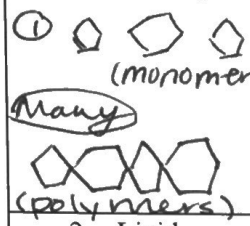
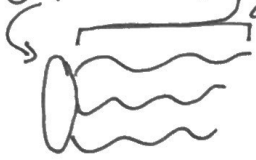
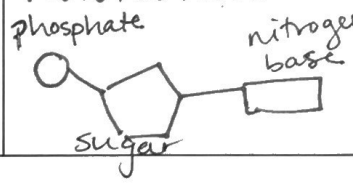
Unit 1 Review Packet

Section 1: Biomolecules (aka Macromolecules)

Complete the table below with the monomers, functions, examples, and drawings of each biomolecule.

Biomolecule	Monomers & Structure	Function (What does it do?)	Examples
1. Carbohydrate 	monosaccharides (sugars) fructose, glucose, etc.	main source of energy for organisms	simple sugars: glucose, fructose, lactose complex carbs: starch, cellulose, glycogen
2. Lipid	glycerol & fatty acids 	• main component of cell membranes • source of stored energy (backup) • warmth/insulation • waterproofing	oils (plants) lard, wax, butter (animals) steroids → like cholesterol
3. Protein	amino acids 	• speed up chemical reactions (enzymes) • transport materials across the cell membrane • growth & repair of cells	lactase, amylase (enzymes) insulin (hormones) hemoglobin
4. Nucleic Acid	nucleotide 	• provide instructions for life • store & transmit hereditary info from 1 generation to the next.	Deoxyribonucleic Acid (DNA) Ribonucleic Acid (RNA)

Fill in the blanks with the correct biomolecule: protein, lipid, carbohydrate, nucleic acid.

5. lipids/carbs — Used by the body for long term energy.
6. carbohydrates — Two types are monosaccharides and disaccharides.
7. carbohydrates — Used by the body for quick energy.
8. lipids — Used by the body for insulation.
9. protein — An example is an enzyme.
10. protein — Tuna and other meats contain much of this.
11. carbohydrates (starch) — Pasta contains much of this.
12. protein — The enzyme lactase is an example.
13. lipids/carbs — Used for long-term energy.
14. nucleic acid — Stores information in your cells in the form of a genetic code.
15. protein — Building block is an amino acid.
16. lipids — Butter and other fats contains much of this.
17. protein — Hemoglobin is an example and it helps transport oxygen in blood.
18. carbohydrate — An example of this is glucose, which is a form of sugar.
19. lipids — Building blocks are fatty acids
20. nucleic acids — Made of nucleotides
21. nucleic acids — DNA and RNA are examples.
22. protein (hormone) — Insulin, which regulates blood sugar, is an example.

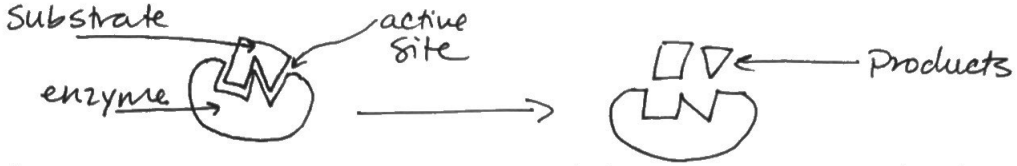
long-term energy = starch
long-term energy storage = lipids

Section 2: Enzymes

- **Explain the Enzyme-Substrate Complex and how it is like a lock and key →**

  - Each enzyme fits a specific substrate
  - the shape of the enzyme's active site is specific to its substrate they fit together like a lock & key; no other substrate will fit into that enzyme's active site → each enzyme can catalyze one specific type of reaction

- **Draw a picture and label the enzyme, substrate, active site, and products**



Read each of the following situations and identify the substrate, enzyme, and products of each biological reaction:

1. When humans eat **lipids** or fats, the lipids must be broken down in order to be digested. **Lipase** breaks down lipids into **glycerol** and **two fatty acids** that humans can absorb.
   a. Substrate: LIPID
   b. Enzyme: LIPASE
   c. Products: GLYCEROL & 2 FATTY ACIDS

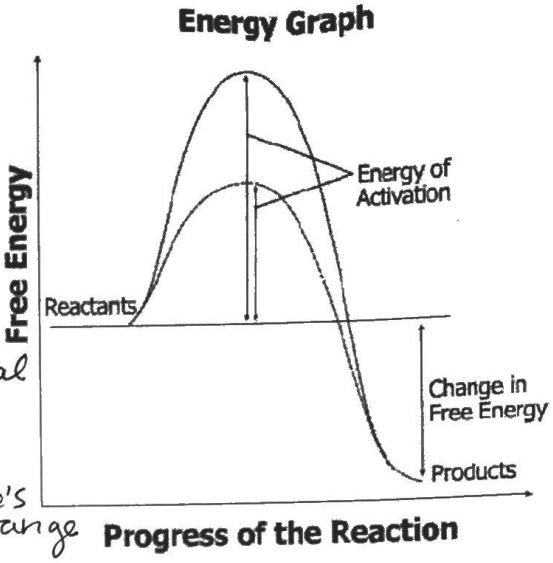
2. **Maltose** is a form of sugar found in cereals, breads, and beer. To digest maltose, humans rely on **maltase** to break down the sugar into **two glucose molecules**.
   a. Substrate: MALTOSE
   b. Enzyme: MALTASE
   c. Products: 2 GLUCOSE MOLECULES

3. **Cellulose** is a carbohydrate that makes up the cell walls of green plants, such as grass. Humans cannot digest cellulose, but cows can because they have **cellulase** in their stomachs that break cellulose down into **glucose** and **cellotetraose** .
   a. Substrate: CELLULOSE
   b. Enzyme: CELLULASE
   c. Products: GLUCOSE & CELLOTETRAOSE

4. When you eat chicken at lunch, your body breaks down the **proteins** in the chicken down into the amino acids **valine** and **lysine**. Your body relies upon the enzyme **protease** to carry out this reaction.
   a. Substrate: PROTEINS
   b. Enzyme: PROTEASE
   c. Products: VALINE & LYSINE

5. Activation energy is the energy required for a chemical or biological reaction to occur normally. **How do enzymes SPEED UP reactions?**
   a. They provide energy to the reactants.
   b. They absorb the energy from the products
   (c.) They lower the activation energy of a reaction
   d. They increase the number of available reactant particles

6. What can be concluded from the graph to the right?
   a. The reactants have less energy than the products
   b. The enzyme is consumed during the course of the reaction
   (c.) The enzyme lowers the energy of activation for the reaction
   d. The amount of free energy produced in the reaction increases with an enzyme



What does it mean for an enzyme to ***denature***? What two factors are most likely to cause an enzyme to denature?

denatured enzymes become non-functional - they deform & their active site no longer fits the substrate

* change in ~~temperature~~ or ~~pH~~ outside the enzyme's range

Draw a picture comparing a functioning enzyme and a denatured enzyme:

* the enzyme (a protein) unfolds slightly when it's denatured *

Does enzyme activity increase or decrease after denaturing? Why?

DECREASE

denatured enzymes can no longer catalyze reactions

Section 3: The pH Scale and Properties of Water

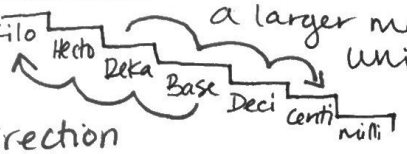
Write the term which best describes the property being described

1. Water molecules like to stick to each other cohesion
2. Water molecules have a slightly positive and a slightly negative end polar molecules/polarity
3. A solution with a pH of 12 is basic
4. Water molecules like to stick to other materials adhesion
5. A solution with a pH of 4 is acidic
6. Water can "defy gravity" and travel up narrow tubes capillary action
7. A solution with a pH of 7 is neutral

Section 4: Metric Measurements & Scientific Method

Draw the metric staircase and **describe how you can use it** to make metric conversions:

King Henry Died By Drinking Chocolate Milk



decimal moves right when converting from a larger measurement unit to a smaller one

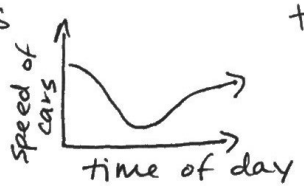
When converting between metric measures of the same base, the decimal moves the same direction and number of steps traveled from the original prefix to the new one

Imagine you are testing the speed of cars on the highway at different times of day. You plan to stand on the sidewalk and measure the average speed of the cars going by at 10 am, 2 pm, and 6 pm. Your hypothesis is that people will drive faster in the evening than they do earlier in the day. remember this is the variable you are manipulating

What is the dependent variable? Speed of the drivers

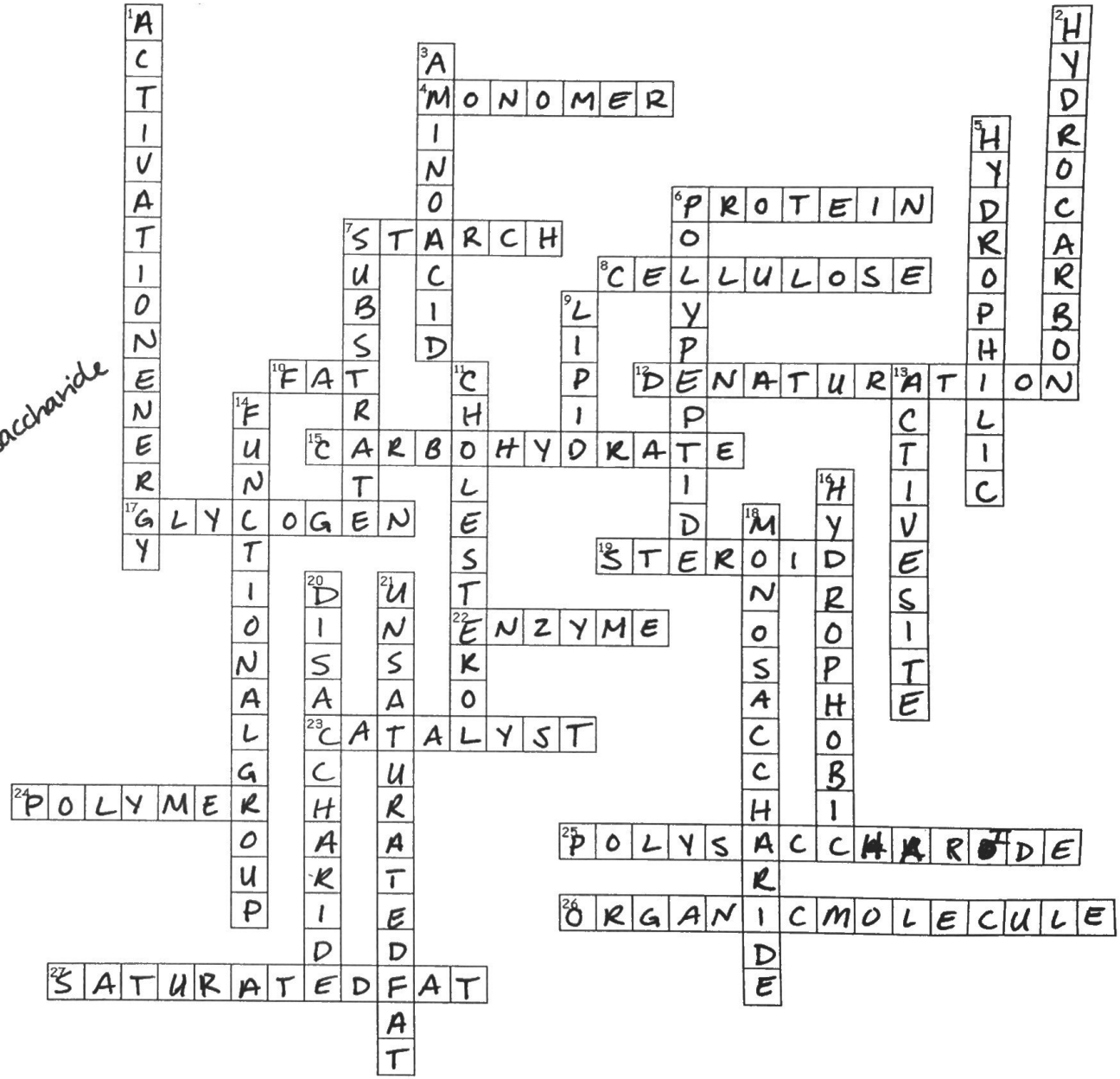
What is the independent variable? time of day

How would you graph your data?



you may not ☐ know #s in boxes

Molecules of Life



Across
4. small, simple molecule unit
6. polymer made of amino acids
7. polysaccharide in plants made of glucose molecules
8. polysaccharide in plants that serves as a building material
10. consists of a glycerol and 3 fatty acids
12. process that causes a protein to lose its shape
15. organic compound made of sugars
17. polysaccharide used for storage in animals
19. lipid molecule composed of four carbon rings
22. main catalyst in organisms
23. compound that speeds up chemical reactions
24. molecule composed of monomers
25. polymer chain made of sugars
26. carbon-based compound
27. all 3 fatty acid chains have the maximum number of hydrogens

Down
1. energy needed to start a chemical reaction
2. organic molecule composed only of hydrogen and carbon
3. the monomers that form proteins
5. water loving
6. chain of amino acids held together by peptide bonds
7. reactant an enzyme acts upon
9. oil and fat are examples
11. steroid found in cell membranes
13. region where substrate fits into an enzyme
14. group of atoms that interacts in predictable ways
16. water fearing
18. simple sugars containing one sugar unit
20. "double sugar"
21. one or more fatty acid chains has a double bond that bends it