



Shelldon's Kitchen

Created by the NC Aquarium at Fort Fisher Education Section

Essential Question:

How can an aquarium feed a single sea turtle in a way that keeps him from competing with the other animals for food?

Lesson Overview:

Students use the Ask-Imagine-Plan-Create-Improve procedure to design, and build if desired, a method to separate a sea turtle (Shelldon) from the other animals in his large enclosure to ensure that he can eat all his food without having to compete with the other animals.

Learning Objectives:

Students will learn how the North Carolina Aquarium at Fort Fisher (NCAFF) feeds their green sea turtle, Shelldon. Students will be able to:

- Explain how the staff at NCAFF feed Shelldon.
- Use the engineering design process to create an enclosure for feeding sea turtles.

North Carolina Standards:

First Grade:

Science:

- 1.L.2 Summarize the needs of living organisms for energy and growth.
 - 1.L.2.2 Summarize the basic needs of a variety of different animals (including air, water, and food) for energy and growth.

Fourth Grade:

Science:

- 4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats
 - 4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment.

Engineering Connection:

- EG K-2 D 1 Use the engineering design process of Ask-Imagine-Plan-Create-Improve
 - EG K-2 D 1.1 Design product to solve a stated problem.
- EG K-2 P 1 Use a systematic approach to solve several different types of problems.
 - EG K-2 P 1.1 Identify problems that need to be solved.
- EG K-2 P 2 Use critical thinking to suggest solutions to problems.
 - EG K-2 P 2.3 Solve a problem that requires a picture to be drawn.
- EG 3-5 D 1 Use the engineering design process of Ask-Imagine-Plan-Create-Improve



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- EG 3-5 D 1.2 Design product to solve a stated problem.
- EG 3-5 D 1.3 Contrast multiple designs for a specific challenge
- EG 3-5 P 1 Use a systematic approach to solve several different types of problems.
 - EG 3-5 P1.2 Identify several problems that need to be solved in daily life.

Time Frame:

Preparation: 5 minutes

Activity: 30 minutes plus time to build (optional)

Materials:

- Pencils
- Engineering Design Worksheets
- Materials for designing turtle enclosures (optional)
- Bin of water for testing turtle enclosures (optional)

Supplemental Background Information for Teachers:

Shelldon, the green sea turtle, arrived as a hatchling to the Aquarium after a late season nest in Emerald Isle was excavated due to cold weather in November 2010. The animal, officially identified as CM06, weighed less than one ounce (28 grams) and measured slightly longer than 2 inches (5.8 centimeters). The animal was suffering from a respiratory infection and other medical issues for which it received treatment. Green sea turtles are threatened in North Carolina and endangered in other areas of the United States. Successful rehabilitation and permitting from the North Carolina Wildlife Resource Commission allowed CM06 to grow and thrive while remaining at the Aquarium to help educate the public on the plight of sea turtles. In 2013 the Aquarium held a contest to name CM06. After many weeks of voting, CM06 was officially introduced as Shelldon.

As with other turtles at the Aquarium, Shelldon is fed a certain amount of food based on his weight. Since he is a larger turtle, he is only fed five days a week. The staff uses the same ratio to feed Shelldon as the other sea turtles:

Turtle weight	Feed %
0-100g	15%
100-200g	7%
200-500g	4%
500g+	3%

Since Shelldon lives in the largest tank at the Aquarium, the Cape Fear Shoals, he shares space with about 100 other animals. The staff needs to make sure that Shelldon is eating all of his food and not competing with other animals for their food. To do this, they created a floating enclosure to separate him from the other animals during feeding time. This was created from PVC pipes, mesh, and foam. Shelldon stays in his enclosure until the entire tank has finished eating.



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As Shelldon grows, the staff will need to create larger enclosures. When he was first placed on exhibit in 2011, he was introduced to the Shadows on the Sand exhibit. While in that exhibit, Shelldon was fed in a laundry basket held afloat by pool noodles. When Shelldon grew larger they created a slightly larger basket before designing his current enclosure.

Preparation:

Print one worksheet per student or student group.

Procedure:

1. As a class, read about Shelldon on the [blog \(seaturtleexploration.com/masonry-blog/\)](http://seaturtleexploration.com/masonry-blog/). Do not discuss how he is fed. You can also watch the video of Shelldon swimming on the [homepage \(seaturtleexploration.com/\)](http://seaturtleexploration.com/).
2. Since Shelldon lives at the Aquarium, the staff has a responsibility to feed and care for him. Refer to the “[Build your own hatchling](http://seaturtleexploration.com/wp-content/uploads/2014/08/Build-your-own-hatchling-final1.pdf)” lesson (<http://seaturtleexploration.com/wp-content/uploads/2014/08/Build-your-own-hatchling-final1.pdf>) for information on feeding turtles at the aquarium. You can also watch our video on how we feed our loggerhead turtles (https://www.youtube.com/watch?v=i1_M_8CfQ-k).
3. As a class, discuss the issues associated with trying to feed one animal in a tank that can have over 100 different animals.
4. Tell the students that they have been asked by the Aquarium to help create a way to make sure Shelldon gets fed the right amount of food.
5. Pass out the engineering design worksheets. Help the students begin filling them out.
 - a. Ask: What is the problem? (How do we feed Shelldon in a way that keeps him from competing with the other animals for food?)
 - b. Imagine: What are some ways we can do that? What are our limitations? (It should be made with easily found objects, it must float, it must hold the weight of a turtle, it must keep the food from getting out, but let water in.)
 - c. Plan: Draw the diagram of how they would feed Shelldon on the worksheet. Once the students are finished, have them share their ideas with the class.
 - d. Create: If the class has time, you can build some of their ideas using household objects and a large bin of water. The students should test out their enclosures to make sure that they float. Then you can add their hatchlings from the “Build your own hatchling” lesson to make sure that they can support the weight of a turtle.
 - e. Improve: As a class, brainstorm some ways to improve on their designs.
6. Once you have completed the design process, watch the video of Shelldon being fed at the aquarium. (<https://www.youtube.com/watch?v=a0vXO92IWYk>)



Extensions:

1. Watch the video on how food is prepared for the turtles at the aquarium.
(<https://www.youtube.com/watch?v=RyanoOzyJsU>)
2. Schedule a behind the scenes tour at the Aquarium to see where the food is prepared and how our animals are fed:
<https://reservations.ncaquariums.com/fortfisher/Info.aspx?EventID=2>.

Resources:

For more information on the design process check out this resource from North Carolina State University:
<https://khsstem.pbworks.com/w/file/fetch/51523487/Engineering%20Design%20Process.pdf>

This resource is from the North Carolina State Standards website:
<http://www.ncpublicschools.org/docs/academic/services/conference/2013/presentations/76.pdf>

Engineering Design Process Elementary School	Graphic
Ask	
Imagine	
Plan	
Create	
Improve as needed at any step	



Engineering Design Process

1. Ask: What is the problem we are trying to solve? _____

2. Imagine: What are some ways we can solve that problem? _____

What are the limitations? _____

3. Plan: Draw a diagram of how you would solve the problem (use the back if needed):

4. Create: Build your design and test it.

5. Improve: How could you improve your design? _____
