

Ch.1

1. List and order the levels of Biological organization

- molecules, organelles, cells, tissues, organs and organ systems, organisms, population, communities, ecosystem, biosphere

2. List and describe the 8 core themes of biology

- emergent properties
- organisms interact with each other and the physical environment
- Life requires energy transfer and transformation
- Structure and function are correlated at all levels
- The cell is an organisms basic unit of structure and function
- The continuity of life is based on heritable information in the form of DNA: genes inherited by offspring from parents
- Feedback mechanisms regulate biological systems: regulation of biological processes are critical for a living organisms
 - negative feedback: slows processes
 - positive feedback: speeds up processes
- THE CORE THEME evolution

3. Define evolution: change in gene frequency over time due to the 4 mechanisms

C 1. Natural Selection: survival of the fittest

A 2. Mutation: new gene of offspring, to adapt to environment

B 3. Migration: move to other group and pass on their gene

D 4. Genetic Drift: unpredictable, disaster happens and wipes out a portion a specific gene

pictures on slide help explain

4. Explain how the scientific method is used to acquire knowledge

- observation, questions, hypothesis, prediction experiment, conclusion
- hypothesis: a tentative statement that explains
- prediction: if-then statement
- reliably expand our knowledge base

5. emergent properties: new property that emerges at each step of biological organization and were not in preceding level

Ch. 2

1. Define matter, elements, and atoms.

- Matter: anything that takes up space and has mass
- elements: something that cannot be broken down to other substances by chemical reactions
- atoms: smallest unit of matter that has same parent element

2. List the three subatomic particles found in atoms

- proton +
- neutron (neutral)
- electron –

3. Explain atomic number notation

mass on top (protons+neutrons), atomic number on bottom (# protons)

4. Define isotope, valence

- isotopes: different # of neutrons, same number of protons
- valence: electrons in outer shell

5. Explain how energy is transferred between electron shells

- by chemical bonds

6. Compare and contrast the three types of chemical bonds

- Ionic bonds: don't share, between cation and anion, transfer electrons
 - strongest bonds but easily broken by water
- Covalent bonds: share electrons, result in a molecules, # of valence electrons=# of bonds
 - non-polar covalent bonds: equally electronegativity, no charge, shared equally, hydrophobic
 - polar covalent bonds: electronegativity slightly positive, not shared equally, hydrophilic
- Weak bonds: hydrogen bonds, weakest bonds, 2 polar molecules, can form between different molecules and within same molecules\
- van der waals interactions: weakest bond, negative charges

Ch. 3

1. Explain how water's polar covalent bonds (molecular property) contributes to hydrogen bonding (emergent property).

- The polarity of water molecule allows there to be hydrogen bonds,

2. Define cohesion, adhesion, surface tension, solution, solvent, solute, hydrophilic, hydrophobic, specific heat, heat of vaporization, evaporative cooling.

- Cohesion: water attracted to water
- Adhesion: water to other molecules
- surface tension: measure of how difficult it is to stretch or break the surface of a liquid
- solution: 2 or substances liquids
- solvent: what the solute is dissolved in
- solute: substances being dissolved
- hydrophilic: able to react with water (polar and ionic bonds)
- hydrophobic: unable to react with water (non-polar and covalent bonds)
- specific heat: water has high specific heat
- heat of vaporization:
- evaporative cooling:

3. List the four life-sustaining emergent properties of water

4. Explain how the 4 emergent properties of water sustain life on earth

1. Ice is less dense than liquid water: keeps from freezing water, fish in water in winter
2. solvent of life- versatile solvent: dissolves nutrients in water.
3. cohesive behavior and adhesive: plants- trees
4. moderation of temperature (specific heat): we don't heat up so fast

2 important properties of solution

1. concentration
2. Acidity

different between an acid and a base

calculate pH & explain pH scale

explain how buffers maintain pH

- weak acid and conjugate base, resists the change in pH, strong acid reacts with base instead of water

1. Explain how acidic and basic condition affect living organisms