

Hammerhead Heroes: The Science of the "Cephalofoil"

Learning Objectives

By the end of this lesson, Keatyn will be able to:

- Identify the unique name for a Hammerhead's head (the **cephalofoil**).
- Explain three scientific advantages of having a hammer-shaped head.
- Demonstrate how Hammerheads use "electroreception" to find prey.
- Create a scale model or detailed diagram of a Hammerhead species showing its specialized features.

Materials Needed

- Modeling clay or Play-Doh
- A small magnet and several metal paperclips
- A shallow tray or plastic bin filled with sand or dried rice
- Paper and colored markers/pencils
- A ruler or measuring tape
- Access to a video clip of a Hammerhead swimming (optional)

1. Introduction: The "Alien" of the Sea (The Hook)

The Hook: Ask Keatyn: "If you could move your eyes to the ends of your ears, what would you be able to see that you can't see now?"

Discussion: Most sharks have "torpedo-shaped" heads to cut through the water. But the Hammerhead decided to be different. It evolved a head that looks like a tool! Today, we are going to discover why being a 'flat-head' is actually a superpower in the ocean.

2. Direct Instruction: Why the Hammer? (I Do)

Explain the three main superpowers of the **Cephalofoil** (the scientific name for the hammer-head):

- **360-Degree Vision:** Because their eyes are on the very ends of the hammer, they can see above, below, and behind themselves all at once. They have a massive "binocular" view!
- **The Underwater Wing:** The head acts like a wing on an airplane. It provides "lift," allowing the shark to make sharp, acrobatic turns much faster than other sharks.
- **The Metal Detector:** Hammerheads are covered in tiny pores called *Ampullae of Lorenzini*. These pores pick up electricity. Since the head is so wide, it acts like a giant sensor to find stingrays hiding under the sand.

3. Guided Exploration: The Stingray Hunt (We Do)

In this activity, Keatyn will simulate how a Hammerhead "scans" the ocean floor.

1. **Set-up:** Hide several metal paperclips (representing stingrays) at the bottom of a tray and cover them completely with sand or rice.
2. **The "Shark" Tool:** Give Keatyn a magnet. This magnet represents the shark's *Ampullae of Lorenzini*.
3. **The Hunt:** Have Keatyn "swim" the magnet just above the surface of the sand without touching it. When she feels a "tug," she has found a stingray!
4. **Observation:** Discuss how much easier it is to find things when your "sensor" (the magnet/head) is wide and covers more ground.

4. Creative Application: Design a Hammerhead (You Do)

Keatyn will now apply what she learned by creating her own shark model.

The Challenge: Choose one of the nine species of Hammerhead (like the Great Hammerhead, the Scalloped Hammerhead, or the tiny Bonnethead). Use modeling clay or markers to create a model that includes:

- The **Cephalofoil** (make sure it's the right shape for the species chosen!).
- The **Eyes** located at the very tips.
- Small dots on the snout to represent the **sensors**.
- The **Dorsal Fin** (the tall one on the back).

Success Criteria: Keatyn must "pitch" her shark model to you, explaining how its head helps it see, turn, and hunt.

5. Conclusion & Recap

Summary: Recap the main points by playing "Fact or Fishy":

- "Hammerheads use their heads to hit nails." (*Fishy! They use it for sensing and steering.*)
- "They can see in almost every direction at once." (*Fact!*)
- "The special head is called a Cephalofoil." (*Fact!*)

Final Reflection: Ask Keatyn: "If you were a Hammerhead, which of your three superpowers would you use most to stay safe from a larger predator like an Orca?"

6. Assessment

- **Formative:** During the "Stingray Hunt," ask Keatyn to explain what the magnet represents.
 - **Summative:** Review the clay model or diagram. Check for the placement of eyes and sensors. Can she correctly use the word "Cephalofoil"?
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7. Differentiation & Extensions

- **For an extra challenge:** Have Keatyn use a ruler to draw a Great Hammerhead to scale. If a Great Hammerhead is 20 feet long and a Bonnethead is only 3 feet, how many Bonnetheads equal one Great Hammerhead?
- **For a more visual learner:** Watch a slow-motion video of a Hammerhead turning. Use a piece of cardboard to mimic the head and feel the "wind resistance" as she moves it through the air like the shark moves through water.