**Biology Review L.14.1 – Cell Theory**

***Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.***

1. Describe and/or explain the principles of the cell theory.
2. Describe how continuous investigations and/or new scientific information influenced the development of the cell theory.
3. Explain the development of a theory.
4. Students will recognize the differences between theories and laws.

**Key Vocabulary:** cell theory, spontaneous generation

* *What are the 3 main points of the cell theory?*
* *What technology advanced cell theory?*
* *How is a theory developed?*
* *How do you differentiate between a theory and a law?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.14.3 – Prokaryotic and Eukaryotic Cells**

**Animal and Plant Cells, Cell Transport**

***Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.***

1. Compare and/or contrast the structures found in plant cells and in animal cells.
2. Compare and/or contrast the structures found in prokaryotic and eukaryotic cells.
3. Describe how structures in cells are directly related to their function in the cell.
4. Explain the role of the cell membrane during active and passive transport

**Key Vocabulary:** active transport, cell membrane, cell plate, cell wall, cellular respiration, centriole, chloroplasts, diffusion, equilibrium, eukaryote, nucleus, organelle, osmosis, passive transport, photosynthesis, prokaryote, ribosome, semi-permeable

* *How do you differentiate between an animal cell and a plant cell?*
* *How do you differentiate between a prokaryotic and eukaryotic cell?*
* *How do cell structures support cell function?*
* *How does the cell membrane support cells in getting needed nutrients?*
* *How did eukaryotic cells evolve?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.14.7 – Plant Structures and Functions**

***Relate the structure of each of the major plant organs and tissues to physiological processes.***

1. Explain how the structures of plant tissues and organs are directly related to their roles in physiological processes.

**Key Vocabulary:** roots, steam, leaves, photosynthesis, transpiration, reproduction, flower, phloem, pollen, stomata, xylem

1. *How are the structures of plant tissues and organs directly related to their roles in physiological processes?*
   * Roots
   * Steam
   * Leaves
   * Flower
   * Phloem
   * Pollen
   * Stomata
   * Xylem

**References: Where did you find your Evidence to complete the above questions?**

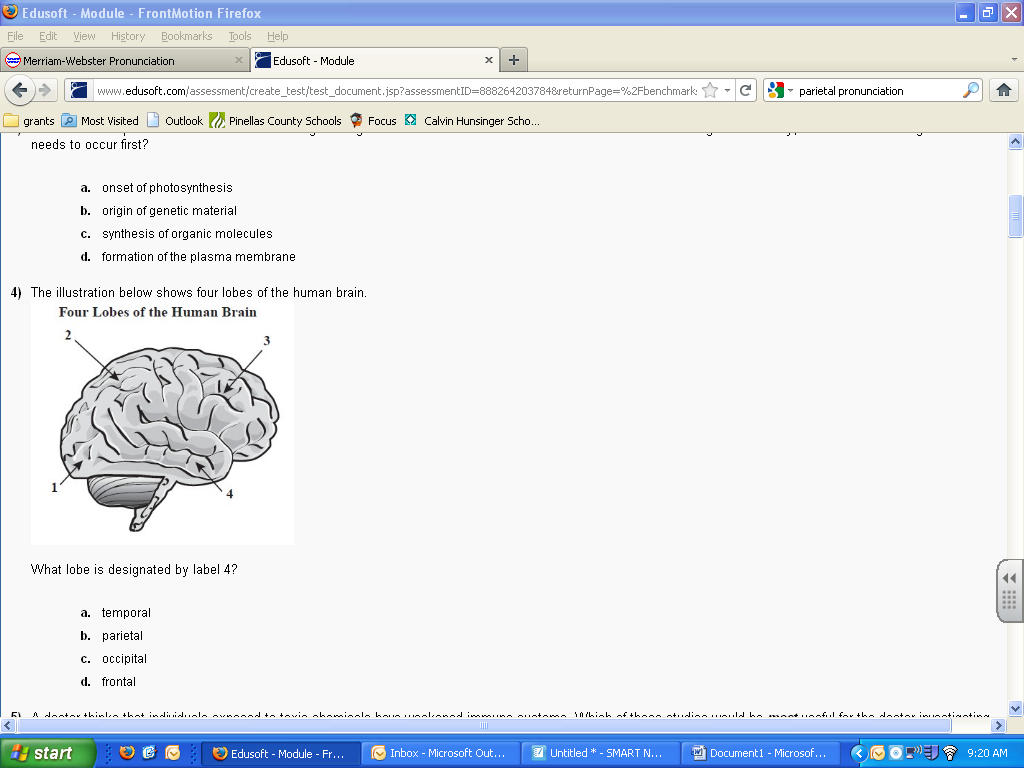
**Biology Review L.14.26 – Brain parts**

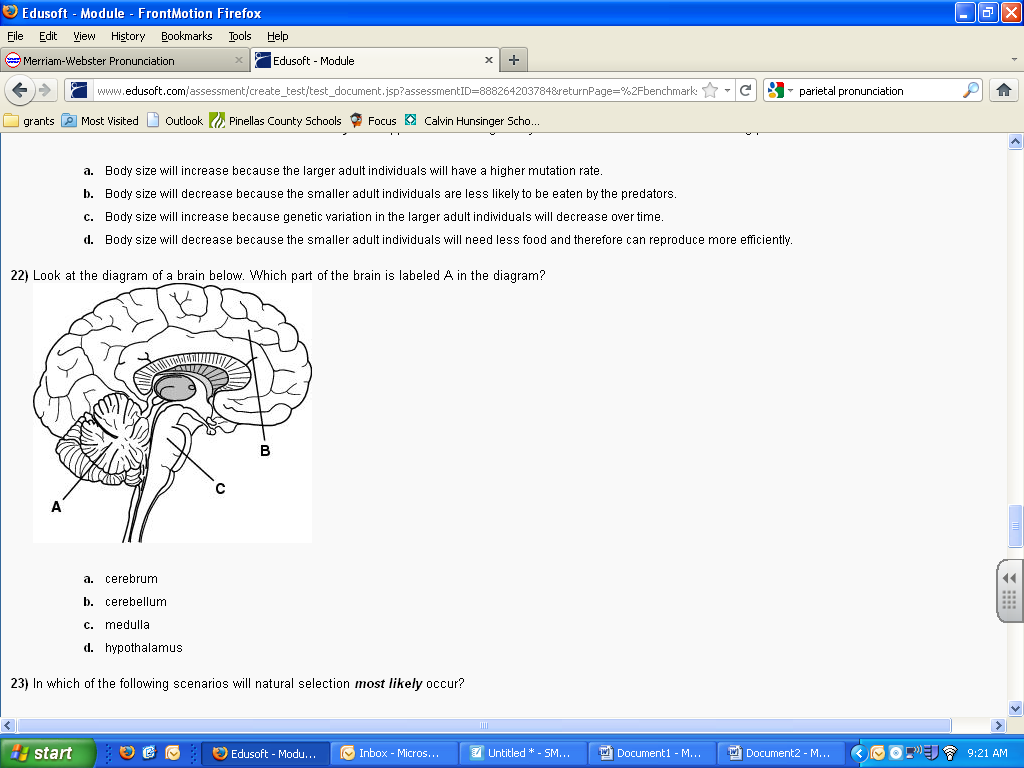
***Identify the major parts of the brain on diagrams or models.***

1. Identify the major parts of the brain on diagrams.

**Key Vocabulary:** cerebrum, cerebellum, frontal lobe, medulla, occipital lobe, parietal lobe, temporal lobe

* *Label the Lobes and sections of the human brain*

**



**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.14.36 – Blood Flow**

***Describe the factors affecting blood flow through the cardiovascular system.***

1. Identify factors that affect blood flow and/or describe how these factors affect blood flow through the cardiovascular system.

**Key Vocabulary:** anatomy, artery, blood flow, blood pressure, capillaries, cardiovascular system, homeostasis, physiology, vein, vascular tissue

* *How do factors such as genetics, nutrition and behavior affect blood flow through the cardiovascular system?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.14.52 – Immune System**

***Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.***

1. Identify and/or explain the basic functions of the human immune system, including specific and nonspecific immune responses.
2. Describe how the human immune system responds to vaccines and/or antibiotics.

**Key Vocabulary:** antibiotic, antibody, antigen, communicable disease, pathogen, vaccine, vein, vascular tissue

* *How does the immune system protect humans from disease?*
  + *Active*
  + *Passive*
* *How does the human immune system respond to vaccines and antibiotics?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.15.1 – Theory of Evolution**

***Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.***

1. Identify evidence and/or explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observable evolutionary change.
2. Explain the development of a theory.
3. Recognize the differences between theories and laws.

**Key Vocabulary:** continental drift, embryology, evidence, evolution, fossil, genetic drift, gene flow, homologous structures, observations, species, natural selection, theory, speciation, vestigial structures;

* *What is the Theory of Evolution?*
* *List 5 pieces of evidence and explain how it supports the Theory of Evolution.*



**Ref References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.15.6 – Classification**

***Discuss distinguishing characteristics of the domains and kingdoms of living organisms.***

1. Classify organisms based on the distinguishing characteristics of the domains and/or kingdoms of living organisms.
2. Identify and/or describe how and/or why organisms are hierarchically classified based on evolutionary relationships.
3. Identify and/or explain the reasons for changes in how organisms are classified.

**Key Vocabulary:** binomial nomenclature, chordates, dichotomous key, domain, invertebrate, kingdom, vertebrate,

* *What are the key characteristics of organisms in the 6 kingdoms?*



* *What are the 3 Domains, the kingdoms in the domain, and the characteristics of the organisms in each Domain.*



* *How and why organisms are hierarchically classified based on evolutionary relationships?*
* *Why have ways of classifying organisms changed over time?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.15.8 – Origin of Life on Earth**

***Describe the scientific explanations of the origin of life on Earth.***

1. Identify examples of and basic trends in hominid evolution from early ancestors to modern humans.
2. Describe scientific explanations for the origin of life on Earth.
3. Identify situations or conditions contributing to the origin of life on Earth.

**Key Vocabulary:** hominid, organic molecules

* *How have hominids changed from through evolution from early ancestors to modern humans? What evidence do we use to show this change?*
* *How do scientists explain the origin of life on earth?*
* *What situations and conditions contributed to the origin of life on earth?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.15.13 – Natural Selection**

***Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.***

1. Explain and/or describe the conditions required for natural selection that result in differential reproductive success.
2. Explain and/or describe the scientific mechanisms, such as genetic drift, gene flow, and nonrandom mating, resulting in evolutionary change.
3. Explain and/or describe how mutation and genetic recombination increase genetic variation

**Key Vocabulary:** adaptation, biodiversity, diversity, genetic drift, gene flow, mutation, offspring, reproductive isolation, species, natural selection, theory, speciation, subspecies, variation

*What conditions must be present for natural selection to result in a difference in reproductive success?*

* *How do mechanisms like genetic drift, gene flow and nonrandom mating result in evolutionary change?*
* *genetic drift*
* *gene flow*
* *nonrandom mating*
* *How do mutation and genetic recombination increase genetic variation?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.16.1 – Mendel’s Laws, Inheritance patterns**

***Use Mendel’s laws of segregation and independent assortment to analyze patterns of inheritance.***

1. Describe the process of meiosis, including independent assortment and crossing over.
2. Describe the role of meiosis in sexual reproduction, including how these processes may contribute to or limit genetic variation.
3. Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance
4. Identify, analyze, and/or predict inheritance patterns caused by various modes of inheritance.

**Key Vocabulary:** alleles, codominant, dominant, gene, genetics, genotype, heredity, heterozygous, homologous, homozygous, hybrid, incomplete dominance, independent assortment, pedigree, phenotype, pigment, polygenic, purebred, recessive, segregation, sex-linked, trait

* *How can independent assortment and crossing over occur during meiosis?*
* *Why is meiosis necessary for sexual reproduction and how does it allow for genetic diversity?*
* *How do the laws of segregation and independent assortment affect the analysis of inheritance patterns?*
* *How does the mode of inheritance (dominance, co-dominance, etc.)affect the prediction and analysis of inheritance patterns?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.16.3 – DNA Replication**

***Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.***

1. Describe the process of DNA replication and/or its role in the transmission and conservation of genetic information.
2. Explain the basic processes of transcription and/or translation, and their roles in the expression of genes.
3. Explain the basic components of DNA are universal in organisms
4. Describe gene and chromosomal mutations in the DNA sequence.
5. Explain how gene and chromosomal mutations may or may not result in a phenotypic change

**Key Vocabulary:** DNA, protein synthesis, replication, RNA, transcription, translation, mRNA, tRNA, ribosome, amino acid, protein

* *How does the process of DNA replication enable genetic information to be transmitted and used to build proteins?*
* *How do the processes of transcription and translation determine how genes are expressed?*
* *How is DNA alike in all organisms?*
* *How can DNA mutate?*
* *Why don't all mutations result in visible change?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.16.10 – Biotechnology**

***Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.***

1. Explain how similarities in the genetic codes of organisms are due to common ancestry and the process of inheritance.
2. Evaluate examples and/or explain the possible impact of biotechnology on the individual, society, and/or the environment.

* *Why do scientists use DNA as evidence that all organisms are related?*
* *How can biotechnology have positive and negative impacts on society?*

**References: Where did you find your Evidence to complete the above questions?**

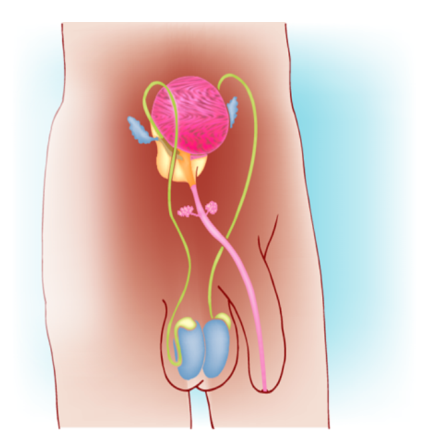
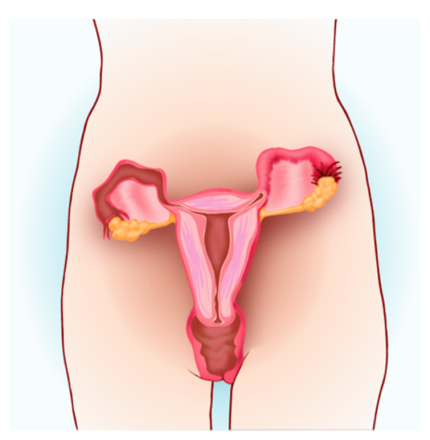
**Biology Review L.16.13 – Human Reproduction**

***Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.***

1. Identify and/or describe the basic anatomy and physiology of the human reproductive system.
2. Describe the process of human development from the zygotic stage to the end of the third trimester and birth.

**Key Vocabulary:** anatomy, fertilization, trimester, zygote, embryo, fetus

* *What are the important structures in the female and male reproductive systems and*

* *

* *How do the male and female reproductive systems work together to create a zygote?*
* *How does a human develop from a zygote to a "full term" baby?*

*First Trimester –*

*Second Trimester –*

*Third Trimester*

**References: Where did you find your Evidence to complete the above questions?**

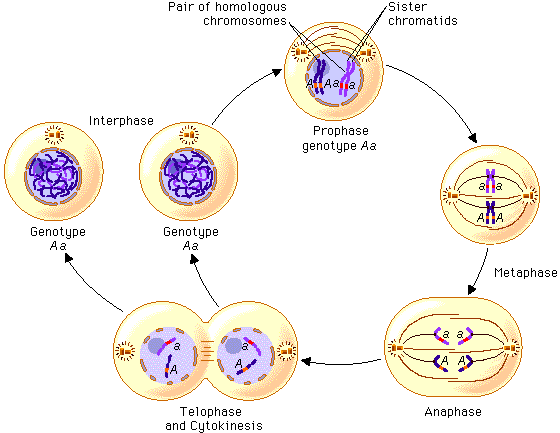
**Biology Review L.16.17 – Mitosis/ Meiosis**

***Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.***

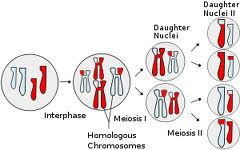
1. Differentiate the processes of mitosis and meiosis.
2. Describe the role of mitosis in asexual reproduction, and/or the role of meiosis in sexual reproduction, including how these processes may contribute to or limit genetic variation.
3. Describe specific events occurring in each of the stages of the cell cycle and/or phases of mitosis.
4. Explain how mitosis forms new cells and its role in maintaining chromosome number during asexual reproduction.
5. Explain how cancer (uncontrolled cell growth) may result from mutations that affect the proteins that regulate the cell cycle.
6. Describe the process of meiosis, including independent assortment and crossing over.
7. Explain how meiosis results in the formation of haploid gametes or spores.

**Key Vocabulary:** chromatid, chromosome, diploid, gamete, haploid, meiosis, mitosis, nucleus, replication, prophase, metaphase, anaphase, telophase

* *What are the stages of mitosis and how do they produce identical copies of cells?*

**

* *How does mitosis for new cells that maintain the chromosome number in the parent cells?*
* *How does mitosis allow for asexual reproduction?*
* *What are the steps in meiosis that result in the formation of haploid gametes?*

**

* *Why is meiosis necessary for sexual reproduction and how does it allow for creating genetic diversity?*
* *How are mitosis and meiosis similar but different?*
* *How can independent assortment and crossing over occur during meiosis?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.17.5 – Populations**

***Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.***

1. Use data and information about population dynamics, abiotic factors, and/or biotic factors to explain and/or analyze a change in carrying capacity and its effect on population size in an ecosystem.
2. Explain that different types of organisms exist within aquatic systems due to chemistry, geography, light, depth, salinity, and/or temperature.
3. Identify positive and/or negative consequences that result from a reduction in biodiversity.

**Key Vocabulary:** biodiversity, biomass, carrying capacity, emigration, extinction, immigration, limiting factor, population

* *What affects population? Explain each.*
* *What affects carrying capacity and how can it affect population size of an ecosystem?*
* *How does the chemistry, geography, light, depth, salinity, and/or temperature of an aquatic system affect what organisms can live there?*
* *How can reducing biodiversity positively or negatively impact ecosystems and humans?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.17.9 – Trophic Levels**

***Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.***

1. Explain how organisms cooperate and compete in ecosystems.
2. Describe the energy pathways through the different trophic levels of a food web or energy pyramid.
3. Describe the potential changes to an ecosystem resulting from seasonal variations, climate changes, and/or succession.
4. Analyze the movement of matter through different biogeochemical cycles.

**Key Vocabulary:** abiotic, autotroph, biotic, biogeochemical cycles, consumer, decomposer, ecology, ecosystem, energy, heterotroph, primary producer, producer, succession, trophic level

* *How do organisms cooperate and compete in ecosystems? (give examples of each)*
* *How does energy move through a food web or energy pyramid? (draw and explain)*
* *How can ecosystems be changed by seasonal variations, climate changes and succession? (give example)*
* *How does matter move through different biogeochemical cycles (such as carbon through the carbon cycle)?*
* *How can energy be transformed from one form to another?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.17.20 – Human Impact**

***Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.***

1. Predict how the actions of humans may impact environmental systems and/or affect sustainability.
2. Evaluate possible environmental impacts resulting from the use of renewable and/or nonrenewable resources.

**Key Vocabulary:** fossil fuel, invasive species, nonrenewable resource, productivity, renewable resource, sustainability,

* *How can the actions of humans may impact environmental systems and/or affect sustainability?*
* *How can the environmental impacts of using renewable and nonrenewable resources differ?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.18.1 – Macromolecules, Enzymes**

***Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules***

1. Explain how enzymes speed up the rate of a biochemical reaction by lowering the energy needed to start reaction.
2. Identify and/or describe the effect of environmental factors on enzyme activity.
3. Identify and/or describe the basic molecular structure of carbohydrates, lipids, proteins, and/or nucleic acids.
4. Explain the difference between organic and inorganic compounds.
5. Describe the primary functions of carbohydrates, lipids, proteins, and/or nucleic acids in organisms.
6. Describe the properties of the carbon atom that make the diversity of carbon compounds possible.

**Key Vocabulary:** acid, activation energy, amino acid, atom, base, carbohydrate, catalyst, compound, DNA, element, energy, enzyme, inorganic, lipid, macromolecule, molecule, nucleic acid, organic, pH, protein

* *What are the elements that make up the 4 macromolecules in the body?*
* *How do each of the four major categories of macromolecules support the body?*
* *How do enzymes act as catalysts?*
* *How do various factors affect enzymes?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.18.9 – Photosynthesis and Cellular Respiration**

***Explain the interrelated nature of photosynthesis and cellular respiration.***

1. Explain how reactants and products of photosynthesis are used as reactants for cellular respiration and vice versa.
2. Explain how photosynthesis stores energy and cellular respiration releases energy.
3. Identify the reactants, products and/or the basic function of photosynthesis.
4. Identify the reactants, products, and/or the basic functions of aerobic and anaerobic cellular respiration.
5. Connect the role of ATP to energy transfers within the cell.
6. Discuss the role of anaerobic respiration in living things.

**Key Vocabulary:** ATP, aerobic, anaerobic, cellular respiration, centriole, chloroplasts, photosynthesis, products, reactants

* *How do the processes of photosynthesis and cellular respiration form a cycle?*
* *How does photosynthesis create the food that is used for energy in cellular respiration?*
* *What are the products and reactants of photosynthesis?(give equation)*
* *What are the products and reactants of cellular respiration?(give equation)*
* *What is the difference between aerobic and anaerobic respiration?*
* *What is the role of ATP in energy transfer?*

**References: Where did you find your Evidence to complete the above questions?**

**Biology Review L.18.12 – Properties of Water**

***Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.***

1. Identify examples of water's properties that sustain life (e.g. ice floats, water movement through plants, water cycle).
2. Explain the properties of water at a conceptual level.
3. Explain how the properties of water make water essential for life on Earth.

**Key Vocabulary:** adhesion, cohesion, endothermic, exothermic heat capacity, polarity, surface tension, solute, solution, solvent

* *What are the properties of water and how do they influence life on Earth?*
* *How does water dissolve substances?*
* *How do the properties of water make it able to sustain life?*

**References: Where did you find your Evidence to complete the above questions?**