GENERAL BIOLOGY I
TEST I

REVIEW
BE ABLE TO DEFINE

• Biology
  • The study of life

• Hypothesis
  • A proposed explanation of a natural phenomenon, must be testable and falsifiable

• Alternative Hypothesis
  • The opposite of the hypothesis

• Theory
  • A hypothesis that has stood the test of time, and has a large amount of supporting evidence

• Testable
  • Quantifiable, measurable

• Falsifiable
  • Can be disproven

• Eukaryote
  • Has cells with a nucleus and membrane-bound organelles

• Prokaryote
  • Cells have no nucleus or membrane bound organelles
BE ABLE TO DEFINE

• Proton
  • Positively charged particle in the nucleus of an atom. (Mass = 1 amu)
• Neutron
  • Non charged particle in the nucleus of an atom. (Mass = 1 amu)
• Electron
  • Negatively charged particle that orbits the nucleus of an atom.
• Electron Orbital
  • The area where an electron may be found
• Hydrophilic
  • Will mix with water (polar)
• Hydrophobic
  • Repels water (non-polar)
• DNA
  • Deoxyribonucleic Acid, used for storing information in a cell
• RNA
  • Ribonucleic Acid, used to carry information to be processed and turned into protein
BE ABLE TO DEFINE

• Nucleotide
  • A nitrogenous base acid + A 5-carbon sugar (deoxyribose or ribose) + a phosphate group, building blocks of DNA and RNA

• Positive Feedback
  • A cycle in which one signal triggers increase in another, which increases the original signal. System output increases until system crashes. i.e. childbirth

• Negative Feedback
  • One signal triggers increase of another, which decreases the original signal, Maintains balance. i.e. insulin and glucagon

• Artificial Selection
  • Selection by humans for specific traits in animals or plants

• Natural Selection
  • Selection by the environment for certain traits in animals or plants

• Common Descent
  • All things are descended from a common ancestor, i.e. all species evolved from one organism

• Solvent
  • What a chemical is dissolved in, usually water

• Solute
  • What is being dissolved
BE ABLE TO DEFINE

- Photosynthetic
  - Uses photons (sunlight) to make food, i.e. makes glucose via photosynthesis
- Heterotrophic
  - Uses existing sources of food, i.e. eats other things
- Isotope
  - An atom of a given element with extra neutrons (extra mass) in its nucleus
- Trace Element
  - Elements that make up less than .01% of human body weight
- Atomic Number
  - The number of protons in an atom’s nucleus, defines the element
- Atomic Mass
  - The mass of protons and neutrons in an atom
- Calorie
  - The heat required to raise one gram of water one degree centigrade.
    - Metric unit of Energy.
- Kilocalorie
  - 1000 Calories
CONCEPT QUESTIONS

• What are the characteristics that distinguish a living organism from a non-living substance?
  • Order, Evolutionary adaptation, Response to environment, Regulation (or homeostasis), Energy processing, Growth, Development, Reproduction

• Know the scientific method.
  • Observation, Question, Hypothesis, Prediction, Experiment

• What did the Pasteur experiment prove?
  • No spontaneous generation

• Know the order of the hierarchy of life
  • Atom, molecule, organelle, cell, tissue, organ, organism, population, community, ecosystem, and biosphere.
    • Be able to define each term and give examples
## THE HIERARCHY OF LIFE

<table>
<thead>
<tr>
<th>Level</th>
<th>Examples (where relevant use plant and animal examples)</th>
<th>Define</th>
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<tbody>
<tr>
<td>Atom</td>
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<tr>
<td>Molecule</td>
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<td>Organelle</td>
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<td>Cell</td>
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<td>Tissue</td>
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<td>Organ</td>
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<td>Organism</td>
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<td>Community</td>
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<td>Ecosystem</td>
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<tr>
<td>Biosphere</td>
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</tbody>
</table>
# THE HIERARCHY OF LIFE

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<th>Examples (where relevant use plant and animal examples)</th>
<th>Define</th>
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</thead>
<tbody>
<tr>
<td>Atom</td>
<td>Oxygen, Hydrogen, Nitrogen</td>
<td>Smallest unit of matter</td>
</tr>
<tr>
<td>Molecule</td>
<td>Water (H₂O) Carbon Dioxide (CO₂)</td>
<td>Two or more atoms held together by covalent bond(s)</td>
</tr>
<tr>
<td>Organelle</td>
<td>Mitochondria, chloroplast</td>
<td>a membrane bound structure; like nucleus, mitochondria, or chloroplast</td>
</tr>
<tr>
<td>Cell</td>
<td>animal cell, plant cell</td>
<td>Basic or smallest unit of life</td>
</tr>
<tr>
<td>Tissue</td>
<td>skin or heart muscle tissue</td>
<td>A group of cells with one function</td>
</tr>
<tr>
<td>Organ</td>
<td>heart</td>
<td>A group of tissues with one function.</td>
</tr>
<tr>
<td>Organism</td>
<td>a single person, a single Zebra</td>
<td>a single organism</td>
</tr>
<tr>
<td>Population</td>
<td>number of Zebras in a certain area</td>
<td>Organisms of one species in an area.</td>
</tr>
<tr>
<td>Community</td>
<td>All the animals and plants in a forest</td>
<td>all populations of all species in one particular area</td>
</tr>
<tr>
<td>Ecosystem</td>
<td>The Ocean, Artic, or Desert Ecosystem</td>
<td>all biotic (living) and abiotic (non-living) factors that interact with the biotic in an area.</td>
</tr>
<tr>
<td>Biosphere</td>
<td>The Earth or maybe northern and southern hemisphere</td>
<td>all ecosystems on earth or global ecosystem</td>
</tr>
</tbody>
</table>
CONCEPT QUESTIONS

• How does energy flow through an ecosystem?
  • One way
• What is the ultimate source of energy for almost all ecosystems?
  • The sun
• What are an ion, element, and a molecule?
  • Ion: an atom with a different number of electrons, a charged atom
  • Element: A pure substance, made of only one type of atom
  • Molecule: Two or more atoms bound together
• What part of the atom defines an element?
  • The number of protons
• Which four elements comprise 96% of the human body?
  • Carbon, Hydrogen, Oxygen, Nitrogen
• What is a hydrogen bond?
  • A dipole-dipole interaction between Hydrogen and either Oxygen, Nitrogen, or Fluorine.
• What is an ionic bond?
  • A bond between two atoms, where electrons are transferred from one atom to the other
• What is a covalent bond?
  • A bond between two atoms, where electrons are shared between both atoms
CONCEPT QUESTIONS

• What is a polar covalent and nonpolar covalent bond?
  • Polar covalent bonds are bonds between two non-metals of different electronegativities.
  • Nonpolar covalent bonds are bonds between two non-metals of the same electronegativities.
    • When differences in electronegativities is very small the bond is considered to be nonpolar.

• Which carries the partial negative and which carries the partial positive charge in water?
  • Oxygen carries the partial negative, Hydrogen carries the partial positive

• In addition to oxygen-hydrogen bond, nitrogen-hydrogen bond is
  • polar

• The carbon-hydrogen bond is
  • non-polar
CONCEPT QUESTIONS

• What is the pH scale?
  • A measure of the concentration of hydrogen ions present in a substance, it represents the acidity of the solution.

• What magnitude of [H] or [OH] does each number represent?
  • pH = -log[H]
  • Therefore each number is a magnitude of ten.

• How much more acidic is pH 6 than pH 7?
  • 10 times more acidic

• How much more acidic is pH 4 than pH 7?
  • 1000 times more acidic
CONCEPT QUESTIONS

• Be able to identify whether a molecule is positive or negative based on whether oxygen or hydrogen is attracted to it.
  • If Oxygen is attracted to a molecule then the molecule is positive
  • If Hydrogen is attracted to a molecule then the molecule is negative.

• What is the order of taxonomy from kingdom to species?
  • **Kingdom, Phylum, Class, Order, Family, Genus, Species;**
  • keep piling chocolate on for goodness sake

• What are the characteristics of the three domains and the characteristics of kingdoms of Eukarya?
### WHAT ARE THE CHARACTERISTICS OF THE THREE DOMAINS AND THE CHARACTERISTICS OF KINGDOMS OF EUKARYA?

<table>
<thead>
<tr>
<th>Domain</th>
<th>Example organism</th>
<th>Characteristics of Domain (and then kingdom of Eukarya)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain = Archaea</td>
<td></td>
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<tr>
<td>Domain = Bacteria</td>
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<tr>
<td>Domain Eukarya</td>
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<tr>
<td>Kingdom = Protista</td>
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<tr>
<td>Domain Eukarya</td>
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<tr>
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<tr>
<td>Kingdom = Plantae</td>
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<tr>
<td>Domain Eukarya</td>
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<tr>
<td>Kingdom = Fungi</td>
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<tr>
<td>Domain/Eukarya</td>
<td>Example Organism</td>
<td>Characteristics of Domain (and then Kingdom of Eukarya)</td>
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<td>------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Domain = <em>Archaea</em></td>
<td>Thermophile or Halophile</td>
<td>Live in extreme environments (Salt and Heat for example)</td>
</tr>
<tr>
<td>Domain = <em>Bacteria</em></td>
<td>E. Coli</td>
<td>Prokaryotes, meaning they do not have membrane bound organelles. Also true bacteria have a peptidoglycan cell wall.</td>
</tr>
<tr>
<td>Domain = Eukarya</td>
<td>Paramecium, Human, Sunflower, Mushrooms</td>
<td>Multicellular organisms</td>
</tr>
<tr>
<td>Domain = Eukarya</td>
<td>Paramecium</td>
<td>Single celled organisms</td>
</tr>
<tr>
<td>Kingdom = Protista</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domain = Eukarya</td>
<td>Cheetah, Whale, Human</td>
<td>Multicellular eukaryotic heterotrophic organisms that ingest organic materials.</td>
</tr>
<tr>
<td>Kingdom = Animalia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domain = Eukarya</td>
<td>Oak Tree, Sunflower</td>
<td>Multicellular eukaryotic photosynthetic organisms</td>
</tr>
<tr>
<td>Kingdom = Plantae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domain = Eukarya</td>
<td>Mushrooms</td>
<td>Multicellular heterotroph that digests externally</td>
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<tr>
<td>Kingdom = Fungi</td>
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</tr>
</tbody>
</table>
Questions

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http://www.daytonastate.edu/asc/ascsciencehandouts.html