

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

Date: \_\_\_\_\_

**Catalyst/Bellringer:** Because of our shortened class period today, please follow these instructions in order to start Part III of our SOL review:

1. Take out your tablet
2. Go to [www.biomonsters.com](http://www.biomonsters.com)
3. Click on Academic Biology
4. Click on Video Podcasts
5. PLAY the SOL Review Part 4: Biochemistry Podcast

Please remember you are expected to use every minute of class time to prepare for the SOL!!!!

**Water:**

1. \_\_\_\_\_ is the most abundant molecule found in our bodies. \_\_\_\_\_ of our bodies are composed of water.
  - a. The chemical formula of water is \_\_\_\_\_. This means water is composed of \_\_\_\_\_ oxygen atom, and \_\_\_\_\_ hydrogen atoms.
2. Water is a \_\_\_\_\_ molecule. This means that water has \_\_\_\_\_ charges on \_\_\_\_\_ ends.
3. Water has some very \_\_\_\_\_ properties.
  - a. Water is less \_\_\_\_\_ as a solid than a liquid.
  - b. Water is has a \_\_\_\_\_ boiling point.
  - c. Water is a \_\_\_\_\_

**pH:**

4. The pH scale runs from \_\_\_\_\_ to \_\_\_\_\_



**Macromolecules:**

5.

Macromolecule	Monomer	Function	Example
1. Carbohydrate			
2. Lipid			
3. Protein			
4. Nucleic Acid			

**Enzymes:**

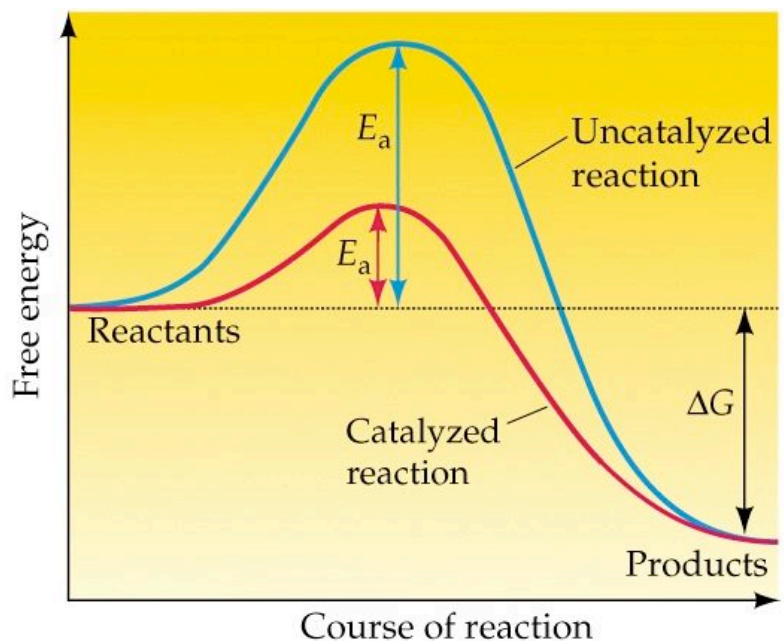
6. Enzymes are \_\_\_\_\_. A catalyst is anything that speeds things up.

a. Enzymes speed up \_\_\_\_\_.

b. Enzymes are \_\_\_\_\_ specific. They only catalyze reactants that fit inside of their \_\_\_\_\_. They work like a \_\_\_\_\_ & \_\_\_\_\_.

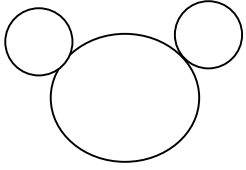
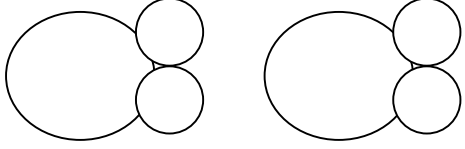
7. Enzymes speed up chemical reactions by lowering

\_\_\_\_\_  
\_\_\_\_\_.



## SOL Top Facts to Know: Biochemistry

### Activity 1: Water Flip-Flop

1) READ HERE:	2) THEN ANSWER QUESTIONS HERE:
<p><b>The Water Molecule</b></p> <p>Water's scientific name is H<sub>2</sub>O. This means one molecule of water has 2 atoms of hydrogen and 1 atom of oxygen.</p> <p>Water is polar. This means that parts of the molecule are slightly negatively charged and parts of the molecule are slightly positively charged. In water, the oxygen atom has a small negative charge, and the hydrogen atoms each have a small positive charge.</p>	<p><b>1. On the water molecule below, label the hydrogen atoms and the oxygen atom</b></p>  <p><b>2. On the water molecule above, label which parts are negatively charged, and which parts are positively charged</b></p>
<p>Water's polarity causes it to have lots of unique properties. For example, water molecules stick to each other. This is called <b>cohesion</b>. The positively charged hydrogen atoms are attracted to the negatively charged oxygen atoms. This attraction between water molecules is called <b>hydrogen bonding</b>. You can see this property of water in action of the surface of lakes and ponds. The water molecules are attracted to one another, so they stick together, forming a thin layer on the surface of water that some insects can walk on! This property of water is called <b>surface tension</b>.</p>	<p><b>3. On the two water molecules below, draw dotted lines ----- between the parts that are attracted to one another</b></p>  <p><b>4. What causes surface tension?</b></p>
<p>Because water is polar, it is also attracted to lots of other substances besides water. This property of water is called <b>adhesion</b>. Cohesion and adhesion are both necessary to helping water move up the stem of plants against gravity. Adhesion causes water to be attracted and pulled up the plant stem, and cohesion helps the water molecules stick together as they are pulled up towards the leaves. This combination of cohesive and adhesive forces is called <b>capillary action</b>. If it weren't for cohesion and adhesion, plants could not get the water they need to make food and grow!</p>	<p><b>5. What is the difference between cohesion and adhesion?</b></p> <p><b>6. Why are cohesion and adhesion both important to plants?</b></p>
<p>Because water is polar, it can dissolve a wide variety of substances. In fact, water is so good at dissolving different things, we call it the "universal solvent." When water dissolves something, it breaks it up into such tiny pieces that we cannot see it anymore – but it's still in the water! This property of water is extremely important to living things. Most of life's chemical reactions take place in water. In</p>	<p><b>7. SOL BLITZ:</b> <b>Water dissolves many substances. This occurs because water has</b></p> <ul style="list-style-type: none"><li>A. surface tension</li><li>B. polarity</li><li>C. specific heat</li><li>D. cohesion</li></ul>

<p>humans, water makes up most of our blood, and helps dissolve and transport nutrients all over our bodies.</p>	
<p>The last really amazing thing about water is that it is less dense as a solid than a liquid. This means that when water freezes, the molecules inside expand and become more spread out. Living cells are mostly made of water. If they freeze, the water molecules inside will expand and could cause the cell to burst! This is part of the reason why most living things must have adaptations to maintain a stable body temperature.</p>	<p><b>8. Why do the cells of most living things burst when they freeze?</b></p>
<p>You can see that water is less dense as a solid than a liquid anytime you put ice in a glass of water – the solid ice floats! This property of water is really important to living things. If ice did not float on top of lakes and ponds in the winter, it would sink to the bottom and either freeze or crush all the fish and other organisms underneath! Ice is also an important habitat in the arctic – polar bears, penguins, and seals all rely on floating ice for their home.</p>	<p><b>9. What property of water do <u>you</u> think is the most important to living thing? Why?</b></p>

### Activity 2: Water

Directions: Use your “Water” notes to correctly pair the two columns below.

\_\_\_\_\_ Water molecules stick to each other on the surface of a pond, making a surface that bugs can walk on

A. Universal Solvent

\_\_\_\_\_ Water in our blood can dissolve and carry nutrients throughout our body

B. Adhesion

\_\_\_\_\_ Icebergs floating in the Arctic Ocean provide a habitat for polar bears

C. Less dense as a solid than a liquid

\_\_\_\_\_ Water sticks to plant stems, helping water move up a plant

D. Cohesion

### Activity 3: pH

Directions: Determine if the following substances are acidic, basic, or neutral.

1. This solution has a pH of 3. \_\_\_\_\_

2. This solution has a pH of 11. \_\_\_\_\_

3. This solution has a pH of 7. \_\_\_\_\_

4. Most solutions in the human body are \_\_\_\_\_ because we are mostly composed of water.

#### Activity 4: Macromolecules Analogies

Directions:

1. Determine the relationship between the first two underlined terms.
2. Fill in the last blank so there is the same relationship between the last two underlined terms as there is between the first two

*Example: Carbohydrate is to sugars and starches, as lipid is to **fats and oils**.*

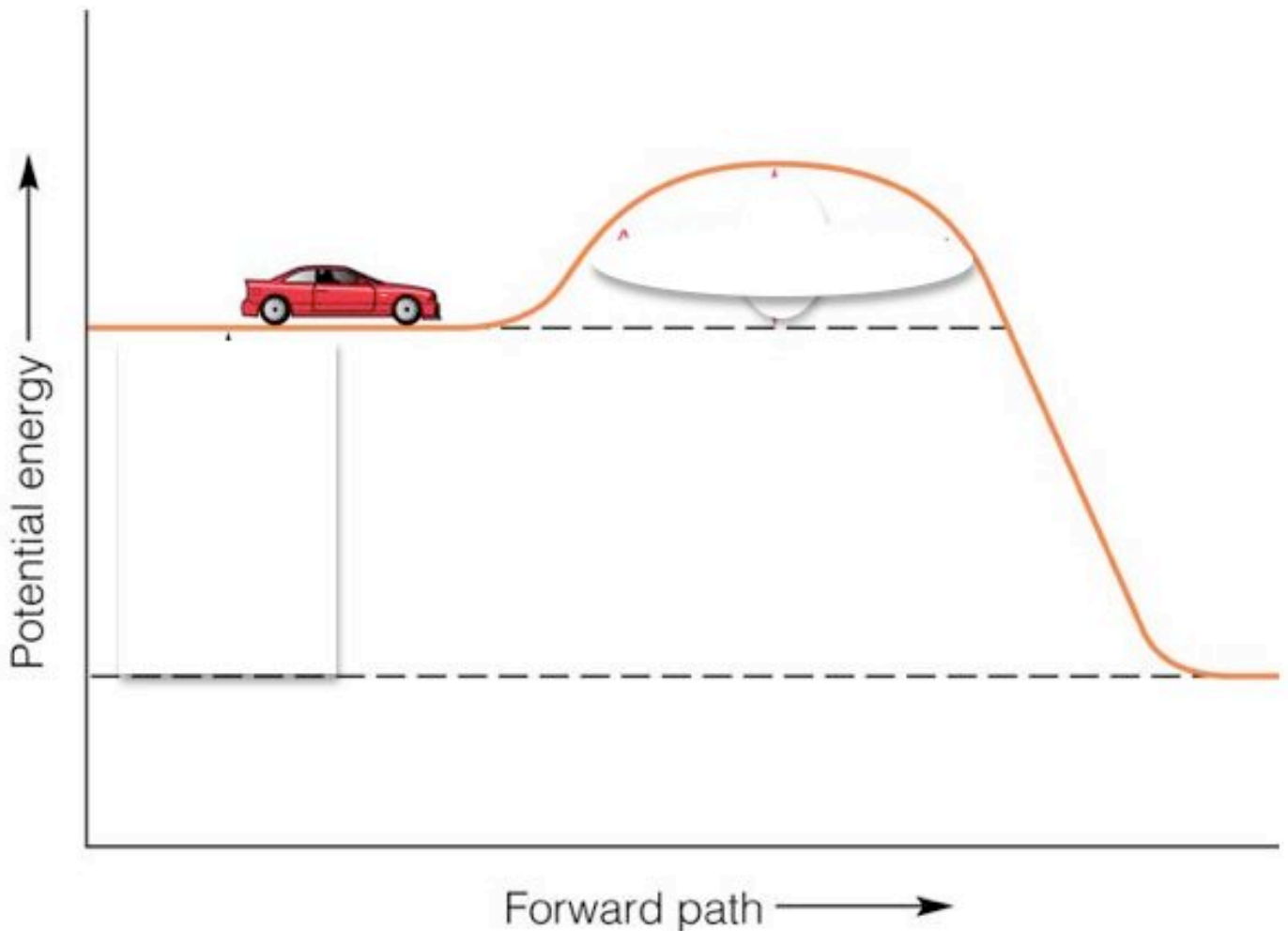
1. Monosaccharide is to carbohydrate, as nucleotide is to \_\_\_\_\_.
2. Monosaccharide is to carbohydrate, as fatty acid is to \_\_\_\_\_.
3. Monosaccharide is to carbohydrate, as amino acid is to \_\_\_\_\_.
4. Carbohydrate is to monosaccharide, as nucleic acid is to \_\_\_\_\_.
5. Lipids are to fatty acids, as proteins are to \_\_\_\_\_.
6. Nucleotide is to DNA, as monosaccharide is to \_\_\_\_\_.
7. Carbohydrates are to energy source, as lipids are to \_\_\_\_\_.
8. Carbohydrates are to cell wall, as lipids are to \_\_\_\_\_.
9. Proteins are to enzymes, as nucleic acids are to \_\_\_\_\_ and \_\_\_\_\_.
10. Proteins are to amino acids, as carbohydrates are \_\_\_\_\_.

## Activity 5: Interpreting Graphs of Chemical Reactions

The graph below shows the rate of a chemical reaction without an enzyme.

1. Draw a line showing what the rate of the reaction would look like if an enzyme were present.
2. Then label the graph using the following terms:

**Word Bank:** uncatalyzed                      catalyzed                      activation energy                      enzyme  
No enzyme                                      fast                                      activation energy                      slow  
Dependent variable                              X-axis                                      Independent variable                      Y-axis



## Activity 6: Complete the Sentence

Directions: Circle the correct answer from each pair in parentheses.

1. Enzymes make reactions go (faster/slower) by (raising/lowering) the activation energy of the reaction.
2. Chemical reactions in your body are regulated by (enzymes/polysaccharides).
3. Enzymes make reactions (speed up/ slow down).
4. The part of the enzyme that binds to the substrate is called the (active site/ activation energy).

## Activity 7: I've Finished Early...Now What?

1. Choose important vocabulary words and facts and make flashcards
2. Create a practice quiz with 10 questions
3. Get a blank piece of paper and create a ONE PAGER about this topic
4. Go to [www.brainpop.com](http://www.brainpop.com) on your tablet. Find videos related to the topics in this packet. Watch the videos and try the quiz and activities at the end of each video.  
Username: ccdis  
Password: pop
5. Create a PowerPoint presentation to teach this topic to another student
6. Make a jeopardy review game about this topic!  
Create at least 5 categories  
In each category, you should make at least 3 questions (100 point, 200 point, and 300 point)  
In each category, the three questions should get increasingly more difficult!
7. Re-read the SOL Top 10 Facts to know about this topic. Use a highlighter to highlight key words. Use a pen or pencil to put \*s next to the facts you think you'll have the most trouble remembering. Come up with a memory device for each fact with a \*. Write these memory devices on the page.
8. Go to JLab <http://education.jlab.org/solquiz/index.html> and complete practice SOL questions
9. Write a dialogue between two friends discussing this topic
10. Create a review poster to hang in the classroom about this topic.

**THE EXPECTATION IS THAT YOU USE EVERY MINUTE OF CLASS TIME TO REVIEW FOR THE BIOLOGY SOL!**