

Biology Midterm Review

Part 1 – Running an Experiment

1. What is the scientific method? List all the steps involved.

The scientific method is a systematic way of systematically answering a question

- Observation
- Question
- Background Research
- Hypothesis and Prediction
- Design experiment with control group and control variables
- Collect Results
- Analyze data
- Make conclusions (Report results)

2. Explain the difference between a *control group* and a *control variable*.

A control group is used as comparison like the placebo group in a clinical study or in the snail and elodea lab when we had a test tube with nothing in it.

A control variable is used to make sure that you have nothing except your independent variable impacting our dependent variable. For example in the pea lab there should have been the same amount of water and the same number of peas in each test tube.

3. You are testing whether increasing the amount of sugar given to yeast will increase the rate (how fast) they release carbon dioxide. What is the independent variable? What is the dependent variable? Where are they found on a graph (x or y axis)?

IV- the amount of sugar (x axis)

DV- Rate of CO₂ production (y axis)

Part 2 – Chemistry of Life

1. Compare the four classes of organic macromolecules:

Macromolecule	Structure (building blocks)	Function	Examples (food)
Carbohydrate	Monosaccharide (CHO)	Preferred energy storage	Bread Fruit Sugar
Lipid	Glycerol and Fatty Acid (CHO)	Long term energy storage, water proofing, padding, insulation	Oil, butter,
Protein	Amino Acid (CHON)	Enzymes and structure	Meats, nuts, fish, eggs,
Nucleic Acids	Nucleotides (CHONP)	DNA- carry genetic information	Found in all cells.

Name _____

2. Give the definition or state the importance of the properties of water below.
- cohesion – two water molecules stick together. You can remember this because in coworker co means same.
 - adhesion – Water sticks to something else.
 - density – When water is frozen it is less dense so it will float. When water is cooler it is more dense so it will shrink. When water is hotter it is less dense so it will rise to the top.
 - high specific heat capacity – Water takes a long time to heat up and to cool down.
 - solubility – Like will dissolve like. When salt is dissolved in water the partially negative Oxygen will surround the positive Sodium and the partially positive Hydrogen's will surround the negative Chlorine.

3. Testing unknown solutions with an indicator.

To test for the presence of starch, a carbohydrate, a student added the same amount of iodine, an indicator to three test tubes. Two test tubes contained unknown solutions. The third contained water. The chart below shows the results obtained after iodine was added to the solutions.

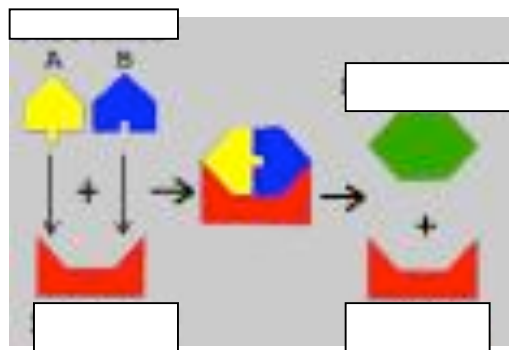
Tube	Contents	Color after indicator is added
1	Unknown solution plus iodine	Blue/black
2	Unknown solution plus iodine	Clear
3	Water plus iodine	Clear

What can the student correctly conclude based on the data above?

1. Test tube one contained starch
2. Test tube three did not contain starch
3. The is was the control group

Part 3 – Enzymes – Label the following diagrams with the words below pertaining to enzymes.

Enzyme Substrate Enzyme-substrate complex Products Active Site

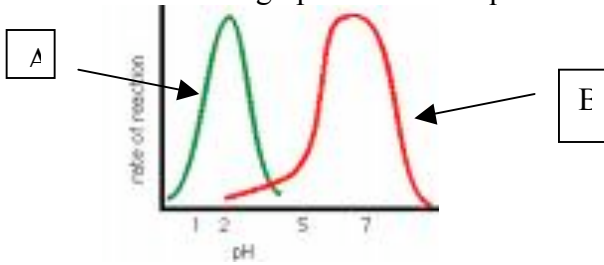


synthesis

Is this dehydration synthesis or hydrolysis?- dehydration

pH

1. What range on a pH scale is acidic? 0-7
 2. What range on a pH scale is basic? 7-14
- Look at the graphs to answer questions 4 – 6.



3. Which enzyme is shown working in an acidic range?
Green graph

4. Which enzyme is shown working in a basic range?
Red Graph



The effect of Temperature on rate of enzyme activity.

5. What happens to enzyme A as the temperature gets higher? Why?
 - a. It will increase and at first because the molecules are moving faster then the rate will decrease because the enzyme is denature and cannot work properly.
6. **False** – Enzymes slow down chemical reactions in your body.
7. **False** – You can live without enzymes in your body.
8. What happens to an enzyme once a product is released? **The enzyme will continue making products**
9. What type of macromolecule is an enzyme? **Proteins which are amino acids**
10. Can substrates be broken down into their products by more than one enzyme? Why or why not?
No. Enzyme and Substrate are specific.
11. What are vitamins and minerals? Give an example and function of each learned in class.
 - a. Vitamin C- **Wound Healing**
 - b. Vitamin D- **Bone growth**
 - c. Vitamin A- **Eye sight**
 - d. Vitamin K- **Blood Clotting**

Part 4 – The Microscope

1. Give the function of each part of the microscope below
 - a. Eyepiece - **The lens at the top that you look through will be 10X.**
 - b. Nosepiece – **Where the objectives are found.**

- c. High power objective lens - will be 40X
 - d. Low power objective lens - will be 4X
 - e. Coarse focus – The larger knob used to focus the microscope, only to be used on the low power objective.
 - f. Fine focus - The smaller knob used to get a finer focus you can use this on all of the objectives.
 - g. Stage – Where your slide will be placed (this is what moves when you move the focus)
 - h. Diaphragm - This will control how much light goes through the microscope.
2. What is total magnification?
It will be the eyepiece multiplied by the objective.
3. What would the total magnification of a specimen be if you were looking at it with a 100X objective lens?

1000 X

Part 5: Comparing Cells

1. What is a eukaryote?
You are Eukaryote they are cells that have membrane bound organelles and are much larger than Prokaryotic cell.
2. What is a prokaryote?
Bacteria are an example of prokaryotic cells, they are much smaller and DO NOT have membrane bound organelles.
3. Why do plants appear green?
The chloroplast in plant cells.
4. Why do both plant and animal cells need a nucleus?
The nucleus contains the DNA that is essential for all cells.
5. What advantage do plant have over animals?
Plants can make their own food with chloroplast.
6. List three differences between plant and animal cells

- 1. Plants have cell wall
- 2.Plants have Chloroplast
- 3.Animal cells have Centriols and Lysosome

Part 6 – Cell Parts and Their Functions

List the function of the cell parts below:

- 1. Cell membrane – Semi-Permeable covering of all cells
- 2. Cytoplasm – Gel like substance that holds all of the other organelles
- 3. Nucleus – Contains the DNA for the cell
- 4. Mitochondria – Converts energy from the food we eat in to energy our cells can use.
Cellular Respiration.

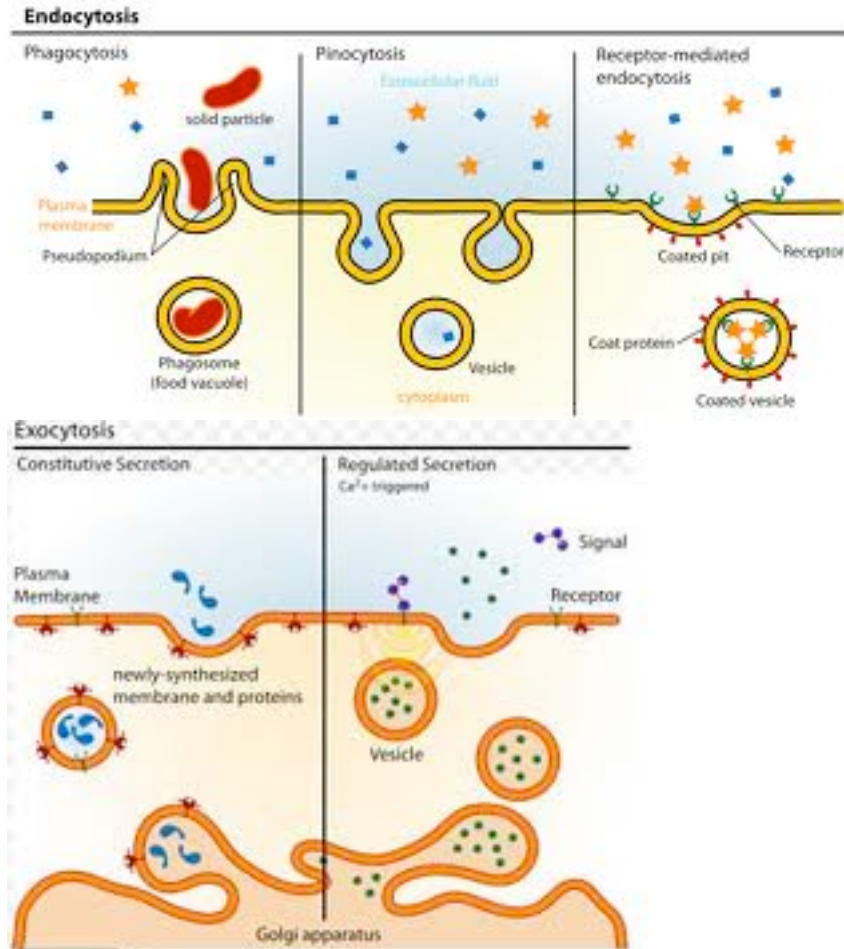
5. Ribosome – Site of protein synthesis.
6. Endoplasmic reticulum – Site of lipid synthesis.
7. Golgi bodies – Site of Macromolecule modification.
8. Lysosomes – Breaks down old run down organelles.
9. Vacuoles – Stores nutrients and water, this will be very large in plant cells.
10. Centrioles (Centrosomes) – Organizes the DNA during cells replication.
11. Cell Wall – Outer covering of plant cells that is mainly composed of cellulose.
12. Chloroplasts – Organelle found only in plant cells that makes food for the plant during a process called Photosynthesis.

Part 7 – Transport across the Cell Membrane

1. Define the following types of transport
 - a. Passive transport – Does not require energy, will go from high to low concentration.
 - b. Diffusion – Movement of molecules from high to low concentration.
 - c. Osmosis – Movement of water from high to low concentration across a semi-permeable membrane.
 - d. Facilitated diffusion – Still moves from high to low concentration but uses a protein in the membrane to get across.
 - e. Active transport – Movement of molecules from low to high concentration, this requires energy.
 - f. Endocytosis – When a vesicle will fuse with the membrane letting a large amount of molecules into the cell. There is Phagocytosis which is like cell eating and Pinocytosis which is like cell drinking. This requires energy.
 - g. Exocytosis – A vesicle from inside the cell will fuse with the cell membrane and release molecules from the cell. This requires energy.
2. What is hypertonic and hypotonic?

Hypertonic – there is more solute outside of the cell than inside so water will move out and the cell will shrink.

Hypotonic- There is more solute inside the cell than outside so the cell will expand and maybe explode.
3. Draw a picture of what endocytosis and exocytosis would look like.



Part 8 – Cell Membrane

1. Define: semi-permeable.- It means that only select molecules can move through the membrane this is usually determined by size.
2. Are the heads and tails of the bilayer polar or nonpolar?

The glycerol head is polar and is hydrophilic which means it is attracted to water. The Fatty acid tails are nonpolar which means that they are hydrophobic which makes them repelled by water.

3. Which way do the heads and tails face and why?

The head faces toward the water because they are hydrophilic and the tails are in the middle away from the water because they are hydrophobic.

Part 9 – Diffusion Demonstration

A beaker contains starch & water. A baggie with water, glucose & iodine is placed into the beaker.

1. What color is iodine?- yellow
2. What color is starch?- Cloudy
3. What happens when iodine hits starch? What color appears? Turns Blue-Black
4. What way does the concentration gradient move in diffusion? It will always move from high to low concentration
5. What change will occur due to the movement of iodine in the description above? The BEAKER will turn blue and be positive for the Benedicts test for glucose.

Part 10- Single Cell Movement

Define the following Terms

1. Cilia- Small hairs surrounding the cell that beat. You will also find them in your lungs to push up particles in your lungs.
2. Flagella- Several long tails that beat to move the cell.
3. Pseudopodia- False feet. The cell will push its cytoplasm forward and then pull the rest of it's self along.
4. Cytoplasmic Streaming- This in inside the cell when the cytoplasm with in the cell will move, like the chloroplasts we saw going around in a circle.

Part 11– Photosynthesis

1. What is the equation for photosynthesis? Explain what it means.
Photosynthesis: $CO_2 + H_2O + Light\ Energy \rightarrow Glucose + O_2$
2. What are the starting materials that plants use to make their own food?
Carbon Dioxide water and light
3. What does a plant need to allow the molecules in carbon dioxide and water to change into sugar?
You must have the energy from sunlight
4. What is the purpose of the pigment chlorophyll in plants?
This is what absorbs the sunlight and where the electron is excited.
5. What is the waste product of photosynthesis? How is it recycled?
Oxygen is made and is recycles using Cellular Respiration
6. What are stomata? What factors cause stomata to open or close?
There are openings in the leaves (mostly at the bottom) where the Carbon Dioxide comes in and the Oxygen leaves.
7. What cell part does photosynthesis occur in?
The chloroplast. Light reactions happen on the thylakoid and the Calvin Cycle will happen in the stroma.
8. True– Plants are the major source of energy for all living things.
But there is Chemosynthesis
9. Draw a graph that shows the effect of light intensity on the rate of photosynthesis.
Your graph should increase as light intensity increases then level off.

10. What is chemosynthesis?

It is the process that bacteria use at the bottom of the ocean where there is no sunlight so they use the chemicals from thermal vents to make food.

Part 12 – Cellular Respiration

1. What is the equation for cellular respiration? Explain what it means.

Respiration: Glucose + Oxygen → Energy + CO₂ + Water

2. What cell part does cellular respiration occur in?

Glycolysis makes 2 ATP and occurs in the cytoplasm

The Krebs Cycle makes 2 ATP and occurs in the Matrix of the Mitochondria

The Electron Transport Chain makes 32-34 ATP and occurs on the cristae in the Mitochondria

3. Does cellular respiration occur in plants, animals, or both?

Both and all the time

4. Does cellular respiration need the sun for the process to take place?

NO!

Part 13 – Snail/Elodea Lab

1. A snail is placed in a vial with blue bromthymol blue solution (BMB) in the dark. What will happen and why?

The Bromothymol blue will turn yellow because it is producing CO₂ through cellular respiration

2. A plant is placed in blue bromthymol blue solution for 24 hours, in the light. The solution remains blue, why?

It will stay Blue because it is going through photosynthesis which creates oxygen but more importantly removes the CO₂ which causes the color change.

3. A plant is placed in yellow bromthymol blue solutions for 24 hours, in the light. The solution turned blue, why?

Because it is going through photosynthesis which creates oxygen and removes the CO₂ from the bromothymol blue.

Name _____

Part 13 – Body Systems- Explain how the circulatory, respiratory and excretory/Urinary systems are involved in cellular respiration.

Define Homeostasis:

System	Function	Relationship to CR
Circulatory	Main transportation through out the body.	Hemoglobin will carry oxygen from the lungs to the cells. Glucose will travel through out the blood stream from the
Respiratory	Main organ is the lungs for bringing in oxygen and releasing CO ₂ .	The lungs use diffusion across a membrane in to the blood stream to carry oxygen through out the body and then CO ₂ will diffuse in to the lungs to and be exhaled out.
Digestive	To break down food and provide nutrients for the body.	This is where the glucose for CR will enter through the small intestine that will then be carried around through the circulatory system.

System	Function
Endocrine	Messaging system through out the body. Uses hormones to send messages to cells.
Nervous	Uses electrical signals to monitor and respond to the environment to maintain homeostasis. Main parts include nerve, spinal cord and brain.
Urinary	Otherwise known as the Excretory system. This includes the kidneys and bladder and its main function is to remove toxins from the blood.