UNIT 1: CELLULAR STRUCTURES

SB1: Students will analyze the nature of relationships between structures and functions in living cells.

a. Explain the role of cell organelles for both prokaryotic and eukaryotic cells, including the cell membrane, in maintaining homeostasis & cell reproduction.
b. Explain how enzymes function as catalysts.
c. Identify the function of the four macromolecules.
d. Explain the impact of water on life processes.

SB3: Students will derive the relationship between single-celled and multi-celled organisms and the increasing complexity of systems.

a. Explain the cycling of energy through the process of photosynthesis and respiration.

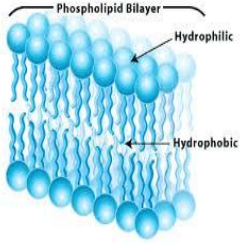
What does the "Theory of Endosymbiosis" state?

Organelle	Function
Golgi	
Ribosome	
Nucleus	
Lysosome	
Chloroplast	
Mitochondria	
Vacuole	
ER	
Nucleolus	

List 3 differences between plant & animal cells.

What is Homeostasis? Give an example.

Describe the structure and composition of the cell membrane. How does the cell membrane help maintain homoestasis?



How does the contractile vacuole in some protists help maintain homeostasis?

Prokaryote	Both	Eukaryote

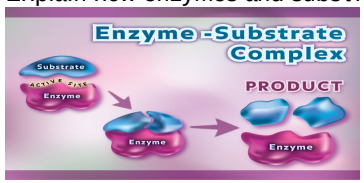
1. What do enzymes do to reaction rate & activation energy?

2. List 4 characteristics of enzymes.

	Elements	Major functions	Monomer	Examples
Carbohydrates				
Lipids				
Proteins				
Nucleic Acids				

What will happen to the rate of reaction if you....
Heat up the enzyme?_____
Cool down the enzyme?_____
Change the pH? _____

Explain how enzymes and substrates react. What changes, etc...?



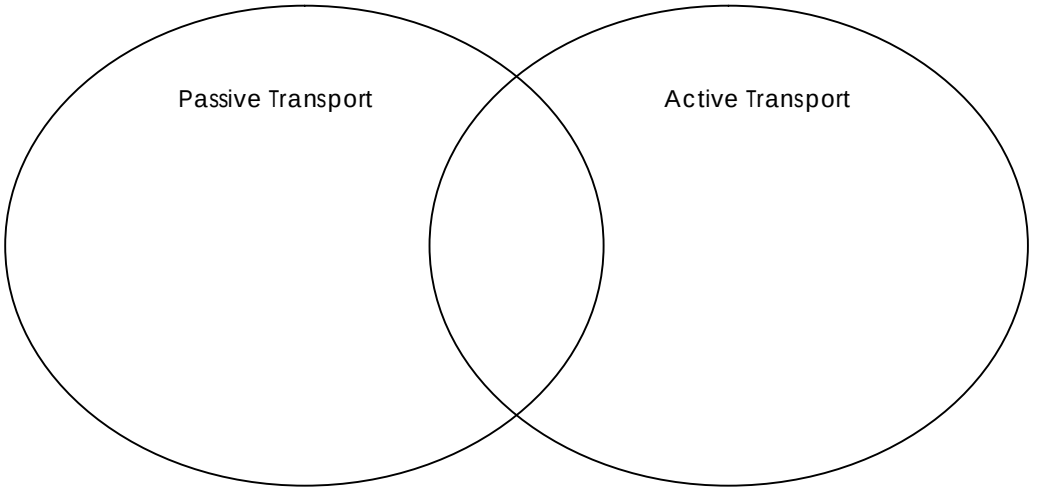
CELLULAR TRANSPORT

1. What is osmosis?
2. What is diffusion?
3. What is facilitated diffusion?
4. What is endocytosis?
5. What is exocytosis?
6. What are membrane pumps? (ex. Na/K pumps)

How is ATP formed? What is stored in the bonds?

Describe each type of solution. What happens to the cell?

Hypotonic	Isotonic	Hypertonic



What is the equation for Photosynthesis?

Define photosynthesis.

What happens in each step of photosynthesis?

What types of organism can do photosynthesis?

Where does photosynthesis take place in the cell?

Compare photosynthesis & respiration.

What is the equation for cellular respiration?

Define cellular respiration.

What types of organism perform cellular respiration?

Explain the 3 steps, location of reactions and amount of ATP produced.

When does fermentation occur?

UNIT 2: HEREDITY

SB2: Students will analyze how biological traits are passes on to successive generations.

a. Distinguish between DNA and RNA.
b. Explain the role of DNA in storing and transmitting cellular information.
c. Using Mendel's Laws, explain the role of meiosis in reproductive variability.
d. Describe the relationships between changes in DNA and potential appearance of new traits including – alterations during replication, insertions, deletions, substitutions, mutagenic factors, radiation, chemicals.
e. Compare the advantages of sexual reproduction and asexual reproduction in different situations.
f. Examine the use of DNA technology in forensics, medicine and agriculture.

A section of a chromosome that codes for a protein is called a _____.

	DNA	RNA
# of strands		
Monomers		
Major function		
Involved in what processes?		
4 Bases		
Location in cell		
Sugar		
What it stands for		

What is the term used to describe the shape of DNA?_____

_____

What forms the backbone?

_____

_____

What's the bond called between the nitrogen bases?

_____

	Mitosis	Meiosis
# of cells & types of cells made		
Genetically identical or different daughter cells?		
What happens to the # of chromosomes?		

What is cytokinesis?

What happens in these phases of mitosis?

Prophase	Metaphase	Anaphase	Telophase

How many chromosomes do humans have in their somatic cells? _____ Gametes?_____

Define:

Diploid:_____

Haploid:_____

What are the parts of a nucleotide?

Which part codes for proteins?

What happens in interphase?

Briefly describe DNA replication.

What are the 3 coding letters called in mRNA?

What are the 3 coding letters called in tRNA?

Transcribe and then translate the following DNA strand: AGT AGC TAG

mRNA_____

amino acid _____

	Transcription	Translation
What happens?		
Where does it occur?		

What are the complementary bases to this DNA strand?

ATA CCG TTA

What are the 3 types of RNA?

What's the bond between amino acids called?

The process of meiosis provides the opportunity for the shuffling of chromosomes. How is meiosis and sexual reproduction helpful for the survival of a species?

What is crossing over? How does this relate to the question above?

What are the sources of genetic variation in organisms?

	Sexual reproduction	Asexual reproduction
# of parents		
Genetics different or same?		
Types	Bacteria & Protista:	Bacteria & Fungi:
Advantages		
Disadvantages		

In rabbits, black fur (B) is dominant over brown fur (b). If one parent rabbit is heterozygous and the other parent rabbit is homozygous brown, what is the probability of producing an offspring with brown fur? (Use a Punnett square to determine your answer.)

What is the phenotypic ratio of the offspring?

What is the genotypic ration of the offspring?

Know these

Genetic terms

- Allele
- Dihybrid
- Dominant
- Gene
- Genotype
- Heterozygous
- Homozygous
- Monohybrid
- Phenotype
- Recessive
- Trait

- Heterozygous: _____
- Homozygous:_____

What are transgenic organisms?

What is gene splicing? How is it used in genetics?

Explain the following types of gene mutations:

Frame Shift – insertion & deletions	Substitution

What is a mutation?

What is a mutagen? List 3.

	How is DNA technology used in the following areas?
Forensics	
Medicine	
Agriculture	

How do mutations help populations survive and adapt (evolve)?

What is genetic engineering?

What is DNA fingerprinting?

What is gene therapy?

What is cloning?

How is PCR used in genetics?

What is nondisjunction? What diseases does it cause?

UNIT 3: EVOLUTION/CLASSIFICATION/ORGANISMS

SB3: Students will derive the relationship between single-celled and multi-celled organisms and the increasing complexity of systems.

b. Compare how structures and function vary between the six kingdoms.
c. Examine the evolutionary basis of modern classification systems.
d. Compare and contrast viruses with living organisms.

SB4: Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

e. Relate plant adaptations, including tropisms, to the ability to survive stressful environmental conditions.
f. Relate animal adaptations, including behaviors, to the ability to survive stressful conditions.

SB5: Students will evaluate the role of natural selection in the development of the theory of evolution.

a. Trace the history of the theory.
b. Explain the history of life in terms of biodiversity, ancestry and rates of evolution.
c. Explain how fossil and biochemical evidence supports the theory.
d. Relate natural selection to changes in organisms.
e. Recognize the role of evolution to biological resistance.

What is Binomial Nomenclature?

Which kingdom is the most ancient?

What are the taxons?

Why are viruses considered nonliving?

Domain	Archae	Bacteria	Eukarya			
Kingdoms	Archaebacteria	Eubacteria	Protista	Fungi	Plant	Animals
Prokaryotic or eukaryotic						
Uni or multicellular						
Heterotrophic or Autotrophic						
Cell wall?? (If so, composition?)						
Other distinguishing characteristics -						

What is the basic structure of a virus? What's the function of each part?

Which one has organisms that are most closely related? _____ Least? _____

Why is HIV called a retrovirus?

Explain how a virus replicates.

LYTIC CYCLE

LYSOGENIC CYCLE

How do seeds help plant populations to survive? List 3.

Treatment of viral and bacterial diseases?

How has vascular tissue allowed plants to evolve toward land?

Xylem function?

Phloem function?

How do tropisms help plants survive?
Thigmotropism –

Phototropism –

Gravitropism -

Why is it that scientists have trouble when it comes to RNA viruses?

How do bacteria become resistant to antibiotics?

	How it helps the plant? Think Function…..
Cuticle	
stomata	
Leaf size	
Pollen grains	
Flowers & fruit	

What is mimicry and camouflage and how does it enable animals to survive?

What was Lamark's mechanism for evolution?

Explain each rate of evolution.
Gradualism

Punctuated equilibrium

What are the components of Natural Selection?

Natural selection doesn't produce new genotypes & phenotypes, but it eliminates the less fit. Organisms with genes that allow them to survive get to REPRODUCE and pass on their "good" genes.

Animal ADAPTATIONS – What is it?

Innate (reflexes/instincts) –

Territorial –

Learned Behaviors

Imprinting –

Habituation –

Mechanical Defenses – List 2 examples

Chemical Defenses – List 2 examples.

What is meant by an organism's "fitness?"

Explain each type of evolution. Give an example of each.

Coevolution	Divergent Evolution	Convergent Evolution

List and describe 3 Mechanism of Speciation:

What is speciation?

Geographical Isolation _____
Behavioral Isolation _____
Temporal Isolation

What are analogous structures?

What can lead to changes in allele frequencies?

Describe the evidence for evolution:

1. Fossils _____
2. Genetics _____
3. Adaptive Radiation _____
   _____
4. Homologous structures _____
   _____
5. Embryology _____
6. Vestigial Organs _____

Explain…
Stabilizing selection

Disruptive selection

Directional selection

UNIT 4: ECOLOGY

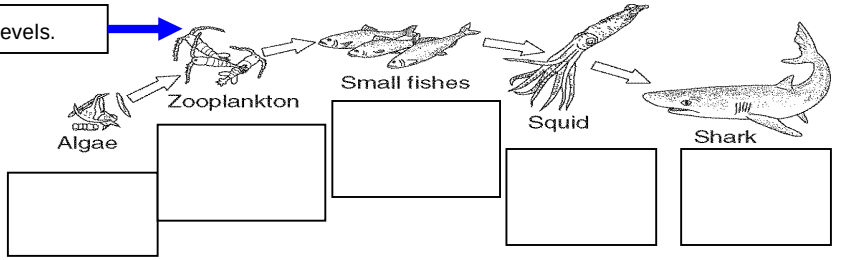
SB4: Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

a. Investigate the relationships among organisms, populations, communities, ecosystems, and biomes.
b. Explain the flow of matter and energy through ecosystems by:
   - arranging components of a food chain according to energy flow.
   - comparing the quantity of energy in the steps of an energy pyramid.
   - explaining the need for cycling of major nutrients.
c. Relate environmental conditions to successful changes in ecosystems.
d. Assess and explain human activities that influence and modify the environment such as global warming, population growth, pesticide use and water/power consumption.

List 1 biotic and 1 abiotic factor in an ecosystem:

Why do elements (nutrients) need to be cycled (recycled) in the environment?

LABEL the trophic levels.



What do the arrows in the food chain represent?

What percent of the energy is available to the next trophic level?

What happens to the rest of the energy?

List ways these elements cycle:

CO_2: _____

_____

H_2O: _____

_____

N_2: _____

_____

P: _____

What is a niche?

In the food chain, which level can support the most organisms?

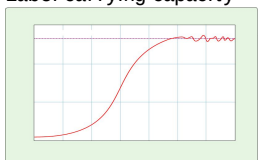
If there were a toxin in the environment, which organism would contain the most?

Who has the greatest biomass?

List the levels of organization in the biosphere:

What is carrying capacity?

Label carrying capacity-



How does overpopulation affect the environment? (Exceeding carrying capacity!)

What is biological magnification? List an example.

What is the difference between logistic and exponential growth?

What is a limiting factor?

List 3 density dependent limiting factors:

List 3 density independent limiting factors:

What's the difference between a population and a community?

How are decomposers beneficial for the environment?

How do chemoautotrophs obtain energy?

Describe primary succession:

CAUSES?

What are pioneer species? List two.

Describe secondary succession:

CAUSES?

What is a climax community?

What causes acid rain?

How does acid rain affect the environmental effects?

What is the greenhouse effect? What's it purpose?

What are renewable resources? List examples.

What are nonrenewable resources? List examples.

What is the ozone? What's the function?

What is causing ozone depletion?

	What causes it?	What does it do to the environment?
Global warming		

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What are biomes?

Identify characteristics or adaptations of organisms in these biomes.
Tundra –

Desert –

Grassland –

Taiga –

Temperate Deciduous Forest –

Intertidal zone –

Estuaries