**Anatomy and Physiology Virtual Rain Day: Chemistry of Biological Organisms**

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

This is a study guide and review of what we have been talking about for the last two weeks.

There is a power point on the website that will help you answer most of these questions.

Don’t worry if you feel overwhelmed, there is a ton of new vocabulary that you will likely be encountering. The idea is that the more you read it, speak it, write it, the more it will become natural.

Remember, we are learning a “foreign language.” Do your best.   
  
If you want to type in answers that is cool but I suggest writing them out. On a piece of paper, especially the drawings.

Matter:  
Element:  
  
Atoms:

What are the three components of an Atom? (I suggest making a table of the charge, atomic mass, and where each particle is found)  
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:  
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:  
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:

What are the 12 most common elements found in living things? Write their atomic symbol, atomic number, and atomic mass.

Draw a Hydrogen Atom, a Sodium Atom, a Chlorine Atom, a Carbon Atom, and a Nitrogen Atom. How many empty spots for an electron are there in the valence shell (outermost shell)?

What is the octet rule?

What is an Ion? What is a positively charge ion called? What is a negatively charge ion called?   
  
  
  
   
  
  
What are the three types of bonds from strongest to weakest and explain how they form?  
1.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:  
  
2.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:

3.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:

Draw two water molecules (one long hand that shows how they share valence electrons and one short hand where you use a line to indicate the covalent bond). How do they associate to each other? Label the covalent and hydrogen bonds.

What is the difference between a covalent and hydrogen bond?

Draw a Sodium and Chlorine Atom. Using the octet rule, explain how they tend to form an Ionic bond rather than a covalent bond.

What are unique properties of water that makes it vital for life as we know it?

1.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
What is an exotherm? What is an endotherm? Give an example of each:  
  
  
What does it mean to be a biological solvent?  
  
How is water used to regulate body temperature?   
  
  
  
  
  
What is the latent heat of evaporation?  
  
  
  
  
What is an acid? What is a Base?   
  
  
  
  
Draw the pH scale: What is the PH of ocean water, water, bollod, bleach, coffee, mountain dew, and hydrochloric acid?

What is a buffer?   
  
  
  
  
  
  
  
  
What are the four types of macromolecules?

1.

2.

3.

4.

Draw a figure depicting Hydrolysis and Dehydration Synthesis. What is the difference?

**Carbohydrates**

Draw a Monosacharide and name it:  
  
  
  
  
  
  
  
  
  
Draw a Disacharide and name it:  
  
  
  
  
  
  
  
  
  
What is a polysaccharide?

How do animals tend to store sugars?   
  
  
  
What is cellulose?   
  
  
What is Chitin?

**Lipids**

What are the three types of lipids-in a less detailed form draw each one of the three so you know the difference.

You may notice steroids look way different than triglycerides and phospholipids. Why are they considered lipids?  
  
  
  
  
  
In a cell, where are phospholipids found and why are phospholipids so important to a cell?

**Proteins**

What do proteins do?  
  
  
What is an enzyme? Are they destroyed during a chemical reaction?   
What are the building blocks of a protein? How many amino acids (A-A) are there?   
  
  
There are four types of A-A based on the R-group. Based on the sequence of these groups, a protein folds in a particular way, thus allowing it to perform it’s function. What are these four groups?

1.

2.

3.

4.

Based on the properties of water and the fact that our bodies are made up of roughly 70% water, where do you think you will find the polar and charged amino acids (hydrophilic) and where will you find the non-charged (hydrophobic) amino acids?What are the essential amino acids?   
  
  
  
  
  
  
  
What are the primary 1°, secondary 2°, tertiary 3°, and quatinary 4° structure of A-S. Draw each and explain.

When is an enzyme first able to catalyze reactions?   
  
  
  
  
  
  
  
Based on your newfound understanding of the four basic structures of proteins, why is it a problem if we are missing an essential amino acid? I would pay particular attention to the 1° structure.

What are four factors that determine the 3° shape of a protein?  
1.

2.

3.

4.  
  
  
  
What happens if you heat a protein or change the pH drastically?  
  
  
  
  
  
  
  
  
**Ribonecleic Acids**Draw a Venn diagram that shows the commonalities and differences of deoxyribonucleic acids (DNA) and Ribonucleic acids (RNA). Also describe what their functions are.   
  
  
  
  
  
What is the Universal Energy Source? Draw it:   
  
  
  
  
  
  
  
Draw the transition between ATP and ADP. Label Hydrolysis and Dehydration synthesis.

What organelle is responsible for making most of the ATP in a eukaryotic cell?