

**Grades K-2**  
**Next Generation Science Standards**  
**2-LS4-1** Partially meets – needs further comparison to different habitats.

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*Exploring Marine Science and Aquaculture* Grades K-2

## Fish Printing

Developed by the University of Maine Cooperative Extension  
Revised and formatted by Maine Agriculture in the Classroom

### Activity Description:

This activity introduces the concept of identifiable characteristics and provides experience using a dichotomous key. Students also engage in the art of Japanese fish printing (*goyutaku*).

### Learning Objectives:

Students will:

- Understand that each living thing has a unique set of characteristics and can be identified by its characteristics.
- Begin to identify fish features and characteristics, and their purpose and function.

### Essential Questions:

- What are some characteristics of fish?
- Why do fish have gills?
- How does the shape of a fish help it?
- How do the fins and tail help a fish?
- What is a dichotomous key

### Background Information:

All species have identifying characteristics and features. We can investigate these features to learn more about each species. Fish characteristics include gills, fins, tails, ability to be camouflaged, size, jaws, teeth. Fish can be identified through asking a series of yes or no questions, with a tool called a **dichotomous key**. After each question, many species are eliminated, which narrows down the possibilities until the species is identified.

### Vocabulary List:

**Dichotomous Key:** A key for the identification of organisms based on a series of choices between alternative characters.

**Characteristics:** A special quality or trait that makes a person, thing, or group different from others



## Materials:

- Paint
- Roller
- Plates
- Magnifying glasses
- Markers/Colored pencils
- Paper
- Paper Towels
- Newspaper
- Dichotomous key
- Imaginary fish sorting cards
- Fish 1 and 2
- Fish replicas: Trout, Salmon, Flounder, Largemouth Bass\*

\*Source for fish models is at the end of lesson under **Additional Resources**.

## Procedure:

### Engage

1. Introduce the activity by telling the students that they will be learning about the characteristics and features of fish.
  - a. *We are going to practice identifying characteristics by playing a game.*
2. Tell students that you are going to randomly choose one person and the class will have to figure out who it is by asking yes or no questions.
3. Quietly select someone without saying who it is, and then tell everyone to stand up.
4. Encourage students to raise their hand if they have a question that might help discover the person who was chosen.
  - a. *For example, a question might be “Does the person have black hair?”.*
  - b. *If you answer “Yes”, then anyone who doesn’t have black hair will sit down.*
  - c. *Since you answered “Yes, the person has black hair”, then anyone with black hair should remain standing.*
  - d. *Once someone has been eliminated, they should remain seated until the end of the round, but they can still raise their hand to ask questions.*
5. The last person standing should be the one you chose in the beginning.
6. Repeat as many times as necessary for the students to gain sufficient practice, choosing different participants each time.

### Explain

7. Explain to students that this is an example of how scientists use characteristics of plants and animals to help identify their names and tell them apart from each other.
8. Ask students to brainstorm some characteristics of fish that may be helpful in identifying them. Older youth can make a list.
  - a. *How we can tell fish apart?*
  - b. *What are some characteristics that fish have?*
  - c. *Are there any fish that have unique characteristics?*
  - d. *What characteristics do some fish share?*
9. Show this video for an introduction to fish characteristics (2:54 minutes in length):  
[https://www.youtube.com/watch?v=u\\_Xv5BRnflA](https://www.youtube.com/watch?v=u_Xv5BRnflA)
10. Emphasize the following in the video: gills, fins, tails, colors, size, teeth, fish that take shelter or not, fish that move in schools or solo.
11. Tell students that they will be observing some of these characteristics through fish printing using a fish model, paint, and a roller tool.
12. Model for the students how to use the fish model and the amount of paint that should be used for printing (it only requires a light coating of paint; using too much paint will result in a poor print).
13. Place students in cooperative learning groups of 2-3.
14. Each group should get one fish model, one roller, paint, newspaper, paper towels and print paper for each student. Once at their table, each participant should print the fish at least once.
15. Once the students have printed their fish, they should use their magnifying glass to make observations about the fish.



16. They should focus on characteristics of the fish (scales, fins, shape, tails, gills, mouth).
17. Tell them to make a lot of observations because they will be using their observations to help them identify what kind of fish they printed.
18. Meet as a whole group to make comparisons between the characteristics of each fish.
  - a. *What are characteristic they all have in common?*
  - b. *What characteristics are different?*

### Explore

19. Engage the students in a discussion about fish:
  - a. *What makes a fish a fish? (It has gills which take oxygen from the water)*
  - b. *Why do fish need fins? (It helps them move and balance in the water)*
  - c. *What do you think the tail helps a fish to do? (Helps them control their speed and direction like a boat's rudder)*
  - d. *Why is the fish shape important? (Some fish, like tuna, are streamlined for speed; others have a flat body to blend into a sandy ocean bottom, like a flounder)*
  - e. *Why do fish move differently than we do? (Moving through the water requires different characteristics than moving through the air. Water is thicker than air).*
  - f. *Why is it important to be able to identify fish? (Fish have different purposes for humans; some we eat, some are used as bait, some are pets, some need to be protected because they are overfished and their numbers go down).*

### Elaborate

20. Tell students that scientists have a method for identifying fish: they use a tool called a Dichotomous Key.
21. Challenge the students to say this word:
  - a. *Say hippopotamus, rhymes with dichotomous.*
  - b. *Repeat after me: Hippopotamus-Dichotomous; Hippopotamus-Dichotomous*
22. Explain the word to the students while showing the key:
  - a. *The word "dichotomous" means split into 2 parts.*
  - b. *At each step in this key, 2 choices are given.*
  - c. *Each answer leads to another question, and ends with the name of the fish!*
23. Show this video about dichotomous keys (2:38 length):  
<https://www.youtube.com/watch?v=M51AKJqx-7s>
24. For younger students, distribute the dichotomous key for fish and direct students to work in groups to match the fish with the statement in the key.
25. For older students, use the imaginary fish sort cards to look at the differences between their characteristics.

### Evaluate

26. Ask students to share their Point of Most Significance (POM).
  - a. *What do you remember most about fish?*
27. Ask students for their Muddiest Point.
  - a. *What do you need or want to know more about fish?*

### Extension Ideas:

- For older students: Make a dichotomous key of their own, using the Fish 1 and 2 cards. The number of fish used can be tailored to the ability of the group.
- Use fish replicas and fabric paint on t-shirts or another keepsake that the youth can take home with them.



## Additional Resources:

- More information about making fish prints (*goyutaku* – traditional Japanese fish print making)  
<http://blog.growingwithscience.com/2014/09/gyotaku-fish-print-activity-for-kids/>
- Fish models:  
<https://www.amazon.com/Simulated-Realistic-Lifelike-Decoration-Photography/dp/B01H30L0YY>
- **A reference for using a dichotomous key**  
<https://www.youtube.com/watch?v=3x7tuIZd4Sw> (This link must be cut and pasted, the direct linking won't work)
- A reference for making your own dichotomous key:  
[http://ww2.mdsg.umd.edu/interactive\\_lessons/key/student1.htm](http://ww2.mdsg.umd.edu/interactive_lessons/key/student1.htm)  
<https://www.youtube.com/watch?v=hQZ09SkmZe4> Very clear explanation of making a dichotomous key  
- good first step in explanation  
<https://www.youtube.com/watch?v=osa2a0iGv-Q> Engaging subjects for identifying (aliens) another good explanation, but omits the step of making the tree.

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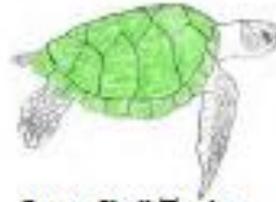
# Dichotomous Key



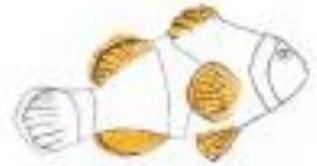
Purple Tail Fish



Red Fin Fish



Green Shell Turtle



Orange Fin Fish

1. If it is a fish, go to 2.  
If it is not a fish, go to 4.
2. If it has a purple tail, it is a **Purple Tail fish**.  
If it does not have a purple tail, go to 3.
3. If it has an **orange** fin, it is an **Orange Fin fish**.  
If it has a **red** fin, it is a **Red Fin fish**.
4. If it has a **green** shell, it is a **Green Shell turtle**.

