

Flex Test Review - Biology A

Characteristics of Living things

- Describe the 5 basic functions of all living things
- Recognizes the cell is the cell as the basic unit of life and can name the major elements found in living things
- Can list some life processes (such as photosynthesis, chemosynthesis, respiration, biosynthesis)
- Explain and give examples of homeostasis
- Applies characteristics of life to support a claim that determines if an object is living or not
- Explain the relationship between positive and negative feedback loops and homeostasis
- Can interpret an image regarding positive and/or negative feedback in an organism

Biomolecules

- Knows the most common elements in living things
- Understands how the structure of carbon makes it ideal for forming large molecules (chains and rings)
- Can distinguish between organic and inorganic
- Can identify/describe the basic biomolecules
 - carbohydrates
 - lipids
 - proteins
 - nucleic acids
- Recognizes that the biomolecules are used in metabolism
- Recognize that the biomolecules are “polymers” of a repeating “monomer”
- Identifies biomolecules as organic molecules
- Matches monomers and polymers to each type of biomolecule
- Understands and describes the uses and importance of each biomolecule
- Can compare and contrast hydrolysis and condensation
- Can explain the relationship between sugars and starch (for its significance in our diets)

Enzymes

- Recognize that enzymes are proteins and that their function is determined by their shape
- Define: Substrate, product, enzyme, catalyst, active site
- Summarize the characteristics of enzymes (reusable, protein, catalyst, etc)
- Understands enzymatic proteins speed up/catalyze most chemical reactions in the cell
- Label enzyme reaction diagrams: enzyme-substrate complex, lock and key, etc.
- Identify factors that affect enzyme function and can cause it to be denatured (i.e. pH, temperature, salinity, substrate concentration); why is denaturing an enzyme an issue?
- Interprets experimental data that demonstrates enzyme function
- Describe how enzymes work by lowering the activation energy of reactions (enzyme substrate complex)

The Cell

Knows the function of these structures and can identify them on an image:

- Cell/plasma Membrane
- Cell Wall
- Centrioles
- Chloroplast
- Endoplasmic Reticulum-ER
- Golgi Body
- Mitochondria
- Nucleus
- Nucleolus
- Ribosomes
- Vacuole (plant)
- Flagella/cilia

- Knows the tenants of the cell theory
- Can identify structures that all cells have in common
- Compares and contrasts organelles found in plant and animal cells
- Distinguishes between prokaryotic and eukaryotic cells
- Understands that cell differentiation allows for cells within one organism to have different functions while having the same DNA
- Understands that the cell works as a system (protein production)
- Know the uses/abilities/limitations of a light microscope in viewing cells

The Cell Membrane

- Identifies components of the cell membrane from words or images
- Can recognize qualities, characteristics, and functions of the cell membrane
- Can explain the significance of the phospholipid bilayer (in terms of hydrophobic/ hydrophilic interactions- ie how the membrane arranges itself)
- Recognize and describe the function of each cell membrane component: cholesterol, phospholipids, channel and carrier proteins, carbohydrate chains
- Describes and recognizes substances that can diffuse across/through the different components of the cell membrane

Transport

- Understands the role of the Concentration gradient in transport (active and passive)
- Can define and distinguish between diffusion, facilitate diffusion, and osmosis
- Understands that the rate of diffusion is affected by temperature, concentration gradients, pressure
- Knowing the size, charge, and concentration gradient of a substance, can determine the method of transport through a membrane
- Can compare and contrast hypo-, hyper- and isotonic solutions and their individual effects on a cell due to osmosis
- Can distinguish between exocytosis and endocytosis (bulk transport methods)
- Recognizes types of transport based on images or descriptions: diffusion, facilitated diffusion, active transport and bulk transport (endo and exocytosis) - paying special attention to energy requirements and the components of the cell membrane involved

ATP

- Understands the uses and significance of ATP
- Describes how ADP can be recycled to form ATP; can discuss how energy is stored in ATP
- Can identify uses of ATP in specific cell processes (ex. Na/K pump)

Photosynthesis

- Can distinguish between autotrophs and heterotrophs and can give examples of each
- Can identify the overall reactants and products of photosynthesis; recognize the equation
- Recognize that photosynthesis has two major steps: light and dark reactions (Calvin cycle)
- State role of plant pigments in photosynthesis, especially chlorophyll and its location within a cell
- Can identify environmental conditions and/or leaf structures that affect the rate of photosynthesis, including different pigments
- Can explain the energy transformations that occur in photosynthesis
- Using a diagram, can answer questions regarding photosynthesis (light and dark reaction)
- Can compare and contrast photosynthesis and chemosynthesis

Respiration

- Can identify overall products and reactants of respiration; can recognize the equation for cellular respiration
- Recognize that ALL organisms start sugar breakdown in the cytoplasm (glycolysis)
- Recognize that the most ATP is produced in the mitochondria during respiration (after glycolysis)
- Recognize that (if no oxygen), lactic acid or alcoholic fermentation will occur
- Can recognize the types of organisms and cells capable of performing aerobic and anaerobic respiration (fermentation)
- State products of alcoholic and lactic acid fermentation
- Differentiates energy/ATP production from aerobic and anaerobic respiration
- Can trace the conversion of energy from the sun to bond energy (chemical potential) to usable cell energy
- Can explain how carbon dioxide and oxygen cycle through photosynthesis and respiration
- Can compare and contrast respiration and photosynthesis

DNA and DNA Structure

- Can describe and label DNA's double helix structure (covalent bonds, H-bonds, nitrogenous bases (A,T,C,G), phosphate, deoxyribose, sugar/phosphate backbone)
- Defines and identifies the 3 parts of a nucleotide
- Can determine the complementary strand to a given DNA strand
- Understands the relationship between DNA, nucleotides, genes, chromosomes, and a genome
- Understands the job/importance of DNA to all living being
- Recognize that the nucleotide sequence of DNA determines the traits of an organism

DNA replication and DNA fingerprinting

- Can explain the statement: "DNA replication is semiconservative"
- Can model replication through 2 replication cycles
- Recognize that enzymes are involved in many of the steps of DNA replication and proof-reading
- Understands the role of DNA replication in the transmission of hereditary information; it is an extremely accurate process
- Knows that all cells in a single organism have descended from one single cell and therefore have the same exact genetic code
- Can determine the identity of an individual based on a DNA fingerprint (exact match)
- Can state the purpose of restriction enzymes in the process of DNA fingerprinting
- Understands how the process of gel electrophoresis creates a DNA fingerprint
- Can determine relatedness between individuals on a DNA fingerprint and its application (ex. paternity)

Cell Division

- Can identify if cells are in the process of dividing
- Can order the events of mitosis given descriptions or images
- Can describe the end result of mitosis and its importance in an organism
- Understands the role cell division plays in growth, repair, and reproduction
- Can make the relationship between uncontrolled cell division and cancer
- Knows the difference between malignant and benign tumors

Protein Synthesis

- Compare and contrast DNA and RNA
- Knows the 3 types of RNA and their roles in protein synthesis
- Recognize that genes are segments of DNA that code for one protein
- For transcription: can provide the steps, location, and end product
- For translation: can provide the steps, location, and end product
- Can state the codon- amino acid relationship
- Recognize that protein molecules result from long folded chains made from combination of the 20 amino acids
- Can transcribe a DNA code into a mRNA code
- Can translate an mRNA sequence into a protein
- Understands that protein synthesis works the same in all organisms (DNA → RNA → Protein)
- Explain how the DNA nucleotide sequence in a gene determines the amino acid sequence in making a protein

Mutation

- Can identify frameshift mutations (additions and deletions) and point mutations (substitutions)
- Can demonstrate the effect(s) of a gene mutation on the resulting protein
- Knows the difference between gametes and somatic cells
- Can explain why a mutation in a gamete has different consequences than one in a somatic cell
- Can recognize that chromosomal mutations involve many genes
- Can compare and contrast chromosome and gene mutations

Nature of Science

- Can identify parts of a scientific investigation: hypothesis, independent variable, dependent variable, and controlled variables
- Can draw conclusions about an experiment given images, graphs, or descriptors
- Can determine the validity of an experiment by examining the experimental setup/design