

**City School District of Albany
Science Curriculum Pacing Map
Grade 8**

*Indicates mandatory lab

| MONTH | CONTENT TOPICS | NYS STANDARD/KEY IDEA/PERFORMANCE INDICATOR PHYSICAL SETTING 2.1a-j, 2.2a-f, 2.1e,f, 2.2g-r | LABS/SKILLS |
|----------------------------------|--|--|--|
| September to Late October | <p>Lab Safety Tools of the Scientist Metric Measurement & Nanoscale measurement</p> <p>Brief Review of Earth's Changing Surface (approx. 3 days)</p> <p>Formation of Mountains, Land Formations Elevation Topography</p> <p>Rocks and Minerals</p> | <p>2.1a-j Nearly all the atmosphere is confined to a thin shell surrounding Earth. The atmosphere is a mixture of gases, including nitrogen and oxygen with small amounts of water vapor, carbon dioxide, and other trace gases. The atmosphere is stratified into layers, each having distinct properties. Nearly all weather occurs in the lowest layer of the atmosphere. The rock at Earth's surface forms a nearly continuous shell around Earth called the lithosphere. The majority of the lithosphere is covered by a relatively thin layer of water called the hydrosphere. The dynamic processes that wear away Earth's surface include weathering and erosion. The process of weathering breaks down rocks to form sediment. Soil consists of sediment, organic material, water, and air. Erosion is the transport of sediment. Gravity is the driving force behind erosion. Gravity can act directly or through agents such as moving water, wind, and glaciers. Water circulates through the atmosphere, lithosphere, and hydrosphere in what is known as the water cycle.</p> <p>2.2a-f The interior of Earth is hot. Heat flow and movement of material within Earth cause sections of Earth's crust to move. This may result in earthquakes, volcanic eruption, and the creation of mountains and ocean basins. Analysis of earthquake wave data (vibrational disturbances) leads to the conclusion that there are layers within Earth. These layers in the crust, mantle, outer core, and inner core have distinct properties. Folded, tilted, faulted, and displaced rock layers suggest past crustal movement.. Continents fitting together like puzzle parts and fossil correlations provided initial evidence that continents were once together. The Theory of Plate Tectonics explains how the solid lithosphere consists of a series of plates that float on the partially molten section of the mantle. Convection cells within the mantle may be the driving force for the movement of the plates. Plates may collide, move apart, or slide past one another. Most volcanic activity and mountain building occur at the boundaries of these plates, often resulting in earthquakes.</p> <p>2.1e,f Rocks are composed of minerals. Only a few rock-forming minerals make up most of the rocks of Earth. Minerals are identified on the basis of physical properties such as streak, hardness, and reaction to acid. Fossils are usually found in sedimentary rocks and are used to study past climates and environments.</p> <p>2.2g-r Rocks are classified according to their method of formation. The three classes of rocks are sedimentary, metamorphic, and igneous. Most rocks show characteristics that give clues to their formation conditions. The rock cycle model shows how types of rock or rock material may be transformed from one type of rock to another.</p> | <p>LABS:</p> <ul style="list-style-type: none"> ❖ Measuring at the Nanoscale: NanoScience and Nanotechnology in our lives ❖ Reading and using topographic maps (Adirondack mountain topography) Lab ❖ Rock Identification Lab ❖ Mineral Identification Lab <p>SKILLS:</p> <ul style="list-style-type: none"> ❖ Safety & Equipment ❖ Metric system ❖ Triple beam balance ❖ Observations ❖ Measure angular elevation of an object, using appropriate instruments ❖ Classify, compare, and contrast ❖ Use diagrams of the rock cycle to determine geologic processes/events that led to the formation of specific rock types ❖ Identify minerals using identification tests and flow charts |

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|------------------------------------|--|--|---|
| End October to End November | <p>Weather Fronts Currents Density and its relation to weather (cold vs. warm air masses) Acid Rain –pH scale</p> | <p>2.2i-r Weather describes the conditions of the atmosphere for a short period of time. Climate is the characteristic weather that prevails from season to season and year to year. The uneven heating of Earth's surface is the cause of weather. Air masses form when air remains nearly stationary over a large section of Earth's surface and takes on the conditions of temperature and humidity from that location. Weather conditions at a location are determined primarily by temperature, humidity, and pressure of air masses over that location. Air masses movements cause most changes in local weather conditions. Prevailing winds and upper air currents determine the movement of air masses. Fronts are boundaries between air masses. Precipitation is likely to occur at these boundaries. High-pressure systems generally bring fair weather. Low-pressure systems usually bring cloudy, unstable conditions. The general movement of highs and lows is from west to east across the United States. Hazardous weather conditions include thunderstorms, tornadoes, hurricanes, ice storms, and blizzards. Humans can prepare for and respond to these conditions if given sufficient warning. Substances enter the atmosphere naturally and from human activity. Some of these substances include dust from volcanic eruptions and greenhouse gases such as carbon dioxide, methane, and water vapor. These substances can affect weather, climate, and living things.</p> <p>3.2a During a physical change a substance keeps its chemical composition and properties. Examples of physical changes include freezing, melting, condensation, boiling, evaporation, tearing, and crushing.</p> <p>3.1h Density can be described as the amount of matter that is in a given amount of space. If two objects have equal volume, but one has more mass, the one with more mass is denser.</p> <p>4.2b,d Heat can be transferred through matter by the collisions of atoms and/or molecules (conduction) or through space (radiation). In a liquid or gas, currents will facilitate the transfer of heat (convection). Most substances expand when heated and contract when cooled. Water is an exception, expanding when changing to ice.</p> | <p>LABS:</p> <ul style="list-style-type: none"> ❖ Density of air masses lab/Cold vs. warm fronts ❖ Convection current lab ❖ Heating & cooling of water ❖ Fronts foldable lab <p>SKILLS:</p> <ul style="list-style-type: none"> ❖ Latitude/Longitude and weather ❖ Generate/interpret field maps (topographic, weather) ❖ Predict characteristics of an air mass based on origin ❖ Measure weather variables (wind speed, direction, relative humidity, barometric pressure, etc.) |

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| MONTH | CONTENT TOPICS | NYS STANDARD/KEY IDEA/PERFORMANCE INDICATOR PHYSICAL SETTING 5.2c-g, 3.1b,c, 5.1c-g, | LABS/SKILLS |
|-------------------------------------|---|--|--|
| End November to End December | <p>Simple Machines Transfer of mechanical energy from one object to another Friction Machines and force Levers Pulleys Wheel & axle Inclined Planes Complex Machines (bicycle)</p> <p><i>NanoTechnology and work efficiency</i></p> <p>Ecology Environmental conditions and survival (adaptations) Sexual reproduction and diversity of traits</p> | <p>5.2c-g Machines transfer mechanical energy from one object to another. Friction is a force that opposes motion. A machine can be made more efficient by reducing friction. Some common ways of reducing friction include lubricating or waxing surfaces. Machines can change the direction or amount of force, or the distance or speed of force required to do work. Simple machines include a lever, a pulley, a wheel and axle, and an inclined plane. A complex machine uses a combination of interacting simple machines, e.g., a bicycle.</p> <p>3.1b,c Changes in environmental conditions can affect the survival of individual organisms with a particular trait. Small differences between parents and offspring can accumulate in successive generations so that descendants are very different from their ancestors. Individual organisms with certain traits are more likely to survive and have offspring than individuals without those traits. In all environments, organisms with similar needs may compete with one another for resources.</p> <p>5.1c-g All organisms require energy to survive. The amount of energy needed and the method for obtaining this energy vary among cells. Some cells use oxygen to release the energy stored in food. The methods for obtaining nutrients vary among organisms. Producers, such as green plants, use light energy to make their food. Consumers, such as animals, take in energy-rich foods. Herbivores obtain energy from plants. Carnivores obtain energy from animals. Omnivores obtain energy from both plants and animals. Decomposers, such as bacteria and fungi, obtain energy by consuming wastes and/or dead organisms. Regulation of an organisms' internal environment involves sensing the internal environment and changing physiological activities to keep conditions within the range required for survival. Regulation includes a variety of nervous and hormonal feedback systems. The survival of an organism depends on its ability to sense and respond to its external environment.</p> | <p>LABS:</p> <ul style="list-style-type: none"> ❖ *Ramp/Racing Activity ❖ Inclined Plane Lab ❖ Simple Machine Lab (work and force) ❖ Robotics Labs <p>SKILLS:</p> <ul style="list-style-type: none"> ❖ Recognize how machines transfer mechanical energy from one object to another ❖ Understand and apply friction as a force that opposes motion ❖ Understand how to make simple machines more efficient by reducing friction, manipulating variables to change direction/amount of work/distance/or speed of force required to do work |

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| MONTH | CONTENT TOPICS | NYS STANDARD/KEY IDEA/PERFORMANCE INDICATOR LIVING ENVIRONMENT-6.1a-c, 6.2a-c, 7.1a-e, PHYSICAL SETTING-2.2r, 4.1a-c, 4.3d,e | LABS/SKILLS |
|----------------------------|--|---|---|
| January to February | <p>Ecology cont. Variations of species Living things and life functions/maintaining a dynamic equilibrium – life processes, producers, consumers, decomposers, herbivores, carnivores, omnivores</p> <p>Food chains & food webs Energy Pyramid</p> <p>Industrial Revolution & survival</p> <p>Human impact on the environment</p> | <p>6.1a-c Energy flows through ecosystems in one direction, usually from the Sun, through producers to consumers and then to decomposers. This process may be visualized with food chains or energy pyramids. Food webs identify feeding relationships among producers, consumers, and decomposers in an ecosystem. Matter is transferred from one organism to another and between organisms and their physical environment. Water, nitrogen, carbon dioxide, and oxygen are examples of substances cycled between the living and nonliving environment. Provide evidence that green plants make food and explain the significance of this process to other organisms.</p> <p>6.2a-c Photosynthesis is carried on by green plants and other organisms containing chlorophyll. In this process, the Sun's energy is converted into and stored as chemical energy in the form of a sugar. The quantity of sugar molecules increases in green plants during photosynthesis in the presence of sunlight. The major source of atmospheric oxygen is photosynthesis. Carbon dioxide is removed from the atmosphere and oxygen is released during photosynthesis. Green plants are the producers of food, which is used directly or indirectly by consumers.</p> <p>7.1a-e A population consists of all individuals of a species that are found together at a given place and time. Populations living in one place form a community. The community and the physical factors with which it interacts compose an ecosystem. Given adequate resources and no disease or predators, populations (including humans) increase. Lack of resources, habitat destruction, and other factors such as predation and climate limit the growth of certain populations in the ecosystem. In all environments, organisms interact with one another in many ways. Relationships among organisms may be competitive, harmful, or beneficial. Some species have adapted to be dependent upon each other with the result that neither could survive without the other. Some microorganisms are essential to the survival of other living things. The environment may contain dangerous levels of substances (pollutants) that are harmful to organisms. Therefore, the good health of environments and individuals requires the monitoring of soil, air, and water, and taking steps to keep them safe. Describe the effects of environmental changes on humans and other populations.</p> | <p>LABS:</p> <ul style="list-style-type: none"> ❖ Station Rotations/Timed Activities ❖ *Field of View Microscope Lab ❖ Food Chains and Food Webs ❖ *Classification of Seeds Lab ❖ Energy Pyramid <p>SKILLS:</p> <ul style="list-style-type: none"> ❖ Identify cause & effect relationships ❖ Recognize/analyze patterns and trends ❖ Interpret and/or be able to illustrate energy flow in a food chain, energy pyramid, or food web ❖ Classify living things according to a scheme. ❖ Use a compound microscope ❖ Measure with a compound microscope ❖ Identify cause & effect relationships ❖ Recognize/analyze patterns and trends. |

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|--------------------------|--|---|---|
| February to April | <p>Human Body Systems Cells & Cell Theory, Viruses, Cells, tissues, organs, organ systems- Digestive, Respiratory, Excretory, Circulatory Musculoskeletal, Nervous, Endocrine, Reproductive Systems</p> <p>Diseases Bacteria, viruses, Germ Theory, infection, Immune system, White blood cells, antigens, antibodies, Microbes</p> <p>Maintaining Health: Dynamic Equilibrium Nutrients, vitamins, minerals, food, carbohydrates, fats, proteins, water, energy, calories, minimum daily intake, metabolism, toxic substances, dynamic equilibrium</p> | <p>7.2a-d In ecosystems, balance is the result of interactions between community members and their environment. The environment may be altered through the activities of organisms. Alterations are sometimes abrupt. Some species may replace others over time, resulting in long-term gradual changes (ecological succession). Overpopulation by any species impacts the environment due to the increased use of resources. Human activities can bring about environmental degradation through resource acquisition, urban growth, land-use decisions, waste disposal, etc. Since the Industrial Revolution, human activities have resulted in major pollution of air, water, and soil. Pollution has cumulative ecological effects such as acid rain, global warming, or ozone depletion. The survival of living things on our planet depends on the conservation and protection of Earth's resources.</p> <p>1.1a-h Living things are composed of cells. Cells provide structure and carry on major functions to sustain life. Cells are usually microscopic in size. In all living things, the way in which cells function is similar. Cells grow and divide, producing more cells. Cells take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or an organism needs. Most cells have cell membranes, genetic material, and cytoplasm. Some cells have a cell wall and/or chloroplasts. Many cells have a nucleus. Some organisms are single cells; others, including humans, are multi-cellular. Cells are organized for more effective functioning in multi-cellular organisms. Levels of organization for structure and function of a multi-cellular organism include cells, tissues, organs, and organ systems. Many plants have roots, stems, leaves, and reproductive structures. These organized groups of tissues are responsible for a plant's life activities. Multi-cellular animals often have similar organs and specialized systems for carrying out major life activities. Living things are classified by shared characteristics on the cellular and organism level. In classifying organisms, biologists consider details of internal and external structures. Biological classification systems are arranged from general (kingdom) to specific(species).</p> | <p>LABS:</p> <ul style="list-style-type: none"> ❖ Station Rotations/Timed Activities ❖ Looking at human body cells and tissue under the microscope ❖ Pulse points and pulse rates lab ❖ *Density: Candy Bar Lab ❖ Looking at bacteria and viruses ❖ Studying Evolution <p>SKILLS:</p> <ul style="list-style-type: none"> ❖ Explain functioning of major human organ systems and their interactions ❖ Identify pulse points and pulse rates ❖ Identify structure and function relationships in organisms ❖ Use a compound microscope ❖ Describe sources of variation in organisms and how they relate to survival ❖ Describe factors responsible for competition in species |

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|--------------------|--|--|--|
| May to June | <p>Evolution Survival of the fittest Darwin Competition Variation and adaptations</p> <p>Genetics & Genetic Engineering (preparing for High School Regents Living Environment)</p> <p><i>Nanobiology/Nanoscience in genetics and genetic engineering</i></p> | <p>3.2a-d In all environments, organisms with similar needs may compete with one another for resources. Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to permit its survival. Extinction of species is common. Fossils are evidence that a great variety of species existed in the past. Many thousands of layers of sedimentary rock provide evidence for the long history of Earth and for the long history of changing life forms whose remains are found in the rocks. Recently deposited rock layers are more likely to contain fossils resembling existing species. Although the time needed for change in a species is usually great, some species of insects and bacteria have undergone significant change in just a few years.</p> <p>4.3a-c Multi-cellular organisms exhibit complex changes in development, which begin after fertilization. The fertilized egg undergoes numerous cellular divisions that will result in a multi-cellular organism, with each cell having identical genetic information. In humans, the fertilized egg grows into tissue, which develops into organs and organ systems before birth. Various body structures and functions change as an organism goes through its life cycle.</p> <p>2.1a-e Hereditary information is contained in genes. Genes are composed of DNA that makes up the chromosomes of cells. Each gene carries a single unit of information. A single inherited trait of an individual can be determined by one pair or by many pairs of genes. A human cell contains thousands of different genes. Each human cell contains a copy of all the genes needed to produce a human being. In asexual reproduction, all the genes come from a single parent. Asexually produced offspring are genetically identical to the parent. In sexual reproduction typically half of the genes come from each parent. Sexually produced offspring are not identical to either parent.</p> | <p>LABS:</p> <ul style="list-style-type: none"> ❖ Station Rotations/Timed Activities ❖ Studying Evolution ❖ Adaptations ❖ Studying genes and heredity ❖ Probability ❖ Cloning ❖ Genetic Testing ❖ Mutations and Disease <p>SKILLS:</p> <ul style="list-style-type: none"> ❖ Identify cause & effect relationships ❖ Recognize/analyze patterns and trends ❖ Identify structure and function relationships in organisms ❖ Use a compound microscope ❖ Describe sources of variation in organisms and how they relate to survival ❖ Describe factors responsible for competition in species ❖ Describe basic techniques used in genetic testing and genetic engineering |