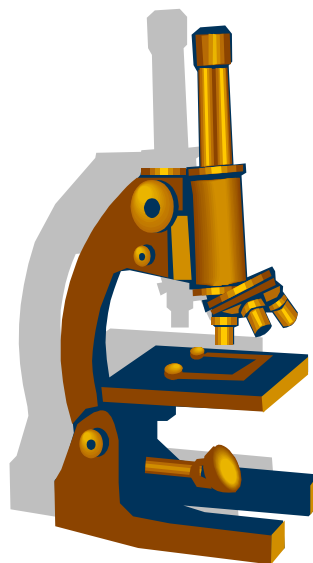


PHYSICAL SCIENCE



Niles McKinley High School Science Department
SY2009-2010

September Physical Science Grade 9**Essential Understanding: Collecting, organizing and analyzing data helps people make decisions and develop theories.****Indicators:****Week 1**

9SI2 2. Research and apply appropriate safety precautions when designing and conducting scientific investigations (e.g., OSHA, Material Safety Data Sheets [MSDS], eyewash, goggles and ventilation).

Page 11 and page 868

Week 2- Not in book

9SI1 1. Distinguish between observations and inferences given a scientific situation.

Chapter 1- (1.3)

9SI4 4. Decide what degree of precision based on the data is adequate and round off the results of calculator operations to the proper number of significant figures to reasonably reflect those of the inputs. (First Time Introduced)

Chapter 1

Week 3

9SK6 Explain that inquiry fuels observation and experimentation that produce data that are the foundation of scientific disciplines. Theories are explanations of these data.

9SI6 Draw logical conclusions based on scientific knowledge and evidence from investigations. (First Time Introduced)

9SK5 Justify that scientific theories are explanations of large bodies of information and/or observations that withstand repeated testing.

9ST2 Identify a problem or need, propose designs and choose among alternative solutions for the problem.

9ST3 Explain why a design should be continually assessed and the ideas of the design should be tested, adapted and refined.

9SK1 Comprehend that many scientific investigations require the contributions of women and men from different disciplines in and out of science. These people study different topics, use different techniques and have different standards of evidence but share a common purpose - to better understand a portion of our universe.

Chapter 1

AUTHENTIC ASSESSMENT

Teacher
Use Only

October Physical Science Grade 9**Essential Understanding: Good science uses clear methods and procedures, reliable evidence and ethical practices.****Indicators****Week 1 and 2**

9PS9 Investigate the properties of pure substances and mixtures (e.g., density, conductivity, hardness, properties of alloys, superconductors and semiconductors). (First Time Introduced)

Chapter 2 (2.1, 2.2 2.3)

Week 3

9PS16 16. Illustrate that chemical reactions are either endothermic or exothermic (e.g., cold packs, hot packs and the burning of fossil fuels). (First Time Introduced)

Chapter 3 – Terms only. DRY ICE EXPERIMENT

Week 4

Describe advances and issues in physical science that that have important, long lasting effects on science and society (e.g. atomic theory, quantum theory, Newtonian mechanics, nuclear energy, nanotechnology, plastics, ceramics, and communication technology.)

Chapter 4

AUTHENTIC ASSESSMENT

Teacher
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November Physical Science Grade 9**Essential Understanding: All materials are composed of atoms and their compositions can be organized into similar properties.****Indicators****Week 1 and 2**

9PS1 Recognize that all atoms of the same element contain the same number of protons, and elements with the same number of protons may or may not have the same mass. Those with different masses (different numbers of neutrons) are called isotopes.

Chapter 4- (4.2)

9PS2 Illustrate that atoms with the same number of positively charged protons and negatively charged electrons are electrically neutral.

(First Time Introduced)

Chapter 4- (4.2)

Week 3 and 4

9PS4 Show that when elements are listed in order according to the number of protons (called the atomic number), the repeating patterns of physical and chemical properties identify families of elements. Recognize that the periodic table was formed because of the repeating pattern of electron configurations.

(First time Introduced)

Chapter 5- (5.1, 5.2, 5.3)

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December Physical Science Grade 9
Essential Understanding: Chemical Equations

Indicators

Weeks 1-3

9PS6 Explain that the electric force between the nucleus and the electrons hold an atom together. Relate that on a larger scale, electric forces hold solid and liquid materials together (e.g., (salt crystals Chapter 6.1) and water). (First Time Introduced)
Chapter 6.1

9PS7 Show how atoms may be bonded together by losing, gaining or sharing electrons and that in a chemical reaction, the number, type of atoms and total mass must be the same before and after the reaction (e.g., writing correct chemical formulas and writing balanced chemical equations (Covered in Chapter 7 in Jan.)
6.1, 6.2, 6.3

9PS10 Compare the conductivity of different materials and explain the role of electrons in the ability to conduct electricity.

9PS5 Describe how ions are formed when an atom or a group of atoms acquire an unbalanced charge by gaining or losing one or more electrons. (First time Introduced)
Chapter 6
Rubric to include 1,2,3,and 7.

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Teacher
Use Only

January Physical Science Grade 9**Essential Understanding: Balancing Equations and the pH Scale****Indicators****Week 1-2**

9PS7 Show how atoms may be bonded together by losing, gaining or sharing electrons and that in a chemical reaction, the number, type of atoms and total mass must be the same before and after the reaction (e.g., writing correct chemical formulas and writing balanced chemical equations)

Chapter 7

9PS16 Illustrate that chemical reactions are either endothermic or exothermic (e.g., cold packs, hot packs and the burning of fossil fuels).

(First Time Introduced)

Chapter 7

9PS8 Demonstrate that the pH scale (0-14) is used to measure acidity and classify substances or solutions as acidic, basic, or neutral.

(First time Introduced)

Chapter 7 Minimal/ 8.3

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February Physical Science Grade 9
Essential Understanding: Energy

Indicators

Weeks 1-2

9PS3 Describe radioactive substances as unstable nuclei that undergo random spontaneous nuclear decay emitting particles and/or high energy wavelike radiation.

9PS14 Summarize how nuclear reactions convert a small amount of matter into a large amount of energy. (Fission involves the splitting of a large nucleus into smaller nuclei; fusion is the joining of two small nuclei into a larger nucleus at extremely high energies.)
(First time Introduced)
Chapter 10 - Minimal

9ES1 Explain that stars produce energy from nuclear reactions and that processes in stars have led to the formation of all elements beyond hydrogen and helium.

9ST1 Describe means of comparing the benefits with the risks of technology and how science can inform public policy.
Chapter 10

AUTHENTIC ASSESSMENT

Teacher
Use Only

March Physical Science Grade 9**Essential Understanding: Waves have energy and can transfer energy when they interact with matter.****Indicators****Week 1-2**

9PS21 Demonstrate that motion is a measurable quantity that depends on the observer's frame of reference and describe the object's motion in terms of position, velocity, acceleration and time.

Chapter 11- Need for Introduction- Brief- Need to know terms. (position, velocity, acceleration and time)

9PS22 Demonstrate that any object does not accelerate (remains at rest or maintains a constant speed and direction of motion) unless an unbalanced (net) force acts on it.

Chapter 12- Important- Newton's Laws- 3 weeks

9PS23 Explain the change in motion (acceleration) of an object.

Demonstrate that the acceleration is proportional to the net force acting on the object and inversely proportional to the mass of the object. ($F_{net} = ma$. Note that weight is the gravitational force on a mass.)

Chapter 12- Important- Spend Time- Newton's Laws

9PS24 Demonstrate that whenever one object exerts a force on another, an equal amount of force is exerted back on the first object.

Chapter 12- Important- Newton's Laws

9PS25 Demonstrate the ways in which frictional forces constrain the motion of objects (e.g., a car traveling around a curve, a block on an inclined plane, a person running, an airplane in flight).

Chapter 12

9ESS3 Explain that gravitational forces govern the characteristics and movement patterns of the planets, comets, and asteroids in the solar system.

Chapter 12.4

AUTHENTIC ASSESSMENT

Teacher
Use Only

March Physical Science Grade 9 - *CONTINUED***Essential Understanding: Waves have energy and can transfer energy when they interact with matter.****Indicators****Week 3-4**

9PS11 Explain how thermal energy exists in the random motion and vibrations of atoms and molecules. Recognize that the higher the temperature, the greater the average atomic or molecular motion, and during changes of state the temperature remains constant.

9PS12 Explain how an object's kinetic energy depends on its mass and its speed ($KE = \frac{1}{2}mv^2$).
Chapter 15

9PS13 Demonstrate that near Earth's surface an object's gravitational potential energy depends upon its weight (mg where m is the object's mass and g is the acceleration due to gravity) and height (h) above a reference surface ($PE = mgh$).
Chapter 15

9PS15 Trace the transformations of energy within a system (e.g., chemical to electrical to mechanical) and recognize that energy is conserved. Show that these transformations involve the release of some thermal energy.
Chapter 15.2

AUTHENTIC ASSESSMENT

Teacher
Use Only

April Physical Science Grade 9**Essential Understanding: Processes move and shape earth's surface.****Indicators****Week 1-2**

9PS17 Demonstrate that thermal energy can be transferred by conduction, convection or radiation (e.g., through materials by the collision of particles, moving air masses or across empty space by forms of electromagnetic radiation). Chapter 16.2

Chapter 16- 1 question in the last 4 years.

Weeks 3-4

9PS19 Show how the properties of a wave depend on the properties of the medium through which it travels. Recognize that electromagnetic waves can be propagated without a medium.

Chapter 17 and 18 *****--- One week for chapter 17

9PS20 Describe how waves can superimpose on one another when propagated in the same medium. Analyze conditions in which waves can bend around corners, reflect off surfaces, are absorbed by materials they enter, and change direction and speed when entering a different material.

Chapter 17, 18 and 22

AUTHENTIC ASSESSMENT

Teacher
Use Only

May Physical Science Grade 9

**Essential Understanding: Stars provide information about the composition of the physical universe.
Historical development of scientific theories describe emerging issues.**

Indicators**Week 1**

9PS18 Demonstrate that electromagnetic radiation is a form of energy. Recognize that light acts as a wave. Show that visible light is a part of the electromagnetic spectrum (e.g., radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays).
Chapter 18- One week for chapter 18

9ES4 Explain the relationships of the oceans to the lithosphere and atmosphere (e.g., transfer of energy, ocean currents and landforms).
Chapter 23.5

Week 2

9ES5 Explain how the slow movement of material within Earth results from: thermal energy transfer (conduction and convection) from the deep interior; the action of gravitational forces on regions of different density. (Grade 8)
Chapter 22.1 and Chapter 12 p. 381--- Chapter 22- One week

9ES6 Explain the results of plate tectonic activity (e.g., magma generation, igneous intrusion, metamorphism, volcanic action, earthquakes, faulting and folding).
Chapter 22.4 , 22.5, 22.6

9ES7 Explain sea-floor spreading and continental drift using scientific evidence (e.g., fossil distributions, magnetic reversals and radiometric dating). (Grade 8) *****
Chapter 22.4

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May Physical Science Grade 9 - *CONTINUED*

Essential Understanding: Stars provide information about the composition of the physical universe.
Historical development of scientific theories describe emerging issues.

Indicators

9ES1 Describe that stars produce energy from nuclear reactions and that processes in stars have led to the formation of all elements beyond hydrogen and helium.

Chapter 26.2

9ES2 Describe the current scientific evidence that supports the theory of the explosive expansion of the universe, the Big Bang, over 10 billion years ago.

(First time Introduced)

Chapter 26.2

9ES3 Explain that gravitational forces govern the characteristics and movement patterns of the planets, comets and asteroids in the solar system.

(First time Introduced)

Chapter 25

9ES8 Use historical examples to explain how new ideas are limited by the context in which they are conceived; are often initially rejected by the scientific establishment; sometimes spring from unexpected findings; and usually grow slowly through contributions from many different investigators (e.g., heliocentric theory and plate tectonics theory).

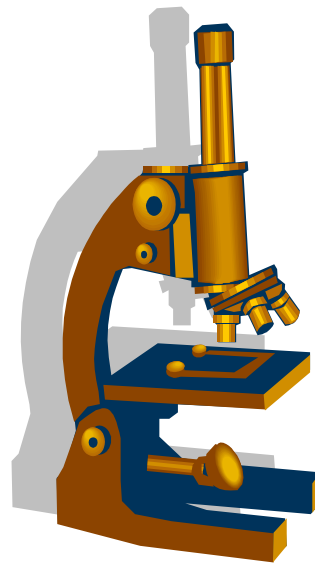
9SK9 Investigate how the knowledge, skills and interests learned in science classes apply to the careers students plan to pursue.

9SI3 Construct, interpret and apply physical and conceptual models that represent or explain systems, objects, events or concepts

AUTHENTIC ASSESSMENT

Teacher
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FUNDAMENTAL & ACADEMIC BIOLOGY



September Grade 10 Science Fundamental & Academic Biology

Essential Understanding: Science is a way of knowing that involves observation, questioning, forming hypotheses, and creating experiments with safety in mind. Ethical considerations involve dedication to scientific truth but are often open to debate and without firm guidelines.

Indicators:

LS26 Use historical examples to explain how new ideas are limited by the context in which they are conceived. These ideas are often rejected by the scientific establishment; sometimes spring from unexpected findings; and usually grow slowly through contributions from many different investigators (e.g., biological evolution, germ theory, biotechnology and discovering germs).

ST3 Explain that when evaluating a design for a device or process, thought should be given to how it will be manufactured, operated, maintained, replaced and disposed of in addition to who will sell, operate and take care of it. Explain how the costs associated with these considerations may introduce additional constraints on the design.

SI1 Research and apply appropriate safety precautions when designing and conducting scientific investigations (e.g. OSHA, MSDS, eyewash, goggles and ventilation).

SI2 Present scientific findings using clear language, accurate data, appropriate graphs, tables, maps and available technology.

SWK1 Discuss science as a dynamic body of knowledge that can lead to the development of entirely new disciplines.

SWK2 Describe that scientists may disagree about explanations of phenomena, about interpretation of data or about the value of rival theories, but they do agree that questioning, response to criticism and open communication are integral to the process of science.

SWK3: Recognize that science is a systematic method of continuing investigation, based on observation, hypothesis testing, measurement, experimentation, and theory building, which leads to more adequate explanations of natural phenomena.

AUTHENTIC ASSESSMENT

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October Grade 10 Science Fundamental & Academic Biology

Essential Understanding: The cell, the most basic unit of living things, is characterized by organelles, method of reproduction, and transformation of matter and energy.

Indicators:

ES4 Describe how organisms on Earth contributed to the dramatic change in oxygen content of Earth's early atmosphere.

LS1 Explain that living cells

- a. are composed of a small number of key chemical elements (carbon, hydrogen, oxygen, nitrogen, phosphorus and sulfur)
- b. are the basic unit of structure and function of all living things
- c. come from pre-existing cells after life originated, and
- d. are different from viruses

LS10 Describe how cells and organisms acquire and release energy (photosynthesis, chemosynthesis, cellular respiration and fermentation).

LS11 Explain that living organisms use matter and energy to synthesize a variety of organic molecules (e.g., proteins, carbohydrates, lipids and nucleic acids) and to drive life processes (e.g., growth, reacting to the environment, reproduction and movement).

LS25 Explain that life on Earth is thought to have begun as simple, one celled organisms approximately 4 billion years ago. During most of the history of Earth only single celled microorganisms existed, but once cells with nuclei developed about a billion years ago, increasingly complex multicellular organisms evolved.

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November Grade 10 Science Fundamental & Academic Biology

Essential Understanding: Living things carry out activities by using a similar pattern of energy flow and cycling of matter. Basic chemical transformations in photosynthesis and cellular respiration were highlighted. Cell growth and division, including mitosis and meiosis, were thoroughly studied.

Indicators:

LS2 Compare the structure, function and interrelatedness of cell organelles in eukaryotic cells (e.g., nucleus, chromosome, mitochondria, cell membrane, cell wall, chloroplast, cilia, flagella) and prokaryotic cells.

LS3 Explain the characteristics of life as indicated by cellular processes including

- a. homeostasis
- b. energy transfers and transformation
- c. transportation of molecules
- d. disposal of wastes
- e. synthesis of new molecules

LS4 Summarize the general processes of cell division and differentiation, and explain why specialized cells are useful to organisms and explain that complex multicellular organisms are formed as highly organized arrangements of differentiated cells.

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December Grade 10 Science Fundamental & Academic Biology**Essential Understanding:** The genetic mechanisms of inheritance are covered in depth, especially with regard to Mendel.

Indicators:

LS6 Explain that a unit of hereditary information is called a gene, and genes may occur in different forms called alleles (e.g., gene for pea plant height has two alleles, tall and short).

LS8 Use the concepts of Mendelian and non-Mendelian genetics (e.g., segregation, independent assortment, dominant and recessive traits, sex-linked traits and jumping genes) to explain inheritance.

LS13 Explain that the variation of organisms within a species increases the likelihood that at least some members of a species will survive under gradually changing environmental conditions.

LS22 Describe historical scientific developments that occurred in evolutionary thought (e.g., Lamarck and Darwin, Mendelian Genetics and modern synthesis).

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January Grade 10 Science Fundamental & Academic Biology

Essential Understanding: Organisms are interconnected to each other in a biosphere of land, water, and air that enables energy to flow and matter to cycle. Human activities can alter the equilibrium in ecosystems.

Indicators:

ES1 Summarize the relationship between the climatic zone and the resultant biomes. (This includes explaining the nature of the rainfall and temperature of the mid-latitude climatic zone that supports the deciduous forest.)

ES6 Describe ways that human activity can alter biogeochemical cycles (e.g., carbon and nitrogen cycles) as well as food webs and energy pyramids (e.g., pest control, legume rotation crops vs. chemical fertilizers).

LS9 Describe how matter cycles and energy flows through different levels of organization in living systems and between living systems and the physical environment. Explain how some energy is stored and much is dissipated into the environment as thermal energy (e.g., food webs and energy pyramids).

LS14 Relate diversity and adaptation to structures and their functions in living organisms (e.g., adaptive radiation).

LS15 Explain how living things interact with biotic and abiotic components of the environment (e.g., predation, competition, natural disasters and weather).

LS16 Relate how distribution and abundance of organisms and populations in ecosystems are limited by the ability of the ecosystem to recycle materials and the availability of matter, space and energy.

LS17 Conclude that ecosystems tend to have cyclic fluctuations around a state of approximate equilibrium that can change when climate changes, when one or more new species appear as a result of immigration or when one or more species disappear.

LS18 Describe ways that human activities can deliberately or inadvertently alter the equilibrium in ecosystems. Explain how changes in technology/biotechnology can cause significant changes, either positive or negative, in environmental quality and carrying capacity.

SI3 Use mathematical models to predict and analyze natural phenomena.

AUTHENTIC ASSESSMENT

Teacher
Use Only

February Grade 10 Science Fundamental & Academic Biology

Essential Understanding: Evolutionary relationships contribute to grasping the unity and diversity of life. A foundation of biological evolution is the change in the gene frequency over time. Historical (i.e. Darwin) and current scientific developments, mechanisms, and processes of biological evolution are covered.

Indicators:

LS12 Describe that biological classification represents how organisms are related with species being the most fundamental unit of the classification system. Relate how biologists arrange organisms into a hierarchy of groups and subgroups based on similarities and differences that reflect their evolutionary relationships.

LS19 Illustrate how uses of resources at local, state, regional, national, and global levels have affected the quality of life (e.g., energy production and sustainable vs. unsustainable agriculture).

LS20 Recognize that a change in gene frequency (genetic composition) in a population over time is a foundation of biological evolution.

LS21 Explain that natural selection provides the following mechanism for evolution; undirected variation in inherited characteristics exist within every species. These characteristics may give individuals an advantage or disadvantage compared to others in surviving and reproducing. The advantaged offspring are more likely to survive and reproduce. Therefore, the proportion of individuals that have advantageous characteristics will increase. When an environment changes, the survival value of some inherited characteristics may change.

LS22 Describe historical scientific developments that occurred in evolutionary thought (e.g., Lamarck and Darwin, Mendelian Genetics and modern synthesis).

LS24 Analyze how natural selection and other evolutionary mechanisms (e.g. genetic drift, immigration, emigration, mutation) and their consequences provide a scientific explanation for the diversity and unity of past life forms, as depicted in the fossil record, and present life forms.

SI4 Draw conclusions from inquiries based on scientific knowledge and principles, the use of logic and evidence (data) from investigations.

SI5 Explain how new scientific data can cause any existing scientific explanation to be supported, revised or rejected.

AUTHENTIC ASSESSMENT

Teacher
Use Only

March Grade 10 Science Fundamental & Academic Biology

Essential Understanding: Much of this month, at least in the academic biology class, was devoted to review of the prior months' material, using an OGT study guide. We also briefly touched on 10th grade Earth and Space science concepts, such as weather patterns and global warming, and described some advances in biotechnology.

Indicators:

ES2 Explain climate and weather patterns associated with certain geographic locations and features (e.g., tornado alley, tropical hurricanes and lake effect snow).

ES3 Explain how geologic time can be estimated by multiple methods (e.g., rock sequences, fossil correlation and radiometric dating).

ES5 Explain how the acquisition and use of resources, urban growth and waste disposal can accelerate natural change and impact the quality of life.

ES7 Describe advances and issues in Earth and space science that have important long-lasting effects on science and society (e.g., geologic time scales, global warming, depletion of resources and exponential population growth).

LS27 Describe advances in life sciences that have important long-lasting effects on science and society (e.g., biological evolution, germ theory, biotechnology and discovering germs).

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April Grade 10 Science Fundamental & Academic Biology

Essential Understanding: In the academic biology class, molecular biology was covered this month through an in-depth examination of DNA, RNA, and proteins. Students studied from Chapter 12 of the Miller/Levine text and viewed several segments of NOVA's *Cracking the Code* video series. The genetics of Cystic Fibrosis and Tay-Sachs were covered in the video series. There were several days of hands-on activities. The indicators that were stressed in this month and in May had been previously covered in less depth in prior months.

Indicators:

LS5 Illustrate the relationship of the structure and function of DNA to protein synthesis and the characteristics of an organism.

LS7 Describe that spontaneous changes in DNA are mutations, which are a source of genetic variation. When mutations occur in sex cells, they may be passed on to future generations; mutations that occur in body cells may affect the functioning of that cell or the organism in which that cell is found.

LS28 Analyze and investigate emerging scientific issues (e.g., genetically modified food, stem cell research, genetic research and cloning).

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May Grade 10 Science Fundamental & Academic Biology

Essential Understanding: The phylum Chordata, of which humans are members, was covered in depth. The focus was on understanding the characteristics and evolutionary adaptations of fishes and amphibians. Examples of ethical practices during research were included. Again, the following indicators were introduced in less depth before the OGT but covered most fully, in the academic class, during this month.

Indicators:

ST1 Cite examples of ways that scientific inquiry is driven by the desire to understand the natural world and how technology is driven by the need to meet human needs and solve human problems.

ST2 Describe examples of scientific advances and emerging technologies and how they may impact society.

SWK4 Recognize that ethical considerations limit what scientists can do.

SWK5 Recognize that research involving voluntary human subjects should be conducted only with the informed consent of the subjects and follow rigid guidelines and/or laws.

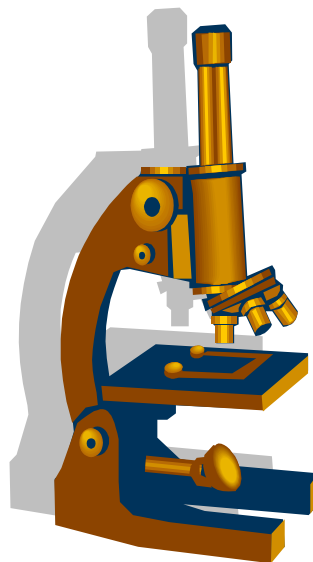
SWK6 Recognize that animal-based research must be conducted according to currently accepted professional standards and laws.

SWK7 Investigate how the knowledge, skills and interests learned in science classes apply to the careers students plan to pursue.

AUTHENTIC ASSESSMENT

Teacher
Use Only

ENVIRONMENTAL SCIENCE



September Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: Understand how the universe was created, the interactions of the parts of the biosphere (lithosphere, hydrosphere and atmosphere) and how organisms are dependent on all parts of the biosphere.

Indicators: Chapter 1

11ESS 1. Describe how the early Earth was different from the planet we live on today, and explain the formation of the sun, Earth and the rest of the solar system from a nebular cloud of dust and gas approximately 4.5 billion years ago.

11ESS 6. Explain how interactions among Earth's lithosphere, hydrosphere, atmosphere and biosphere have resulted in the ongoing changes of Earth's system.

11ESS 9. Explain the effects of biomass and human activity on climate (e.g., climatic change and global warming).

11ESS 14. Conclude that Earth has finite resources and explain that humans deplete some resources faster than they can be renewed.

Authentic Assessments

Teacher
Use Only

September Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: Collecting, organizing and analyzing data help people to make an informed decision and to develop theories.

Indicators: CHAPTER 2

11SI 1. Formulate testable hypotheses. Develop and explain the appropriate procedures, controls and variables (dependent and independent) in scientific experimentation.

11SI 2. Evaluate assumptions that have been used in reaching scientific conclusions.

11SI 3. Design and carry out scientific inquiry (investigation), communicate and critique results through peer review.

11SI 4. Explain why the methods of an investigation are based on the questions being asked.

11SI 5. Summarize data and construct a reasonable argument based on those data and other known information.

11SWK 3. Demonstrate that scientific explanations adhere to established criteria, for example a proposed explanation must be logically consistent, it must abide by the rules of evidence and it must be open to questions and modifications.

11 SWK 5. Recognize that bias affects outcomes. People tend to ignore evidence that challenges their beliefs but accept evidence that supports their beliefs. Scientist attempt to avoid bias in their work.

11SWK 8. Explain that the decision to develop a new technology is influenced by societal opinions and demands and by cost benefit considerations.

11SWK 10. Describe costs and trade-offs of various hazards – ranging from those with minor risk to a few people, to major catastrophes with major risk to many people. The scale of events and the accuracy with which scientists and engineers can (and cannot) predict events are important considerations.

Authentic Assessments

Teacher
Use Only

October Grade 11/12: ENVIRONMENTAL SCIENCE**Essential Understandings: Changes in the biosphere affects the environment, needs of organisms and the ecosystem.****Indicators: CHAPTER 3**

11ESS 5. Use appropriate data to analyze and predict upcoming trends in global weather patterns (e.g., el Niño and la Niña, melting glaciers and icecaps and changes in ocean surface temperatures).

11ESS 6. Explain how interactions among Earth's lithosphere, hydrosphere, atmosphere and biosphere have resulted in the ongoing changes of Earth's system.

11ESS 7. Describe the effects of particulates and gases in the atmosphere including those originating from volcanic activity.

11ESS13. Explain how human behavior affects the basic processes of natural ecosystems and the quality of the atmosphere, hydrosphere and lithosphere.

11ESS 16. Describe advances in Earth and space science that have important long-lasting effects on science and society (e.g., global warming, Heliocentric Theory and Plate Tectonics Theory).

11LS 12. Recognize that ecosystems change when significant climate changes occur or when one or more new species appear as a result of immigration or speciation.

11LS 14. Describe how geologic time can be estimated by observing rock sequences and using fossils to correlate the sequences at various locations. Recognize that current methods include using the known decay rates of radioactive isotopes present in rocks to measure the time since the rock was formed.

Authentic Assessments

Teacher
Use Only

October Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: Matter and energy in the ecosystem involve roles of biotic factors, ecosystem structure, energy in the ecosystem and cycles of matter.

Indicators: CHAPTER 4

11ESS 3. Explain heat and energy transfers in and out of the atmosphere and its involvement in weather and climate (radiation, conduction, convection and advection).

11ESS 11. Analyze how materials from human societies (e.g., radioactive waste and air pollution) affect both physical and chemical cycles of Earth.

11PS 3. Describe real world examples showing that all energy transformations tend toward disorganized states (e.g., fossil fuel combustion, food pyramids and electrical use).

Authentic Assessments

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November Grade 11/12: ENVIRONMENTAL SCIENCE**Essential Understandings: Interactions in the environment have an effect on the carrying capacity of an area.****Indicators: CHAPTER 5**

11LS 6. Predict some possible impacts on an ecosystem with the introduction of a non-native species.

11LS 7. Show how populations can increase through linear or exponential growth with corresponding effects on resource use and environmental pollution.

11LS 8. Recognize that populations can reach or temporarily exceed the carrying capacity of a given environment. Show that the limitation is not just the availability of space but the number of organisms in relation to resources and the capacity of earth systems to support life.

Authentic Assessments

Teacher
Use Only

November Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: Balance in the ecosystem is delicate and is related to evolution of organisms, human activity and environmental factors.

Indicators: CHAPTER 6

11LS 6. Explain how developmental differentiation is regulated through the expression of different genes.

11LS 9. Give examples of how human activity can accelerate rates of natural change and can have unforeseen consequences.

11LS 10. Explain how environmental factors can influence heredity or development of organisms.

11LS 13. Describe how the process of evolution has changed the physical world over geologic time.

Authentic Assessments

Teacher
Use Only

December Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: Deserts and tundra are formed due to the amount of precipitation and are greatly affected by human activity.

Indicators: CHAPTER 7

11ESS 12. Explain ways in which humans have had a major effect on other species (e.g., the influence of humans on other organisms occurs through land use, which decreases space available to other species and pollution, which changes the chemical composition of air, soil and water).

11ESS 13. Explain how human behavior affects the basic processes of natural ecosystems and the quality of the atmosphere, hydrosphere and lithosphere.

11LS 5. Investigate the impact on the structure and stability of ecosystems due to changes in their biotic and abiotic components as a result of human activity.

11LS 9. Give examples of how human activity can accelerate rates of natural change and can have unforeseen consequences.

11ST 2. Predict how decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment and/or humans.

11SWK 1. Analyze a set of data to derive a hypothesis and apply that hypothesis to a similar phenomenon (e.g., biome data).

Authentic Assessments

Teacher
Use Only

December Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: Humans greatly affect the grassland biomes and precipitation dictates biome type and organisms that live in that biome.

Indicators: CHAPTER 8

11ESS 12. Explain ways in which humans have had a major effect on other species (e.g., the influence of humans on other organisms occurs through land use, which decreases space available to other species and pollution, which changes the chemical composition of air, soil and water).

11ESS 13. Explain how human behavior affects the basic processes of natural ecosystems and the quality of the atmosphere, hydrosphere and lithosphere.

11LS 5. Investigate the impact on the structure and stability of ecosystems due to changes in their biotic and abiotic components as a result of human activity.

11LS 9. Give examples of how human activity can accelerate rates of natural change and can have unforeseen consequences.

11ST 2. Predict how decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment and/or humans.

11SWK 1. Analyze a set of data to derive a hypothesis and apply that hypothesis to a similar phenomenon (e.g., biome data).

Authentic Assessments

Teacher
Use Only

January Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: Many acres of forests are being destroyed every year by humans which plays havoc with the organisms living in that biome.

Indicators: CHAPTER 9

11ESS 12. Explain ways in which humans have had a major effect on other species (e.g., the influence of humans on other organisms occurs through land use, which decreases space available to other species and pollution, which changes the chemical composition of air, soil and water).

11ESS 13. Explain how human behavior affects the basic processes of natural ecosystems and the quality of the atmosphere, hydrosphere and lithosphere.

11LS 5. Investigate the impact on the structure and stability of ecosystems due to changes in their biotic and abiotic components as a result of human activity.

11LS 9. Give examples of how human activity can accelerate rates of natural change and can have unforeseen consequences.

11ST 2. Predict how decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment and/or humans.

11SWK 1. Analyze a set of data to derive a hypothesis and apply that hypothesis to a similar phenomenon (e.g., biome data).

Authentic Assessments

Teacher
Use Only

January Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: Freshwater biomes contain organisms that are affected by water pollution caused by human activity.

Indicators: CHAPTER 10

11ESS 12. Explain ways in which humans have had a major effect on other species (e.g., the influence of humans on other organisms occurs through land use, which decreases space available to other species and pollution, which changes the chemical composition of air, soil and water).

11ESS 13. Explain how human behavior affects the basic processes of natural ecosystems and the quality of the atmosphere, hydrosphere and lithosphere.

11LS 5. Investigate the impact on the structure and stability of ecosystems due to changes in their biotic and abiotic components as a result of human activity.

11SWK 1. Analyze a set of data to derive a hypothesis and apply that hypothesis to a similar phenomenon (e.g., biome data).

11SWK 9. Explain how natural and human-induced hazards present the need for humans to assess potential danger and risk. Many changes in the environment designed by humans bring benefits to society as well as cause risks.

Authentic Assessments

Teacher
Use Only

February Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: World oceans are important to the stability of the earth and are affected by human activity.

Indicators: CHAPTER 11

11ESS 12. Explain ways in which humans have had a major effect on other species (e.g., the influence of humans on other organisms occurs through land use, which decreases space available to other species and pollution, which changes the chemical composition of air, soil and water).

11ESS 13. Explain how human behavior affects the basic processes of natural ecosystems and the quality of the atmosphere, hydrosphere and lithosphere.

11LS 5. Investigate the impact on the structure and stability of ecosystems due to changes in their biotic and abiotic components as a result of human activity.

11SWK 1. Analyze a set of data to derive a hypothesis and apply that hypothesis to a similar phenomenon (e.g., biome data).

Authentic Assessments

Teacher
Use Only

February Grade 11/12: ENVIRONMENTAL SCIENCE**Essential Understandings: World oceans are important to the stability of the earth and are affected by human activity.****Indicators: CHAPTER 11**

11ESS 12. Explain ways in which humans have had a major effect on other species (e.g., the influence of humans on other organisms occurs through land use, which decreases space available to other species and pollution, which changes the chemical composition of air, soil and water).

11ESS 13. Explain how human behavior affects the basic processes of natural ecosystems and the quality of the atmosphere, hydrosphere and lithosphere.

11LS 5. Investigate the impact on the structure and stability of ecosystems due to changes in their biotic and abiotic components as a result of human activity.

11SWK 1. Analyze a set of data to derive a hypothesis and apply that hypothesis to a similar phenomenon (e.g., biome data).

Authentic Assessments

Teacher
Use Only

March Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: Societies of the world are different, see the world differently and use the materials of the world differently.

Indicators: CHAPTER 12

11ESS 8. Describe the normal adjustments of Earth, which may be hazardous for humans. Recognize that humans live at the interface between the atmosphere driven by solar energy and the upper mantle where convection creates changes in Earth's solid crust. Realize that as societies have grown, become stable and come to value aspects of the environment, vulnerability to natural processes of change has increased.

11ESS 13. Explain how human behavior affects the basic processes of natural ecosystems and the quality of the atmosphere, hydrosphere and lithosphere.

11ESS 15. Use historical examples to show how new ideas are limited by the context in which they are conceived; are often rejected by the social establishment; sometimes spring from unexpected findings; and usually grow slowly through contributions from many different investigators.

11LS 5. Investigate the impact on the structure and stability of ecosystems due to changes in their biotic and abiotic components as a result of human activity.

11LS 11. Investigate issues of environmental quality at local, regional, national and global levels such as population growth, resource use, population distribution, over-consumption, the capacity of technology to solve problems, poverty, the role of economics, politics and different ways humans view the earth.

11ST 1. Identify that science and technology are essential social enterprises but alone they can only indicate what can happen, not what should happen. Realize the latter involves human decisions about the use of knowledge

Authentic Assessments

Teacher
Use Only

MARCH Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: Natural systems are impacted by technology, human population growth factors as human population growth is affected by pathogens.

Indicators: CHAPTER 13

11LS 1. Explain how stability is challenged by changing physical, chemical and environmental conditions as well as the presence of pathogens.

11LS 3. Relate how birth rates, fertility rates and death rates are affected by various factors.

11LS 4. Examine the contributing factors of human population growth that impact natural systems such as levels of education, children in the labor force, education and employment of women, infant mortality rates, costs of raising children, birth control methods, and cultural norms.

11ST 2. Predict how decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment and/or humans.

Authentic Assessments

Teacher
Use Only

APRIL Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: Resources of earth and the quality of the biosphere are affected by human behavior: food molecules contain energy.

Indicators: CHAPTER 14

11ESS 13. Explain how human behavior affects the basic processes of natural ecosystems and the quality of the atmosphere, hydrosphere and lithosphere.

11ESS 14. Conclude that Earth has finite resources and explain that humans deplete some resources faster than they can be renewed.

11LS 2. Recognize that chemical bonds of food molecules contain energy. Energy is released when the bonds of food molecules are broken and new compounds with lower energy bonds are formed. Some of this energy is released as thermal energy.

Authentic Assessments

Teacher
Use Only

MAY Grade 11/12: ENVIRONMENTAL SCIENCE

Essential Understandings: The need for fuel in the world is increasing but fossil fuels are finite leading to the finding of alternative fuels.

Indicators: CHAPTER 15

11ESS 13. Explain how human behavior affects the basic processes of natural ecosystems and the quality of the atmosphere, hydrosphere and lithosphere.

11ESS 14. Conclude that Earth has finite resources and explain that humans deplete some resources faster than they can be renewed.

11ST 5. Investigate that all fuels (e.g., fossil, solar and nuclear) have advantages and disadvantages; therefore society must consider the trade-offs among them (e.g., economic costs and environmental impact).

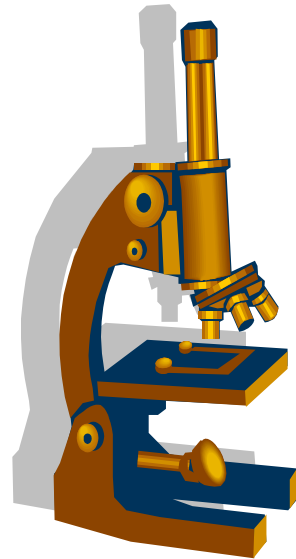
11ST 6. Research sources of energy beyond traditional fuels and the advantages, disadvantages and trade-offs society must consider when using alternative sources (e.g., biomass, solar, hybrid engines, wind and fuel cells).

Authentic Assessments

Teacher
Use Only

BIOLOGY II:

Human Anatomy and Physiology



September Biology II Grade 11 & 12

Essential Understanding: Levels of structural organization proceed from the cell to the human body. To sustain life, the body must maintain homeostasis, a relatively stable internal environment, which is a concept that will be kept in mind throughout the course. There is a specific language of anatomy with regard to position, region, and direction. This includes the various planes, sections, and cavities. Students will begin to learn the basic chemistry that underlies physiology. This includes concepts of matter and energy as well as the function of specific biochemical molecules and reactions.

Indicators:

Life Science

Grade 11 (#1) Describe how the maintenance of a relatively stable internal environment is required for the continuation of life, and explain how stability is challenged by changing physical, chemical and environmental conditions as well as the presence of pathogens.

Grade 11 (#2) Recognize that chemical bonds of food molecules contain energy. Energy is released when the bonds of food molecules are broken down and new compounds with lower energy bonds are formed. Some of this energy is released as thermal energy.

Grade 12 (#4) Explain that carbon-containing molecules can be used to assemble larger molecules, with biological activity (including proteins, DNA, sugars and fats). In addition, the energy stored in bonds between atoms (chemical energy) can be used as sources of energy for life processes.

Grade 12 (#9) Explain why and how living systems require a continuous input of energy to maintain their chemical and physical organization. Explain that with death and the cessation of energy input, living systems rapidly disintegrate toward more disorganized states.

Scientific Inquiry

Grade 12 (#3) Research and apply appropriate safety precautions when designing and/or conducting scientific investigations (OSHA, MSDS, eyewash, goggles, ventilation.)

Grade 11 (#4) Explain why the methods of an investigation are based on the questions being asked.

Grade 11 (#1) Formulate testable hypotheses. Develop and explain the appropriate procedures, controls and variables (dependent and independent) in scientific experimentation.

Scientific Ways of Knowing

Grade 11 (#3) Demonstrate that scientific explanations adhere to established criteria, for example a proposed explanation must be logically consistent, it must abide by the rules of evidence and it must be open to questions and modifications.

Grade 11 (#2) Analyze a set of data to derive a hypothesis and apply that hypothesis to a similar phenomenon.

Science and Technology

Grade 11 (#2) Predict how decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment and/or humans.

Grade 12 (#1) Explain how science often advances with the introduction of new technologies and how solving technological problems often results in new scientific knowledge.

AUTHENTIC ASSESSMENT

Teacher
Use Only

October Biology II Grade 11 & 12

Essential Understanding: The structure of the plasma membrane and various transport processes account for movements of specific biomolecules into and out of cells. DNA codes for proteins using three major varieties of RNA and is able to replicate itself. The four major categories of tissues and their chief subcategories will be introduced. Tissue repair and wound healing is discussed. Neoplasm and cancer is introduced and distinguished with hyperplasia.

Indicators:

Life Science

Grade 11 (#1) Recognize that information stored in DNA provides the instructions for assembling protein molecules used by the cells that determine the characteristics of the organisms.

Grade 11 (#10) Explain how environmental factors can influence heredity or development of organisms.

Scientific Inquiry

Grade 11 (#2) Evaluate assumptions that have been used in reaching scientific conclusions.

Scientific Ways of Knowing

Grade 11 (#8) Explain that the decision to develop a new technology is influenced by societal opinions and demands and by cost benefit considerations.

Grade 11 (#9) Explain how natural and human-induced hazards present the need for humans to assess potential danger and risk. Many changes in the environment designed by human bring benefits to society as well as cause risk.

Grade 12 (#1) Give examples that show how science is a social endeavor in which scientists share their knowledge with the expectation that it will be challenged by the continuously by the scientific community and others.

Science and Technology

Grade 11 (#3) Explore and explain any given technology that may have a different value for different groups of people and at different points in time (e.g. genetic instructions to reproduce new characteristics).

AUTHENTIC ASSESSMENT

Teacher
Use Only

November Biology II Grade 11 & 12

Essential Understanding: Body membranes line or cover, protect, and lubricate body surfaces. Students will list several important functions of the integumentary system and differentiate between first-, second-, and third-degree burns. The skeletal system provides an internal framework for the body, protects organs by enclosure, and anchors skeletal muscles so that muscle contraction can cause movement. Students will learn the subdivisions of the skeleton, classify, and identify bones.

Indicators:

Life Science

Gr12 (#7) Relate diversity and adaptation to structures and functions of living organisms at various levels of organization.

Scientific Inquiry

Gr11 (#3) Design and carry out scientific inquiry (investigation), communicate and critique results through peer review.

Gr12 (#1) Formulate testable hypotheses. Develop and explain the appropriate procedures, controls and variables (dependent and independent) in scientific experimentation.

Scientific Ways of Knowing

Gr11 (#1) Analyze a set of data to derive a hypothesis and apply that hypothesis to a similar phenomenon.

Gr12 (#2) Evaluate scientific investigations by reviewing current scientific knowledge and the experimental procedures used, examining the evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence and suggesting alternative explanations for the same observations.

Gr12 (#4) Analyze a set of data to derive a principle and then apply that principle to a similar phenomenon.

Science and Technology

Gr11 (#1) Identify that science and technology are essential social enterprises but alone they can only indicate what can happen, not what should happen. Realize the latter involves human decisions about the use of knowledge.

AUTHENTIC ASSESSMENT

Teacher
Use Only

December Biology II Grade 11 & 12

Essential Understanding: The muscular system provides for movement of the body and its parts, maintains posture, generates heat, and stabilizes joints.

Indicators:

Life Science

Gr12 (#12) Describe advances in life sciences that have important, long-lasting effects on science and society (e.g. biotechnology).

Scientific Inquiry

Gr11 (#5) Summarize data and construct a reasonable argument based on those data and other known information.

Scientific Ways of Knowing

Gr11 (#2) Apply scientific inquiry to evaluate results of scientific investigations, observations, theoretical models and the explanations proposed by other scientists.

Gr12 (#5) Describe how individuals and teams contribute to science and engineering at different levels of complexity (e.g., an individual may conduct basic field studies, hundreds of people may work together on major scientific questions or technical problems).

Science and Technology

Gr12 (#2) Describe how new technologies often extend the current levels of scientific understanding and introduce new areas of research.

AUTHENTIC ASSESSMENT

Teacher
Use Only

January Biology II Grade 11 & 12

Essential Understanding: The nervous system maintains body homeostasis with electrical signals; provides for sensation, higher mental functioning, and emotional response; and activates muscles and glands. Students will list the general functions of the nervous system, identify the structure and function of nervous tissue, explore the central and peripheral nervous systems, and learn about developmental aspects of the nervous system.

The special senses respond to different types of energetic stimuli involved in vision, hearing, balance, smell, and taste. Students will learn the structure and function of the eye, the ear, chemical senses, and the developmental aspects of the special senses.

Indicators:

Life Sciences

Gr12 (#2) Explain why specialized cells/structures are useful to animals (e.g. nerve cells).

Gr12 (#5) Examine the inheritance of traits through one or more genes and how a single gene can influence more than one trait.

Scientific Inquiry

Gr12 (#2) Derive simple mathematical relationships that have predictive power from experimental data (e.g., derive an equation from a graph and vice versa, determine whether a linear or exponential relationship exists among the data in a table).

Scientific Ways of Knowing

Gr11 (#5) Recognize that bias affects outcomes. People tend to ignore evidence that challenges their beliefs but accept evidence that supports their beliefs. Scientists attempt to avoid bias in their work.

Gr11 (#10) Describe costs and trade-offs of various hazards – ranging from those with minor risk to major catastrophes. The scale of the events and the accuracy with which scientists can (and cannot) predict events are important considerations.

Science and Technology

Gr11 (#4) Explain why basic concepts and principles of science and technology should be a part of active debate about the economics, policies, politics and ethics of various science-related and technology-related challenges.

AUTHENTIC ASSESSMENT

Teacher
Use Only

February Biology II Grade 11 & 12

Essential Understanding: The endocrine system maintains homeostasis by releasing chemicals called hormones, and controls prolonged or continuous processes such as growth and development, reproduction, and metabolism. Students will learn the role of important hormones and endocrine organs in the body.

Blood serves as a vehicle for distributing body heat and for transporting nutrients, respiratory gases, and other substances throughout the body. Students will learn about the composition and functions of blood, hemostasis, blood groups and transfusions, and developmental aspects of blood.

Indicators:

Life Science:

Gr12 (#11) Trace the historical development of a biological theory or idea.

Scientific Inquiry

Gr12 (#4) Create and clarify the method, procedures, controls, and variables in complex scientific investigations.

Scientific Ways of Knowing

Gr11 (#6) Describe the strongly held traditions of science that serve to keep scientists within the bounds of ethical professional behavior.

Gr12 (#1) Give examples that show how science is a social endeavor in which scientists share their knowledge with the expectation that it will be challenged continuously by the scientific community and others.

Gr12 (#7) Describe the current and historical contributions of diverse peoples and cultures to science and technology and the scarcity and inaccessibility of information on some of these contributions.

Science and Technology

Gr12 (#3) Research how scientific inquiry is driven by the desire to understand the natural world and how technological design is driven by the need to meet human needs and solve human problems.

AUTHENTIC ASSESSMENT

Teacher
Use Only

March Biology II Grade 11 & 12

Essential Understanding: The heart pumps blood and blood vessels provide the conduits within which blood circulates to all body tissues. Student will trace the pathway of blood through the heart, explain the intrinsic conduction system of the heart, compare and contrast the structure and function of arteries, veins, and capillaries, and identify the body's major arteries and veins. The lymphatic system returns leaked plasma to the blood vessels after cleansing it of bacteria and other foreign matter. The immune system protects against disease by destroying foreign cells and by inactivating toxins with antibodies. Students will learn the two major types of structures composing the lymphatic system, will describe the types of immune cells and responses, and will describe the inflammatory process.

Indicators:

Life Science – no new indicators

Scientific Inquiry

Gr12 (#5) Use appropriate summary statistics to analyze and describe data.

Scientific Ways of Knowing

Gr11 (#7) Explain how theories are judged by how well they fit with other theories, the range of included observations, how well they explain observations and how effective they are in predicting new findings.

Gr12 (#3) Select a scientific model, concept, or theory and explain how it has been revised over time based on new knowledge, perceptions or technology.

Science and Technology

Gr12 (#4) Explain why basic concepts and principles of science and technology should be a part of active debate about the economics, policies, politics and ethics of various science-related and technology-related challenges.

AUTHENTIC ASSESSMENT

Teacher
Use Only

April Biology II Grade 11 & 12

Essential Understanding: The respiratory system supplies oxygen to the blood while removing carbon dioxide. Students will identify the functional anatomy of the respiratory system, explain it's physiology, learn about COPD and lung cancer, and explore developmental aspects of the respiratory system.

The digestive system breaks down ingested food into particles small enough to be absorbed into the blood. Metabolism produces cellular energy (ATP) and accounts for all constructive and degradative cellular activities. Students will identify the anatomy of the digestive system, functions of the digestive system, and learn about nutrition and the body's means of using it.

Indicators:

Life Science: no new indicators

Scientific Inquiry: no new indicators

Science as a Way of Knowing

Gr12 (#10) Recognize that social issues and challenges can affect progress in science and technology. (e.g., Funding priorities for specific health problems serve as examples of ways that social issues influence science and technology.)

Gr12 (#9) Recognize the appropriateness and value of basic questions "What can happen?" "What are the odds?" and "How do scientists and engineers know what will happen?"

Science and Technology

Gr11 (#4) Explain why basic concepts and principles of science and technology should be a part of active debate about the economics, policies, politics and ethics of various science-related and technology-related challenges.

AUTHENTIC ASSESSMENT

Teacher
Use Only

May Biology II Grade 11 & 12

Essential Understanding: The urinary system rids the body of nitrogenous wastes while regulating water, electrolyte, and acid-base balance of the blood. Students will describe the structure and function of the kidneys, ureters, urinary bladder, and urethra, as well as learn about fluid, electrolyte, and acid-base balance.

The reproductive system ensures continuity of the species by producing offspring. Students will learn about the anatomy and functions of the male and female reproductive systems and survey pregnancy and embryonic development.

Indicators:

Life Science

Gr11 (#3) Relate how birth rates, fertility rates and death rates are affected by various environmental factors.

Gr12 (#6) Explain how developmental differentiation is regulated through the expression of different genes.

Scientific Inquiry: no new indicators

Science as a Way of Knowing

Gr11 (#11) Research the role of science and technology in careers that students plan to pursue.

Gr12 (#6) Explain that scientists may develop and apply ethical tests to evaluate the consequences of their research when appropriate.

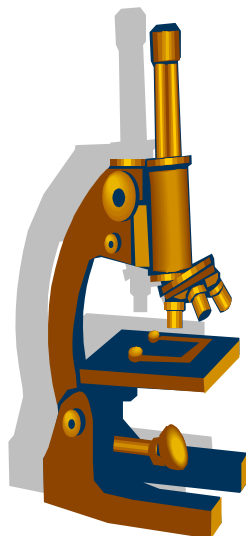
Gr12 (#8) Recognize that individuals and society must decide on proposals involving new research and the introduction of new technologies into society. Decisions involve assessment of alternatives, risks, costs and benefits and consideration of who benefits and who suffers, who pays and gains, and what the risks are and who bears them.

Gr12 (#11) Research how advances in scientific knowledge have impacted society on a local, national, or global level.

AUTHENTIC ASSESSMENT

Teacher
Use Only

CHEMISTRY



Niles McKinley High School Science Department
SY2009-2010

September Chemistry Grade 11 & 12**Essential Understanding: Matter and Change, Measurement and Calculations, Elements, Scientific Method, Laboratory safety and procedures**

Indicators:

Science Technology

Grade 12 (#1) Explain how science often advances with the introduction of new technologies and how solving technological problems often results in new scientific knowledge.

Scientific Inquiry

Grade 11 (#1) Formulate testable hypotheses. Develop and explain the appropriate procedures, controls and variables (dependent and independent) in scientific experimentation.

Grade 12 (#1) Formulate testable hypotheses. Develop and explain the appropriate procedures, controls and variables (dependent and independent) in scientific experimentation.

Grade 12 (#2) Derive simple mathematical relationships that have predictive power from experimental data (e.g., derive an equation from a graph and vice versa, determine whether a linear or exponential relationship exists among the data in a table).

Grade 12 (#3) Research and apply appropriate safety precautions when designing and/or conducting scientific investigations (e.g., OSHA, MSDS, eyewash, goggles and ventilation).

Grade 12 (#4) Create and clarify the method, procedures, controls and variables in complex scientific investigations.

Grade 12 (#5) Use appropriate summary statistics to analyze and describe data.

AUTHENTIC ASSESSMENT

Teacher
Use Only

October Chemistry Grade 11 & 12**Essential Understanding: Measurement and calculations, Atom: Philosophical Idea to Scientific Theory, Structure of the Atom****Indicators:****Physical Science**

Grade 11 (#1) Explain that elements with the same number of protons may or may not have the same mass and those with different masses (different numbers of neutrons) are called isotopes. Some of these are radioactive.

Grade 12 (#10) Explain the characteristics of isotopes. The nuclei of radioactive isotopes are unstable and spontaneously decay emitting particles and/or wavelike radiation. It cannot be predicted exactly when, if ever, an unstable nucleus will decay, but a large group of identical nuclei decay at a predictable rate.

Grade 12 (#14) Use historical examples to explain how new ideas are limited by the context in which they are conceived; are often initially rejected by the scientific establishment; sometimes spring from unexpected findings; and usually grow slowly through contributions from many different investigators (e.g., nuclear energy, quantum theory and theory of relativity).

Science Technology

Grade 12 (#1) Explain how science often advances with the introduction of new technologies and how solving technological problems often results in new scientific knowledge.

Grade 12 (#2) Describe how new technologies often extend the current levels of scientific understanding and introduce new areas of research.

Scientific ways of knowing

Grade 11 (#2) Apply scientific inquiry to evaluate results of scientific investigations, observations, theoretical models and the explanations proposed by other scientists.

Grade 11 (#3) Demonstrate that scientific explanations adhere to established criteria, for example a proposed explanation must be logically consistent, it must abide by the rules of evidence and it must be open to questions and modifications.

Grade 11 (#7) Explain how theories are judged by how well they fit with other theories, the range of included observations, how well they explain observations and how effective they are in predicting new findings.

AUTHENTIC ASSESSMENT

Teacher
Use Only

November **Chemistry Grade 11 & 12**
Essential Understanding: Arrangement of Electrons in Atoms

Indicators:

Physical Science

Grade 12 (#12) Describe how different atomic energy levels are associated with the electron configurations of atoms and electron configurations (and/or conformations) of molecules.

Grade 12 (#13) Explain how atoms and molecules can gain or lose energy in particular discrete amounts (quanta or packets); therefore they can only absorb or emit light at the wavelengths corresponding to these amounts.

Science Technology

Grade 12 (#1) Explain how science often advances with the introduction of new technologies and how solving technological problems often results in new scientific knowledge.

Grade 12 (#2) Describe how new technologies often extend the current levels of scientific understanding and introduce new areas of research.

AUTHENTIC ASSESSMENT

Teacher
Use Only

December Chemistry Grade 11 & 12**Essential Understanding: Periodic Law: History and Properties of the Periodic Table****Indicators:**

Describe the modern periodic table.

Explain how periodic law can be used to predict the physical and chemical properties of elements.

Compare the atomic radii, ionization energy, and electronegativities of the elements.

AUTHENTIC ASSESSMENT

Teacher
Use Only

January Chemistry Grade 11 & 12**Essential Understanding: Chemical Bonding and Molecular Geometry****Indicators:****Physical Science**

Grade 11 (#2) Explain that humans have used unique bonding of carbon atoms to make a variety of molecules (e.g., plastics).

Science Technology

Grade 12 (#1) Explain how science often advances with the introduction of new technologies and how solving technological problems often results in new scientific knowledge.

Grade 12 (#2) Describe how new technologies often extend the current levels of scientific understanding and introduce new areas of research.

AUTHENTIC ASSESSMENT

Teacher
Use Only

February Chemistry Grade 11 & 12**Essential Understanding: Naming and Writing Chemical Formulas, Determining and Using Chemical Formulas, Describe Chemical Reactions.****Indicators:**

Explain the significance of a chemical formula.

Name ionic compounds and binary molecular compounds.

Write chemical formulas.

Calculate formula mass of a compound.

Calculate molar mass and convert to grams.

Calculate the percent composition of a chemical compound.

Write word equations and formula equations for a given chemical reaction.

Balance a formula equation.

AUTHENTIC ASSESSMENT

Teacher
Use Only

March Chemistry Grade 11 & 12**Essential Understanding: Chemical Reactions and Stoichiometry, Law of Conservation Mass****Indicators:****Science Technology**

Grade 12 (#1) Explain how science often advances with the introduction of new technologies and how solving technological problems often results in new scientific knowledge.

Define and give general equations for synthesis, decomposition, single displacement, and double displacement reactions.

Predict the products of simple reactions given the reactants.

Write a mole ratio relating two substances in a chemical equation.

Calculate the amount of moles and mass of reactants and products in chemical equations

AUTHENTIC ASSESSMENT

Teacher
Use Only

April Chemistry Grade 11 & 12**Essential Understanding: States of Matter, Kinetic Theory of Matter and Changes of State****Indicators:**

State the Kinetic Theory of Matter, describe how it explains certain properties of matter.

Describe the characteristic properties of gases.

Describe the characteristic properties of liquids.

Describe the characteristic properties of solids.

AUTHENTIC ASSESSMENT

Teacher
Use Only

May Chemistry Grade 11 & 12**Essential Understanding: Structure of the water molecule, Gas Laws****Indicators:**

Describe the structure of the water molecule.

Discuss the physical properties of water.

State the standard conditions of temperature and pressure and convert units of pressure.

Use Daltons Law of partial pressures.

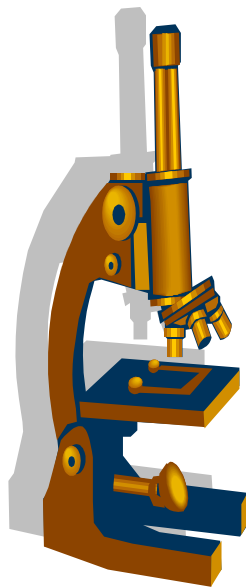
Use kinetic theory to explain the relationship between gas volume, temperature and pressure

Explain Boyles Law, Charles Law, Gay-Lussac Law and the Ideal Gas Law

AUTHENTIC ASSESSMENT

Teacher
Use Only

PHYSICS



Niles McKinley High School Science Department
SY2009-2010

September: Physics

Essential Understanding: Students will be able to analyze straight-line and projectile motion both mathematically and conceptually.

Indicators:

12-SI-3 Research and apply appropriate safety precautions when designing and/or conducting investigations Laboratory Safety:

12-SWK-8 Recognize that individuals and society must decide on proposals involving new research and introduction of new technologies into society. Chapter 1 “About Science”:

12-PS-14 Use historical examples to explain how new ideas are limited by the context in which they are conceived; are often initially rejected by the scientific establishment; sometimes spring from unexpected findings; and usually grow slowly through contributions from many different investigators. Chapter 2 “Linear Motion”:

12-PS-9 Describe how gravitational forces act between all masses and always create a force of attraction. Chapter 3 “Projectile Motion”:

12-PS-5 Use and apply the laws of motion to analyze, describe, and predict the effects of forces on the motion of objects mathematically. Chapter 4 “Newton’s First Law”:

AUTHENTIC ASSESSMENTS

Teacher
Use Only

October Physics

Essential Understanding: Students will be able to use and apply Newton's laws of motion to analyze, describe and predict the effects of forces on motion.

Indicators:

12-PS-5 Use and apply the laws of motion to analyze, describe, and predict the effects of forces on the motion of objects mathematically. Chapter 5 "Newton's Second Law":

Chapter 6 "Newton's Third Law": 12-PS-5

Chapter 7 "Momentum": 12-PS-5

AUTHENTIC ASSESSMENTS

Teacher
Use Only

November Physics

Essential Understanding: Students will demonstrate that energy can be described as kinetic or potential, that it may change forms, and that in all cases the total quantity of energy is conserved.

Indicators:

9-PS-12 Explain how an object's kinetic energy depends on its mass and its speed. Chapter 8 "Energy"

9-PS-13 Demonstrate that near the Earth's surface an object's gravitational potential energy depends upon its weight and height above a reference surface.

9-PS-15 Trace the transformation of energy within a system and recognize that energy is conserved.

9-PS-25 Demonstrate the ways in which frictional forces constrain the motion of objects. Chapter 9 "Circular Motion"

Chapter 10 "Center of Gravity"

AUTHENTIC ASSESSMENTS

Teacher
Use Only

December **Physics**

Essential Understanding: Students will be able to describe the large scale motion of the universe as it is governed by gravitational interactions.

Indicators:

Chapter 11 “Rotational Mechanics”

12-PS-9 Describe how gravitational forces act between all masses and always create a force of attraction. Recognize that the strength of the force is proportional to the masses and weaker rapidly with increasing distance between them.

Chapter 12 “Universal Gravitation”

Chapter 13 “Gravitational Interactions”

12-SWK-3 Select a scientific model, concept, or theory and explain how it has been revised over time based on new knowledge, perceptions, or technology.

Chapter 14 “Satellite Motion” 12-PS-9

AUTHENTIC ASSESSMENTS

Teacher
Use Only

January **Physics**

Essential Understanding: Students will be able to describe the atomic nature of matter and describe some of the physical and chemical properties of matter.

Indicators:

12-PS-6 Recognize that the nuclear forces that hold the nucleus of an atom together, at nuclear distances, are stronger than the electric forces that would make it fly apart. Chapter 17 “Atomic Nature of Matter”

11-PS-1 Explain that elements with the same number of protons may or may not have the same mass. Those with different masses are called isotopes.

12-PS-1 Explain how atoms join with one another in various combinations in distinct molecules or in repeating crystal patterns. Chapter 18 “Solids”

9-PS-9 Investigate the properties of pure substances and mixtures. Chapter 19 “Liquids”

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February **Physics**

Essential Understanding: Students will be able to distinguish between heat, temperature, and thermal energy and will be able to describe methods of heat transfer.

Indicators:

9-PS-9 Investigate the properties of pure substances and mixtures. Chapter 20 “Gasses”

9-PS-11 Explain how thermal energy exists in the random motion and vibrations of atoms and molecules. Recognize that the higher the temperature, the greater the average atomic or molecular motion is and during changes of state the temperature remains constant. Chapter 21 “Temperature, Heat, and Expansion”

11-ESS-3 Explain heat and energy transfers in and out of the atmosphere and its involvement in weather and climate. Chapter 22 “Heat Transfer”

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March **Physics**

Essential Understanding: Students will understand that all energy transformations tend toward disorganized states.

Indicators:

9-PS-11 Recognize that during changes of state the temperature remains constant. Chapter 23 “Change of Phase”

11-PS-2 Describe real world examples showing that all energy transformation tend toward disorganized states. Chapter 24 “Thermodynamics”

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April **Physics**

Essential Understanding: Students will demonstrate that waves have energy and that sound waves require a medium to be propagated.

Indicators:

12-SI-1 Formulate testable hypotheses. Develop and explain appropriate procedures, controls, and variables in scientific experimentation. Chapter 25 “Vibrations and Waves”

12-PS-8 Describe how the observed wavelength of a wave depends on the relative motion of the source and the observer. It either is moving towards the other, the observed wavelength is shorter; if either is moving away, the observed wavelength is longer. Chapter 26 “Sound”

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May Physics

Essential Understanding: Students will understand that light is a form of electromagnetic energy and will be able to describe some properties and behaviors of light.

Indicators:

9-PS-19 Show how the properties of a wave depend on the properties of the medium through which it travels. Recognize that electromagnetic waves can be propagated without a medium. Chapter 27 “Light”

Chapter 28 “Color” 9-PS-19

9-PS-20 Describe how waves can superimpose on one another when propagated in the same medium. Analyze conditions in which waves can bend around corners, reflect off surfaces, are absorbed by materials they enter, and change direction and speed when entering a new material. Chapter 29 “Reflection and Refraction”

Chapter 30 “Lenses” 9-PS-20

Chapter 31 “Diffraction and Interference” 9-PS-20

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