Map: **Science: Living Environment RP** Type: **Consensus** Grade Level: **9** School Year: **2010-2011**

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Created: **06/28/2010** Last Updated: **07/15/2010**

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	Essential Questions	Content	Skills	Assessments	Standards / PIs	Resources / Notes
Unit 1	**What are the similarities and differences among living things?** **How is each of the life functions related to each other?** **Why is the cell the basic unit of life?** **What are the similarities and differences among plant and animal cells?** **How do the different organelles work together to maintain homeostasis?** **How does a cell membrane help to maintain homeostasis?** **Why does diffusion always lead to equilibrium?** **Why is water necessary for transport to occur?** How do the human body systems interact in order to carry out life processes?	**Topic 1: Characteristics of Life** **Vocabulary:** metabolism homeostasis reproduction cell respiration synthesis excretion organic inorganic organelles tissues organ organ system **Topic 2: Parts of the cell** cytoplasm nucleus vacuoles ribosomes mitochondria chloroplasts	**Identify the necessary life functions** **Distinguish relationships between each of the life functions** **Recognize and label the parts of a cell** **Describe the function of each cell organelle.** **Summarize how cell organelles work together to maintain homeostasis**		**MST1-K4-2A** **MST4-K6-6B** **MST4-K6-6C** **MST4-K10-10C**	

	How do single-celled organisms compare to multi-cellular organisms?	**Topic 3: Transport throughout the cell membrane** cell membrane diffusion active transport digestion amino acids simple sugars receptor molecules hormones	**Distinguish between passive and active transport** **Point out the importance of water to the life function of transport**				
		Topic 4: Human Body Systems digestion respiration circulation excretion movement coordination	Define the functions of the systems of the human body. Explain how the human body systems interact in order to maintain homeostasis. Compare single-celled and multicellular oraganisms in terms of how they carry out life processes.				

		immunity reproduction				
Unit 2	**How does the biochemical process of photosynthesis allow organisms to maintain homeostasis?** Explain how cells use the process of cellular respiration to release energy. **How do enzymes affect biochemical processes?** **How are enzymes affected by temperature, pH, substrate/enzyme concentration?** **How do feedback mechanisms allow an organism to maintain homeostasis?** How does disease affect homeostasis in	**Topic 5: Photosynthesis** **Vocabulary:** photosynthesis chloroplasts glucose ATP synthesis **Topic 6: Cellular Respiration** **Vocabulary:** cellular respiration enzymes gas exchange mitochondria **Topic 7: Enzymes** **Vocabulary:** enzyme catalyst	**Recognize how photosynthesis and respiration are related.** **Identify what happens to the sugar produced by photosyntheis.** **Define the process of cellular respiration** **Identify the materials used and the materials produced during cellular respiration.** **Explain why cellular respiration is essential for living things.** **State the role of enzymes in biochemical processes.** **Illustrate how enzymes are specific.** **Explain how the factors of shape,**		**MST1-K5-2A** **MST1-K6-2A** **MST4-K10-10A** **MST4-K11-11B**	

	organisms? How does the immune system protect organisms from danger and disease?	reaction rate pH **Topic 8: Feedback and Homeostasis** **Vocabulary:** dynamic equilibrium feedback mechanism stimuli pancreas insulin guard cells **Topic 9: Disease as a failure of homeostasis** **Vocabulary:** **disease** **pathogens** **cancer** **immune system** **antigens** **antibodies** **microbes** **vaccines** **AIDS** **allergy**	**temperature, and pH affect enzyme reaction rates.** **Explain the need for homeostasis in living things.** **Compare feedback in living things to a thermostat.** **Detail two examples of cell/organ feedback interactions.** **Relate how the pancreas in humans and guard cells in a plant maintain homeostasis.** Summarize how viruses, bacteria, fungi, and parasites cause disease. Describe how white blood cells and antibodies produced by the immune system fight against pathogens. Identify the contents of a vaccination and summarize how it works to produce immunity in the body. Explain what results from damage to the				

		histamines **antihistamines**	immune system. Describe methods developed to diagnose, prevent, and treat disease.			
Unit 3	**How are traits passed from organism to offspring?** **How does the structure of DNA allow it to replicate and make proteins?** **How do mutations affect an individual's DNA?** How do humans use genetic engineering to alter the genetic instructions in organisms?	**Topic 10: heredity and genes** **Vocabulary:** genes traits heredity DNA chromosomes asexual reproduction sexual reproduction clones sperm egg body cells genetic recombination **Topic 11: DNA** **Vocabulary:** subunits replicated template bond protein synthesis	**Explore how traits are passed from parent to offspring.** **Compare and contrast asexual and sexual reproduction.** **Identify how genetic recombination results in genetic variation.** **Describe the parts of DNA.** **Explain the steps of DNA replication.** **Explore how DNA allows a cell to make proteins.** **Distinuish between the four type of mutations.** **Describe how cells**		**MST1-K6-2A** **MST4-K6-6B** **MST4-K6-6C** **MST4-K10-10A** **MST4-K10-10B** **MST4-K10-10C**	

		Topic 12: Mutations **Vocabulary:** mutation expressed substitution deletion addition inversion **Topic 13: Genetic Engineering** **Vocabulary:** genetic engineering biotechnology selective breeding gene manipulation	**with identical genetic information can differ in structure and function.** **Explain how an organism's environment can affect the expression of genes.** Illustrate the ways that selective breeding allow for new varities of organisms. Explain how the prcess of genetic engineering using bacteria is beneficial to humans. Summarize the ways in which biotechnology is applied to the field of health care.			

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Unit 4	**How do the two types of reproduction compare and contrast?** **How do the processes of mitosis and meiosis compare and contrast?** **How does the process of meiosis allow for variation in organisms?** **How does a zygote form and develop into an embryo?** **How does the process of differentiation influence embryonic development?** How are the human male and female reproductive systems adapted for reproduction and development?	**Topic 14: Types of Reproduction** **Vocabulary:** species development asexual reproduction sexual reproduction sex cells gametes fertilization sperm egg cloning **Topic 15: mitosis and meiosis** **Vocabulary:** mitosis meiosis fertilization **Topic 16: zygote formation and early development** **Vocabulary:** zygote recombination	**Compare and contrast asexual and sexual reproduction.** **Explain why organisms resulting from sexual reproduction have more variation than those produced by asexual reproduction.** **Describe the process of cloning.** **Compare and contrast cell division by mitosis and meiosis.** **Describe how meiosis and fertilization increase variation.** **Identify the process of zygote formation.**		**MST4-K7-7A** **MST4-K6-6C** **MST4-K9-9A**	

		differentiation embryo expressed gene expression **Topic 17: Human Reproduction and Development** **Vocabulary:** ovaries estrogen progesterone uterus placenta testes testosterone fetus	**Explain how differentiation leads to embryo development.** **Detail the factors that affect gene expression.** Explore the structure and function of the human male and female reproductive systems. Determine how the interaction of progesterone and estrogen control the activities of the female reproductive system. Detail the role of the placenta. How can reproductive technology be applied to the field of medicine?			
	How did Charles Darwin's theory of evolution emerge?	**Topic 18: The Theory of Evolution**	Detail the theory of evolution.		**MST4-K11-11C**	

Unit 5	How did Charles Darwin explain the process of natural selection? What conditions are vital to the process of evolution? What are the causes and effects of genetic variation? What factors influence the rate of evolution?	**Vocabulary:** evolution theory fossil record geologic time **Topic 19: The mechanics of evolution** **Vocabulary:** natural selection overproduction genetic variation adaptive value **Topic 20: Genetic Variation** **Vocabulary**: mutation genetic shuffling **Topic 21: The Rate of Evolution** **Vocabulary:** extinction	List the evidence that Charles Darwin used to support this theory. List the four conditions that lead to evolutionary change. Explain how the environment selects individuals for survival. Summarize how mutations and genetic shuffling lead to variation. Explore how genetic variation leads to change in structure, function, and behavior. Compare the rate of evolution in different organisms. Identify factors which lead to extinction of a species.		**MST4-K8-8A**	
	How do the orgnisms in an	**Topic 22: Ecology**	**Describe the parts of an**		**MST4-K11-**	

Unit 6	ecosystem interact with one another and the environment? How are populations linked directly or indirectly to one another? How does energy flow through an ecosystem? How does biodiversity benefit species and habitats?	**Vocabulary:** **ecology** **ecosystem** **abiotic** **biotic** **habitat** **population** **community** **biosphere** **finite** **competition** **limiting factors** **predators** **prey** **carrying capacity** **Topic 23: Roles and Relationships in the Ecosystem** **Vocabulary:** ecological niche food chains autotrophs producers heterotrophs herbivores carnivores consumers decomposers scavengers parasites	**ecosystem.** **Explain how competition affects an ecosystem.** **Identify limiting factors in an ecosystem.** Identify the roles that different organisms play in an ecosystem. Trace the path of energy through a food chain. Explain the need for material cycles in an ecosystem.		**11A** **MST4-K11-11B** **MST4-K11-11C** **MST4-K12-12A**	

		host food web Topic 24: Energy flow through an ecosystem Vocabulary: energy pyramid				

	Essential Questions	Content	Skills	Assessments	Standards/PIs	Resources/Notes
Unit 7	How do humans impact the ecosystem? **How do human activities lead to the loss of diversity?** **How does technology and industrialization affect the ecosystem?**	**Topic 25: Human Impact on Eosystems** **Vocabulary:** renewable resources nonrenewable resources pollution water cycle energy flow carrying capacity **Topic 26: Human Activities and the Loss of Diversity** **Vocabulary:** direct harvesting deforestation biodiversity imported species **Topic 27: Impact of Technology and Industrialization on the Ecosystem** **Vocabulary:** **tecnnology** **industrialization** **nuclear fuel** **fossil fuels** **acid rain** **global warming** **ozone shield**	**Distinguish between renewable and nonrenewable resources.** **Detail methods that humans can use to preserve resources.** **Summarize ways in which the growth of the human population can affect the environment.** **Recognize ways in which human activites lead to the loss of diversity.** **Summarize the processes of direct harvesting, habitat destruction, and important species and detail their affect on the environment.** **Investigate the connection between technology and pollution.** **Detail the affect of water polution and air pollution on the environment.** **Explain the affect of global atmospheric changes.**		**MST4-K7-7A** **MST4-K7-7B** **MST1-K4-2A** **MST1-K4-2C** **MST1-K5-2B** **MST1-K6-2A** **MST4-K9-9A** **MST4-K11-11B**	

		trade-off	**Analyze the cost and benefits of technological advances and determine which trade-off would be acceptable and which would be too dangerous.**			
Unit 8	**How is scientific inquiry related to the study of the living environment?** What are the components of a scientific experiment? How do scientists collect and organize data?	**Topic 28: Scientific Inquiry** **Vocabulary:** evidence observations assumptions opinions biased **Topic 29: Scientific Experiments** **Vocabulary:** scientific literacy research plan dependent variable independent variable **Topic 30: Collecting and Organizing Data** **Vocabulary:** data	Define the term science. Give examples of scientific inquiry. Relate the process of scientic inquiry to everyday life. Describe the steps of a reserach plan. Identify the independent and dependent variables in an investigation. Design an experiment that can be used to test a hypothesis. Construct a graph that contains a properly labeled horizontal axis and vertical axis. Graph data accurately.		**MST1-K4-2A** **MST1-K4-2C** **MST1-K4-2D** **MST1-K5-2A** **MST1-K6-2C** **MST4-K8-8A** **MST4-K11-11B** **MST4-K11-11C**	

		model				
Unit 9	How are measurement tools used in the laboratory? How is the microscope used to view a specimen? How are the laboratory techniques of electrophoresis, chromatography, indicators, and dichotomous keys used in the laboratory? What are the proper techniques for safely observing plant and animal species?	**Topic 31: Tools for measurement** **Vocabulary:** metric ruler graduated cylinder volume mass balance triple-beam balance electronic balance **Topic 32: Microscope Skills** **Vocabulary:** microscope magnification stereoscope compound light microscope **Topic 33: Additional Laboratory Techniques** **Vocabulary:** electrophoresis chromatography stains	Measure given objects using a metric ruler. Measure volume using a graduated cylinder. Measure mass using a balance. Demonstrate proper use of the compound light microscope. Calculate total magnification of a specimen. Utilize proper techniques for focusing the microscope. Detail the steps used in preparing a wetmount. Employ proper technique to the staining of a specimen. Explain the use of gel electropheresis and relate it to everyday life. Utilize the technique of chromatography to separate the pigments in plants. Describe the use of indicators. Identify the equipment used for dissection and detail the		**MST1-K4-2A** **MST1-K4-2C** **MST1-K6-2C**	-

		indicators dichotomous key Topic 34: Observing plant and animal species Vocabulary: dissection	use of each. Demonstrate proper lab safety techniques.			

	Essential Questions	Content	Skills	Assessments	Standards/PIs	Resources/Notes
Unit 10	What skills are needed to achieve mastery level on the Living Environment Regents Exam?	**Regents Review**	Demonstrate and understanding of strategies for multiple choice questions. Practice strategies for free response questions. Review the 4 NY State Labs and answer practice questions related to them.			

Key to Standards used in this Map

MST1-K4-2A [4 occurences] - MST Standard 1 - Key Idea 4 [Scientific Inquiry i] - Performance Indicator 2A - elaborate on basic scientific and personal explanations of natural phenomena, and develop extended visual models and mathematical formulations to represent their thinking. [Commencement]

MST1-K4-2C [3 occurences] - MST Standard 1 - Key Idea 4 [Scientific Inquiry i] - Performance Indicator 2C - work toward reconciling competing explanations; clarifying points of agreement and disagreement. [Commencement]

MST1-K4-2D [1 occurence] - MST Standard 1 - Key Idea 4 [Scientific Inquiry i] - Performance Indicator 2D - coordinate explanations at different levels of scale, points of focus, and degrees of complexity and specificity and recognize the need for such alternative representations of the natural world. [Commencement]

MST1-K5-2A [2 occurences] - MST Standard 1 - Key Idea 5 [Scientific Inquiry ii] - Performance Indicator 2A - devise ways of making observations to test proposed explanations. [Commencement]

MST1-K5-2B [1 occurence] - MST Standard 1 - Key Idea 5 [Scientific Inquiry ii] - Performance Indicator 2B - refine their research ideas through library investigations, including electronic information retrieval and reviews of the literature, and through peer feedback obtained from review and discussion. [Commencement]

MST1-K6-2A [3 occurences] - MST Standard 1 - Key Idea 6 [Scientific Inquiry iii] - Performance Indicator 2A - use various means of representing and organizing observations (e.g., diagrams, tables, charts, graphs, equations, matrices) and insightfully interpret the organized data. [Commencement]

MST1-K6-2C [2 occurences] - MST Standard 1 - Key Idea 6 [Scientific Inquiry iii] - Performance Indicator 2C - assess correspondence between the predicted result contained in the hypothesis and the actual result and reach a conclusion as to whether or not the explanation on which the prediction was based is supported. [Commencement]

MST4-K6-6B [2 occurences] - MST Standard 4 - Key Idea 6 [The Living Environment i] - Performance Indicator 6B - describe and explain the structures and functions of the human body at different organizational levels (e.g., systems, tissues, cells, organelles). [Commencement]

MST4-K6-6C [3 occurences] - MST Standard 4 - Key Idea 6 [The Living Environment i] - Performance Indicator 6C - explain how a one-celled organism is able to function despite lacking the levels of organization present in more complex organisms. [Commencement]

MST4-K7-7A [2 occurences] - MST Standard 4 - Key Idea 7 [The Living Environment ii] - Performance Indicator 7A - explain how the structure and replication of genetic material result in offspring that resemble their parents. [Commencement]

MST4-K7-7B [1 occurence] - MST Standard 4 - Key Idea 7 [The Living Environment ii] - Performance Indicator 7B - explain how the technology of genetic engineering allows humans to alter the genetic makeup of organisms. [Commencement]

MST4-K8-8A [2 occurences] - MST Standard 4 - Key Idea 8 [The Living Environment iii] - Performance Indicator 8A - explain the mechanisms and patterns of evolution. [Commencement]

MST4-K9-9A [2 occurences] - MST Standard 4 - Key Idea 9 [The Living Environment iv] - Performance Indicator 9A - explain how organisms, including humans, reproduce their own kind. [Commencement]

MST4-K10-10A [2 occurences] - MST Standard 4 - Key Idea 10 [The Living Environment v] - Performance Indicator 10A - explain the basic biochemical processes in living organisms and their importance in maintaining dynamic equilibrium. [Commencement]

MST4-K10-10B [1 occurence] - MST Standard 4 - Key Idea 10 [The Living Environment v] - Performance Indicator 10B - explain disease as a failure of homeostasis. [Commencement]

MST4-K10-10C [2 occurences] - MST Standard 4 - Key Idea 10 [The Living Environment v] - Performance Indicator 10C - relate processes at the system level to the cellular level in order to explain dynamic equilibrium in multicelled organisms. [Commencement]

MST4-K11-11A [1 occurence] - MST Standard 4 - Key Idea 11 [The Living Environment vi] - Performance Indicator 11A - explain factors that limit growth of individuals and populations. [Commencement]

MST4-K11-11B [4 occurences] - MST Standard 4 - Key Idea 11 [The Living Environment vi] - Performance Indicator 11B - explain the importance of preserving diversity of species and habitats. [Commencement]

MST4-K11-11C [3 occurences] - MST Standard 4 - Key Idea 11 [The Living Environment vi] - Performance Indicator 11C - explain how the living and nonliving environments change over time and respond to disturbances. [Commencement]

MST4-K12-12A [1 occurence] - MST Standard 4 - Key Idea 12 [The Living Environment vii] - Performance Indicator 12A - describe the range of interrelationships of humans with the living and nonliving environment. [Commencement]