Biology — Midterm Review

Characteristics of Life

1. Homeostasis is the ability for an organism to maintain stable living conditions.
2. All organisms can maintain homeostasis (keeping themselves alive), have metabolisms, respond to stimulus (swimming away when approached), and can move (running/swimming).
3. Metabolism is the set of chemical reactions used by an organism to sustain its own life.

Chemistry



1. An isotope is a variant type of atom with a different amount of neutrons.
2. An ion is an atom with a positive or negative charge.

1. A chemical compound is a compound that is actually chemically composed differently than just a standard mixture.
2. An ionic bond is a bond in which atoms are actually changed, and the participants are left with charges. Covalent means a shared electron bond.
3. Hydrogen, H, Carbon, C, Oxygen, O, Sodium, Na, Magnesium, Mg, Phosphorus, P, Sulfur, S, Potassium, K, Calcium, Ca, Iron, Fe, and Iodine, I.

Cells

1. All living things are composed of cells and cell products. New cells are formed only by division of preexisting cells. All cells are basically similar in chemical makeup and in metabolic activities. The activity of an organism is due to the collective activities and interactions of all its cells.
2. Prokaryotic cells are simpler, and lack many organelles present in eukaryotes. Prokaryotic organisms typically are uni-ceullar, while eukaryotic-formed organisms are more recent and more evolved, while being inherently more complex.
3. Cell membrane: regulates intake and outtake of items. Cell wall: support and protection for the cell. Cytoplasm: Liquid occupying free space in cell. Nucleus: Control center for cell. Nuclear membrane: Double lipid bilayer which encloses nucleus and genetic material — serves as protection. Chloroplast: Sunlight collector for plants, located in leaves. Allows photosynthesis to occur. Ribosome: Small entities which produce proteins for the cell’s usage. Endoplasmic reticulum: Holding site for ribosomes, membrane tubes which allow for transport within the cell. Golgi Body: Responsible for packaging items for transport in the cell. Lysosome: breaks down sugars for the cell’s usage. Mitochondria: produces of energy for the cell.

Membrane Transport

1. Simple diffusion is the movement of materials to lower density areas. Osmosis is the movement of water to lower density areas to obtain equilibrium. Facilitated diffusion is diffusion in which a cell forces the event using energy. Active transport is the high use of energy by a cell to allow in and out materials from the cell.
2. Concentration of the substance is lower within the cell, so to obtain equilibrium, osmosis will occur, allowing water into the cell, eventually bursting it if it’s an animal cell.
   1. In a lower concentration solution, the solution will leave the cell to obtain equilibrium and balance the concentrations.
   2. Nothing will happen to the cell, they are at equilibrium.

Use of Microscope

1. The total magnification of a compound microscope is the objective lens magnification multiplied by the ocular lens’s magnification.
2. The diaphragm supports the stage for slides.
3. To focus a microscope, one must recursively focus from low to high magnifications, starting at the lowest tier. Once the object is in focus using the coarse focus knob adjustment, the fine focus knob must be used to refine the image under higher power.
4. To make a wet mount slide, one must add a specimen to a slide, the drop water onto it. Afterwards, and after a balanced amount of water is found to use, a slide cover can be set on top of it and pressed until there are no air bubbles remaining.

Metric System

1. Standard units are meters, liters, cubic centimeters, grams, and degrees Celsius. Prefixes are giga, mega, kilo, hector, deka, deci, centi, milli, micro, nano, and pico. One multiplies by ten to step a measurement down, and by .1 for each level upwards.

Photosynthesis

1. Photosynthesis is so important on Earth because it sustains other life by providing others with food to eat, sustaining plant life, providing oxygen for the air, and removing carbon dioxide from the air.
2. Photosynthesis occurs when sunlight, carbon dioxide, water, are available, in the sunlight, in the chloroplasts of plant’s leaves. It produces the energy a plant needs to sustain life.
3. Stomata are the pores on a leaf that regulate the flow of carbon dioxide intake for photosynthesis reactions.

1. 6CO2 + 6H2O in addition to light, yields C6H12O6 + 6O2 The equation, in words, means carbon dioxide, water, and light are converted into sugar for the plant and a byproduct of oxygen.

Cellular Respiration

1. Cellular respiration occurs in cells, when the cell runs out of energy to perform its tasks, to maintain living cells which have enough energy to perform necessary tasks.
2. C6H12O6 + 6O2 yields 6CO2 + 6H2O + heat. This means that the high energy proteins are converted into carbon dioxide and water, along with a waste byproduct.
3. Anaerobic respiration is cellular respiration without the use of oxygen. It produces another waste byproduct, and yields only about two ATP per glucose broken down. In contrast, aerobic respiration uses oxygen, and yields thirty ATP per glucose broken down.
4. Glycolysis is the breakdown of glucose by enzymes to produce cell-usable ATP.
5. Fermentation is the generation of ATP using the oxidation of organic compounds. Lactic acid fermentation uses glucose, fructose, and sucrose to achieve its end-goal. Alcohol fermentation yields the same plus alcohol as a byproduct, but is aerobic, as it uses oxygen.

Experimental Design

1. A control is used to determine if the affects observed in the experimental are from the manipulated variable, or another factor. It is set up by designing the baseline experiment, minus the manipulated variable — a stripped down version of the experimental. Thus, the only difference between the control and the experimental is the manipulated variable, and that variable is the only cause for any differences.
2. Variables are items controlled in an experiment to test the hypothesis — a good experiment should have only one, so the results are clear-cut as to their cause.
3. When making a data table and a graph, one must remember to account for labeling, titling, and ensuring all data points (such as over time or multiple test cases) are accounted for and present.