HOLD YOUR BREATH - LET'S DIVE

This lesson plan developed by:

Overview:

The mammalian dive reflex is a physiological response (internal body response) experienced by aquatic mammals. This is one of the ways whales can hold their breath so long and dive to crazy deep depths. In fact, the Cuvier's beaked whale has both the deepest (9,724 feet) and longest (3 hours and 42 minutes) recorded dives among whales. In this activity, you will experience the natural dive reflex yourself! Your heart rate will lower, thereby reducing the amount of oxygen your body requires, allowing you to hold your breath even longer. It is a natural survival mechanism to conserve oxygen. Want to give it a try?

Key Concepts:

- The mammalian dive reflex allows aquatic mammals to hold their breath for a long time.
- Cold water lowers your heart rate which helps to reduce your consumption of oxygen.

Materials:

- Large bucket or bowl
- Cold water and ice
- Timing device - watch or phone
- Towel

Set-up Prior to Activity:

Fill large bucket or bowl deep enough to submerge your face with very cold water (add ice if necessary to cool it down even more). Have a watch nearby to measure your heart rate. Have a towel within reach.

Duration:

10 minutes

Hold Your Breath - Let's Dive (cont.)

Physical Activity:
Low

Activity:
If you haven't already, fill a large bowl with cold water and add ice if needed to have very cold water. Find your pulse either on the underside of your wrist down from your thumb or on your neck under your jaw. Gently press to feel your pulse. Using a watch or phone, count the number of pulses you feel while timing for 10 seconds. Multiply the number of pulses you feel by 6 to calculate your heart rate. For example, 10 pulses is a heart rate of 60 beats per minute. Record your heart rate.

Time to dive! Hold your breath and submerge your face in the cold water and relax. You do not need to stick your entire head underwater. With the help of a parent or friend, have them count your heart rate as you continue to hold your breath underwater. The longer you stay, the more your heart rate will drop! You can easily see your heart rate drop anywhere from 20 to 30 beats per minute. Pull your head out of the bowl when you are ready and wipe your face with a towel – no need to get soaked! Record your dive heart rate.

What was the difference in your heart rate? Could you feel your heart rate slowing down as you sat with your face in the cold water?

Discussion:
What is happening when you submerge your face in the cold water? The most obvious and noticeable reaction is a slowing of your heart rate, also known as bradycardia. This slowing of your heart rate helps to reduce your consumption of oxygen. It is your body's natural reaction to conserve and use oxygen more efficiently while holding your breath underwater.

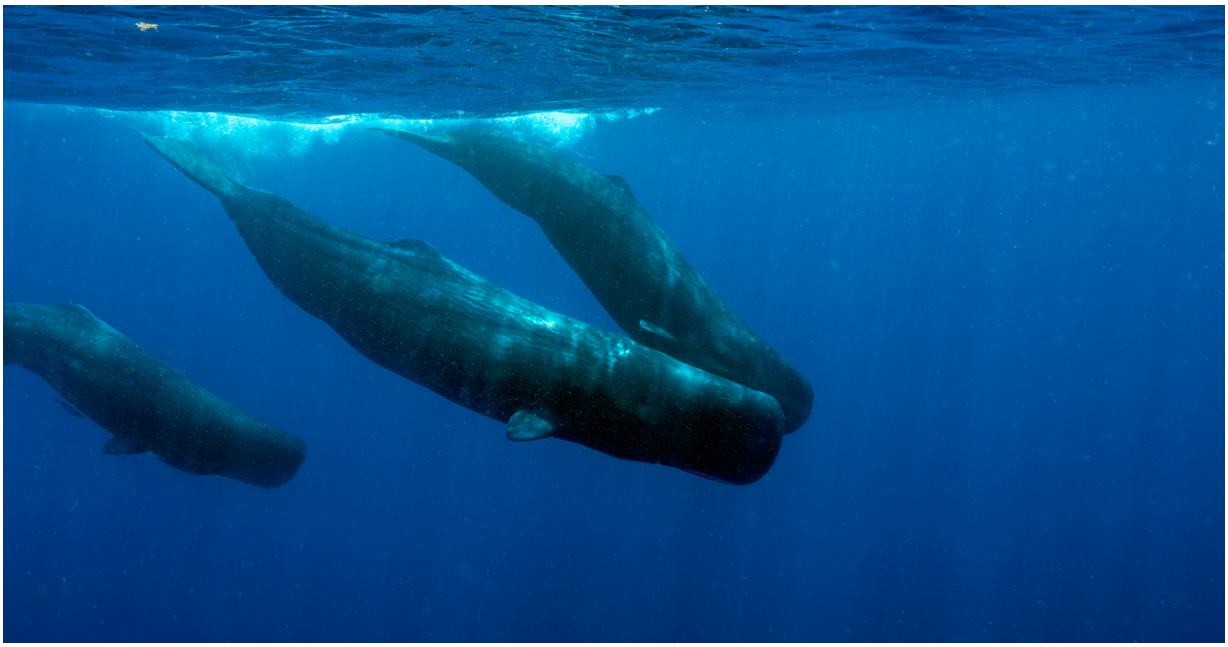
Something that isn't as noticeable is peripheral vasoconstriction – where the blood vessels narrow to reduce blood flow to your fingers, toes, hands, feet, arms, and legs in an effort to direct blood flow to vital organs requiring more oxygen. All of this together extends the length of time mammals can remain underwater. Free divers perfect their technique with this natural adaption in mind to allow them to push the boundaries of physical capabilities. Deep diving species do this every day without a second thought!

This activity was contributed by Sailors for the Sea Skipper, D'amy Steward.

Hold Your Breath - Let's Dive (cont.)

Additional Resources:

To learn more about the activity, check out our How Do Whales Dive For So Long "how to" video.



Ocean Literacy Principles:

Ocean literacy is an understanding of the ocean's influence on us, and our impact on the ocean. There are seven Ocean Literacy Essential Principles that all people of our blue planet should have an opportunity to learn and understand. This activity touches upon the following Essential Principles:

5. The ocean supports a great diversity of life and ecosystems

Further Your Impact with Sailors for the Sea Powered by Oceana:

As sailors and water-lovers, you are among the first to notice changes to our seas such as fewer marine animals, more pollution and damaged marine habitat. Through our Green Boating initiative, Sailors for the Sea Powered by Oceana provides opportunities for you and your community to address pressing ocean health issues. As a Green Boater, you will be provided with the information, resources and access to combat marine plastic pollution, prevent habitat destruction, source responsible seafood and protect marine animals. From demanding plastic-free alternatives to choosing sustainable seafood, your voice and actions are an important part of restoring the abundance of our oceans and protecting marine habitats. Join our growing Green Boating Community today.