

Lesson: Sponge Bob and Party Blowers: How Much Air Can You Exhale?

Teacher:	Kaylan Duthie
Unit Theme/Course:	Human Respiration – 7 th Grade Life Science
Date:	November 15 th and 16 th
Timing:	2 Days

Rationale/Goal:

- Students will learn that a person cannot exhale the entire amount of air in their lungs
- Problem: If your lungs hold about 6 liters of air, how much air (liters) can you exhale?

Overview:

Lungs have a large internal surface area made up of tiny sacs called alveoli, enabling them to hold large amounts of air. Students will explore various aspects of lung capacity during this lesson, including determining their vital lung capacity, and distinguishing that from their total lung capacity and residual volume using models as well as actual human respiration data.

Learning Objectives [cognitive, academic, language, socio-cultural]	Assessment Criteria
Students will use a sponge to model the vital capacity of lungs, and show that they cannot exhale the entire contents of their lungs	Student will complete the data table and perform correct calculations to determine the amount of water remaining in a sponge
Students will graduate and assemble a device that measures vital capacity	Students will define a liter ruler as measuring volume .
Students will determine their own vital capacity	Using the graduated bags, students will complete 2 trials for each individual and determine an average amount of exhaled air for each student.
Students will understand why lung capacity is important.	Students will list five factors that affect lung capacity, and describe the effects of oxygen shortages on the body.

Standard/EALR:

6-8 INQB Investigate	Different kinds of questions suggest different kinds of scientific investigations.	Plan and conduct a scientific investigation (e.g., field study, systematic observation, controlled experiment, model, or simulation) that is appropriate for the question being asked. Propose a hypothesis, give a reason for the hypothesis, and explain how the planned investigation will test the hypothesis. Work collaboratively with other students to carry out the investigations.
6-8 INQE Model	<i>Models</i> are used to represent objects, events, <i>systems</i> , and processes. <i>Models</i> can be used to test <i>hypotheses</i> and better understand <i>phenomena</i> , but they have limitations.	Create a <i>model</i> or <i>simulation</i> to represent the behavior of objects, events, <i>systems</i> , or processes. Use the <i>model</i> to explore the <i>relationship</i> between two <i>variables</i> and point out how the <i>model</i> or simulation is similar to or different from the actual phenomenon.

Preparation Time:

- 30 minutes to make copies and gather materials

Materials:

- 8 bins with:
 - 1" piece of sponge
 - 2 50mL graduated cylinder
 - 250mL beakers
 - Forceps
 - liter ruler
 - Masking tape
 - Permanent marker
- For teacher to pass out:
 - Copies of lab write-up
 - 2-m polyvinyl tubes sealed at one end (1 for each lab group for each period)
 - 1 Plastic inserts for each lab group
 - cardboard mouthpiece for each student

Instructional Sequence:

Day 1

1. Have student read lab problem out loud
2. Have students create hypothesis

- a. Start them off w/ If, Then...
 - b. Have 1 or 2 students read their hypothesis
3. Have students read procedure on pg. 91-92
4. Complete Part I: (Steps 1-8)
 - a. Do the sponge piece and fill out the data table
 - b. After each group is done w/ the sponges, collect the damp sponges and replace w/ dry sponge pieces for the next group
 - c. Finish conclusion questions
5. Start Part I (Steps 1-3)
 - a. Read the procedure on p. 92-93
 - b. Go over the materials w/ students
 - i. Bag has two ends
 - ii. Plastic piece → no lips touching, super snug seal
 - iii. Cardboard mouth piece → one per student.
 - iv. Liter Ruler

*How is the ruler you are using different from other rulers?
 How do you think this ruler was made?
 What is the different between a meter and a liter?*

- 1.
- c. Label the bags with liter rulers
 - i. Make sure students are labeling from the sealed end of the bag
- d. Save bags for day 2

Day 2

1. Ask students what they did with the plastic bags yesterday.
2. Collect Data for Part II
 - a. Do a student demo
 - i. Student needs to take in biggest breath of their lives
 - ii. Blow out the breath until you think you're done, and then blow a little more
 - iii. Pinch off the end of the bag
 - iv. Roll up the sealed end until the bag is plump
 - v. Take the reading where the tube is rolled up to
 - b. Fill out the data table
3. Complete conclusion questions for lab
4. Up, Up, and Away Reading in Peppi and Bollo (p. 96)
 - a. Answer questions for lab
5. Group Discussion about activities

*Was the sponge still wet after you squeezed out as much water as you could? Why/why not?
How do you think this relates to your lungs and breathing?
Thinking about the amounts of water in the sponge, which represents the amount of air you can exhale after a deep breath?
Which amount is the air left in your lungs?
Why were there so many variations in average lung capacity of students in the class?
What are some of the factors that may affect lung capacity?*

a.

Assessment

- Grade Lab Handout

Welcome to Science Class!

Monday 11/15



Random Question: When you breathe out, does any air remain in your lungs?



1) Please sit in your regular flavored seats, but do not unpack yet.

2) New Flavored seats



2) Begin Entry #24: Sponge Bob and Party Blowers

*Read the procedure and collect the sponge data

*Move directly to the second part of the lab

*Do not work on conclusion questions unless you have completed the procedure for both Part I and Part II!