**Q4 Benchmark Study Guide**

**Unit 1: Classifying Living Organisms**

* What is the difference between an autotroph and a heterotroph? Autotroph – makes its own food (“self-feeding”); heterotroph – has to eat other organisms (“different food”) in order to get nutrients
* What is the difference between a eukaryote and a prokaryote? Eukaryote – has a nucleus; prokaryote – does not have a nucleus
* What are the levels of classification in order from most broad to most specific? Domain, Kingdom, Phylum, Class, Order, Family, Genus, and Species
* Know how to use a Dichotomous key. Use your notes to help you with this.
* List the details of the kingdoms: Animalia, Plantae, Fungi, Protista, Eubacteria, Archaebacteria

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Archaebacteria** | **Eubacteria** | **Protista** | **Fungi** | **Plantae** | **Animalia** |
| **Number of**  **cells** | **unicellular** | **unicellular** | **some are uni- and some are multicellular** | **(most are) multicellular**  **yeast are unicellular** | **multicellular** | **multicellular** |
| **Presence of**  **nucleus** | **prokaryote**  **(no)** | **prokaryote**  **(no)** | **eukaryote**  **(yes)** | **eukaryote**  **(yes)** | **eukaryote**  **(yes)** | **eukaryote**  **(yes)** |
| **Form of**  **nutrition** | **Some are auto- and some are heterotrophic** | **Some are auto- and some are heterotrophic** | **Some are auto- and some are heterotrophic** | **heterotrophic**  **(many live on their food)** | **autotrophic** | **heterotrophic** |
| **Other information** | **often found in extreme conditions**  **(ex. hot springs,**  **Dead Sea)** | **the larger of the two bacteria kingdoms** | **Divided into 3 groups:**  **plant-like**  **animal-like**  **fungus-like** | **important source of food and medicine**  **help recycle the Earth’s waste** | **produce food and oxygen, both of which are required by most organisms on Earth** | **provide food, medicines, and companionship** |

**Unit 2: Structure and Function of Cells**

* What is a cell? Smallest unit of structure and function of all living things
* What is an organelle? The parts of a cell (ex. Nucleus, ribosomes, mitochondria, etc.); its “organs”
* What is the difference between a plant and animal cell? Plant cells have a cell wall, chloroplasts, and one large vacuole; animal cells do not have a cell wall or chloroplasts, and they have several small vacuoles
* What is the function of the following cell parts:
  + Cytoplasm: jelly-like substance that holds cell organelles in place
  + Nucleus: the control center of a cell
  + Mitochondria: the powerhouse of the cell
  + Cell membrane: controls what goes into or out of a cell
  + Cell wall: provides structure to a plant cell
* Know how these processes work (what is required and what is produced):
  + Photosynthesis: the process where sunlight, water, and CO2 is converted to glucose and oxygen
  + Cellular Respiration: the process where food (glucose and oxygen) is converted into energy, water, and CO2

**Unit 3: Organ Systems**

* Know the levels of organization in order from smallest to largest. Cell, tissue, organ, organ system, and organism
* Functions and organs of each system and how the systems work together:
  + Excretory: releases waste from the body using the kidneys, skin, intestines, and lungs
  + Digestive: converts food into nutrients using the mouth, esophagus, stomach, small and large intestines, rectum, and anus
  + Nervous: controls the entire body’s movements and actions using the brain, spinal cord, and nerves
  + Reproductive (Egg, sperm, zygote): allows the body to produce offspring using the testes, sperm, ovaries, and egg; zygote = fertilized egg
  + Immune: protects the body from harm using the skin and white blood cells
  + Circulatory: moves blood throughout the body using the veins, arteries, and heart: delivers nutrients throughout the body
  + Respiratory: takes in oxygen and excretes CO2 using the lungs, trachea, nose, and mouth

**Unit 4: Genetics and Evolution**

* What is the difference between a dominant trait/allele and a recessive trait/allele? Dominant traits can mask recessive traits and will always show up if present; recessive traits can be masked by the dominant trait and will need recessive alleles from both parents in order to show up
* Know how to complete a Punnett Square. Use your notes to help you study
* **Mitosis** is the process cells use to make new cells. The new daughter cells have the same number of chromosomes as the parent cells.
* Ethics: **Cloning** could lead to a reduction in genetic variation.
* **Genetic engineering**: Changing DNA to benefit a species.
* Types of Reproduction (definition and specific types)
  + What is required for sexual reproduction and what is the advantage? Sexual reproduction needs sperm and an egg, and this provides variations for a species
  + Know the following types of asexual reproduction.
    - Budding: A small growth develops on a yeast cell and eventually falls off once mature, forming a new cell
    - Binary Fission: When one cell splits into two
* Fossils
  + What is the fossil record and how is it used? Shows the history of life on earth and how organisms have changed over time
  + Which fossils are the oldest in a sample of dirt layers? The ones on the bottom layer are the oldest
* Evolution
  + What is natural selection? Individuals that are better adapted to their environment are more likely to survive and reproduce; “survival of the fittest”
  + What is competition? Organisms fight one another for food, mates, shelter, etc.
  + What are variations? Differences between individuals of the same species
  + What is overproduction? Producing more offspring than could ever survive (etc. sea turtles)
  + What are adaptations? Traits that help an organism survive and reproduce
  + What is the difference between mimicry and camouflage? Mimicry is a form of camouflage where one organism looks like another organism that could be poisonous, harmful, etc. in order to help it survive; camouflage is a general term where an organism blends into its environment so predators or prey have a more difficult time seeing it

**Unit 5: Interdependence of Organisms**

* The sun is the ORIGINAL source of energy
* What is the difference between biotic and abiotic factors? Biotic factors are living; abiotic factors are not living (ex. Sun, clouds, wind, temperature, etc.)
* **Scarcity**: an environmental change that creates a decrease in living space, food, water, etc.
* Biomes (Know the definition and organisms that live there):
* Tundra: Cold and desert-like with permanently-frozen subsoil known as permafrost; mountains with cold, treeless, frozen landscapes
* Taiga: Most abundant biome; cold with snowfall; Alaska, Canada, Scandinavia, and Russia; forests of cold tolerant, dense evergreen trees covered in needles: pine, fir, spruce
* Desert: Dry with little rainfall; can be cold or hot; sandy soil; found all over the world
* Prairie/Temperate Grasslands: Dry, coldclimate savannas; found in North America, Russia and South Africa; open grassland with very few trees
* Savanna/Tropical Grasslands: Dry; found in Africa, India, and Australia; the zoo animals; very few trees with an open grassland
* Tropical Rainforest: Warm, humid, rainy, near Equator; most diverse biome with respect to animals and plants; the tree “canopy” allows for little sunlight to reach ground, so very few low growing plants live here
* Temperate Deciduous Forest: Moderate rainfall and humidity; less than a rainforest; North America, Asia, and Europe; tees, flowers, and shrubs grow in spring and summer, then lose their leaves and become dormant in winter (deciduous): maple, oak, willow
* Freshwater (Rivers, streams, lakes, ponds, and wetlands): Have less than 1% salt content; organisms that live here cannot survive in salt water
  + Rivers and streams: Water that continuously moves in a   
    single direction; because of this, the communities are constantly changing to match the changing pace of the river; found throughout the world
  + Lakes and ponds: A standing body of water that is created as streams and rivers empty into it
  + Wetlands: Areas where the land is saturated with standing water; wetlands have the highest species diversity of all ecosystems
* Marine (Estuary, intertidal zone, open ocean and benthic zone): Cover about 3/4 of the Earth; marine algae supply 90% of the world's oxygen and take in just as much carbon dioxide
  + Estuary: Where freshwater streams & rivers meet the ocean; freshwater brings nutrients from the inland which helps to increase diversity and productivity of the estuary
  + Intertidal zone: Where ocean meets land, and as waves and tides come in and out, the beach can be submerged or exposed; because of this, the communities of plants and animals are constantly changing
  + Coral reef: Includes warm shallow waters that receive lots of sunlight *-* usually near the intertidal zone; also includes barriers around the edges of continents (Ex: the Great Barrier Reef off Australia)
  + Benthic zone/open ocean: Includes cold waters far from the land = open ocean or deep ocean; the benthic zone or sea floor consists of sand & dead organisms; as you go deeper, the temperature decreases; sunlight cannot penetrate through deeper water
* What is the difference between a producer and a consumer? Producer makes its own food; consumer has to take in other food sources in order to get nutrients
* What is the relationship between a predator and a prey? A predator searches for prey as a food source; the prey is the food source
* What is the difference between the symbiotic relationships (mutualism, commensalism, and parasitism)?
  + Mutualism: Both organisms benefit (+,+)
  + Commensalism: One organism benefits, while the other is neither harmed nor helped (+,0)
  + Parasitism: One organism is harmed, while the other is helped (+,-)
* What is a carnivore, omnivore, herbivore, and decomposer?
  + Carnivore: Eats meat
  + Herbivore: Eats plants
  + Decomposer: Eats dead organisms
* Know how to read the following diagrams (use your notes to practice reading the following diagrams):
  + Food Chain: A series of organisms that get energy from one other; includes one producer, a primary consumer (herbivore), a secondary consumer, and usually a tertiary consumer
  + Food Web: a series of interconnecting food chains