**AP BIOLOGY 2021-22 August 25, 2021**

**Today’s Agenda (Day 6)**

1. Housekeeping Items

🡪 REQUEST FOR ITEMS: a) balloons

1. Homework Check:

🡪 Chapter 1 Reading Guide

1. Class Activity:

🡪 CONT’D: Chapter 1 PPT Review

HOMEWORK:

* READ: Chapters 1 – 3
* COMPLETE: Chapter 2 Reading Guide – see END of document
* COMPLETE: Lung Capacity Lab – use Lab Report Template

Chapter 1 Vocabulary

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Adaptive radiation | Archaea | Bacteria | Bioinformatics | Biology | Biosphere |
| Community | Consumer | Controlled experiment | Deductive reasoning | Dependent variable | DNA |
| Domains | Ecosystem | Emergent property | Eukarya | Eukaryotic cell | Evolution |
| Experiment | Feedback regulation | Gene expression | Genes | Genome | Genomics |
| Hypothesis | Independent variables | Inductive reasoning | Inquiry | Model organism | Natural selection organisms |
| Population | Producer | Prokaryotic cell | Proteome | Proteomics | Qualitative data |
| Quantitative data | Systems biology | Technology | theory |  |  |

Chapter 2 Vocabulary

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Anion | Atom | Atomic mass | Atomic nucleus | Atomic number | Balance |
| Cation | Chemical bonds | Chemical equilibrium | Compound | Dalton | Double bond |
| Electron shells | Electronegativity | Electrons | Element | Energy | Essential elements |
| Half-life | Hydrogen bond | Ionic compound/salts | Ionic bond | Ion | Isotope |
| Mass number | Matter molecule | Neutron | Nonpolar covalent bond | Covalent bond | Orbital |
| Polar covalent bond | Potential energy | Product | Proton | Radioactive isotope | Radiometric dating |
| Reactant | Single bond | Trace elements | Valence electrons | Valance shell | Van der Waals interactions |

REMINDERS:

* ~~Chapter 1 Reading Guide – Tuesday, Aug. 24~~
* Lab Report: Lung Capacity – Wed, Aug. 25
* Chapter 2 Reading Guide – Tuesday, Aug. 30
* QUIZ: Ch 1 & 2 Vocabulary **🡪 August 31**
* TEST: Ch 1 & 2 **🡪 Sept. 1**

**AP BIOLOGY 2021-22 LAB ACTIVITY**

**Lung Capacity Lab**

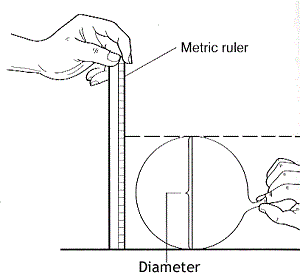
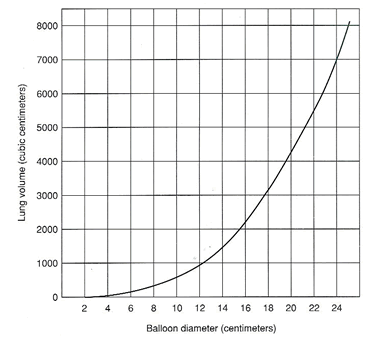
The amount of air that you move in and out of your lungs while breathing normally is called **TIDAL VOLUME.** This amount of air provides enough oxygen for a person who is resting. It is possible to inhale and exhale more forcefully - the maximum amount of air moved in and out of the lungs is called the **VITAL CAPACITY**. In this activity, you will be measuring the vital capacity and the tidal volume of your own lungs, this actual number can then be compared with a number derived from an equation that measures vital capacity. In effect, you are measuring an actual number, based on laboratory measurements, to a theoretical number, based on an equation. If you have any breathing difficulties (asthma or other condition), you should not participate in this activity, instead only take the data on your lab partner or group.

Procedure:

1. **Measuring Tidal Volume** -- Stretch a round balloon several times to stretch it out. Inhale normally and then exhale normally into the balloon. Do not force your breathing. Pinch the end of the balloon and measure its diameter (in cm). Repeat this so that you have 3 total measurements and can take the average and record in the data table.

2. **Measuring Vital Capacity** - Repeat the procedure, only this time inhale as much air as you can and exhale forcefully. Record the measurements in the data table.

3. **Convert** the diameters to a volume using the graph and record this in your table.



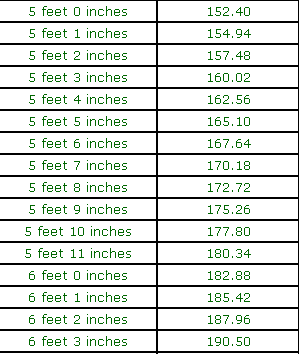
4. Estimated Vital Capacity

Research has shown that the capacity of a person's lungs is proportional to the surface area of his or her body. To find the surface area, you will need to know your height and weight. There are a couple of different ways to calculate your body surface area mathematically. Use the equation provided below.

BSA=https://lh4.googleusercontent.com/sY-kuHECCS5JJeWt_5jxXYtTWbs7PdrgL6ZXUAlyJxOwfCHbnXMvcj_TJ0nflo8xhWaH9cX-8WY6V6f7nW-EADKTkPslCJm1y6pJU-cNXqQ9h2Y5ImNp4VlPnnZcbxu4                                   **Show Calculations:**

\*\* 1lb = .453592kg\*\*

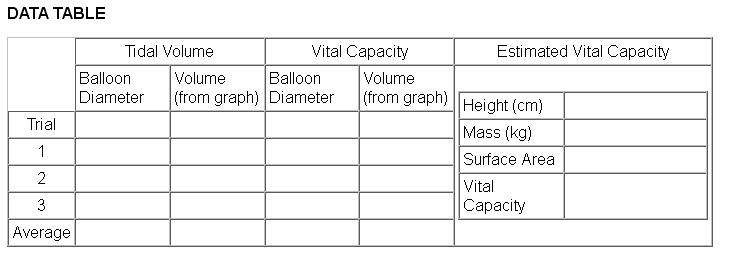
    Height                                  (cm)



Once you have calculated your surface area, a second equation will calculate your estimated vital capacity.

Males: SA x 2500     Females SA x 2000

**Show Calculations:**



**ANALYSIS**

1. Why is it important to measure tidal volume and vital capacity three times and then get an average?

2. Compare your data to other members of the class. How can you account for differences?  List at least 3.

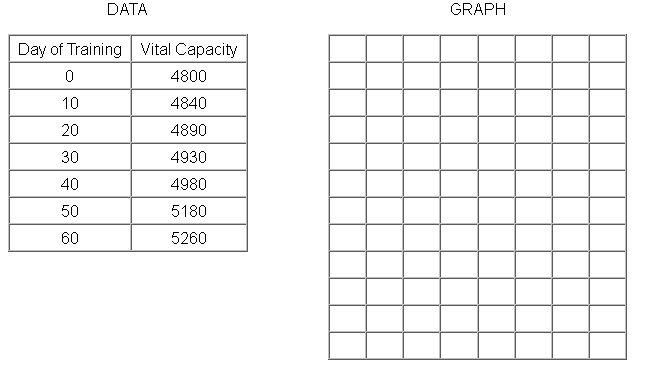
3. How does your measured vital capacity compare to the vital capacity you estimated using the formula? Which do you think is more accurate and why?

4. How might an athlete's vital capacity compare to a non-athlete? Explain your reasoning.

5. Is this a valid experiment? Why or Why not.

**APPLICATION**

1. Examine the data table of a person who entered into a training program. This person's vital capacity was measured over a 60 day period. Use the data to construct a graph. Make sure you label your graph correctly.



2. What happened to the person's vital capacity over the course of the training period?

3. What probably caused the change?

4. How might vital capacity be important to a musician?

**LAB WRITE-UP TEMPLATE**

I. **Title**: Lab Report Procedure

II. **Purpose or Question**: to inform students of the appropriate format for writing lab

Reports. How is a lab report written?

III. **Materials**:

notebook paper graph paper

metric ruler pencils (for most work)

calculator colored pens (optional)

IV. **Procedure**: written in outline to summarize steps actually conducted:

A. All labs are assigned in advance and are expected to be read and prepared before class.

B. The first sections of the lab reports are written in class to document the observations of experiments during class.

C. All data are to be recorded at the time of observation. Scratch paper or recopied data tables are not acceptable.

D. Lab reports are due within one week of completing the lab. Lab reports that are more than one week late will NOT receive credit.

V. **Data**: an objective record of what is observed directly, usually in the form of a data table or diagram. The data may be expanded by analysis with calculations or a graph, but it should be noted as an extension, not an observation.

IV. **Discussion**: This section includes the interpretation of what was observed and recorded in section V, the data. It should include a thorough explanation of the data, not just a restatement of it. Why did you see what you saw? It also includes any questions that are a part of the procedure in the experiment, as well as the application of what was observed to any other type of experiment or to the information in your text. Does anything that you observed make you curious about another type of experiment? What is your next question? Have you collaborated with your colleagues on any of the ideas? Have you cited evidence for your ideas from any of your colleagues? The discussion is usually the longest part of the lab report. It is written in complete sentences and proper paragraph structure.

VII. **Conclusion**: the conclusion is usually one sentence to summarize the report and to answer any question posed in the purpose:

\*\*Students now have the information to write lab reports in an acceptable format.\*\*

**AP BIOLOGY 2021-22 READING GUIDE**

# Chapter 2: The Chemical Context of Life

This chapter covers the basics that you may have learned in your chemistry class. Whether your teacher goes over this chapter or assigns it for you do review on your own, the questions that follow should help you focus on the most important points.

***Concept 2.1 Matter consists of chemical elements in pure form and in combinations called compounds***

1. Define and give an example of the following terms:

## Define Example

## matter

## element

## compound

1. What four elements make up 96% of all living matter?

1. What is the difference between an *essential element* and a *trace element*?

**essential element**

## trace element

### **Concept 2.2 An element’s properties depend on the structure of its atoms**

1. Sketch a model of an atom of helium, showing the: **electrons, protons, neutrons, and atomic nucleus**.

1. What is the atomic number of helium? \_\_\_\_\_\_\_\_\_ Its atomic mass? \_\_\_\_\_\_\_\_

1. Here are some more terms that you should firmly grasp. Define each term: **neutron, proton, electron, atomic number, atomic mass, isotope, electron shells , energy**

1. Consider this entry in the periodic table for carbon: C6 12

What is the atomic mass? \_\_\_\_\_\_ atomic number? \_\_\_\_\_\_\_

How many electrons does carbon have? \_\_\_\_\_\_\_ neutrons? \_\_\_\_\_\_\_

1. Which is the only subatomic particle that is directly involved in the chemical reactions between atoms?

1. What is ***potential energy***?

1. Explain which has more potential energy in each pair:

* 1. boy at the top of a slide/boy at the bottom

* 1. electron in the first energy shell/electron in the third energy shell

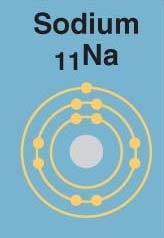
* 1. water/glucose

1. What determines the chemical behavior of an atom?

1. Here is an electron distribution diagram for sodium:

* 1. How many valence electrons does it have? \_\_\_\_\_\_ Circle the valence electron(s).

* 1. How many protons does it have? \_\_\_\_\_\_



### **Concept 2.3 The formation and function of molecules depend on chemical bonding between atoms**

1. Define ***molecule***.

1. Now, refer back to your definition of a ***compound*** and fill in the following chart:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Molecule? (y/n) | Compound? (y/n) | Molecular Formula | Structural Formula |
| Water |  |  |  |  |
| Carbon dioxide |  |  |  |  |
| Methane |  |  |  |  |
| O2 |  |  | O2 |  |

1. What type of bond is seen in O2? Explain what this means.

1. What is meant by ***electronegativity***?

1. Explain the difference between a ***nonpolar covalent bond*** and a ***polar covalent bond***.

1. Make an electron distribution diagram of water. Which element is most electronegative? Why is water considered a *polar* molecule? Label the regions that are more positive or more negative. (This is a very important concept. Spend some time with this one!)

1. Another bond type is the *ionic bond*. Explain what is happening in the figure below (2.14):

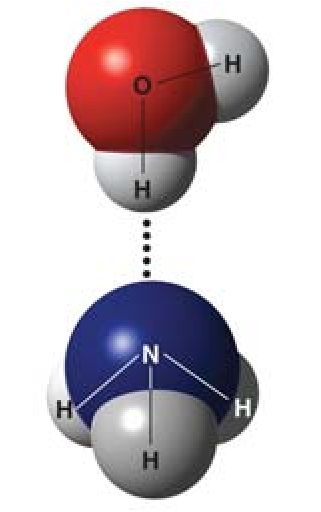
Diagram

Description automatically generated

1. What two elements are involved above?

1. Define ***anion*** and ***cation***. In the preceding example, which is the anion?

1. What is a ***hydrogen bond***? Indicate where the hydrogen bond occurs in this figure.



1. Explain ***van der Waals interactions***. Though they represent very weak attractions, when these interactions are numerous they can stick a gecko to the ceiling!

1. Here is a list of the types of bonds and interactions discussed in this section. Place them in order from the strongest to the weakest: **hydrogen bonds**, **van der Waals interactions**, **covalent bonds**, **ionic** **bonds**.

## STRONG

## WEAK

25. Use morphine and endorphins as examples to explain why molecular shape is crucial in biology.

### **Concept 2.4 Chemical reactions make and break chemical bonds**

1. Write the chemical shorthand equation for photosynthesis. Label the ***reactants***and the***products***.

1. For the equation you just wrote, how many molecules of carbon dioxide are there? \_\_\_\_\_

How many molecules of glucose? \_\_\_\_\_\_\_\_\_ How many elements in glucose? \_\_\_\_\_\_\_\_\_

1. What is meant by ***dynamic equilibrium***? Does this imply equal concentrations of each reactant and product?

*Testing Your Knowledge: Self-Quiz Answers*

Now you should be ready to test your knowledge. Place your answers here: