Name: Key Date: _____ Period: _____

Biology Semester 1: Final Exam Study Guide

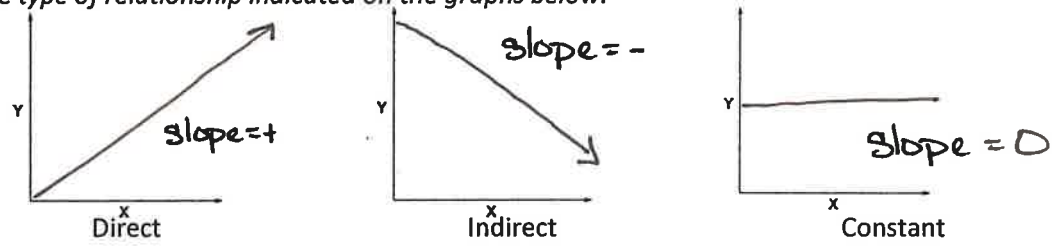
Test Date: See Schedule

1. Graphing Terms/Relationships.

Define the following terms:

1. Independent Variable: The one factor in an experiment manipulated by the scientist
2. Dependent Variable: The factor in an experment that is measured as results
3. Control: Trials where the IV does not exist, or is kept at a standard
4. Qualitative Data: Describes the characteristics of something
5. Quantitative Data: Involves the numerical measurement of something

Draw the type of relationship indicated on the graphs below.



Which axis would represent the independent variable? x-axis

Which axis would represent the dependent variable? y-axis

2. What are the characteristics of living things? Provide an example for each.

G: Grow & Develop - Changes in size and shape over time. Babies grow into adults; seedlings become plants

R: Reproduction & Inheritance - Pass on genetic information to offspring; May be sexual or asexual

O: Obtain Nutrients & Energy - Ingestion of materials & breaking them down to get energy. Eating; cellular respiration; photosynthesis

R: Respond to Environment - Changes and/or movement based on interaction with outside stimuli; Plant turns leaves toward sun

A: Adapt through Evolution - Changes made to a species over time through natural selection; Survival of the fittest.

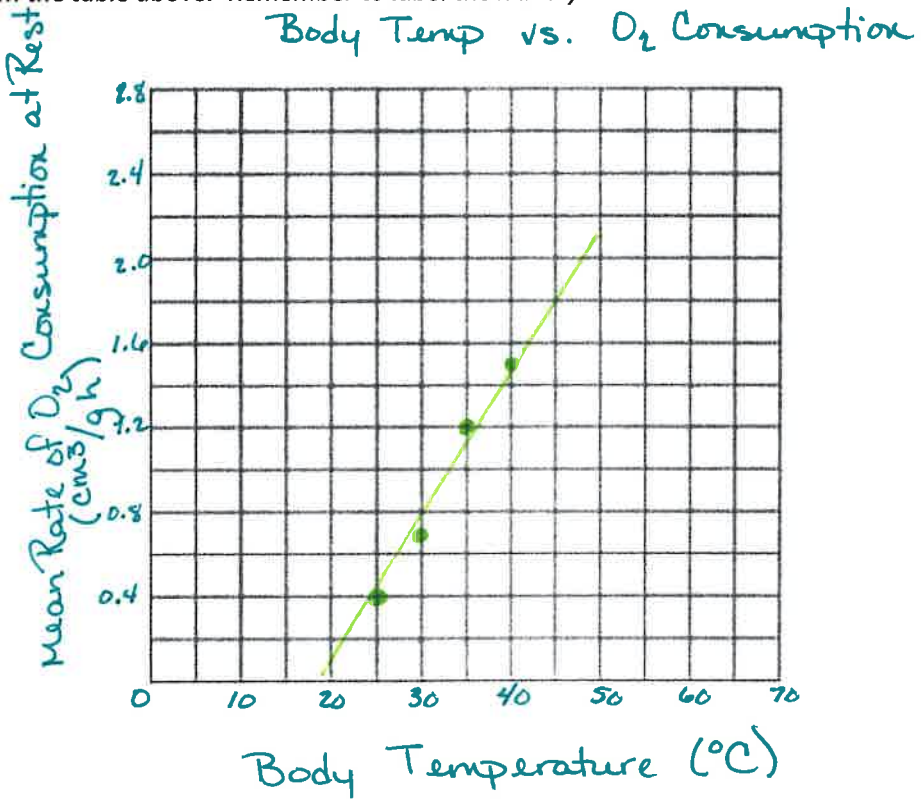
C: Cellular - Made of cells, whether unicellular or multicellular organisms.

E: Environmental Homeostasis - Removal of waste products and feedback loops to maintain internal equilibrium.

Desert iguanas are lizards that live in hot, dry conditions. Scientists measured the rate of oxygen consumption (intake) of desert iguanas at different body temperatures. Some of the results are shown in the table below.

Body temperature/°C	Mean rate of oxygen consumption at rest/ $cm^3 g^{-1} h^{-1}$
25	0.4
30	0.7
35	1.2
40	1.5

Graph the data from the table above. Remember to label the x and y axis.



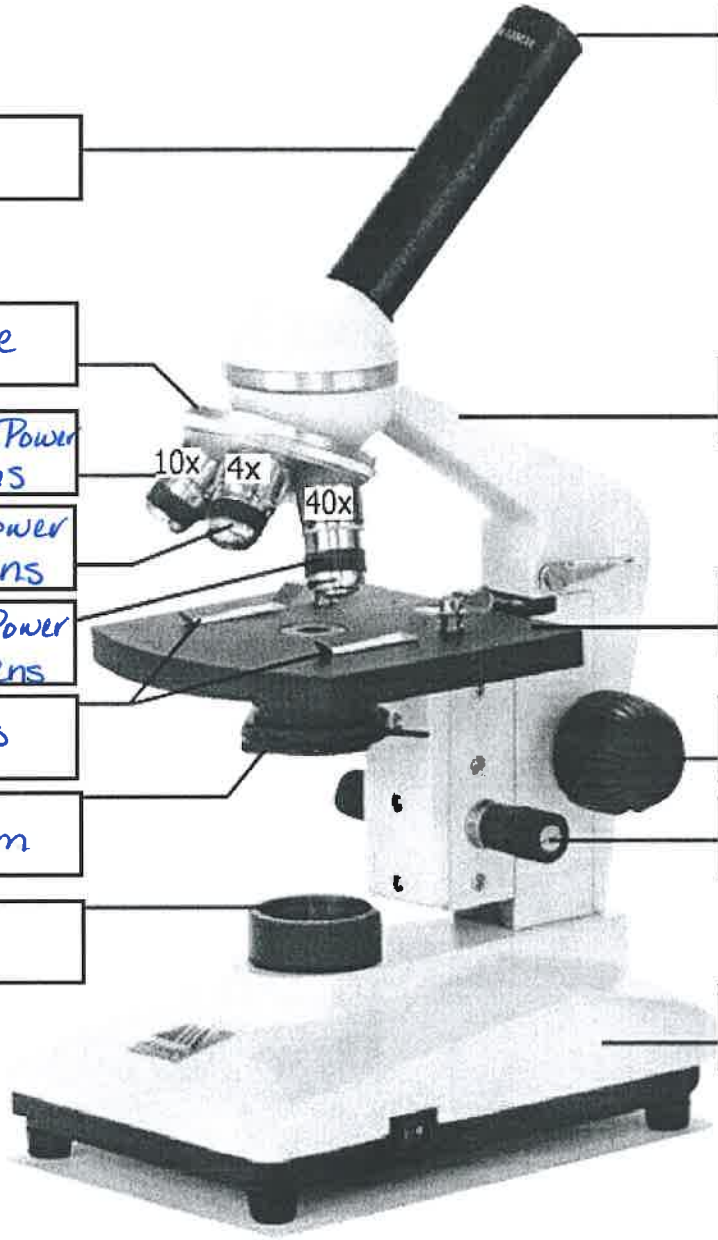
3. Levels of Organization: Fill in the blank and provide examples for each level below.

Least Complex ⟶ **Most Complex**

Atom	Molecule	Cell	Tissue	Organ	System	Organism
Examples	*Examples*	*Examples*	*Examples*	*Examples*	*Examples*	*Examples*
Oxygen	Water (H_2O)	Plant Cell	Muscle Tissue	Heart	*Digestive System*	Human
Carbon	CO_2	Animal Cell		Stomach	*Skeletal System*	Tree
Hydrogen	Salt (NaCl)					Bird

Name_____

Microscope Labeling



1. Eye Piece
2. Nose Piece
3. 10x Medium Power Objective Lens
4. 4x Low Power Objective Lens
5. 40x High Power Objective Lens
6. Stage Clips
7. Diaphragm
8. Light
9. Ocular Lens
10. Arm
11. Stage
12. Coarse Adjustment Knob
13. Fine Adjustment Knob
14. Base

Microscope Use:

15. When focusing a specimen, you should always start with the 4x Low objective.
16. When using the high power objective, only the Fine Adjustment knob should be used.
17. The type of microscope used in most science classes is the Compound microscope.
18. You should carry the microscope by the Arm and the Base.
19. The objectives are attached to what part of the microscope (it can be rotated to click lenses into place?)
Nose Piece
20. A microscope has an ocular objective of 10x and a high power objective of 50x, what is the microscope's total magnification? 500x

Total Magnification = (Ocular)(Objective)
= (10x)(50x)
= 500x

4. Macromolecules

Macromolecule	Examples	Elements contained in the macromolecule	Monomer of Macromolecule	Function of the Macromolecule
Carbohydrates	Sugar Starch Fiber	C, H, O ratio of 1:2:1	Saccharides (simple sugars)	•Main source of energy for organisms •Plant structures
Lipids	Oils Butter Lard	C, H, O No ratio	Fatty Acids Glycerol	•Store energy •Cushion organs •Cell membranes
Nucleic Acids	DNA RNA	C, H, O, N, P	Nucleotides	•Store and transmit genetic information
Proteins	Enzymes Hormones Antibodies	C, H, O, N	Amino Acids	•Transport •Membranes •Structural

All macromolecules are organic. What does this mean (What element must be present)? (Carbon Compounds) Must have carbon

What 2 body systems are most important to help carry/transport these nutrients throughout our body?

1. Circulatory System 2. Digestive & Respiratory Systems

5. Homeostasis

Define homeostasis:
The state of steady internal physical and chemical conditions maintained by living systems.

NEGATIVE FEEDBACK	POSITIVE FEEDBACK
Definition: The product of a reaction leads to an increase in the reaction	*Definition:* The product of a reaction leads to a decrease in the reaction
Examples: •Apples ripening •Blood clotting •Contractions in childbirth	*Examples:* •Body temperature regulation •Blood pressure regulation •Fluid regulation

Most of the feedback mechanisms in the human body are Negative feedback
Positive or Negative

Review Questions:

1. Match the cell parts in the first column with the descriptions in the second column. Each cell part and description should be used only once.

Cell Structure		Description
A. Ribosome	S	Anchors organelles, holds nucleus in place
B. Golgi apparatus	U	Released by the Golgi apparatus, travels to the surface of the cell to release its contents
C. Nucleolus	A	Synthesizes proteins
D. Microtubules	C	Where ribosomes are made
E. Cell membrane	K	Controls cell function and site of DNA storage
F. Rough ER	D	Allows movement of organelles within the cell
G. Centriole	H	Shuttles proteins between organelles
H. Transport vesicles	Q	Provides storage of water, chemicals, and wastes in plant cells
I. Mitochondrion	E	Controls passage of molecules in and out of the cell
J. Flagella	F	Where proteins are made
K. Nucleus	G	Organizes the spindle in cell division
L. Smooth ER	P	Converts solar energy to useable cell energy
M. Cell wall	O	Allows contraction and movement of cells
N. Lysosome	J	Allows the cell to move in space
O. Microfilament	L	Synthesizes and transports lipids
P. Chloroplast	M	Shapes plant cells
Q. Central vacuole	B	Modifies and exports proteins
R. Chromosome	I	Converts the energy from nutrients into ATP
S. Intermediate filaments	N	Digests food vacuoles and damaged organelles
T. Organelle	R	Stores genetic information, located in nucleus
U. Secretory vesicles	T	General name for structures in the cytoplasm

2. List seven differences between plant and animal cells.

Plant Cells have:
- Central Vacuole
- Chloroplasts
- Cell Walls

Animal Cells Have:
- Centrioles
- Lysosomes
- May have: Cilia Flagella

3. Describe the steps by which a protein is first synthesized, and then exported by a cell.

1. Ribosomes synthesize (make) the protien
2. The protein moves through the membrane into the rough ER
3. It exits the rough ER in a transport vesicle and brought to the Golgi Apparatus.
4. The protein is modified by the Golgi Apparatus and released in a new vesicle
5. The protein travels to organelles for use

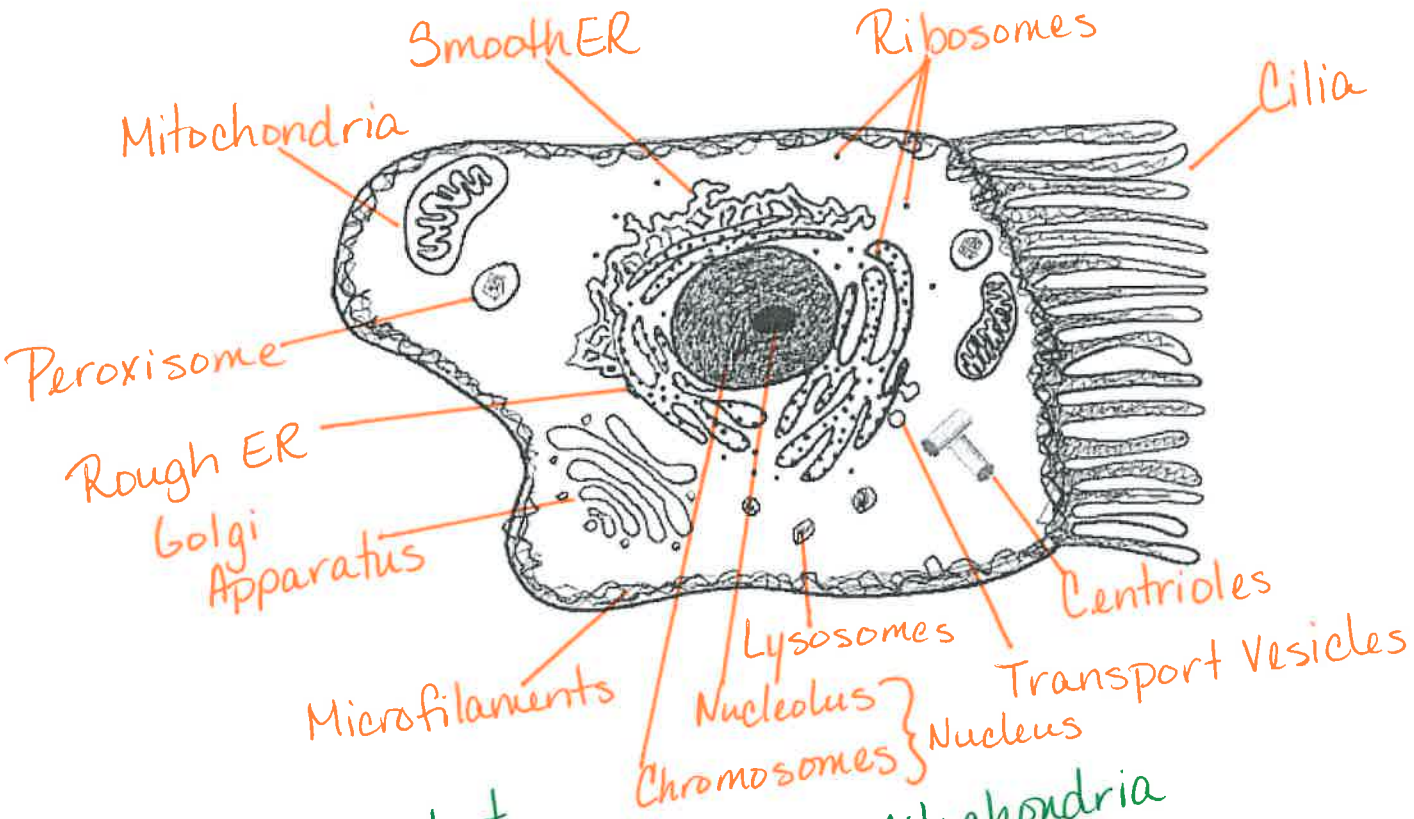
4. Is the plasma membrane the outer boundary of all cells?

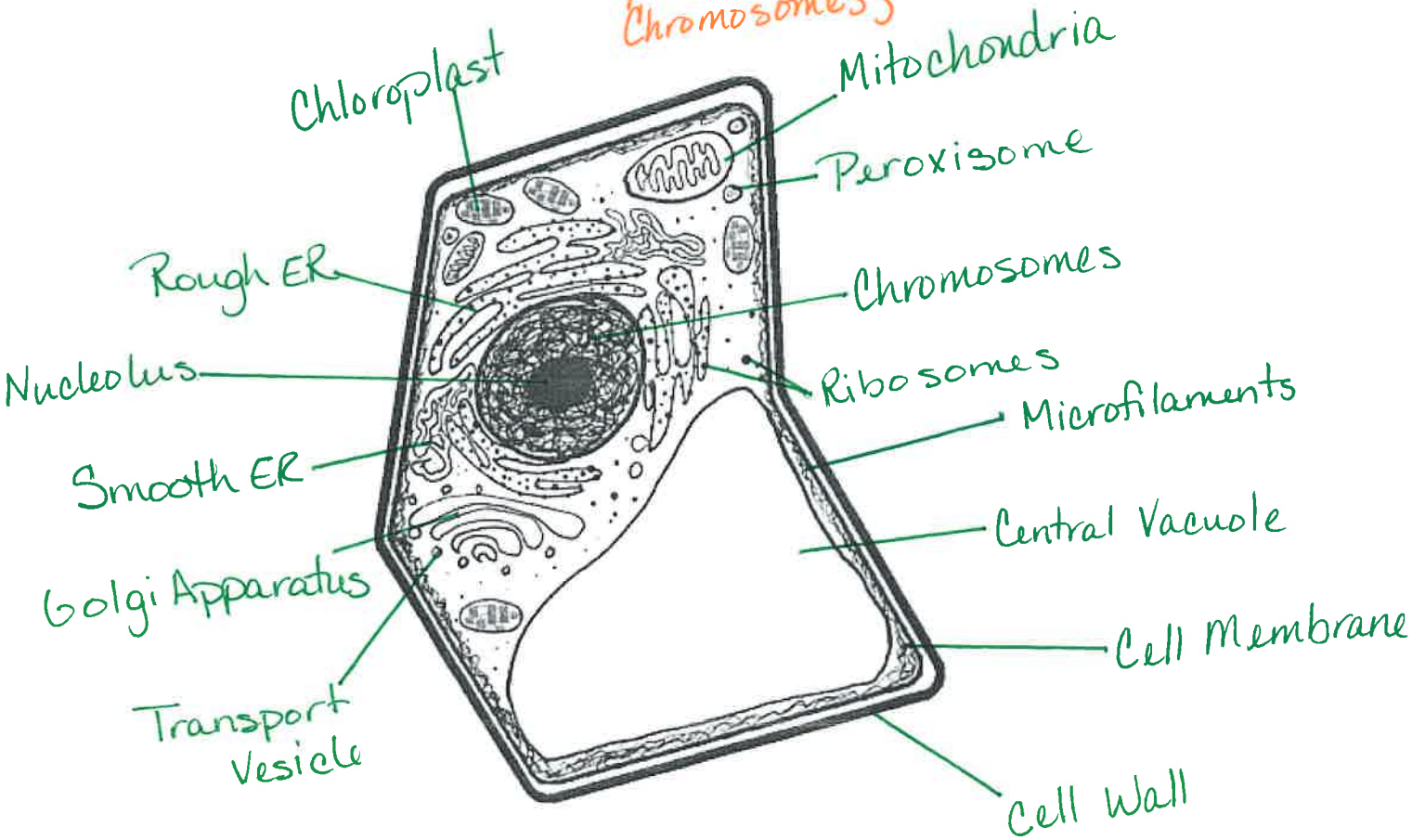
No - Plant cells have the cell wall outside of the cell membrane and other cells can have structures, like cilia and flagella, outside the cell membrane.

5. How might it benefit an organism to have the nucleus near the centre of its cells?

By being in the center of the cell, the nucleus is protected by the cell membrane and the space between the outside of the cell and the nucleus. This also minimizes the distance between the nucleus and other organelles.

6. Label all the major structures in each of the following diagrams. Can you determine which cell is the plant cell and which cell is an animal cell?





6. Homeostasis-- Osmosis and Diffusion

Define the following terms:

Solute: The substance in a solution that is dissolved

Solvent: The substance in a solution that does the dissolving.

Solution: A homogeneous mixture where one substance dissolves into another.

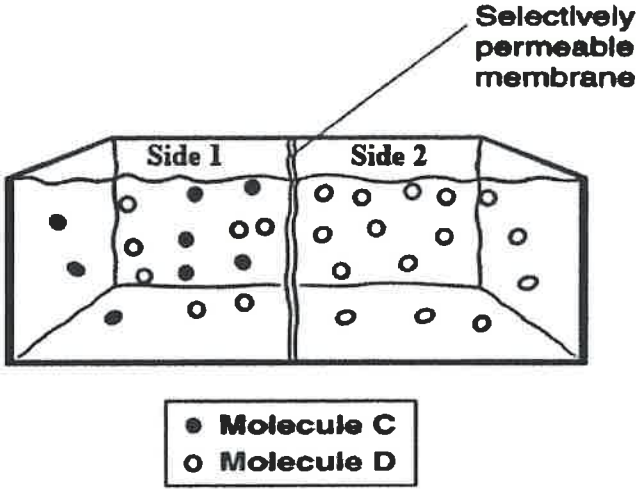
High Concentration: Hypertonic - Contains more solute and less water.

Low Concentration: Hypotonic - Contains more water and less solute.

Equilibrium: Isotonic - Levels of solute and solvent are equally dispersed.

Osmosis: The movement of water across a membrane from high to low.

Diffusion: The spreading of molecules from region of high concentration to low.



A student put together the experimental setup shown above. The selectively permeable membrane between Side 1 and Side 2 allows movement of both types of molecules shown.

Which way would Molecule C move? Toward side 2

Which way would Molecule D move? Toward side 1

Why do we say that equilibrium is *dynamic*? Molecules will still move back and forth with no net change.

Osmosis and diffusion helps organisms to maintain homeostasis. Explain how it is useful in the following examples:

1. An individual eats a very salty meal. How would this affect osmosis in their body?

The body would give up water to the salt and absorb salt into the cells - possibly leading to dehydration and plasmolysis

2. An individual is exercising and rapidly increasing their heartrate. How does diffusion help to regulate carbon dioxide and oxygen in their body?

Increased heart rate means increased blood flow. The CO_2 and O_2 will be able to diffuse across the membranes to keep the muscles working.

Photosynthesis Equation (in words):

Carbon Dioxide + Water + Sunlight (energy) → Oxygen + Glucose

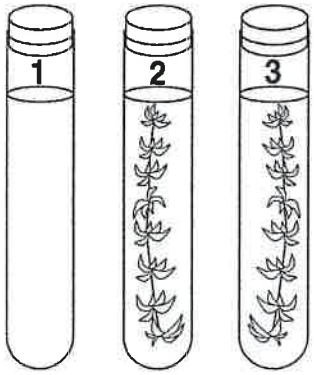
(Reactants) (Products)

Cellular Respiration Equation (in words):

Oxygen + Glucose → Carbon Dioxide + Water + ATP (energy)

(Reactants) (Products)

A student poured a solution of bromothymol blue indicator into three test tubes. Then, he placed an aquatic plant in two of the test tubes, as shown below. He placed a stopper on each test tube and placed them all in the dark for 24 hours. Bromothymol blue turns blue in the presence of O_2 and from blue to yellow in the presence of CO_2.

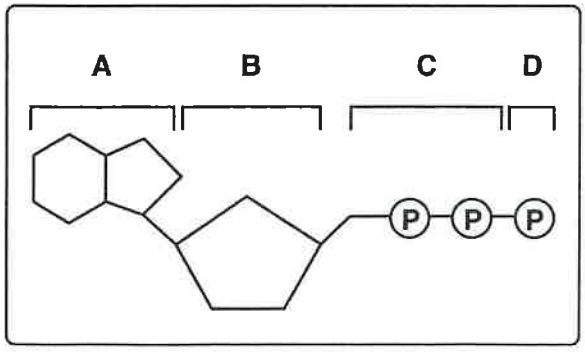


What would happen to test tube 2 and 3 if sunlight was added?

They would turn blue

What would happen to test tube 2 and 3 if you exhaled into each using a straw?

They would turn yellow



What molecule is this? ATP

How is this molecule released?

Energy is released by breaking off the third phosphate group.

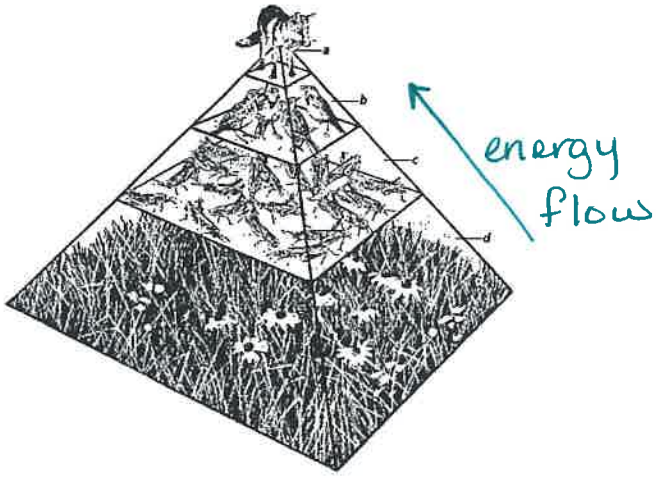
What process creates this molecule?

Cellular Respiration

The 3 steps of Cellular Respiration:

Glycolysis → Krebs Cycle → Electron Transport Chain

Draw the arrows in the direction that energy flows and label each level with the amount of energy it obtains and whether it holds producers, primary consumers, secondary consumers, or tertiary consumers.



A: Tertiary Consumers 0.1%

B: Secondary Consumers 1%

C: Primary Consumers 10%

D: Producers 100%

What happens to the energy that is not passed on to the next trophic level?

It is lost as heat.

Write whether each increases (+) or decreases (-) the amount of CO_2 in the atmosphere:

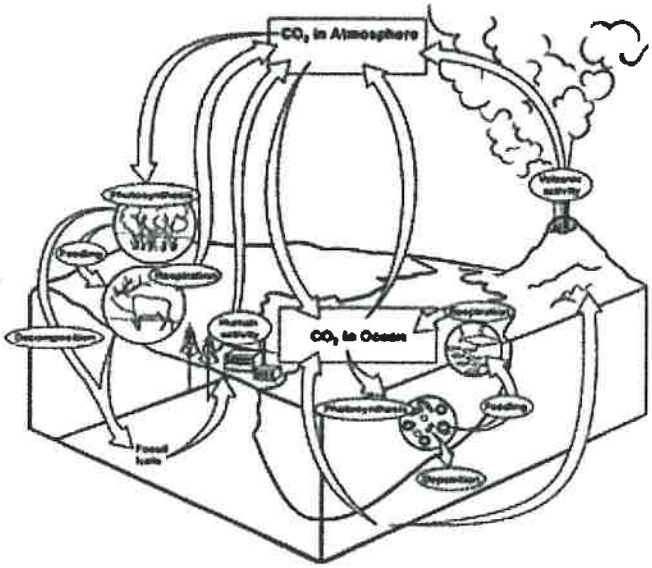
Ocean: −

Photosynthesis: −

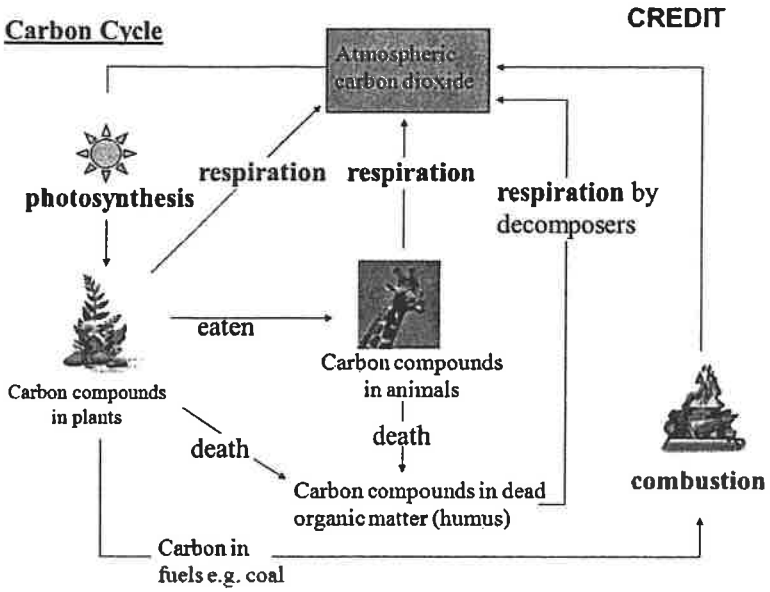
Volcanic Activity: +

Human Activity: +

Respiration: +



The Earth's carbon supply is a nutrient cycling process involving all living matter.



What processes in the carbon cycle add CO_2 to the atmosphere?
Respiration & Combustion

What process in the carbon cycle removes CO_2 from the atmosphere?
Photosynthesis

What does this process require? Sunlight, H_2O, and chlorophyll

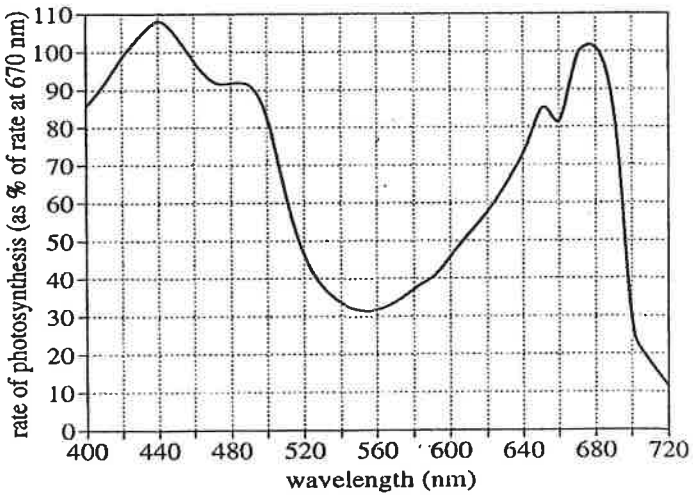


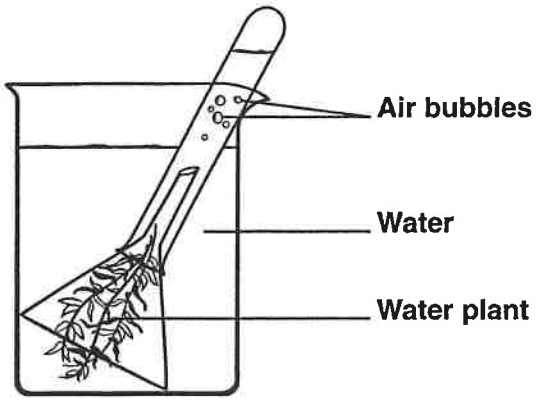
Table 1

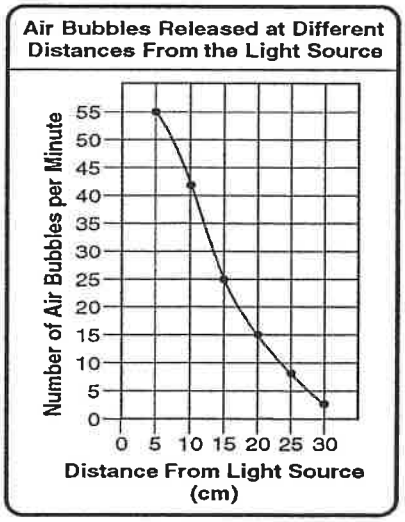
Color	Wavelength (nm)
Violet	380–430
Blue	430–500
Green	500–565
Yellow	565–585
Orange	585–630
Red	630–750

Using the above graph and table, which two pigments need to be absorbed to reach the highest rate of photosynthesis? Blue (440nm) and Red (680 nm)

Using the graph and table, which pigment color is absorbed at 600 nm? Orange

A student prepared two beakers with identical pieces of a water plant as shown below. She placed one beaker in the shade and the other beaker beside a fluorescent lamp. She then systematically changed the distance from the beaker to the lamp. She counted the bubbles given off by each piece of the water plant. Shown here is the graph of the data for the beaker she placed in the light.





Which distance from the light source produced 15 bubbles per minute? 20 cm

What are the air bubbles made of if they increase with the addition of light?

Oxygen

Label each pathway:

A: Lactic Acid Fermentation

B: Ethyl Alcohol Fermentation

C: Cellular Respiration (Aerobic)

Which pathways do not require oxygen?

A and B

Pathway A	Pathway B	Pathway C
Glucose	Glucose	Glucose
↓	↓	↓
Pyruvic acid	Pyruvic acid	Pyruvic acid
↓	↓	↓
	Carbon dioxide	Carbon dioxide
	+	+
Lactic acid	Ethyl alcohol	Water
+	+	+
2 ATP	2 ATP	36 ATP