to a point?
 - a. Yes—go to question #14
 - b. No—go to question #19

14. Is there a white patch on the dorsal fin, back, or sides?
 - a. Yes—go to question #15
 - b. No—go to question #21

15. Is there white on the beak (mouth area)?
 - a. Yes—go to question #16
 - b. No—your whale is the Dall's Porpoise

16. Is there a white ring around the eye?
 - a. Yes—your whale is the Hourglass Dolphin
 - b. No—go to question #17

17. Does the whale have a large dorsal fin?
 - a. Yes—your whale is the Killer Whale
 - b. No—your whale is the Strap-Toothed Whale

18. Is the whale countershaded (dark on top, light on bottom)?
 - a. Yes—your whale is the Southern Right Whale Dolphin
 - b. No—your whale is the Beluga Whale

19. Is there a line separating two colors on the whale that goes through the eye?
 - a. Yes—your whale is the Spectacled Porpoise
 - b. No—go to question #20

20. Is there white on the back of the whale?
 - a. Yes—your whale is the Commerson's Dolphin
 - b. No—your whale is the Hector's Dolphin

21. Can your whale be over 12 feet long?
 - a. Yes—your whale is the Common Bottlenose Dolphin
 - b. No—your whale is the Atlantic White-sided Dolphin