

Honors Biology I Mid-Term Review Packet

Midterm Examination Outline / 2018-2019

This exam will cover all the material we have learned so far this year. It is highly suggested that you focus on class notes, past unit review sheets, Jeopardy review games and handouts when preparing for this exam. This is not comprehensive; you should refer to your unit review guides for a more in-depth review

The Science of Biology (Chapter 1)

- The scientific method
- Experimental methods (including controlled experiments)
- Data analysis /graphing / tables /interpreting data
- Dimensional analysis

Biochemistry/Enzymes(Chapter 2)

- Generalized structure of atoms
- Elements, molecules, compounds, ions
- Macromolecule types & function
- Chemical reactions/neutralization reactions
- Acids and bases and the pH scale
- Role of enzymes in chemical reactions

Photosynthesis and Cellular respiration (Chapter 4)

- Photosynthesis (transfer of light energy to chemical energy)
- Cellular respiration (aerobic and anaerobic)
- Formulas for photosynthesis and cellular respiration
- Fermentation
- Conservation of Mass / Energy

Food Webs and Energy Transfer

Please identify the independent and dependent variables in the following descriptions of experiments:

1. Students watched a cartoon either alone or with others and then rated how funny they found the cartoon to be.

Independent Variable:

Dependent Variable:

2. A comprehension test was given to students after they had studied textbook material either in silence or with the television turned on.

Independent Variable:

Dependent Variable:

3. Some elementary school teachers were told that a child's parents were college graduates, and other teachers were told that the child's parents had not finished high school; they then rated the child's academic potential.

Independent Variable:

Dependent Variable:

4. Read each scenario and identify the IV, DV, constants, control group, experimental group. Write a title and state a hypothesis

Scenario #3: *Aloe vera* and Planaria

Jackie read that *Aloe vera* promoted healing of burned tissue. She decided to investigate the effect of varying amounts of *Aloe vera* on the regeneration of planaria. Planaria are aquatic flat worms that regenerate body parts when severed. Jackie bisected the planaria to obtain 10 parts (5 head sections and 5 tail sections) for each experimental group. She applied concentrations of 0%, 10%, 20%, and 30% *Aloe vera* to the groups. Fifteen mL of *Aloe vera* solutions were applied. All planaria were maintained in a growth chamber with identical food, temperature and humidity. On day 15, Jackie observed the regeneration of planaria parts and categorized the development as full, partial, or none.

Title: _____

Hypothesis: _____

Independent variable (IV): _____

Dependent variable (DV): _____

Control Group (CG): _____

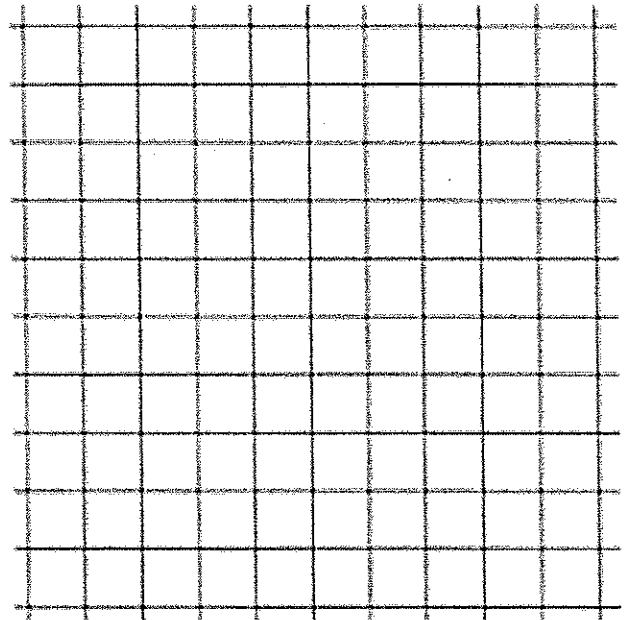
Experimental Group (EG): _____

Control Variables: _____

How could you improve this experiment? _____

5. Graph the following data

Year	Average rainfall in Seattle Washington (inches)	Average rainfall in Connecticut (inches)
2006	39	30
2007	47	45
2008	32	20
2009	38	21
2010	29	30
2011	48	28
2012	20	17



6. Make a data table of the following information. Include all proper components.

Mary wanted to see which sport was most popular among elementary students, she collected the following data. Kindergarten classes voted volleyball, 1st grade classes voted baseball, and the 2nd and 3rd graders both voted for soccer.

7. **Metric Conversion / Dimensional Analysis:** *Convert the following using railroad tracks*

a. Convert 55mm to meters

b. Convert 60 kilograms to milligrams

8. Complete the following chart, naming the parts of the atom:

Particle	Location	Charge

9. What is a covalent bond?

10. What is an ionic bond?

11. Bond Mg and CL together.

12. Bond P and BR.

13. What is an isotope? Please provide an example of one.

14. What is an ion?

15. Complete the table below.

Element	# Valence Electrons	# Electrons to gain	# of electrons to lose	Ion Formed / name
Li	1	none	1	Li ⁺¹ / Cation
S				
Mg				

16. Identify whether the following are acid or bases

pH 2.3 = _____

pH 7.0 = _____

pH 13 = _____

17. Organic Chemistry is the study of all compounds that contain bonds between carbon atoms. Carbon has 4 valence electrons so its bonds are strong. Carbon even has the ability to bond with other carbon atoms, forming long chains or even rings. Living things are made up of molecules that consist of carbons covalently bonded to other elements, such as macromolecules. Fill in the following table.

Macromolecule (polymer)	Monomer "building blocks"	Polymers	Examples	Uses
		Disaccharides - double sugars Polysaccharides - many sugars	Glucose,fructose , galactose Sucrose Starch-plants Glycogen- animals Cellulose-plants Chitin-insects	
		Saturated (all single bonds) Monounsaturated (one double bond) Polyunsaturated (two or more double bonds) Phospholipids (phosphate replaces a FA)	Butter Soft margarine Olive oil Cell membrane Cholesterol Testosterone Progesterone Beeswax (paraffin)	
		Dipeptide (2 amino acids) Polypeptide (many Amino acids)	Enzymes Muscles Skin Some hormones	
Nucleic Acid	nucleotides	DNA RNA	Stores and transmits genetic information	Template for protein synthesis Carry genetic information

Enzyme Structure & Function

1. Most enzymes are what type of macromolecule? _____
2. Enzymes act as _____ in reactions.
3. Are enzymes permanently changed in the chemical reactions they are involved in? Yes or No
4. Will an enzyme work on any substance? Explain.

5. Can enzymes be reused?

6. What ending is found on many enzymes?

7. Give 3 examples of enzymes with this ending

8. How does an enzyme work?

9. What effect does an enzyme have on activation energy needed to start a reaction?

11. What is meant by the term substrate?

12. What is meant by active site?

13. What four factors can affect the activity of an enzyme? How?
 - a. ex. Temp needs to be around body temp (98.6 F)
 - b. _____
 - c. _____
 - d. _____

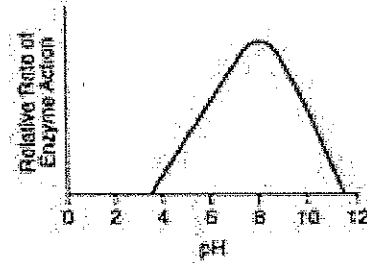
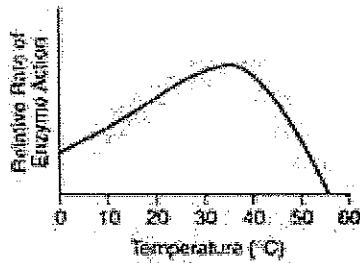
17. What is the effect of high temperature on an enzyme (running fever)?

18. What temperature do most enzymes do best at? _____ °C

19. Most enzymes like a pH near _____.

20. Explain how the shape of an enzyme is determined and why the shape is important to the function.

Use the 2 graphs below to answer Questions 21, 22, and 23.



21. What is the optimal pH that this enzyme functions at? _____

22. What is the optimal temperature that this enzyme functions at? _____

23. What happens when the pH is 2?

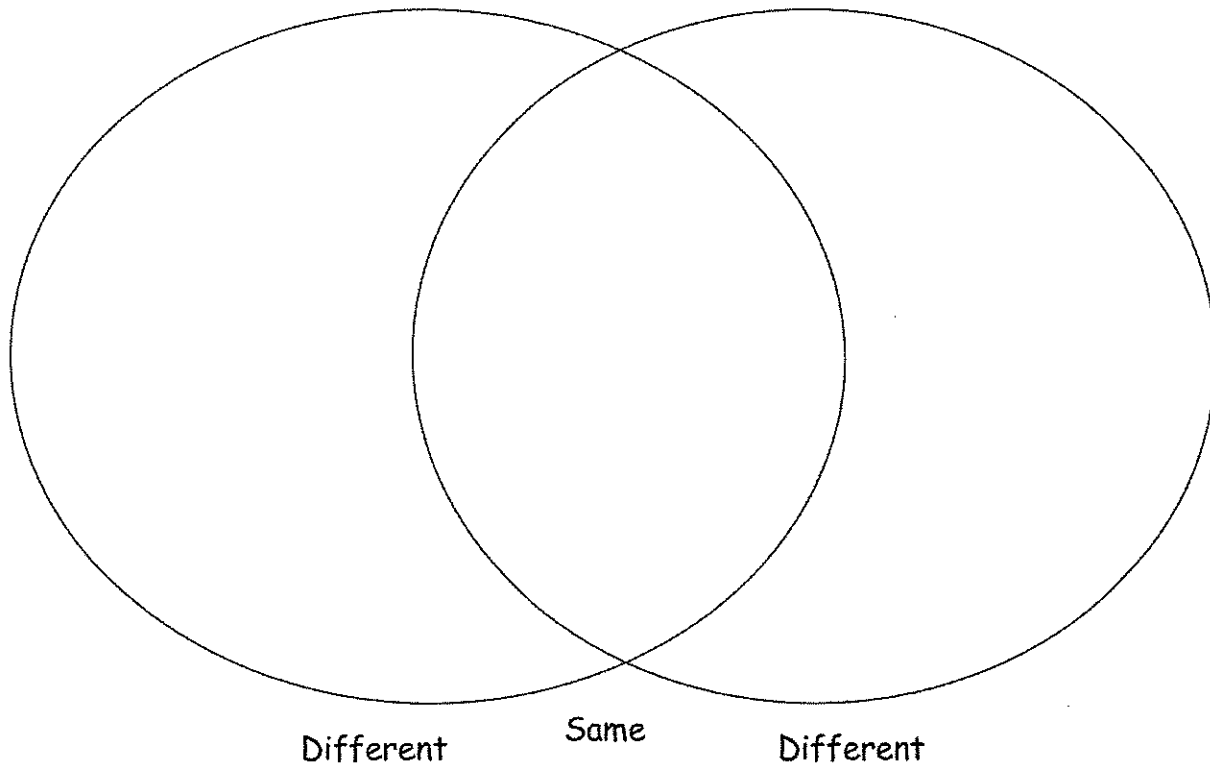
Unit 3: Cells and Cellular Transport Review Worksheet

Cells and Organelles

1. List the levels of biological organization in multicellular organisms from most simple to complex. (cell, organism, organs, molecules, organelles, compound(macromolecules), organ system, atom, tissue)

2. Make a Venn diagram comparing/contrasting prokaryotic and eukaryotic cells.

Venn Diagram Comparing and Contrasting



MATCHING: Match the terms below to the following descriptions.

- | | | | |
|--------------|-----------------|---------------------------------|--------------------|
| A. ribosomes | D. nucleolus | G. plasma membrane | J. lysosomes |
| B. cell wall | E. cytoplasm | H. rough endoplasmic reticulum | K. Golgi apparatus |
| C. nucleus | F. mitochondria | I. Smooth endoplasmic reticulum | L. vacuole |
| | | | M. chloroplast |

- 1 _____ The structure in the nucleus which manufactures ribosomes for protein synthesis.
 - 2 _____ Cellular structure that regulates what enters and leaves the cell.
 - 3 _____ Organelles that store materials such as water, salts, and carbohydrates. They may occupy a large space within plant cells.
 - 4 _____ Helps to support, strengthen and protect the cell. Not found in animal cells.
 - 5 _____ Photosynthetic organelles found in many plant cells only.
 - 6 _____ A system of channels that transport proteins through the cell.
 - 7 _____ The liquid inside the cell that all the organelles are suspended in.
 - 8 _____ Organelles which provide cells with energy by using sugar as a fuel source.
 - 9 _____ Contain chemicals and enzymes necessary for digesting certain materials in the cell.
 - 10 _____ A system of channels that manufacture carbohydrates and lipids and transport them through the cell.
 - 11 _____ Organelle that collects, modifies and packages chemicals made at one location in a cell and secretes finished products to be used at another cellular local.
 - 12 _____ The organelle responsible for manufacturing proteins. (Be specific!)
 - 13 _____ The information and control center of the cell. Contains genetic information.
14. Which organelles are only found in plant cells?

CELLULAR RESPIRATION VOCABULARY REVIEW

1. _____ is the process of splitting a glucose molecule into 2 pyruvic acid molecules.
2. The molecule used by cells to store and transfer energy is _____
3. Glycolysis happens outside the mitochondria in the _____ of the cell.
4. _____ happens when oxygen is present and includes glycolysis, Krebs cycle, and Electron transport.
5. This describes a process that requires oxygen = _____
6. This atmospheric gas is required for aerobic respiration = _____
7. This describes a process that does NOT require oxygen; it means "without air"=

8. Type of fermentation used **by human muscles** in low oxygen conditions and microorganisms to make yogurt, cheese, pickles, sauerkraut and kimchi. = _____
9. The _____ cycle breaks down pyruvic acid into carbon dioxide and produces NADH, FADH₂, and ATP.
10. This 3 carbon molecule is produced during glycolysis when glucose splits in half

11. Cell organelle which acts as the cell's power plant to burn glucose and store energy as ATP

12. If oxygen is NOT present, glycolysis is followed by _____
13. Type of fermentation used to make bread dough rise and produce beer and wine is

14. The carbon atoms in pyruvic acid end up as _____ **in the atmosphere** following the Krebs cycle.
15. Which of the following shows the correct sequence during cellular respiration?
 - A. Electron transport chain → glycolysis → Krebs cycle
 - B. Glycolysis → Electron transport chain → Krebs cycle
 - C. Krebs cycle → Electron transport chain → glycolysis
 - D. Glycolysis → Krebs cycle → Electron transport chain

16. How many total ATP molecules are produced by 1 molecule of glucose completing cellular respiration?

- 2 6 24 36

List the amount of ATP that is produced at each stage.

1. _____
2. _____
3. _____

17. Which stage of cellular respiration produces the most ATP?

- A. glycolysis
- B. Krebs cycle
- C. Electron transport

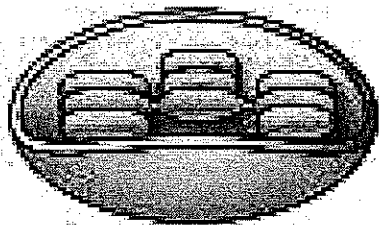
18. Tell the kind of fermentation used in each example:

- a. Yeast use this to make bread dough rise _____
- b. Your muscle cells use this during rapid exercise when oxygen is low _____
- c. Bacteria and yeast use this to make beer and wine _____
- d. Bacteria use this to make cheese, yogurt, and sour cream _____

19. Compare and contrast aerobic cellular respiration with fermentation.

Rearrange the following pieces to create the equation for **photosynthesis**: *Oxygen, Carbon Dioxide, Water, Glucose, Sunlight,*

Rearrange the following pieces to create the equation for **respiration**: *Oxygen, Carbon Dioxide, Water, Glucose, ATP,*



1. Name the two major parts of photosynthesis and **draw an arrow to where they take place in the Chloroplast to the left**

- 1.
- 2.

2. Name the 3 chemical products of the light reactions. Which two get passed on to the Calvin Cycle? Which one leaves the leaf?

3. What is the product made in the Calvin Cycle?

4. How are the equations for photosynthesis and respiration similar? How are they different?

5. What organelle is responsible for photosynthesis?

6. What is the purpose of chlorophyll?

7. Organize the following steps under the appropriate process and put them in the appropriate order.

**Calvin Cycle, Glycolysis, Electron Transport Chain,
Light Reactions, Krebs Cycle**

Photosynthesis

- 1.
- 2.

Cellular Respiration

- 1.
- 2.
- 3.

8. What is the conservation of mass /energy? How does photosynthesis and cellular respiration support this law?

9. How is active transport different than passive transport? Why is it used?

ECOLOGY REVIEW SHEET

I. Matching

Match the following terms with the correct statement. Each statement may be used only once.

<u>Heterotroph</u>	1.	A. An organism that eats only plants
<u>Secondary Succession</u>	2.	B. Study of organisms and their environment
<u>Ecology</u>	3.	C. Gradual replacement of one community by another
<u>Prey</u>	4.	D. Organisms that cannot make their own food
<u>Carnivore</u>	5.	E. Where an organism lives
<u>Autotroph</u>	6.	F. Organisms that can make their own food
<u>Habitat</u>	7.	G. An organism that hunts
<u>Herbivore</u>	8.	H. Organisms that eats only meat
<u>Decomposer</u>	9.	I. Organism that breaks down dead material
<u>Omnivore</u>	10.	J. The role organisms have within their environment, how they eat or behave
<u>Predator</u>	11.	K. Organism that eats both plant and animals
<u>Niche</u>	12.	L. Organism that are hunted

II. FILL IN THE BLANK

In the space to the left, write the word or phrase in parentheses that correctly completes the statement

_____ 13. The biosphere includes air and water; animals and plants; and (mountains and oceans, moon and stars).

_____ 14. Wind, humidity, and (mosses, rocks) would be considered abiotic factors in a terrestrial ecosystem.

_____ 15. The size and extent of a population does not directly depend on the availability of (food, decomposers).

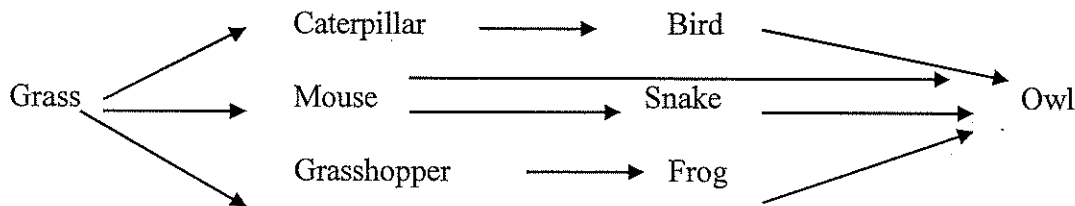
_____ 16. To explain and show how the amount of living material and tissues at each trophic level of a food chain changes, you could use a pyramid of (numbers, biomass).

_____ 17. Energy that passes through a food chain is lost to the environment as (heat, matter).

_____ 19. Water, carbon, and nitrogen are released back into the atmosphere during (symbiosis, decomposition).

_____ 20. In a pond ecosystem, ducks, mosquitoes, pond plants, and frogs are (abiotic, biotic) factors.

Use the following diagram to answer questions.



21. What is the producer in the food web above?

22. Energy flows from the mouse to the _____ and _____

23. The primary consumers are _____, _____, _____.

24. The secondary consumers are _____, _____, _____, and _____.

25. The owl is a secondary consumer if it eats the _____, but a tertiary (third order) consumer if it eats the _____, _____, or _____.

26. As matter and energy move from grasses to owl, the amount of available energy always (**increases, decreases**) but the population size may increase or decrease.

27. Compare and contrast a food chain and a food web.

Food Chain:

Food Web:

28. In an ecological pyramid, what happens to the biomass, energy, and number of species as you go up the pyramid?

29. What is the 10% rule? What is its significance? Why is energy lost?

CER – Claim, Evidence, Reasoning

Read the following and complete a CER

Using an in-depth laboratory analysis of old-fashioned chicken soup, a team of medical researchers explored the science behind the broth's reputation as salvation for the sniffly.

Dr. Stephen Rennard, a pulmonary expert at the University of Nebraska Medical Center in Omaha, found evidence the soup contains anti-inflammatory properties that may help prevent a cold's miserable side effects.

"My wife's grandmother says that chicken soup is good for colds," explains Rennard, whose findings were published in the current issue of *Chest*, the journal of the American College of Chest Physicians. "Just because your grandma said something doesn't mean that it's not true."

Used in Ancient Times The idea that chicken soup, often dubbed the "Jewish penicillin," has medicinal effects dates back to ancient times, but modern scientists have never fully deciphered the reasons.

Some doctors believe that the soup's benefits are mainly psychosomatic, that it's the ultimate comfort food. Others say the steaming hot soup clears congestion and provides the body with necessary hydration to flush out viral bugs.

Researchers believe colds are caused by viral infections in the upper respiratory tract. The body responds with inflammation, which triggers white blood cells to migrate to the area.

These bacteria-devouring cells, however, have little ability to kill off a virus, and as a side effect, stimulate the production of mucous, which may cause the traditional cold season symptoms of stuffy heads, coughs and sneezing.

In the lab, Rennard tested the ability of those white blood cells to migrate from one side of a chamber across a filter to the other side, as they normally do. In the presence of the chicken soup, however, he noted that fewer cells migrated to the other side of the chamber.

His theory is that some ingredient in the soup blocks or slows the amount of cells congregating in the lung area, possibly relieving the development of these cold symptoms.

Biological Basis Unclear

Rennard tested a family recipe passed down from his wife's Lithuanian grandmother that contained chicken, onions, sweet potatoes, parsnips, turnips, carrots, celery, parsley, salt and pepper.

The white blood cells migrated less often in the presence of each of the tasty ingredients. But it remains unclear what chemical compound within the ingredients prevented their motion.

Question: Does consuming chicken soup reduce cold symptoms?

Claim:

Evidence (include quotes) / Reasoning (discuss science concepts):