

Lungs Lesson Guide

This lesson is divided into three parts.

- 1) Pre-lesson quiz
- 2) 5 minute introduction
- 3) 20 minute make a lung project OR lung capacity (finish before 3:00)
- 4) Same as 2 (finish before 3:25)
- 5) Post-lesson quiz

1) Pre-lesson quiz

2) Introduction

Answer the questions with the students on the worksheet. The goal of this is that students can

- a. Find the lungs on a diagram
- b. Understand how the air gets to the lung (i.e. via nose/mouth and airways)
- c. Why we need air (our cells need the element **oxygen** from the air to live)
- d. From the lungs, the oxygen goes to the circulatory system
- e. The intro ends with asking the students if we understand **how** the lungs work
 - i. How do they take in air (inhale)
 - ii. How do they let air out (exhale)

Ask them to breathe deeply to think about what they are doing.

3) Model lung

There will be a completed model of the lungs that the students can look at and play with before/while making one. The complete instructions are in the worksheet. The goal of this exercise is to understand the mechanics of breathing.

Before moving on discuss:

How do they take in air (inhale)?

How do they let air out (exhale)?

What part of our body helps us do this? (**diaphragm**)

4) Lung capacity

In this exercise we will be measuring the students **lung capacity**. Lung capacity is a way we can tell if our lungs are working well. Asthma, bronchitis, and emphysema can affect lung capacity.

(Note: We are measuring something called “forced vital capacity” which is the amount of air we can forcefully expel. This is not the total lung capacity as there is always some residual volume. For adults FVC is ~3-5 liters. Reserve is ~1L. Data is from Wikipedia. For a child, 1 gallon jug should work.)

Please see the video at <https://www.youtube.com/watch?v=cy4kzOeLD5E>

We will not focus on the construction of the apparatus but instead have 3 stations set up. Here is a picture of a working station.

The tutor will demo how the measurement works. We are blowing air into a bottle filled with water upside down in a container of water. We will then measure how much air we displace. Each tick mark will be 100 mL. Each student will do three measurements. They will record the measurements, plot the measurements, and find the average of the measurements. They will write their average on the board as a competition.

Materials needed (for 1 setups): (we will have 3)

1 flat bin

4L bottles marked by 250 mL increments (make sure bottles are sturdy, otherwise they implode)

1 blowing tube

IPA and paper towels to wipe tubes after each student

5) Post-lesson quiz/wrap-up

(when they are finished discuss their answers with them as a wrap-up)