

control: The one you do not test (comparison)

# 1<sup>st</sup> Nine Weeks Study Guide for Biology

constant: stay the same

In Correlation with the Suffolk Public Schools Pacing Guide

Answer each question on a separate sheet.

IV: what "I" change (manipulated variable)

DV: changes b/c of IV (responding variable)

## 1. The Nature of Science

A. Define the parts of the experimental design.

B. Define theory.

C. If a theory is challenged by new evidence, which of the following could occur? *can be modified.*

A. The theory could be altered

B. The theory is accepted, not the evidence

C. The evidence is wrong

D. A vote is taken on whether to accept the new evidence

D. Theories help scientists to:

A. Explain large bodies of data

B. prove hypotheses

C. determine truth from lies

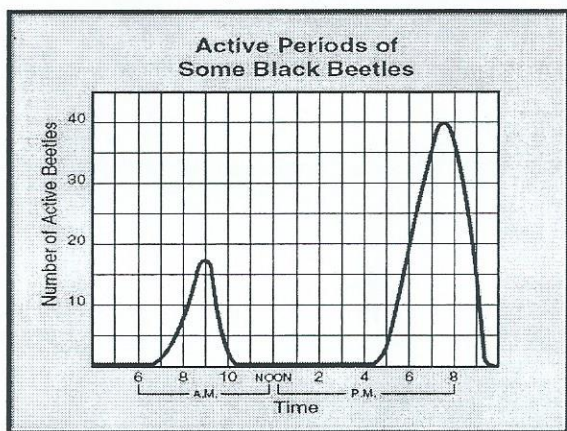
D. propose new ideas about how the world works

E. What are the IV and DV in this data table?

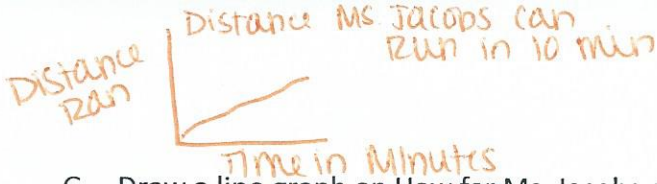
Experimental Plot (4m X 15m)	Wavelength (nm)	Wave Intensity (Joules/m <sup>2</sup> )	Crop Yield (g/m <sup>2</sup> )
A	357.6	0	110
B	357.6	8	110
C	357.6	20	30
D	357.6	25	20

*IV: intensity of uv light  
DV: crop production.*

F. What would be a possible conclusion for this data?



*Beetles are least active during the sunniest hours of the day. They are most active around 9 am and 7 pm.*



G. Draw a line graph on How far Ms. Jacobs can run in ten minutes. Label: the IV, DV, Title, Units.

H. Define qualitative data. Give three examples.

descriptions ex. color, smell, texture.

I. Define quantitative data. Give three examples.

quantity ex. length, weight, # of items, temp.

J. Why is it best to do as many trials in an experiment as possible?

more trials = more accurate results

K. Define accuracy and precision.

how close a measured value is to the actual value. precision: how close the measured values are to each other.

L. What is collaboration? Why is it important?

scientists work together.

M. A student wanted to test the effect of 3 three different pH's on enzyme action. He used the same enzyme, the same equipment, and the same temperature to test the enzyme. He recorded his data on a data table.

Problem: what is the effect of pH on enzyme action?

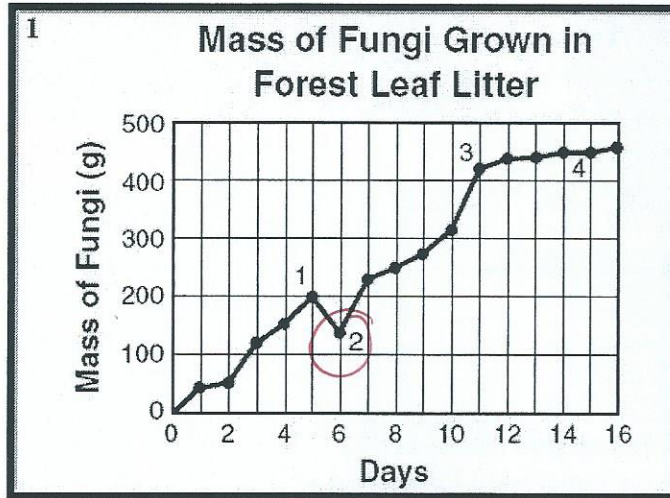
Hypothesis: ~~if an enzyme~~ If pH is changed, enzyme will work differently.

IV: pH

DV: enzyme action

Constants: same enzyme, same equipment, same temperature.

N. What is a possible source of error for the data presented below:



- may have used a different balance to record the mass  
- fungi may have been dry

O. What does abundant and optimal mean?

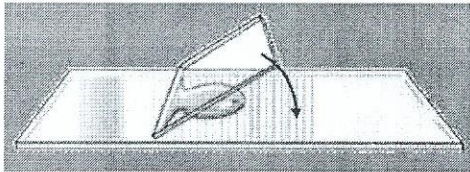
lots of something/plentiful → ideal / preferred / best.

P. What is an inference? Give an example.

guess/prediction based on an observation ex. the car won't start b/c it's out of gas.

## 2. Lab Equipment and Safety Protocol

A. The picture shows a cover slip correctly being lowered onto a slide. This method is used because it?



reduces the # of air bubbles on the slide.

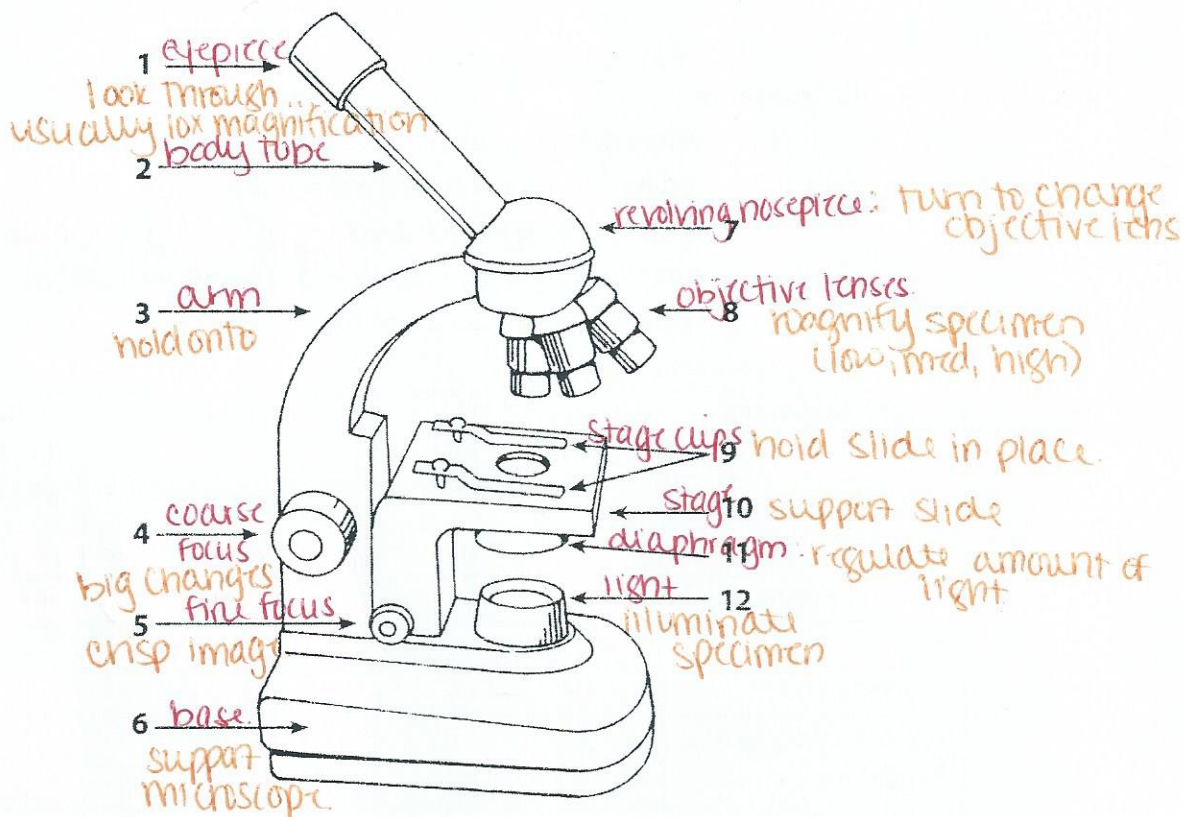
B. List five important safety rules and/or procedures in a laboratory classroom.

C. What is probeware used for?

give an electronic/digital reading of pH, temp, etc.

1. read directions / ask questions
2. no horseplay
3. tie hair back / no loose clothing
4. no eating / drinking
5. clean work area.

D. Label the parts of the microscope below and their uses.



E. Describe how total magnification is determined. Give an example. (Use microscope notes)

eyepiece  $\times$  objective lens ex.  $10 \times 40 = 400 \times$  magnification.

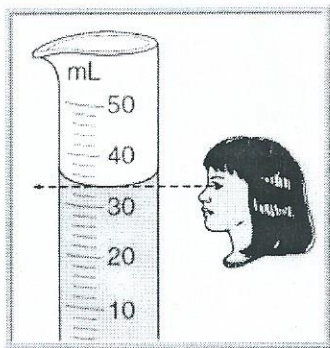
F. What is the field of view? How can the size of an organism be determined in a microscope? Explain.

what you see when you look in the eyepiece (decreases as magnification increases)

G. An experiment was conducted to test the effectiveness of four different fertilizers on plant growth. Two grams of each fertilizer were to be diluted in 9 milliliters (mL) of water before adding to a plant. Which of the following measuring devices would introduce the least error into the measurement of the 9 mL of water?

- A. 10 L graduated cylinder
- B. 10 mL graduated cylinder
- C. 10 mL beaker
- D. 10 L beaker

H. What is the correct procedure to measure a liquid with a graduated cylinder?



I. What is the volume in the picture below? 34 mL

- read from the bottom of the meniscus at eye level.

### 3. Scientific Literature

- A. When doing any scientific research, what are the best sources for getting accurate and valid information? *scientific journals, newspaper*
- B. What are the best websites? *.gov, .edu, some .org some websites*
- C. What kind of information does a scientific key tell you?

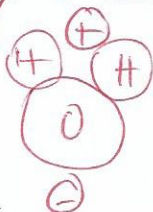
### 4. The Cell: General Overview of Structure and Function

Fill in the chart below:

Cell Organelle	Found in? (Plant, Animal, Bacteria)	Function?	Has the same function as what in the human body?
Nucleus	P, A	brain / holds DNA	brain
Cell membrane	P, A, B	allow stuff ↑/↓	digestion, eat/waste
Ribosomes	P, A, B	make protein	_____
Cell Wall	P, B	Structure	bones
Smooth Endoplasmic Reticulum	P, A	lipid synthesis	nervous, circulatory
Rough Endoplasmic Reticulum	P, A	transport protein	digestive.
Golgi bodies	P, A	packaging	_____
Mitochondria	P, A	power plant	muscles.
Chloroplast	P	photosynthesis	_____
Lysosome	A (some P)	digestion	digestive/immune.
Centrioles	A	cell division	_____
Genetic Material	P, A, B	pass on genes	DNA
Flagellum/Cilia	A, B	motility	limbs
Cytoplasm	P, A, B	chemical rxns	metabolism
Vacuole	P, A (many small)	food storage	fat

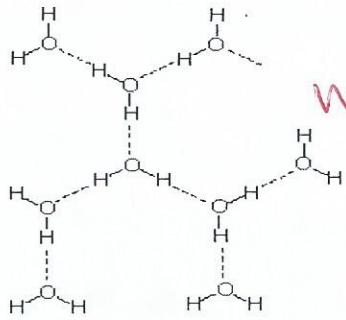
### 5. Importance of Water to Life

- A. Define adhesion and cohesion. *A: water sticks to something other than water. C: water sticks to water*
- B. Why is water being the universal solvent good and bad? *breaks down all polar substances*
- C. What is polarity? *opposite charges on each end of a molecule.*
- D. Draw a water molecule below and label its charges.
- E. What is hydrogen bonding and why is it important in water?



*When water molecules connect to each other. Allows most properties to occur.*

- F. Why does water fall in drops? **cohesion**
- G. Describe surface tension and give an example of it. **skin on surface of water ex. insects walk on water**
- H. Describe capillary action and give an example of it. **water moving against gravity in tubes ex. plants.**
- I. Describe specific heat capacity and give an example of it. **water holds onto heat, resists temp change.**
- J. What does hydrophilic and hydrophobic mean? **ex. prevents bodies of water from freezing solid, maintain internal body temp.**
- K. Why is water important in cell homeostasis? **water ioning, water freezing, resists temp change, dissociates into ions**
- L. Describe the picture below.



Water molecules bonded to each other via H-bonds (cohesion)

## 6. Macromolecules: Carbs, Lipids, Proteins, Nucleic Acids

A. Fill in the chart below:

Macromolecule	Monomer	Function(s)	Functional Group Present or Structural Formula	Examples
Carbohydrates <b>CHO</b>	Monosaccharide 	- short term energy - cell wall in plants.	- OH (alcohol) - C=O - C=O H aldehyde	Sugars & starches.
Lipids <b>CH some O</b>	glycerol w/ FA 	- insulation - protection - long term energy - cell memb.	- C=O ketone (sugar from fat break down) - carboxyl group	Fats, oils, waxes.
Proteins <b>ONCH</b>	amino acid 	- structure - growth - repair - reg cell rxn	H-N = amino group C=O -C=O H = carboxyl group	- muscle - bones - hair - enzymes
Nucleic Acids <b>PONCH</b>	nucleotide 	- store & transmit genetic info.		DNA / RNA

B. What ends in -ose? **sugars.**

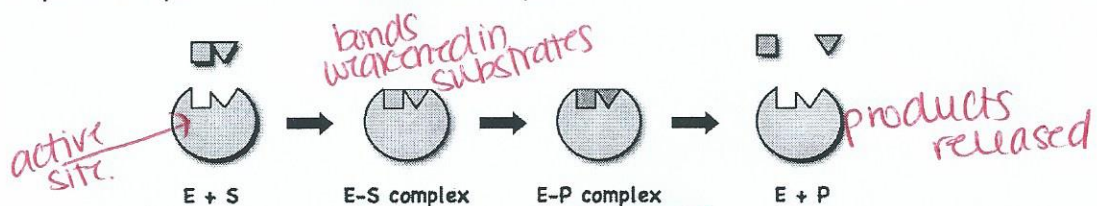
C. What are the four structures of proteins? Explain each.

- 1° = sequence of amino acids.
- 2° = protein chains coil or fold.
- 3° = protein chains join together.
- 4° = globular (many protein chains)

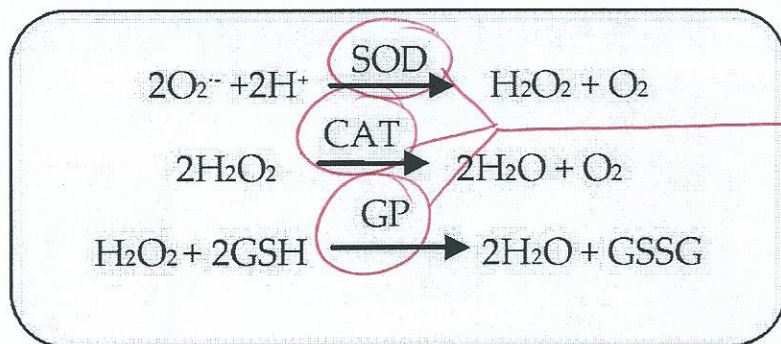
- D. What does denature mean? *break down/unfold a protein (no longer works)*
- E. Describe or draw dehydration synthesis using two amino acids to create a polypeptide. *join 2 amino acids by removing H<sub>2</sub>O*
- F. Define homeostasis. *state of balance/equilibrium.*
- G. What does organic mean? *contains carbon.*
- H. Give examples of a monosaccharide, disaccharide, and a polysaccharide. *glucose, lactose, starch/cellulose*
- I. What is the difference between saturated and unsaturated fats? *no double bonds - double bonds*

## 7. Enzyme Action and Rates

- A. What factors affect enzymes? *temp, pH, environment*
- B. Define metabolism. *all chemical rxns in an organism.*
- C. Define catalyst. *speeds up a chemical rxn*
- D. What is activation energy? *amt of energy needed to start a rxn.*
- E. Explain the picture below. Define each part.



- F. What do all enzymes end in? *-ase. Substrates transformed*
- G. Describe what is over the yields sign (arrow) in the following chemical equations.



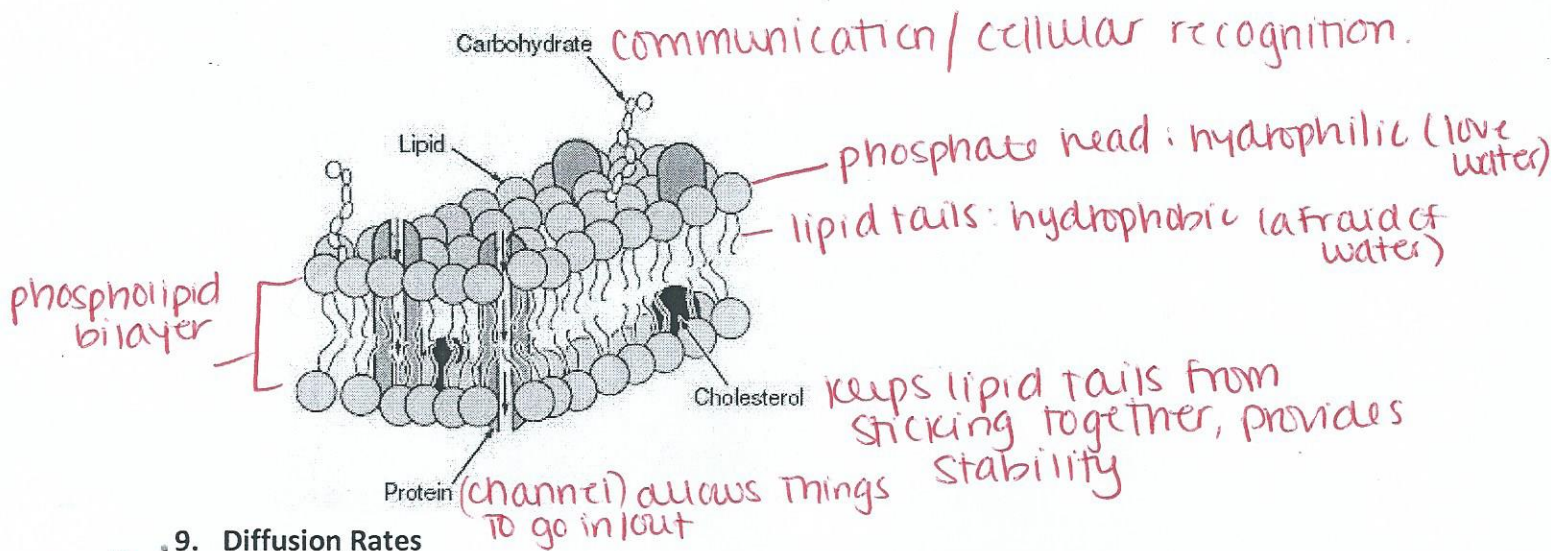
*catalyst (speeds up the rxn)*

## 8. Cell Membrane

- A. What are the different names of the cell membrane? *fluid mosaic model, phospholipid bilayer, plasma membrane*
- B. Define the function of each of the parts in the phospholipid bilayer below.

### Functions of Cell Membrane:

1. Maintains homeostasis (balance/equilibrium)
2. Regulates what enters/leaves the cell.
3. Acts as a barrier (protects)
4. communicates w/ other cells.

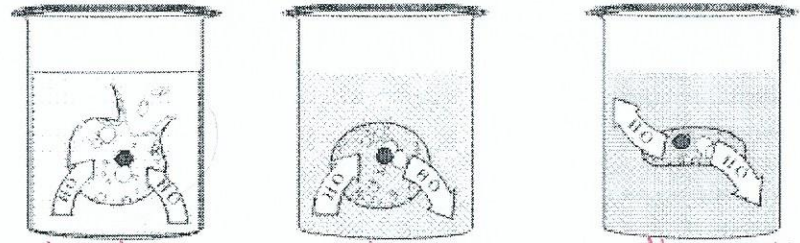


9. Diffusion Rates

ACTIVE  
PASSIVE

- A. Define diffusion: *mvmt of molecules from ↑ to ↓ (no energy needed)*
- B. Define active transport. Give an example. *mvmt from ↓ to ↑ (active: needs energy) (Na/K pump)*
- C. Define passive transport. *No energy needed (mvmt along/down gradient)*
- D. Define facilitative diffusion. *diffusion w/ assistance*
- E. Define exocytosis and endocytosis. *leave cell / enter cell*
- F. Define osmosis. *mvmt (diffusion) of H<sub>2</sub>O from ↑ to ↓*
- G. What are the three types of osmosis? Give examples or draw each in salt solutions. *phagocytosis: eating / pinocytosis: drinking*

H. Describe each letter in the picture below:



A. Hypotonic B. Isotonic C. Hypertonic

I. Describe why cells stay relatively small in size. Explain (volume to ratio). *volume increases faster than surface area*

↳ Isotonic: outside is equal to inside, equal mvmt in both directions, no change in cell size.

environment: 10% salt / 90% H<sub>2</sub>O    cell: 10% salt / 90% water

Hypotonic: more solute inside cell than outside, water flows into cell, cell grows, salt pulls water into cell

environment: 10% salt / 90% water    cell: 20% salt / 80% water

Hypertonic: less solute inside cell than outside, water rushes out & cell shrinks, salt pulls water out

environment: 15% salt / 85% water    cell: 5% salt / 95% water

\*WATER FLOWS FROM HIGH TO LOW!!