

Mount Pleasant Central School District

Biology, Science



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1.Practices in Biology	September	- Overview of the course and what defines a living thing. -The scientific method.	Homeostasis, Metabolism, Unicellular, Multicellular, Autotrophs, Heterotrophs, Decomposers, Growth, Observation, Inference Hypothesis, Independent variable, Dependent variable, Control Variable, Control Group, Qualitative,	HS-LS1-3: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	- Learning and applying the scientific method. -Lab Skills -Analyze data	A hypothesis is a proposed explanation for a phenomena that serves as the bases for further investigation. Large sample sizes are more trustworthy than small.	Lab: Growth Strategies

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			Quantitative				
2.Biochemistry	September	- An introduction to biochemistry and the main organic compounds needed by living things with their structure and function.	Chemistry, Biochemistry, Molecule, Compound, Mixture, Homogeneous, Heterogeneous, Solvent, Solute, Physical change, Chemical change, Chemical reaction, Organic compound,	HS-LS1-6: Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements such as nitrogen, sulfur, and phosphorus to form	-Building organic compounds from their subunits	-Every organic polymer is made from smaller monomers. -Proteins work depending on shape. -The ability for proteins to work depends on pH and temperature.	-Lab: Carbohydrate Chemistry -Lab: Enzymes of Life

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			Inorganic compound	amino acids and other carbon-based molecules.			
3.Cell Structure and Function	October	- This unit covers some of the cell organelles, their interactions, and the movement of materials into and out of the cell.	- Prokaryote, Eukaryote, Autotroph, heterotroph, diffusion, osmosis, hypertonic, hypotonic, isotonic, nucleus, cell membrane, ribosome, cell wall, mitochondria, chloroplast.	HS-LS1-1 - Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. [- Students perform class presentations. -Students use microscopes to study diffusion in cells	-Diffusion is the movement of materials from high to low concentration. This process allows cells to complete biochemical processes and homeostasis.	-Presentation: Cell Organelles -Lab: Diffusion Through a Membrane

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4. Photosynthesis and respiration	October	- There is a cyclic relationship between photosynthesis and respiration where the products of one are the raw materials of the other.	- autotroph, heterotroph, bond energy, respiration, photosynthesis, ATP, glucose, active transport	HS-LS1-5 - Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. HS-LS1-7 - Use a model to illustrate that aerobic cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds	- understanding the laws of conservation of matter and conservation of energy. - measurement skills using both quantitative and qualitative methods.	- plants store the sun's energy through an energy conversion. - all organisms go through respiration in order to release energy (originally stored in photosynthesis)	- Model: Photosynthesis & Cellular Respiration - Lab: Photosynthesis Floating Disks

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				in new compounds are formed resulting in a net transfer of energy. HS-LS2-5 - Develop a model to illustrate the role of various processes in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.			
5. Feedback	November	- An overview of the human digestive	-calorie, Intracellular, extracellular,	HS-LS1-2 -Develop and use a model to	- Lab Skills -analyze data	Surface area is critical for enzymes to work	- Lab: The Marathon Runner

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Mechanisms		system and its processes. -The systems involved in the elimination of wastes - The immune system works to help the body maintain homeostasis when encountering pathogens.	mechanical and chemical digestion. - Lungs, alveoli, kidney, nephron, nitrogenous waste, active transport, heart, arteries, veins, capillaries. - Immunity, Active Immunity, Antigen, Passive Immunity, Pathogen, ABO Blood groups, Phagocytes , Rh factor, antibody, Transfusion, Bacteria, Transplants, Virus,	illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. HS-LS1-3 - Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis	-application of prior knowledge -A student will be able to construct an explanation based on evidence that living things rely on systems that interact and the role of feedback mechanisms and homeostasis. -A student will be able to construct an	effectively and for nutrients to be absorbed effectively. Most wastes are removed through diffusion. Nitrogenous wastes are more difficult and the kidneys have to retrieve nutrients through active transport. Your immune system has a number of interactions which	-NYS Lab: Balancing Act - Exploring Feedback and Homeostasis

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			Allergies, fungus, Autoimmune Disorders, Lymphocyte		explanation based on evidence that living things rely on systems that interact.	allow the body to protect itself against pathogens. These include antibodies, B-cells, T-cells, and the lymphatic system.	
9.Cell division Reproduction	January	- Mitosis, and Meiosis	Mitosis, Meiosis, Haploid, Diploid, Gamete, Somatic Cell, Crossing Over,	HS-LS1-4 - Use a model to illustrate cellular division (mitosis) and differentiation.	-	We all start as one cell and from there we multiply to over a trillion. Cells are also constantly being	-Lab: Meiosis & Crossing Over -Lab: Fetal Development

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			Cytokinesis, Sperm Cell, Egg Cell, Fertilization, Blastula, Gastrulation, Cleavage, Differentiation, Internal Fertilization, External Fertilization, Menstruation, Ovulation, Zygote, Fetus, Embryo			damaged and are in need of replacement. This is all dependent on the cell cycle. The cells that can later go on to join and become a new living thing also have a process of their own.	
10.Genetics	February,	- DNA and how it is	DNA, RNA,	-HS-LS3-1 - Ask	A student will be able	-It is only through the	State Lab: Unraveling

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	March	copied. The transcription of DNA to RNA and the path to protein synthesis. Also mutations and their link to natural selection as well as negative consequences.	Chromosome, Gene, Allele, Heredity, Trait, Genetics, Dominant, Recessive, Hybrid, Purebred, Dominant allele, Recessive allele, Gene expression Phenotype, Genotype, Homozygous, Heterozygous, Test cross, Incomplete dominance, Codominance, Blood types, Multiple alleles, Polygenic traits, Environmental	questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring -HS-LS3-2 - Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new	to ask questions and make and defend claims based on evidence about how hereditary information leads to variation in traits.	transcription of DNA that living things can make the proteins and other materials that they need to survive. -It is only through DNA replication that every cell in the body of a living organism has the information necessary to complete all the needed metabolic functions.	the Mystery of Lactose Intolerance -Claim: Sources of Genetic Variation

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			factors, Sex linked, Pedigree chart, Replication, Codons , Transcription, Translation, RNA , Protein synthesis	genetic combinations through meiosis, (2) viable errors occurring during replication, (3) mutations caused by environmental factors and/or (4) genetic engineering -HS-LS3-3 - Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.			

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11.Evolution & Natural Selection	April	- A look into Darwin, Wallace, and the theory of natural selection.	- common ancestor, mutation, natural selection, gene pool, competition, adaptation, natural selection, homologous structures, vestigial, population bottleneck	-HS-LS4-1 - Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. -HS-LS4-2 - Construct an explanation based on evidence that the process of evolution primarily results from	A student will be able to evaluate scientific evidence and communicate how biological evolution explains the unity and diversity among organisms.	We are all here due to a long series of mistakes. Organisms can only survive as a species if genetic mistakes are made and in some cases, those mistakes give an organism a competitive advantage over other organisms.	Lab: Beaks of Finches Model: Natural Selection

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				four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.			

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				-HS-LS4-3 - Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. -HS-LS4-4- Construct an explanation based on evidence for how natural selection leads			

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				to adaptation of populations -HS-LS4-5 -Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.			

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12.Ecology	April, May	This final chapter covers all of the other topics and how they link together	Ecology Abiotic factor Biotic factor Organism Population Community Ecosystem Autotroph Heterotroph Herbivores Carnivores Omnivore Decomposer Predator Prey Symbiosis Parasitism Habitat Niche Producer Consumer Decomposer Food chain Food web	HS-LS2-1 - Use mathematical and/or computational representations to support explanations of biotic and abiotic factors that affect carrying capacity of ecosystems at different scales. HS-LS2-2 - Use mathematical representations to support and revise explanations based on	A student will be able to develop and use models to construct and revise explanations based on evidence for the cycling of matter and transfer of energy within ecosystems.	Ecology can be viewed through any and all of the prior topics. It is the story and science of how living things interact with each other and the abiotic environment.	-State Lab: For the Birds - Designing Solutions -Lab: Relationships & Biodiversity

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			Competition Equilibrium Biomass Primary succession Secondary succession Climax community Biome Carbon cycle Oxygen cycle Water cycle Nitrogen cycle Limiting factor Carrying capacity Renewable resource Biomagnification Acid rain Ozone	evidence about factors affecting biodiversity and populations in ecosystems of different scales. HS-LS2-3 -Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in ecosystems -HS-LS2-4 - Use mathematical			

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				representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem -HS-LS2-6 -Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable			

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				conditions, but changing conditions may result in a new ecosystem. -HS-LS2-7 - Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. -HS-LS2-8 -Evaluate the evidence for the role of group behavior on individual and			

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				species' chances to survive and reproduce			