

# 6-8 Go “Build-a” Fish Activity

## Overview

### **Focus Question**

What does the shape of a fish tell you about the way a fish lives?

### **Activity Synopsis**

Students will study the characteristics of fish and how they affect what habitat they live in and the food they eat. They will then play a game of “Go Fish” to build a fish that would live in a particular habitat.

### **Time Frame**

90 minutes

### **Objectives**

The learner will be able to:

- Explain how a fish’s mouth determines the food a fish eats
- Explain how the shape of the fish determines where it lives
- Explain how the shape of the tail determines speed
- Explain how the fins of a fish determine how it swims

### **Student and Teacher Key Terms**

- Compressed
- Depressed
- Fusiform
- Filiform
- Caudal fin
- Pectoral fin
- Pelvic fin
- Dorsal fin
- Morphology
- Dorsal
- Ventral

## Standards

### *South Carolina College- and Career-Ready Science Standards 2021*

**7<sup>th</sup> Grade:** 7-LS2-1, 7-LS2-2, 7-LS2-4, 7-LS2-5

### *2014 Academic Standards and Performance Indicators for Science*

**6<sup>th</sup> Grade:** 6.S.1A.1, 6.S.1A.2, 6.S.1A.4, 6.S.1A.6, **6.S.1A.8**, 6.L.4A.1, 6.L.4A.2, 6.L.4B.1, **6.L.4B.2**

**7<sup>th</sup> Grade:** 7.S.1A.1, 7.S.1A.2, 7.S.1A.4, 7.S.1A.6, **7.S.1A.8**, 7.EC.5A.1, 7.EC.5B.1

**8<sup>th</sup> Grade:** 8.S.1A.1, 8.S.1A.2, 8.S.1A.4, 8.S.1A.6, **8.S.1A.8**, **8.S.1B.1**, **8.E.6B.1**

\* **Bold standards are the main standards addressed in this activity**

### *South Carolina College- and Career-Ready Science Standards 2021*

## Seventh Grade Performance Expectations

# 6-8 Go “Build-a” Fish Activity

- 7-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- 7-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
- 7-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- 7-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

## ***2014 Academic Standards and Performance Indicators for Science***

### **Sixth Grade Performance Indicators**

- 6.S.1A.1 Ask questions to (1) generate hypotheses for scientific investigations, (2) refine models, explanations, or designs, or (3) extend the results of investigations or challenge claims.
- 6.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
- 6.S.1A.4 Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
- 6.S.1A.6 Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
- 6.S.1A.8** Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations.
- 6.L.4A.1 Obtain and communicate information to support claims that living organisms (1) obtain and use resources for energy, (2) respond to stimuli, (3) reproduce, and (4) grow and develop.
- 6.L.4A.2 Develop and use models to classify organisms based on the current hierarchical taxonomic structure (including the kingdoms of protists, plants, fungi, and animals).
- 6.L.4B.1 Analyze and interpret data related to the diversity of animals to support claims that all animals (vertebrates and invertebrates) share common characteristics.
- 6.L.4B.2** Obtain and communicate information to explain how the structural adaptations and processes of animals allow for defense, movement, or resource obtainment.

### **Seventh Grade Performance Indicators**

- 7.S.1A.1 Ask questions to (1) generate hypotheses for scientific investigations, (2) refine models, explanations, or designs, or (3) extend the results of investigations or challenge claims.
- 7.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
- 7.S.1A.4 Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
- 7.S.1A.6 Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
- 7.S.1A.8** Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations.
- 7.EC.5A.1 Develop and use models to describe the characteristics of the levels of organization within ecosystems (including species, populations, communities, ecosystems, and biomes).
- 7.EC.5B.1 Develop and use models to explain how organisms interact in a competitive or mutually beneficial relationship for food, shelter, or space (including competition, mutualism, commensalism, parasitism, and predator-prey relationships).

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## Eighth Grade Performance Indicators

8.S.1A.1 Ask questions to (1) generate hypotheses for scientific investigations, (2) refine models, explanations, or designs, or (3) extend the results of investigations or challenge claims.

8.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

8.S.1A.4 Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.

8.S.1A.6 Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.

**8.S.1A.8** Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations.

**8.S.1B.1** Construct devices or design solutions using scientific knowledge to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the device or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem and refine the design if needed, and (6) communicate the results.

**8.E.6B.1** Construct explanations for how biological adaptations and genetic variations of traits in a population enhance the probability of survival in a particular environment.

## **Cross Curricular Standards**

### **Common Core ELA Standards**

Reading Informational Text – 6.1, 6.4, 7.1, 8.1

Speaking/Listening – 6.1, 6.4, 7.1, 7.4, 8.1, 8.4

Language – 6.1, 7.1, 8.1

## **Background**

### **Key Points**

*Key Points will give you the main information you should know to teach the activity.*

- The shape of a fish can tell you generally where the fish lives.
- The shape of the **caudal fin** (tail) can tell you generally how fast the fish swims.
- The shape and placement of the mouth can tell you what the fish eats.

### **Detailed Information**

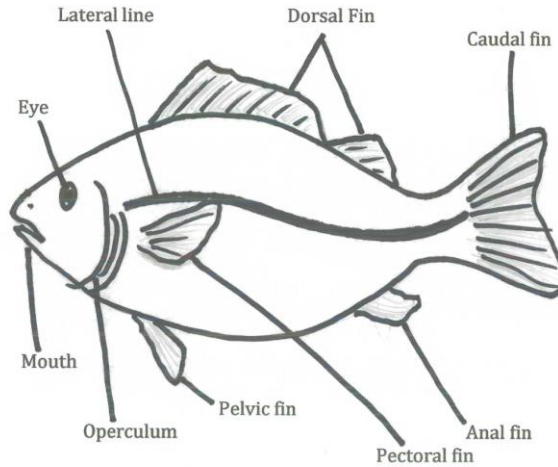
*Detailed information gives more in-depth background to increase your own knowledge, in case you want to expand upon the activity or you are asked detailed questions by students.*

Fish are characterized by their shape, fins, and their mouth; all of which allow you to “read” a fish. Although fish come in many shapes and sizes, they all have basically the same types of fins.

A fin is a membrane that is supported by spines or rays, made of cartilage. The main fin on the top (**dorsal** side) of the fish is the **dorsal fin**. There may be one or more dorsal fins. The dorsal fins help with balance. The tail fin is called the **caudal fin**. The caudal fin helps propel the fish through the water. The **pelvic fin** is located on the **ventral** side (bottom) of the fish toward the front. The pelvic fin also helps with balance and aids in stopping. The **pectoral fins** are located on either side of the fish, usually in the middle front of the body. The pectorals aid in balance, allow the fish to turn and some fish use the pectoral fins to help with propulsion. The **anal fin** is located on the ventral side of the fish, near the caudal fin (tail). The anal fin helps with balance.



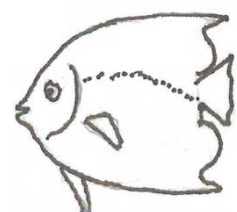

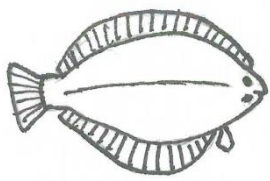

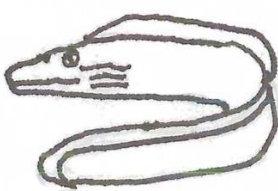

# 6-8 Go “Build-a” Fish Activity

This picture shows the **morphology**/external anatomy of a fish.




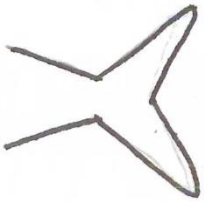
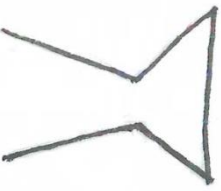
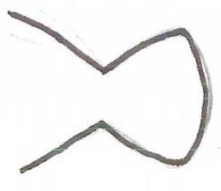
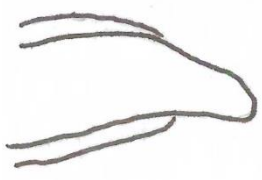
# 6-8 Go “Build-a” Fish Activity

The body type, or shape, of a fish can tell you a lot about where a fish can live and how fast they can swim. Most fish are somewhat torpedo-shaped, which allows it to swim easily through the water. Some fish are more disk-shaped vertically while others are disk-shaped horizontally. The disk-shaped fish are not fast swimmers. Here is a table of the main body shapes of fish.

Body Shape	Picture	Example Fish	Habitat and Speed	Cross-section
<b>Fusiform</b>		Tuna, shark	Open ocean, fast	
<b>Compressed</b>		Angelfish, triggerfish, butterfly-fish	Many habitats, not constantly moving but short bursts of speed	
<b>Depressed</b>		Skates, rays, flounder	Bottom dwellers, flight like swimming	
<b>Filiform</b>		Eels	Holes and crevices, long thin body that moves like a ribbon	

# 6-8 Go “Build-a” Fish Activity


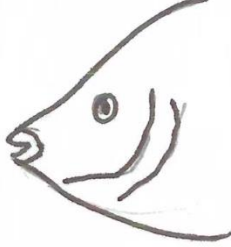

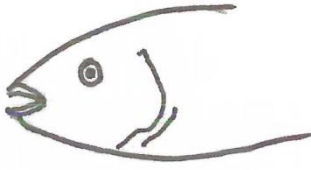
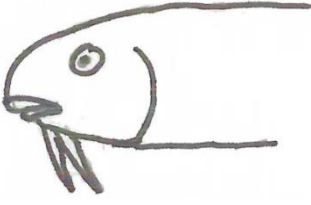
The shape of the caudal fin can shed some light on the general speed at which the fish swims. The basic rule of thumb is that the round shape denotes the slowest speed, and as you go from flattened to the deep V or crescent, the faster the fish swims.

Caudal Fin	Picture	Swim Speed	Habitat
Lunate, crescent		Fast, doesn't turn easily	Open ocean
Forked		Constantly moving, moderately fast	Open ocean, reef
Truncate		Strong swimmer but slower, short bursts of speed	Open ocean, reef
Rounded		Strong swimmer but slower, short bursts of speed	Open ocean, reef
Continuous		Weak swimmer, wriggling on bottom or through crevices	Open ocean, bottom



# 6-8 Go “Build-a” Fish Activity

The mouth of the fish can tell you what and where the fish eats. If the mouth is large and in front, then the fish eats other large fish. If the fish has a small mouth, then it eats mostly invertebrates. The placement of the mouth is also tell-tale. If the mouth is on top, the fish eats from above or the actual surface. If the mouth is on the bottom, the fish eats from below.

Type of Mouth	What it Eats	Picture
Beak-like	Crunches, could eat coral	
Little mouth	Nibbling on small plants/animals or invertebrates, sometimes has teeth	
Mouth near the top (superior)	Eating near the surface of the water or at least above the fish, sometimes has teeth	
Mouth in the middle (terminal)	Eating directly ahead, algae eater, gulper, surrounds prey	
Mouth on bottom	Sometimes has teeth, bottom feeder or strong biter.	

# 6-8 Go “Build-a” Fish Activity

## Procedures

### Materials

- [Go “build a” Fish Introduction PowerPoint](#)
- [Fish Morphology Tables](#) (1 per group of 3 students)
- [Go “build a” Fish Playing Cards](#) (1 set per group of 3 students))
- [Answer Key for game](#) (for teacher only)

### Procedure

1. Use the Go “build a” Fish PowerPoint to introduce the morphology (external anatomy) of fish. Also introduce the concepts of body shape, mouth placement, and caudal fins as to their function on the fish.
2. Show pictures of different fish on the PowerPoint. The class will discuss the different caudal fins, shapes of the body, and the mouths on the fish so that students are aware of the differences.
3. Divide students into groups of 3. Have playing cards organized in 2 piles to start. 1 pile of Habitat/Characteristics cards and 1 pile of Body Shape, Mouth and Caudal Fin cards per group. Also have a copy of the Fish Morphology Tables for each group to reference while they play.
4. Each student should draw a habitat/characteristics card. This card will inform them of the characteristics they need to obtain to build their fish.
5. Each student should then draw 3 cards that contain different mouths, shapes, and caudal fins. The remaining cards will be put face down in the middle of the table.
6. The goal of the game is to be the first in your group to get the correct body shape, mouth and caudal fin for the fish they draw from the habitat/characteristics pile.
7. One at a time, each student should ask someone in their group for a specific card that they need. If that person has that card, they will give it to them. If not, the student will “fish” from the stack of remaining cards.
8. The first student to correctly build their fish will win (might still have extra cards in hand, that’s ok they just need to build 1 fish). That student should explain why they picked each card to the rest of their group.
9. As the students are playing the game, meander around the room to see what they are trying to put together and help as needed.
10. Could have them play multiple times and each time they should draw a new Habitat/Characteristic card.

### Follow-up questions

- What type of fish would you like to be?
- How are sharks different than other fish (bony fish)? How are they similar?

### Assessment

After playing to game, you can assess student learning by having them draw a fish that fits the correct certain criteria. Go back to the habitat/characteristics cards. Draw one for the whole class (or you could have each draw one, but it will be easier for you to assess if they are all drawing the same thing). The students will be asked to draw a fish that meets the criteria making sure to draw all the fins, the correct caudal fin, correct mouth and correct body shape. They should also label these characteristics.

*Scoring rubric out of 100 points.*

Correct placement of fins:	<b>10 points</b>
Correct mouth type:	<b>30 points</b>
Correct caudal fin:	<b>30 points</b>
Correct body shape:	<b>30 points</b>

### Cross Curricular Extensions



# 6-8 Go “Build-a” Fish Activity

## **STEM Extension**

To follow the Engineering Design Process, start by asking the students to design a fish that will be neutrally buoyant (in the middle of the water.) Allow them time to research different types of fish as to body type, caudal fins, etc. You will need to provide different materials that float and sink. Clay is an excellent way to connect the two. Carrots will float and are a wonderful example of the fusiform body shape. Carrots are excellent because you can carve them to look like a fish and add weights into the flesh, such as screws or nails. Students will draw out their design for a fish. (It doesn't have to look like a real fish.) Students will then build the fish to match their design. They will then test it in water, such as a bucket or an aquarium. (Have towels on hand because they will spill!) The students will then revise their “fish” until they can get it to float in the middle.

## **STEAM Extension**

Have the students draw a background page out of various colors. Have those same colors of cake frosting. Make fish shaped cookies. Have the students decorate their fish cookie to match the background they have drawn. (This is always good before a holiday.)

## **STEAM Extension**

Fish printing is another way to add art into the science class. Get either a rubber fish (less stinky!) or a real fish. Paint the whole fish with acrylic paint on one side of its body. Take either paper or fabric and then lay it over the painted body. Rub the fabric to transfer the image. You can do this on t-shirts as well.

## **Resources**

### **Teacher and Student Reference Books**

Greenberg, Idaz. *Guide to Corals and Fishes of Florida, the Bahamas and the Caribbean*. Seahawk Press, Miami, 1986.

Greenberg, Michael. *The Fishes beneath Tropic Seas*. Seahawk Press, Miami, 1987.

Hoover, John. *Hawaii's Fishes, A Guide for Snorkelers and Divers and Aquarists*. Mutual Publishing, Honolulu, 2003.

Humann, Paul. *Reef Fish Identification, Florida, Caribbean, Bahamas*. New World Publications, Jacksonville, 1994.

Niessen, Thomas. *The Marine Biology Coloring Book*. Harper Collins, New York, 1982.

### **Teacher and Student Reference websites**

[www.dnr.sc.gov](http://www.dnr.sc.gov)

- Educator Resources
- Saltwater fish identification guide
- Two-sided Fish ID poster

[www.ocean.si.edu/ocean-fish-pictures](http://www.ocean.si.edu/ocean-fish-pictures)

[www.oceanlight.com/fish.html](http://www.oceanlight.com/fish.html)

[www.discovery.com/tv-shows/curiosity/topics/saltwater-fish-pictures.htm](http://www.discovery.com/tv-shows/curiosity/topics/saltwater-fish-pictures.htm)

[www.marine.usf.edu/pjocan](http://www.marine.usf.edu/pjocan)

### **SMART board games**

<http://www.pbslearningmedia.org/resource/Isps07.sci.life.evo.buildafish/build-a-fish/>

[www.lawrencehalloffscience.org/kidsite/portfolio/build-a-fish](http://www.lawrencehalloffscience.org/kidsite/portfolio/build-a-fish)