

Living Environment
Ms. Khandhar

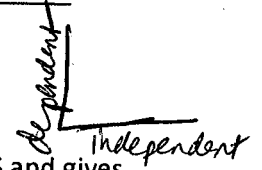
Khandhar
Key

MIDTERM REVIEW

Scientific Method

In a **controlled experiment** it is important to consider which variable will change and which variables remain constant. It is also important to consider sample size, the bigger the better. Finally, there needs to be a control group, where the tested variable is held "constant" and an experimental group, where the tested variable is changed. All other variables should be held constant.

When graphing, the independent variable is the factor that was *varied* in an experiment to determine its effect on another variable. This variable is always graphed on the x axis. The dependent variable is what you find out as a result of experiment, it is always plotted on the y axis.



Consider the following controlled experiments

Experiment 1: Mr. Smith thinks the drug AZT will cure AIDS. He takes 100 patients with AIDS and gives the drug to 50 of them (Group A). To the other 50, he gives a drug which looks like AZT, but it is really just a sugar pill (Group B). Both groups were told they were getting a drug that would cure AIDS. After 6 months, 30 patients in group A reported having fewer symptoms, and 10 people in group B reported having fewer symptoms.

Control Group: <u>Group B</u>	Independent Variable: <u>pill or no pill</u>
Experimental Group: <u>Group A</u>	Dependent Variable: <u># Symptoms</u>

Does the data support that AZT helps cure AIDS? Why wouldn't we say this data **proves** anything?
 Yes, data supports AZT helps - 30/50 felt better with AZT, only 10/50 felt better w/placebo. This data does not **PROVE** ~~the~~ AZT works, need larger sample size, need to repeat/reproduce.

Experiment 2: Joey notices that his shower is covered in a strange green slime. His friend tells him that coconut juice will get rid of the green slime. Homer decides to test this out by spraying half of the shower with the coconut juice. He sprays the other half of the shower with water. After 3 days of treatment there is no change in the appearance of the green slime on either side of the shower.

Control Group: <u>side of shower w/water</u>	Independent Variable: <u>type of cleaner</u>
Experimental Group: <u>side of shower w/coconut juice</u>	Dependent Variable: <u>amount of green slime</u>

What was Joey's initial observation? shower is covered in green slime.

What should his conclusion be?

Coconut juice is no more effective than water.

Unity and Diversity

All living things share the *characteristics* of life. Living things ...

- are made of cells → Define CELL: *Smallest unit of life*
- maintain homeostasis → Define homeostasis: *Maintaining a constant internal environment*
- carry out metabolic activities. → What are metabolic activities?
sum of all of your body's chemical reactions

All living things carry out a variety of **LIFE PROCESSES**. Match the following terms to their functions.

- | | | |
|---------------------|----------|--------------------------------------------------------|
| 1. Nutrition | <u>5</u> | a. transporting materials throughout the organism |
| 2. Synthesis | <u>8</u> | b. responding to internal and external stimuli |
| 3. Cell Respiration | <u>6</u> | c. creating offspring |
| 4. Excretion | <u>2</u> | d. combining simple substances into complex substances |
| 5. Transport | <u>1</u> | e. obtaining nutrients from the environment |
| 6. Reproduction | <u>7</u> | f. increasing the size or number of cells |
| 7. Growth | <u>4</u> | g. removing waste products from the organism |
| 8. Homeostasis | <u>3</u> | h. releasing the chemical energy stored in food |

Organization of Life

Arrange the following terms in order from simplest to most complex.

tissue organelle organism organ system cell organ

organelle → cell → tissue → organ → organ system → organism

Prokaryotes (cells without a nucleus) Eukaryotes (cells with a nucleus)

Both single-celled organisms and multicellular organisms carry out common life functions. Which part of a single-cell organism carries out a similar function?

Function	Single Cell	Multicellular Organism
Gas Exchange	<i>Mitochondria / all membrane</i>	Respiratory System
Transport of Substances	<i>Rough + Smooth ER / cell membrane</i>	Circulatory System
Nutrition		Digestive System
Excretion		Excretory System

Give two examples of a single-celled organism

1. *E. coli*
2. *ameoba*

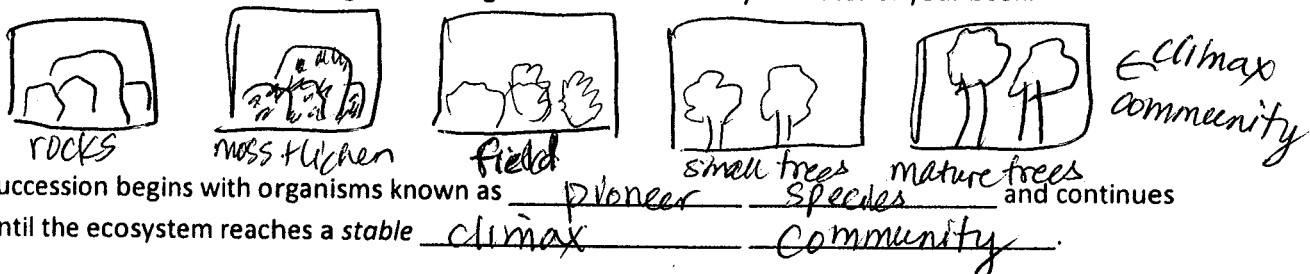
Give two examples of a multicellular organism

- 1.
- 2.

Ecology

"Through ecological succession, all ecosystems progress through a sequence of changes during which one ecological community modifies the environment, making it more suitable for another community. These long-term gradual changes result in the community reaching a point of stability that can last for hundreds or thousands of years."

Draw a picture of different stages in ecological succession from your notes or your book:



Some examples of man-caused factors that can destroy a stable climax community include:

- Development \Rightarrow habitat destruction
- logging for trees

Some examples of natural disasters that can destroy a stable climax community include:

- forest fire
- flood, some type of natural disaster

Arrange the following terms in order of increasing complexity

population organism community biome ecosystem biosphere

organism \rightarrow population \rightarrow community \rightarrow ecosystem \rightarrow biome \rightarrow biosphere

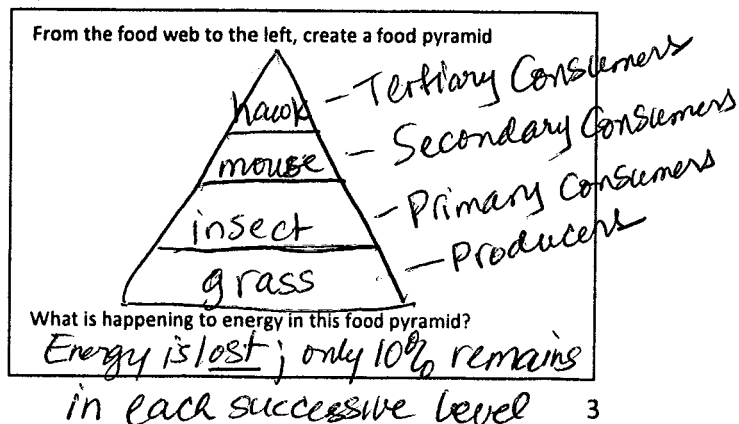
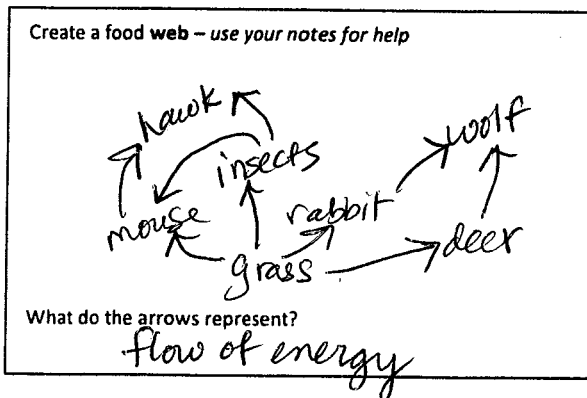
An ecosystem includes BOTH biotic and abiotic factors.

Define and give two examples of biotic factors:

1. population of rabbits
2. grass / trees

Define and give two examples of abiotic factors:

1. sunlight
2. water



Human Impact

Our decisions about how to use the Earth's resources has an impact on all the organisms that depend on those resources. Some of the Earth's resources, such as our food supply and solar energy, are renewable. Other resources, such as fossil fuels and minerals, are non-renewable.

Some human activities are *detrimental*, or damaging, to the Earth's ecosystems. Use your notes to find four ways in which humans are impacting the Earth in a detrimental way and fill in the table below.

Human Impact	Human action(s) that have contributed to this problem	Ways this problem negatively impacts humans	How humans can lessen the effect of this problem
1. Global Warming	burning fossil fuels	Climate change can cause coastal flooding, displacement, economic loss	Use less energy use alternative fuels laws + education
2. Ozone Depletion	using CFC's in refrigerants + aerosols	increased chance of skin cancer	use alternate chemicals pass laws (Montreal Protocol)
3. Acid Rain	burning fossil fuels, factory smokestacks	damages tombstones, statues, car paint. Can affect food chain	
4. Habitat Destruction	development of housing + commercial property farming	can affect food chain + plants needed for medicine	

Define *biodiversity* and how it relates to a stable ecosystem: # species in an ecosystem



↑ Biodiversity ↑ Stability of ecosystem

Both ozone depletion and global warming relate to the Earth's atmosphere, but their causes and effects are DIFFERENT. Take a moment to clarify this difference. Use your resources to help.

	Cause	Effect
Ozone Depletion	use of CFC's, refrigerants	more harmful UV rays entering atmosphere
Global Warming	burning of fossil fuels	climate change, melting of ice caps

Cells

Use cellsalive.com to define the function of each of the following organelles:

Cell Organelle	Function	An additional fact or diagram
Nucleus	control + coordinates all cell functions	Contains <u>DNA</u> that provides the cell with unique characteristic
Centriole	assist in cell division	How many are there in an animal cell?  2 centrioles
Cell Membrane	Describe all of its jobs: regulate what can and cannot enter (semi-permeable)	Sketch it:  Lipid Bilayer proteins lipids + proteins What two things is it made of?
Mitochondrion	where cellular respiration occurs $\text{glucose} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{ATP}$	Describe the outside: Smooth →  Describe the inside: folded membrane
Vacuole	to store water + nutrients	Size in animal cells vs. plant cells? plants have <u>LARGE</u> vacuoles
Cell wall	provide structure in plant cells	is not in animal cells
Chloroplast	where photosynthesis occurs	green due to chlorophyll
Ribosome	where protein synthesis occurs	What process occurs here? protein synthesis
Rough Endoplasmic Reticulum	where ribosomes are used to transport molecules	What makes it look pebbled? ribosomes

Key Idea: Why is a cell's size related to its surface area/volume ratio?

Cells need to be small to keep a high surface area: volume ratio.

Biochemistry

Match the following molecules to their function:

e 1. ATP

a. Carries hereditary information

a 2. DNA

b. makes up enzymes and many structural cell parts

d 3. Carbohydrates

c. acts as a food reserve molecule, stored energy

c 4. Lipids (fats and oils)

d. acts as a food reserve molecule for quick energy

b 5. Protein

e. supplies energy for cells to run on

ENZYMES are biological catalysts

This means they speed up the rate of chemical reactions. A variety of chemical reactions occur in organisms. Match the following biochemical processes to the best definition.

1. Respiration

a. building of complex molecules from simple ones

2. Hydrolysis

b. capturing energy from the sun into the bonds of glucose

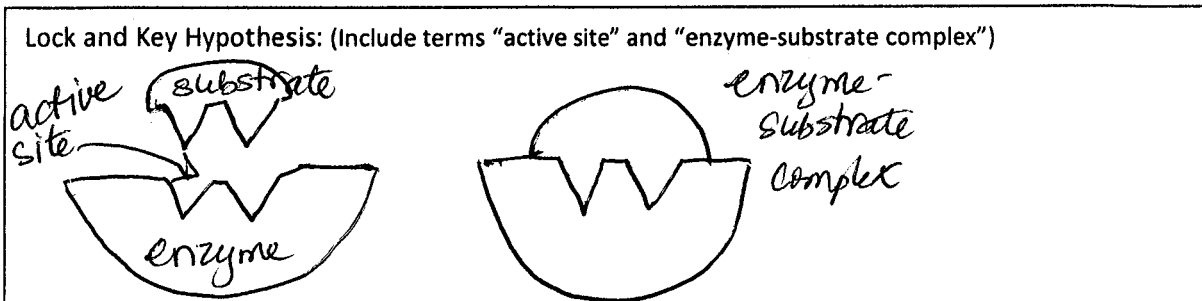
3. Photosynthesis

c. breakdown of complex molecules INTO simpler molecules

4. Dehydration Synthesis

d. releasing energy from food into ATP

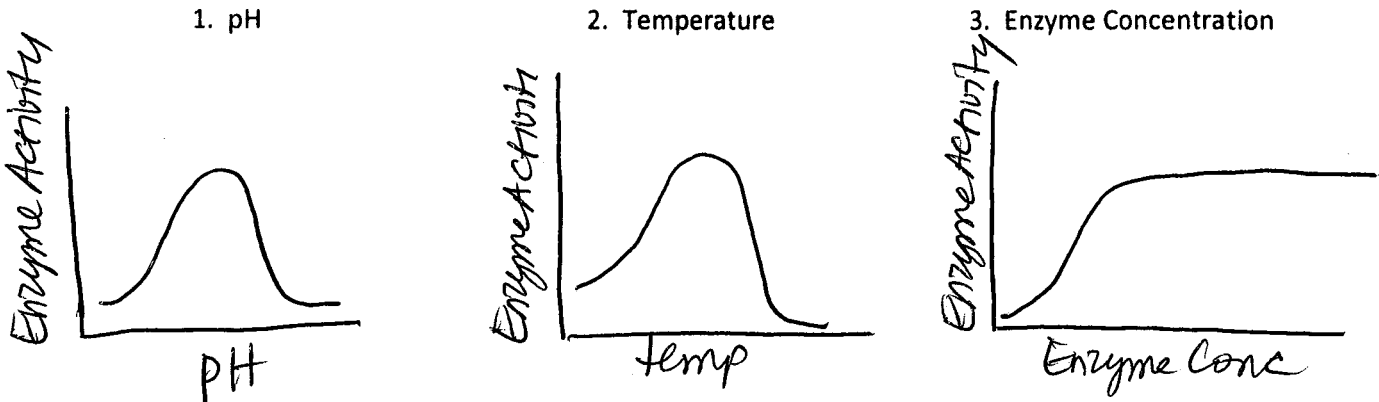
Enzymes are proteins, and a protein's function is determined by its SHAPE. The interaction between an enzyme and its substrate (the molecule whose reaction is catalyzed by the enzyme) can be explained through the lock and key hypothesis. **DRAW** an explanation of the lock and key hypothesis below:



Enzymes only react with **specific** substrates (reactants). Note the relationship below and fill in the missing boxes.

Enzyme	lipase	maltase	protease	amylase
Substrate	lipid	maltose	protein	amylose

Graph the relationship between the following factors and enzyme function



Building Blocks of each Nutrient Macromolecule

Building Blocks	Macromolecule	Enzymes that BREAKDOWN (hydrolyze) the Macromolecule during DIGESTION
amino acids	Protein	protease
simple sugars or monosaccharides ^{ex} glucose	Carbohydrate (starch in plants, glycogen in animals)	Amylase, maltase
glycerol + 3 fatty acids	Fats/Lipids	lipase

PROTEIN SYNTHESIS:

After your digestive system has digested a protein and absorbed the digested products (amino acids) through your small intestine, what part of your cells will use these products to create new proteins? ribosomes. What part of your cell will give the instructions to create these new proteins (a process called protein synthesis)? nucleus. What are the two processes involved in protein synthesis? transcription and translation.

Energy

Energy from the sun is captured by autotrophs (a.k.a. producers) through the process of **photosynthesis**. Cells of *all organisms* can use the products of photosynthesis and convert the stored energy into usable energy (ATP) through the process of **cellular respiration**.

Complete the following table to compare these two processes.

	Photosynthesis	Aerobic Cellular Respiration
Source of energy	Sun	Glucose
Where the energy ends	glucose	ATP
Where the process occurs	chloroplasts	mitochondria
When this process occurs	daytime	day + night (all the time)
Raw materials (reactants)	$CO_2 + H_2O$	$C_6H_{12}O_6 + O_2$
Products made from this process	$C_6H_{12}O_6 + O_2$	$CO_2 + H_2O + ATP$
Complete Chemical Reaction	$6CO_2 + 6H_2O \xrightarrow{\text{light}} C_6H_{12}O_6 + 6O_2$	$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + 36ATP$
Importance of this process to living things (besides its relationship to the other process)	<ol style="list-style-type: none"> 1. way to capture solar energy 2. way to create food to support food chain 	<ol style="list-style-type: none"> 1. way to convert energy from glucose into a usable form (ATP) 2.
Relationship to other processes	produces glucose + O_2 needed for respiration	produces $CO_2 + H_2O$ needed for photosynthesis

Mitosis/Meiosis

Complete the following table comparing mitosis to meiosis for a fruitfly that has 8 chromosomes.

	Mitosis	Meiosis
# of chromosomes in parent cell	8	8
# of chromosomes in daughter cell	8	4
Number of cell divisions	1	2
# of functioning cells produced from original	2	For sperm cells: 4
		For egg cells: 1
Genetic makeup of daughter cells (same or different)	same	different
Where it occurs/function of cells produced	body cells	in ovaries to make eggs in testes to make sperm
Example of an organism that uses this process for reproduction	Yeast and bacteria	Humans

Arrange the following phases of **MITOSIS** in the correct order

telophase anaphase metaphase interphase prophase

interphase → prophase → metaphase → anaphase → telophase

Which type of reproduction, sexual or asexual, results in *genetic variation* of offspring? Sexual

Why is *genetic variation* beneficial to the survival of a species?

makes a species less vulnerable to disease

Define the following terms: gamete, gametogenesis, zygote

gamete → sex cell (ex. egg or sperm)

gametogenesis → meiosis (creation of gametes)

zygote → fertilized egg