

Kenmore-Tonawanda Union Free School District

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## Science - Living Environment

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Options	Standards	Essential Questions	Content	Skills	Suggested Resources	Assessment	Resources
		<b>Scientific Inquiry</b>					<a href="#">Topic 8.ppt</a>
		<b>Beyond the use of reasoning and consensus, how do we test proposed explanations?</b>	<p><b>Research plan</b></p> <ul style="list-style-type: none"> <li>- Independent and dependent variables</li> <li>- Controlled variables</li> <li>- Control set-up</li> <li>- Background information</li> <li>- Major concepts that are being investigated</li> <li>- Recommendations for methodologies</li> <li>- Use of technologies</li> <li>- Proper equipment</li> <li>- Safety precautions</li> </ul> <p><b>Hypotheses</b></p> <ul style="list-style-type: none"> <li>- Predictions</li> <li>- Research</li> <li>- Observation</li> <li>- Collection of data</li> <li>- Interpretation of data</li> <li>- Repeated trials</li> </ul>	<p>Recognize that hypotheses are derived from both research and observation</p> <p>- Design a research plan, including identification of independent and dependent variables, as well as all controlled factors in the experiment</p> <p>- Identify and determine the control group in the research plan</p> <p>- Research background information</p> <p>- Include repeated trials, large sample sizes, and objective data-collection techniques in research design</p>			<a href="#">designyourownlab.doc</a>  <a href="#">octobersky.doc</a>  <a href="#">sn-scimethod.doc</a>  <a href="#">The Nature of Science.ppt</a>
		<b>How do we use the observations made while testing a proposed explanation to provide new insights into natural phenomena?</b>	<p><b>Methods of representing and organizing data</b></p> <ul style="list-style-type: none"> <li>- Diagrams, tables, charts, graphs, equations, matrices</li> <li>- Additional hypotheses</li> <li>- Generalizations</li> <li>- Explanations of natural phenomena</li> </ul>	<p>Design table or chart in which to collect and organize data</p> <p>- Construct graphs and charts to represent data for interpretation</p>			<a href="#">Graphing Exercise.doc</a> <a href="#">Graphing.ppt</a> <a href="#">sn-graphingle.doc</a>
		<b>Similarities and Differences Among Living</b>					

		things				
		What Characteristics do living things have in common?	<p><b>Levels of organization</b> including organelles, cells, tissues, organs, organ systems, and whole organisms</p> <p><b>Humans as organisms. systems of life functions</b> -digestion -respiration -reproduction -circulation -excretion -movement -coordination -immunity</p> <p>Balanced internal environment including control mechanisms</p> <p>Human systems are in balance (homeostasis)</p> <p>Organisms respond to stimuli</p> <p><b>Cells perform roles with certain structures including:</b> -cytoplasm -mitochondria -ribosomes -cell membrane -vacuole -nucleus</p> <p><b>Cell membranes perform functions including:</b> -separating from environment -control flow of molecules -recognition of chemical signals -diffusion</p> <p>Chemical reactions including digestion</p> <p><b>Receptor molecules</b></p>	<p>Students will be able to develop an accurate model of how a complete organism is put together including starting from cells and ending in the whole organism</p> <p>Students will be able to analyze whether or not a human system is in homeostasis, and differentiate between a body that is NOT in homeostasis</p> <p>Students will be able to dramatize an organism responding to a stimulus</p> <p>Students will be able to identify key features in the cell and describe the role that they play in maintaining homeostasis</p> <p>Students will develop a model for the flow of molecules across a semipermeable membrane, and design a plan for putting the "cell" into different concentration solutions</p> <p>Students will research the ways in which hormones play a role in maintaining homeostasis, and contrast their role to that of nerve cells</p> <p>Students will be able to draw receptors and see their particular shape in reference to how they function.</p> <p>1. Identify the various parts of the cell and name their function. 2. Chart the similarities and differences of cell</p>		<p><a href="#">Topic 1.ppt</a></p> <p><a href="#">Pond water lab.DOC</a></p> <p><a href="#">There'sAlwaysRoomForJell-O.doc</a></p>

**play role in the interactions between cells, i.e. cell communication**

-nerve cells  
-hormones

**Human Body Systems**

Describe the basic function of the Human Digestive, Respiratory, Circulatory, Excretory, Skeletal and Reproductive Systems and how they help maintain homeostasis.

organelle with human organs.  
3. Name each cell organelle, describe it's function and compare it to the human organ that has the same or similar function.  
4. Use a microscope to look at plant and animal cells and find and label the various organelle on a diagram.

Students will understand that diffusion is an essential process to the maintenance of homeostasis.

Students will be able to make a wet mount slide of red onion cells to observe plasmolysis.

Students will determine that size is the most important factor when determining whether a molecule will diffuse across a cell membrane.

Students will be able to make a model of a cell using a plastic bag to determine how permeable it is to iodine and starch.

Students will be able to make a wet mount slide of *Elodea* using distilled and salt water to observe plasmolysis.

Students will be able to predict the direction of osmosis by relative salt and water concentrations.

Students will be able to make a model of a cell using dialysis tubing to determine whether or not iodine, starch, and glucose are small enough to diffuse through a cell membrane

				<p>Students will be able to explain the type of nutrient they act upon and the products of enzyme breakdown.</p> <p>Students will be able to describe the action or effect produced by hormones on body tissues.</p> <p>Students will be able to explain the role of hormones in cellular communication.</p>			
		<b>Homeostasis in Organisms</b>					
		Biochemical Processes/Biochemistry	<p>Energy comes from the sun.</p> <p>Photosynthesis is a key process in life</p> <p>Chloroplasts are in plants and some one-celled organisms.</p> <p>Process of photosynthesis and raw materials and products made.</p> <ul style="list-style-type: none"> <li>-carbon dioxide</li> <li>-water</li> <li>-glucose</li> </ul> <p>Cellular Respiration releases energy.</p> <p>Energy stored in ATP.</p> <p>Takes place in the Mitochondria.</p> <p>Raw materials and products</p> <ul style="list-style-type: none"> <li>-oxygen</li> <li>-carbon dioxide</li> <li>-water</li> </ul> <p>Organic Compounds essential to life.</p> <ul style="list-style-type: none"> <li>-proteins</li> <li>-DNA</li> <li>-starch</li> <li>-fats</li> </ul> <p>Energy from ATP used to transport, transform, and obtain</p>	<p>Students will be able to write out the equation for photosynthesis, indicating the raw materials and the products.</p> <p>Students will be able to diagram the equation for cellular respiration, showing the materials that are used in cell respiration, and the products that are formed.</p> <p>Additionally, students will be able to describe the mitochondria as the site of cell respiration.</p> <p>Students will be able to predict how ATP is used as the energy source to perform cellular functions.</p> <p>Students will be able to describe how enzymes play a role in catalyzing reactions, and how pH and temperature play key components in effecting the rate of reaction.</p>			<p><a href="#">Topic 2.ppt</a></p> <p><a href="#">Yeast Resp. Lab.DOC</a></p>

			<p>materials, and eliminate waste.</p> <p>Enzymes play a role in making and breaking substances. The rate of reaction is effected by temperature and pH.</p> <p>Enzymes, hormones, receptor molecules and antibodies have specific shape, that influences how they function.</p>			
		<b>Disease as a Failure of Homeostasis</b>	<p>Immunity</p> <p>Immune System</p> <p>Non-specific defense</p> <p>Specific Defense</p> <p>Pathogen (Antigen-Virus, Bacteria, Fungi and Parasites)</p> <p>Role of WBC</p> <p>Antibody Productio</p> <p>Antibody-Antigen reaction</p> <p>Vaccinations</p> <p>Active vs Passive Immunity</p> <p>Allergy Reaction</p> <p>Organ Transplant</p>	<p>Explain the function of specific immune system tissues.</p> <p>Identify different types of pathogens.</p> <p>Compare Active Immunity and Passive Immunity.</p> <p>Describe the body's response to an antigen/pathogen.</p> <p>Summarize the immune response to a vaccination.</p> <p>Describe the traits of immune disorders, allergies, autoimmune diseases, AIDS and cancer.</p> <p>Explain how immune system disorders stimulate the immune response (restore homeostasis).</p>		

			AIDS; Viral Infections			
		<b>Reproduction and Development</b>				
		<b>How do living things reproduce their own kind?</b>	<p><b>REPRODUCTION BASICS</b></p> <ul style="list-style-type: none"> <li>- Necessary for continuation of species</li> <li>- Asexual</li> <li>- Genetic info from one parent</li> <li>-Cloning</li> <li>- Genetic copies</li> <li>- Sexual</li> <li>- Half genetic info from two parents</li> </ul> <p><b>TYPES OF CELL DIVISION</b></p> <ul style="list-style-type: none"> <li>- Mitosis</li> <li>- Differentiate</li> <li>- Specialized cells, tissues, and organs</li> <li>- Multicellular organisms</li> <li>- Meiosis</li> <li>- Fertilization</li> <li>- Sexual reproduction</li> <li>- Eggs</li> <li>Sperm</li> <li>- Half of genetic information</li> <li>- Gametes</li> <li>- Zygote</li> <li>- Complete genetic information</li> </ul> <p><b>HUMAN REPRODUCTION</b></p>	<ul style="list-style-type: none"> <li>- Identify and/or draw an illustration of mitosis and its steps</li> <li>- Point out that mitosis results in cells that have the same number of chromosomes (clones)</li> <li>- Point out that meiosis is the key to sexual reproduction and only occurs in multicellular organisms</li> <li>- Identify an illustration of meiosis and its steps</li> <li>- Define gamete</li> <li>- Point out that meiosis results in gametes (egg or sperm) that have half the number (N) of chromosomes as the parent cell (2N)</li> <li>- Define and illustrate fertilization by drawing gametes and their chromosome numbers resulting in a zygote</li> <li>- Define zygote</li> <li>- Explain that after fertilization, a zygote divides by mitosis to form specialized cells, tissues, and organs of multicellular organisms</li> <li>- Compare and contrast mitosis and meiosis</li> </ul>		<p><a href="#">Topic 4.ppt</a></p> <p><a href="#">Laboratory #2 Mitosis.doc</a></p> <p><a href="#">Worksheet-ASEXUAL VS SEXUAL.doc</a></p>

**and DEVELOPMENT**

- Gene expression

- Hormones

- Environment

- Reproductive Cycle  
(Male and Female)

- Regulated by  
hormones

- Testosterone

- Estrogen

- Progesterone

Use of  
alcohol/drugs/tobacco

- Exposure toxins or  
infections

Gametes

- Ovaries

- Internal fertilization

- Internal  
development of  
embryo

- Fetus

- Uterus

- Placenta

- Nutrition for  
newborn

- Testes

- Embryonic  
Development

- Pregnancy

- Embryo is at risk

- Faults in genes  
(mutations)

- Poor diet

gene expression,  
hormones, and the  
environment.

- Distinguish  
between female and  
male reproductive  
anatomy as shown in  
both front and side  
diagrams.

- Distinguish between  
female and male  
reproductive hormones.

- Identify and label  
structures of female  
and male reproductive  
anatomy

- Explain functions of  
the structures of female  
and male reproductive  
anatomy

- Assess the  
importance of internal  
fertilization and  
development

- Explain the function of  
the placenta

- Identify and label the  
placenta in a fetal  
diagram

- Explain how the  
placenta provides  
nutrients and gets rid of  
waste by diffusion

- Recognize the  
processes taking place  
in a diagram that shows  
post-fertilization mitosis  
and differentiation into  
tissues and organs

- Explain that the  
earliest stages of  
development of an  
embryo are the most  
important and most  
susceptible to  
damage because that  
is when tissues and  
organs form

- Assess the damage to  
the growing

[Birth Changes.doc](#)

[menstrual diagram.doc](#)

[Human Fetus  
Changes.doc](#)

				embryo/fetus if the mother has a poor diet, uses alcohol/drugs/tobacco, is exposed to toxins or infections.		
		<b>Genetics</b>				
	<p>How do organisms inherit genetic information?</p> <p>What is the structural organization subunits of DNA, genes and chromosomes?</p>	<p><b>STRUCTURE AND REPLICATION OF DNA</b></p> <p>Chromosomes</p> <p>DNA structure (Base Pair rules)</p> <p>DNA - chromosome connection</p> <p>RNA Structure</p> <p>Protein Synthesis</p> <hr/> <p><b>MUTATIONS</b></p> <p>Gene mutations</p> <p>Chromosome mutations</p> <p>Genetic engineering</p> <p>Recombinant DNA Cloning.</p> <p>Selective Breeding</p> <p>Human genetic disease</p> <p>DNA analysis</p> <p>Gene Therapy</p> <p>Ethical Issues</p>	<p>Recognize the structure and function of DNA</p> <p>Describe DNA replication process</p> <p>Explain the structure and function of RNA in Protein Synthesis.</p> <p>Recognize that all cells are genetically identical but genes control cell specialization.</p> <p>Analyze the relationship between DNA, genes, proteins and human body functions.</p> <p>Construct a model to show recombinant DNA.</p> <p>Develop an awareness of technology and applications of genetic engineering.</p> <p>Research genetic engineering techniques.</p>	<p><a href="#">Topic 3.ppt</a></p> <p><a href="#">DNA_Extraction.pdf</a></p> <p><a href="#">dnafingerprinting.doc</a></p> <p><a href="#">DRAGON GENETICS LAB.doc</a></p> <p><a href="#">Genetic Role Play Lab.doc</a></p> <p><a href="#">The Biology Project Genetics tutorial on line.doc</a></p>		
		<b>Evolution</b>				
	<p>How do individual organisms and species change over time?</p>	<p><b>THEORY OF EVOLUTION</b></p> <p>- Theory</p> <p>- Biological evolution</p> <p>- Earth's present day</p>	<p>Define evolution</p> <p>- Identify that the theory of evolution is a central unifying theme of biology</p> <p>- Identify that the theory of evolution is well</p>	<p><a href="#">Topic 5.ppt</a></p> <p><a href="#">Darwin and Mechanisms of Evolution.ppt</a></p>		



			species	documented by extensive evidence from many sources, including the fossil record		
			- Earlier, different species			<a href="#">DRAGON GENETICS LAB.doc</a>
			<b>IMPORTANCE OF VARIATION</b>	-- Explain that present day species have developed from earlier, different species		
			- New inheritable characteristics	Identify that new genetic variation is the result of new combinations of existing genes or mutations in reproductive cells		<a href="#">Evolution Review Game.doc</a>
			- Wide variety of new combinations of genes			
			- Meiosis			<a href="#">peppered_moth analysis.doc</a>
			- Fertilization	- Explain how sexual reproducers increase variation in their species due to meiosis and fertilization		
			- Mutations			
			- Random mutations			
			- Radiation and chemicals	- Recognize that mutations are random, and can be caused by exposure to radiation and chemicals		<a href="#">Variation and Evolution.ppt</a>
			Sex cells			
			- Body cells	Distinguish between mutations that occur in sex cells and body cells, and in which case can be passed on to offspring		
			<b>NATURAL SELECTION AND THE MECHANISMS OF EVOLUTION</b>			
			<b>Natural selection</b>	- Differentiate between sexual reproducers (Random mutation in gametes and genetic recombination) and asexual reproducers (Random mutation only) regarding sources of genetic variation		
			- Fossil record			
			- Ancient life-forms			
			- Molecular and structural similarities			
			<b>Mechanisms of evolution</b>	- Define natural selection		
			- Potential for species to increase its numbers	- Explain how natural selection supports the fossil record		
			- Genetic variability in offspring due to mutation and genetic recombination	- Explain how natural selection supports the molecular and structural similarities among many species		<a href="#">The Rate of Evolution and Extinction.ppt</a>
			- Finite supply of resources	- Identify the four mechanisms of evolution (Overproduction, Genetic Variation, Competition, Selection by the Environment)		
			- Selection by the environment of			

offspring better able to survive and leave offspring

#### RESULTS OF NATURAL SELECTION

- Advantageous characteristics

- Surviving and reproducing

- Advantaged offspring

- Proportion of individuals will increase

- Variation increases chances of survival of species

- Beneficial behaviors

#### EVOLUTION THROUGH LIFE'S HISTORY

- Simple, single-celled organisms

- Complex, multi-celled organisms

- No set direction

- Growth of a bush (tree)

- Extinction

- Explain how each of the four mechanisms leads to natural selection

Explain how beneficial characteristics help organisms to survive and pass these traits on to offspring

- Point out that overtime, if a trait is beneficial, there should be an increase in the proportion of individuals that possess that trait in a species

- Explain how variation within a species increases chances of survival if the environment changes

- Explain how behaviors are also affected by natural selection, and usually are associated with reproductive success

Explain that life began as simple, single celled organisms and over time, evolved into complex, multi-cellular organisms

-Point out that evolution does not have a set direction, and can resemble a branching tree; some branches remain unchanged, some give rise to more complex organisms, and some die out

- Analyze an evolutionary tree, pointing out that branch intersections indicate a common ancestor

- Define extinction

- Identify that most species that have existed are now extinct

Explain the mechanisms that cause extinction (drop in population size -->

				decrease in variation -- >environmental changes -- > little or no chance of recovery)		
		<b>Ecology</b>				
		How do groups of diverse populations in ecosystems relate to the stability of ecosystems?	<p><b>Ecological Vocabulary</b></p> <p>populations food chains food webs relationships producers consumers decomposes autotrophic nutrition heterotrophic nutrition</p> <p><b>Ecosystem</b></p> <p>-biotic -abiotic -light intensity -temperature range -mineral availability -soil/rock type -relative pH</p> <p><b>Interactions of populations</b></p> <p>-interdependence -symbiosis -commensalism -mutualism -parasitism -predator -prey -parasite -host -scavenger -decomposer -disease</p> <p><b>Complex systems of cyclic change</b></p> <p>-nitrogen cycle -water cycle -carbon, hydrogen, oxygen cycle</p> <p><b>Energy flow</b></p> <p>-sun</p>	<p>Describe the roles of producers, consumers, and decomposers in an ecosystem</p> <p>Describe the feeding relationships in an ecosystem in terms of food chains and food webs</p> <p>Describe how abiotic factors effect the location of certain organisms, and how vital they are to basic biological needs</p> <p>Describe the relationships that exist in mutualism, parasitism and commensalism, and list organisms that exhibit these types of relationships.</p> <p>Design feeding relationships that involve differing levels of consumers and non feeding level relationships</p> <p>Describe how matter cycles among the living and nonliving parts of an ecosystem.</p> <p>Explain why nutrients are important in living systems.</p> <p>Describe how the availability of nutrients affects the productivity of ecosystems.</p> <p>Explain the concept of a carrying capacity and the relationship to resource availability</p> <p>Define biodiversity and explain its value.</p> <p>Identify current threats to biodiversity.</p> <p>Describe the goal of</p>		<a href="#">Topic 6.ppt</a>

			<p>-photosynthetic organisms</p> <p>-green plants</p> <p>-algae</p> <p>-herbivore</p> <p>-carnivore</p> <p>-decompser</p> <p><b>Cycling of atoms and molecules</b></p> <p>-biosphere</p> <p>-energy</p> <p>-sunlight</p> <p>-energy pyramid</p> <p>-biomass pyramid</p> <p><b>Habitat/Niche</b></p> <p>-carrying capacity</p> <p>-limited by energy, water, oxygen, minerals, and recycling by bacteria and fungi</p> <p>-finite resources</p> <p><b>Biodiversity is key to maintaining stability of ecosystem</b></p> <p>-availability of rich genetic material exists in diverse communities, possibly leading to future agricultural and medical discoveries</p> <p><b>Ecological succession</b></p> <p>-changes in the community whereby one community replaces another</p> <p>-pioneer species</p> <p>-climax community</p> <p>long term stability</p>	<p>conservation biology.</p> <p>Predict the result of changes to a food web and the possible outcomes of the removal of key species in a food web</p> <p>Evaluate a reading passage for its' effectiveness in meeting the needs of the species in a given food web</p>		
		<b>Human Impact</b>				
		<p>What short and long term effects have humans had on their environment?</p>	<p><b>Finite resources and human consumption</b></p> <p>-renewable</p> <p>-non renewable</p> <p><b>Narural ecosystems provide processes that effect humans</b></p> <p>-quality of atmosphere</p>	<p>Identify factors that affect population size and limit population growth, as well as the stress that population growth places on the environment.</p> <p>list and define the different types of pollution and their sources</p>		<p><a href="#">Topic 7.ppt</a></p>

			<ul style="list-style-type: none"> <li>-water cycle</li> <li>-removal of wastes</li> <li>-energy flow</li> <li>-recycling of nutrients</li> </ul> <p><b>Human activities can alter the equilibrium of ecosystems</b></p> <ul style="list-style-type: none"> <li>-population growth</li> <li>-consumption</li> <li>-technology</li> <li>-destruction of habitats</li> <li>-harvesting</li> <li>-pollution</li> <li>-global stability</li> </ul> <p><b>Loss of diversity as a result of:</b></p> <ul style="list-style-type: none"> <li>-land use</li> <li>-pollution</li> <li>-altering ecosystems</li> </ul> <p><b>Industrialization and positive/Negative results</b></p> <ul style="list-style-type: none"> <li>-demand for fossil and nuclear fuels</li> <li>-positive and negative effects</li> </ul> <p><b>New technologies</b></p> <ul style="list-style-type: none"> <li>-assess risks</li> <li>-costs</li> <li>-benefits</li> <li>-trade-offs</li> <li>-decisions that will effect future generations</li> </ul>	<p>Evaluate the positive and negative results that industrialization has had on the environment.</p> <p>Evaluate current uses of technology and predict the usefulness of new technologies in effecting future generations.</p> <p>Particularly as it applies to land use management, resources, and the benefits vs. present and future costs.</p> <p>compare and contrast the advantages and disadvantages of various renewable and nonrenewable resources</p> <p>Students will be able to identify key processes that effect humans, including how nutrients are recycled, wastes are removed from the environment, and different contributors to air and water quality</p> <p>Analyze graphical representations of human population growth rates</p>			
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Last updated: 7/13/2011