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| Unit 1: Char. of Life | **Learning Goal 1: Use evidence to support an argument for why something is alive** |
| I need to be able to answer: | I need to be able to: |
| 1. What are the characteristics of life? DNA, evolve, maintain homeostasis, react to stimuli, grow/develop, cells, uses energy, and reproduces
2. What is the definition of Homeostasis? Maintaining an internal balance
 | * Identify which characteristic non-living things are missing
* Describe how the characteristics of life apply in a specific situation
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Semester 1 Unit Guide: Learning Goals and Content Expectations

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| Unit 2: O-Chem and Bio molecules | **Learning Goal 2: Use evidence to explain how the elements in an organic molecule can be broken down and recombined into other organic molecules** |
| I need to be able to answer: | I need to be able to: |
| 1. What are organic molecules? Molecules that contain carbon, oxygen and hydrogen, and contain covalent bonds
2. How do elements combine into organic molecules? By forming covalent bonds
3. What elements are in organic molecules? Carbon, Hydrogen & Oxygen
4. What is the function of a protein? provide structure, carry messages, and cause or speed up reactions,
5. What is the function of a Carbohydrate? These are broken down to provide energy for the cell,
6. What si the function of a Lipid? They are long term energy storage,
7. What is the function of Nucleic Acids? They are the genetic material that store instructions that direct all other aspects of the cell
8. What is a polymer? A large macromolecule composed of several smaller subunits
9. What is a monomer? The smaller subunits that make up a larger macromolecule
10. What are the monomers of each of the macromolecules? Proteins = amino acids, Carbohydrates = monosaccharides (ex Glucose), Nucleic Acids = nucleotides (DNA or RNA)
11. How do those monomers combine and separate? Combine = dehydration synthesis, separate = hydrolysis
12. What is a covalent bond? A pair of electrons shared by 2 atoms
13. What are the 3 functions of enzymes? Provide structure, carry messages, and speed up reactions
14. What is a catalyst? A catalyst is something at speeds up a reaction
15. Why are enzymes essential to the body? Lower the activation energy needed for a reaction to happen so that reactions can happen at body temperatures
16. What are the 4 macromolecules? Proteins, Carbohydrates, Lipids, Nucleic Acids
 | * Identify Nucleic acids, carbohydrates, proteins and lipids based on their structure
* Draw or identify the monomers of carbohydrates, lipids and nucleic acids
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| Unit 3: Nature of Science | **Learning Goal 3:Scientific Investigation Standards** |
| I need to be able to answer: | I need to be able to: |
| 1. What is a testable investigative question? A question that asks what effect a manipulated variable has on a quantifiable responding variable,
2. What is a hypothesis? A predicted answer to a testable questions
3. What is a manipulated, controlled, or responding variable? Manipulated: what you are changing, controlled: what you are keeping the same and responding : what you are measuring
4. What must be in a procedure for it to be testable? All variables of the experiment, the controlled and experimental groups, clear logical directions, how the data will be collected and quantified, multiple trials
5. What are experimental and control groups? Experimental = the groups that have the manipulated variable, controlled = the groups that don’t
6. What is qualitative and quantitative data? Quantitative = numerical, qualitative = qualities that can’t be quantified with numbers
7. How do you support a conclusion in science? Answer the investigative question, compare data from each group, draw conclusions about why the data supports the answer, and state a scientific reason.
8. What is validity in a scientific experiment? An experiment is more valid the more repeatable it is
 | * Identify variables in an experiment
* Design a testable experiment
* Identify the experimental and control groups
* Write a replicatable procedure
* Create a statistically illustrative graph
* Take quantities and qualitative data that accurately represents the patterns observed
* Create a line of best fit to show trends in data
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| Unit 4: Ecology and Energy Flow | Learning Goal 4: **Use a graph to help explain what factors effect carrying capacity.** |
| I need to be able to answer: | I need to be able to: |
| 1. What is carrying capacity? The number of individuals in a population that an environment can support
2. How does logistic growth show a carrying capacity? The graph flat-lines when it reaches carrying capacity
3. What is a population graph? A graph showing the number of individuals over time
4. What factors effect carrying capacity? Density dependent (predators, food, shelter) or independent (natural disasters)
5. What is logistic growth? Looks like a stretched S. Birthrate starts out increasing, then slows, then flat lines
6. How do you make a logistic growth graph? Plot the number of individuals on the Y axis and the time on the X
 | * Create a logistic graph of a population over time
* Be able to identify what is happening to the population (birth rates increasing, death rates increasing) based on a graph
* Identify which type of feedback is represented in a population graph
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| Learning Goal 5: **Use graphs and diagrams to help explain what factors effect biodiversity and populations in ecosystems** |
| I need to be able to answer: | I need to be able to: |
| 1. What is biodiversity? The number of different species in the same area. High is many, low is few
2. What are the different distribution patterns of populations? Random, clumped, uniform
3. What factors effect population size? Density dependent factors affect the carrying capacity because more individuals makes these resources tighter. Independent effects the population no matter the number.
4. What is an exponential growth graph? A graph that show an increasing number of births over time, with no slow down and no carrying capacity
5. How do you make an exponential growth graph? Plot the number of individuals on the Y axis and the time on the X
6. What are feedback loops? A cycle of actions or behaviors that cause each other
7. What form of growth does the human population show? exponential
 | * Define limiting resource
* Identify a positive or negative feedback loop when given a population graph
* Identify the distribution of a population based on a diagram
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| Learning Goal 6: **Use evidence to explain how mater cycles through an ecosystem. Use evidence to explain how energy flows in an ecosystem.** |
| I need to be able to answer: | I need to be able to: |
| 1. What is a trophic pyramid? Pyramid showing which trophic level an organism is on
2. What is an energy pyramid? Shows where each organism gets their energy
3. What is biomass? Dry weight of an organism
4. What is a biomass pyramid? Pyramid showing the relative biomass of the organisms in each feeding level
5. How does carbon cycle? From atmospheric to organic (photosynthesis) in producers, from producers (organic) to consumers (organic), from consumers into oil and coal (staying organic again), from organic in consumers and producers back into atmospheric (respiration) and from oil and coal due to combustion and human activity
6. How does nitrogen cycle? From atmospheric to organic in bacteria, then to producers, then to consumers, then back to atmospheric when bacteria decompose the consumers and producers
7. How does water cycle? Condensation, precipitation, run-off, accumulation, evaporation, and repeat
 | * define consumer, producer, heterotroph, autotroph, decomposer
* Create a food chain from a food web.
* convert a food web into a pyramid
* Create a trophic pyramid from a food chain
* calculate the percent of energy at each level of the trophic level
* create a food web
* Apply the terms you defined to a trophic pyramid
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| Unit 5: Human Impact | Learning Goal 7: **Critically evaluate (using evidence) how introduced species will impact the ecosystems they enter** |
| I need to be able to answer: | I need to be able to: |
| 1. How do invasive species effect an ecosystem? The out-compete native species, and can drive them to extinction
2. What are the different types of species interactions? Mutualism, commensalism, parasitism, predation
3. In each of the types of species interactions, which organism is harmed and which is helped? Mutualism: both helped; Predation and parasitism: one helped and one harmed; commensalism: one helped, one gets nothing
 | * Show how an invasive species would interact in a food web
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| Learning Goal 8: **Create a solution that could mitigate the impact of human activity on biodiversity, and text/reevaluate that solution** |
| I need to be able to answer: | I need to be able to: |
| 1. How do humans affect the environment? Add air pollution, burn fossil fuels and add greenhouse gasses to the atmosphere, introduce invasive species, destroy and fragment habitat, drive species to extinction
2. What are solutions to human impacts? Reduce carbon emission, reduce pollution, protect habitat
3. What is global warming? When greenhouse gases trap heat in the atmosphere, causing the planet to warm
4. What re the effects on biodiversity of climate change? Leads to extinction, habitat loss, and changes in behavior,
5. What are the causes of climate change? Human carbon emissions
6. How does the greenhouse effect work? Light enters the atmosphere, is absorbed by dark surfaces like earth and water, radiated back into the atmosphere as heat. Then the heat is absorbed and radiated back down by greenhouse gases.
 | * Design a solution
* Evaluate and redesign your solution
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| Unit 6: Cell Structure and Function | Learning Goal 9: **Use models to show how structures inside a multicellular organism interact and function as a system** |
| I need to be able to answer: | I need to be able to: |
| 1. What are the organelles of an animal cell and a plant cell? Nucleus, nucleolus, chromatin, mitochondria, ribosome, vacuoles, vesical, lysosome, Golgi body, cytoplasm, endoplasmic reticulum, chloroplast, cytoskeleton, cell wall, cell membrane, ribosome
2. What are the functions of the cell structures?
3. What organelles work together to create proteins: Nucleus, ribosome, Rough ER, Vesical, Golgi
4. What is an organ? A system of cells working together as a single unit
5. what organelles work together to give the cell shape and structure? Cytoskeleton, cell membrane, cell wall, vacuole, cytoplasm
6. What organelles work together to send signals through the call and beyond? Cytoskeleton, vesicle, vacuole, rough ER
7. What organelles work together to process and use energy? Mitochondria and chloroplast
8. What is the difference between prokaryotic and eukaryotic cells? Prokaryotic has no nucleus and no internal membranes
9. What are similarities and differences between plant and animal cells? Plant: chloroplast, large central vacuole, wall
 | * Identify the nucleus, chloroplast, cell wall, vacuole, cytoplasm in a cell seen through a microspore
* recognize and identify all important structures of a cell on a diagram
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| Learning Goal 10: **Investigate how a living thing uses a feedback mechanism to maintain homeostasis.** |
| I need to be able to answer: | I need to be able to: |
| 1. What systems maintain homeostasis? Osmoses, endothermic or ectothermic or poikilothermic
2. How does water move through a membrane? Moves from high to low concentration
3. How do other molecules move through a membrane? Through channel proteins, or using active transport
4. What kind of feedback look is homeostasis? negative
 | * Define homeostasis
* Identify a positive or negative feedback loop
* Create a positive and negative feedback loop
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| Unit 7: Photosynthesis and Respiration | Learning Goal 11: **Model the process of photosynthesis** |
| I need to be able to answer: | I need to be able to: |
| 1. What is a chloroplast? A organelle that contains chlorophyll to convert light energy into chemical energy
2. What is photosynthesis? The process of using the energy from the sun to drive the creation of chemical energy (by making sugar)
3. What are the inputs and outputs of photosynthesis Inputs: Light, water, and carbon dioxide. Outputs, glucose and oxygen
4. What is the chemical equation for photosynthesis: 6H2O + 6CO2 🡪 6O2 + C6H12O6
 | Diagram photosynthesis |
| Learning Goal 12: **Model the process of respiration** |
| I need to be able to answer: | I need to be able to: |
| 1. What is respiration? The process of breaking bonds in sugar and oxygen to create ATP (the energy transfer molecule of cells)
2. What is a mitochondria? The organelle where respiration takes place
3. what are the inputs and outputs of respiration In puts: glucose and oxygen, outputs: water and carbon dioxide
4. What is the chemical equation for respiration 6O2 + C6H12O6 🡪 6H2O + 6CO2
 | diagram respiration |
| **Learning Goal 13: Use a model to show how photosynthesis and respiration are the source of the carbon cycle** |
| I need to be able to answer: | I need to be able to: |
| 1. How do the inputs of both processes relate? The inputs of respiration are the outputs of photosynthesis and vise versa
2. What process turns CO2 into C6H12O6? Photosynthesis
3. What form of carbon is present in consumers, producers and decomposers? C6H12O6
4. What form is present in the atmosphere? 6CO2
5. What processes turns C6H12O6 into CO2? Respiration
6. What stores carbon outside of the carbon cycle? Coal and oil
 | Diagram the carbon cycle |