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## Curriculum Map for: Eighth Grade Science

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**Prerequisites:** Previous Middle School Science

**Scope: Cells, Genetics, Heredity, Evolution Chemistry, Weather, Weathering and Erosion**

### **Assessment:**

Assessment comes in a variety of forms and wherever possible should be used to reflect and enhance the teaching and learning process that occurs in a classroom. Assessment should not be seen as a separate activity, but as an integral part of the teaching and learning process. Alternative assessments apply to any and all assessments that differ from multiple choice, timed, one-shot approaches that characterize most standardized and classroom assessment. Authentic assessments are assessments that engage students in applying knowledge and skills in the same way they are used in the real-world. Performance assessment is a broad term, encompassing many of the characteristics of both authentic and alternative assessments.

As this course of study demonstrates, it is clear that no single type of assessment could provide an accurate measurement of the learning experience. Students should have the best opportunity to demonstrate their understanding of the learning experience. Therefore, it is suggested that a variety of data gathering methods be used such as objective tests, observations, products, written reports, performances and a collection of student works.

The **TIME** column offers a suggested time-line so that all topics listed in the **CONTENT/SKILLS** column are feasibly met. It is understood that times will need adjustments as the course develops. The **APPLICATION/PROJECT IDEAS** column offers suggestions and sources for the teacher. This column should be updated periodically to keep current and as new ideas are generated. The **KEY IDEA/PERFORMANCE INDICATOR** column coordinates topics with the NYS standards.

TIME	CONTENT/SKILLS	APPLICATIONS/PROJECT IDEAS	KEY IDEA/PERFORM INDICATOR
Cells (7 weeks)	Cell Theory Microscopes Cell Organization Energy in Cells Cell Growth and Division	<ul style="list-style-type: none"> <li>• Tools of a scientist</li> <li>• Enormous e lab</li> <li>• Cell Organelle Jigsaw</li> <li>• Discovery school cell video</li> <li>• Plant vs. animal cell lab</li> <li>• Levels of organization</li> <li>• Diffusion and osmosis</li> <li>• Passive vs. active transport</li> <li>• Lab: effect of salt on elodea</li> <li>• Photosynthesis web quest-technology</li> <li>• Lab: plant pigments</li> <li>• Lab: exhaling carbon dioxide</li> <li>• Activity: pipe cleaner cell division</li> <li>• Lab: multiplying by dividing</li> <li>• Video: Human body in action</li> <li>• Cancer: Cube activity (research)</li> <li>• Phases of Mitosis</li> </ul>	<p>1.1a Living things are composed of cells. Cells provide structure and carry on major functions to sustain life. Cells are usually microscopic in size.</p> <p>1.1b The way in which cells function is similar in all living things. 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.</p> <p>1.1c Most cells have cell membranes, genetic material, and cytoplasm. Some cells have a cell wall and/or chloroplasts. Many cells have a nucleus.</p> <p>1.1d Some organisms are single cells; others, including humans, are multicellular.</p> <p>1.1e Cells are organized for more effective functioning in multicellular organisms.</p> <p>Levels of organization for structure and function of a multicellular organism include cells, tissues, organs, and organ systems.</p> <p>2.1a Hereditary information is contained in genes. Genes are composed of DNA that makes up the chromosomes of cells.</p> <p>2.1b Each gene carries a single unit of information. A single inherited trait of an individual can be determined by</p>

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			<p>one pair or by many pairs of genes. A human cell contains thousands of different genes.</p> <p>2.1c Each human cell contains a copy of all the genes needed to produce a human being</p> <p>2.1d In asexual reproduction, all the genes come from a single parent. Asexually produced offspring are genetically identical to the parent.</p> <p>2.1e In sexual reproduction typically half of the genes come from each parent. Sexually produced offspring are not identical to either parent.</p> <p>4.1a Some organisms reproduce asexually. Other organisms reproduce sexually. Some organisms can reproduce both sexually and asexually.</p> <p>4.1b There are many methods of asexual reproduction, including division of a cell into two cells, or separation of part of an animal or plant from the parent, resulting in the growth of another individual.</p> <p>4.1c Methods of sexual reproduction depend upon the species. All methods involve the merging of sex cells to begin the development of a new individual. In many species, including plants and humans, eggs and sperm are produced.</p> <p>4.1d Fertilization and/or development in organisms may be internal or external.</p> <p>4.3a Multicellular organisms exhibit</p>

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			<p>complex changes in development, which begin after fertilization. The fertilized egg undergoes numerous cellular divisions that will result in a multicellular organism, with each cell having identical genetic information.</p> <p>4.3b In humans, the fertilized egg grows into tissue which develops into organs and organ systems before birth.</p> <p>4.3c Various body structures and functions change as an organism goes through its life cycle.</p> <p>4.4a In multicellular organisms, cell division is responsible for growth, maintenance, and repair. In some one-celled organisms, cell division is a method of asexual reproduction.</p> <p>4.4b In one type of cell division, chromosomes are duplicated and then separated into two identical and complete sets to be passed to each of the two resulting cells. In this type of cell division, the hereditary information is identical in all the cells that result.</p> <p>4.4c Another type of cell division accounts for the production of egg and sperm cells in sexually reproducing organisms. The eggs and sperm resulting from this type of cell division contain one-half of the hereditary information.</p> <p>4.4d Cancers are a result of abnormal cell division.</p>

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<p>Heredity (5 Weeks)</p>	<p>Mendelian Genetics            Incomplete Dominance            Multiple Gene Inheritance            Genetic Engineering            Cloning            Selective breeding</p>	<ul style="list-style-type: none"> <li>• Punnett Squares</li> <li>• Lab: make the right call</li> <li>• Paper Pet Project</li> <li>• Lab zone activity</li> <li>• Interpret pedigree charts</li> <li>• Cloning project</li> <li>• Video: national geographic cloning</li> <li>• Lab/research on Human genetic disorders</li> <li>• Heredity concept map</li> <li>• Genetic Traits Lab</li> <li>• Pedigree Chart</li> <li>• Hand Span Lab</li> </ul>	<p><b>Living Environment Skills</b></p> <p>1.Manipulate a compound microscope to view microscopic objects            2. Determine the size of a microscopic object, using a compound microscope            3.Prepare a wet mount slide            4. Use appropriate staining techniques</p> <p>2.2a In all organisms, genetic traits are passed on from generation to generation.</p> <p>2.2b Some genes are dominant and some are recessive. Some traits are inherited by mechanisms other than dominance and recessiveness.</p> <p>2.2c The probability of traits being expressed can be determined using models of genetic inheritance. Some models of prediction are pedigree charts and Punnett squares.</p> <p>3.1c Human activities such as selective breeding and advances in genetic engineering may affect the variations of species.</p> <p>4.2a The male sex cell is the sperm. The female sex cell is the egg. The fertilization of an egg by a sperm results in a fertilized egg.</p> <p>4.2b In sexual reproduction, sperm and egg each carry one-half of the genetic information for the new individual. Therefore, the fertilized</p>

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Evolution (1 week)	Mechanisms of Evolution Adaptation Variation	<ul style="list-style-type: none"> <li>• Story of Evolution Video</li> <li>• Peppered Moth Lab</li> </ul>	<p>egg contains genetic information from each parent.</p> <p><b>Living Environment Skills</b></p> <p>5. Design and use a Punnett square or a pedigree chart to predict the probability of certain traits.</p> <p>3.1a. The processes of sexual reproduction and mutation have given rise to a variety of traits within a species.</p> <p>3.1b 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.</p> <p>3.2 In all environments organisms with similar needs may compete with one another for resources.</p> <p>3.2b Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to permit its survival. Extinction of a species is common. Fossils are evidence that a great variety of species existed in the past.</p> <p>3.2c Many thousands of layers of sedimentary rock provide evidence for the long history of Earth and for the long</p>

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Characteristic properties of matter STC kit (6 weeks)	What is matter? Density of solids, liquids and gases Effect of temperature on density Phase changes Conservation of mass	<ul style="list-style-type: none"> <li>• A lab based program to measure, calculate and compare densities of solids, liquids, and gases.</li> <li>• Phase change lab and graphing using Logger pro software</li> <li>• Building a density column</li> <li>• Identification of mystery objects based on their densities.</li> </ul>	<p>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.</p> <p>3.2d 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><b>General Skills</b></p> <p>7. Sequence events</p> <p>8. Identify cause-and-effect relationships</p> <p>3.1a Substances have characteristic properties. Some of these properties include color, odor, phase at room temperature, density, solubility, heat and electrical conductivity, hardness, and boiling and freezing points.</p> <p>3.1c The motion of particles helps to explain the phases (states) of matter as well as changes from one phase to another. The phase in which matter exists depends on the attractive forces among its particles.</p> <p>3.1d Gases have neither a determined shape nor a definite volume. Gases</p>

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			<p>assume the shape and volume of a closed container.</p> <p>3.1e A liquid has definite volume, but takes the shape of a container.</p> <p>3.1f A solid has definite shape and volume. Particles resist a change in position.</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>3.1i Buoyancy is determined by comparative densities.</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>4.2b 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).</p> <p>4.2c During a phase change, heat energy is absorbed or released. Energy is absorbed when a solid changes to a liquid and when a liquid</p>

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		<ul style="list-style-type: none"> <li>• Determining solubility</li> <li>• Saturating a solution</li> <li>• Filtering technique</li> </ul>	<p>changes to a gas. Energy is released when a gas changes to a liquid and when a liquid changes to a solid.</p> <p>4.2d Most substances expand when heated and contract when cooled. Water is an exception, expanding when changing to ice.</p> <p><b>General Skills</b></p> <ol style="list-style-type: none"> <li>1. Follow safety procedures in the classroom and laboratory</li> <li>2. Safely and accurately use the following measurement tools: * metric ruler* balance* stopwatch* graduated cylinder * thermometer</li> <li>3. Use appropriate units for measured or calculated values</li> </ol> <p><b>Physical setting skills</b></p> <ol style="list-style-type: none"> <li>10. Determine the density of liquids, and regular- and irregular-shaped solids</li> <li>11. Determine the volume of a regular- and an irregular-shaped solid, using water displacement</li> </ol> <p>3.1b Solubility can be affected by the nature of the solute and solvent, temperature, and pressure. The rate of solution can be affected by the size of the particles, stirring, temperature, and the amount of solute already dissolved.</p> <p>3.1g Characteristic properties can</p>

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Mixtures and Solutions STC Kit (6 weeks)	Pure substances vs. mixtures Physical separation of mixtures Solution Chemistry	<ul style="list-style-type: none"> <li>• Cleaning rock salt</li> <li>• Analyzing inks (chromatography)</li> <li>• Changing mixtures-Formal lab write up and graphing with Logger pro software</li> </ul>	<p>be used to identify different materials, and separate a mixture of substances into its components. For example, iron can be removed from a mixture by means of a magnet. An insoluble substance can be separated from a soluble substance by such processes as filtration, settling, and evaporation.</p> <p>3.2b Mixtures are physical combinations of materials and can be separated by physical means.</p> <p><b>Physical setting skills</b></p> <p>14. Using appropriate resources, separate the parts of a mixture</p>
Compound, Elements and Chemical reactions STC Kit. (3 weeks)	Breaking down compounds Examining and Grouping Elements-Periodic Table Combining Elements Chemical reactions Conservation of mass	<ul style="list-style-type: none"> <li>• Electrolysis of Water</li> <li>• Creating and interpreting a period table</li> <li>• Chemical reactions including Corrosion of metals</li> <li>• Measuring mass of reactants and products</li> </ul>	<p>3.2c During a chemical change, substances react in characteristic ways to form new substances with different physical and chemical properties. Examples of chemical changes include burning of wood, cooking of an egg, rusting of iron, and</p>

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			<p>souring of milk.</p> <p>3.2e The Law of Conservation of Mass states that during an ordinary chemical reaction matter cannot be created or destroyed. In chemical reactions, the total mass of the reactants equals the total mass of the products.</p> <p>3.3a All matter is made up of atoms. Atoms are far too small to see with a light microscope.</p> <p>3.3b Atoms and molecules are perpetually in motion. The greater the temperature, the greater the motion.</p> <p>3.3c Atoms may join together in well-defined molecules or may be arranged in regular geometric patterns.</p> <p>3.3d Interactions among atoms and/or molecules result in chemical reactions.</p> <p>3.3e The atoms of any one element are different from the atoms of other elements.</p> <p>3.3g The periodic table is one useful model for classifying elements. The periodic table can be used to predict properties of elements (metals, nonmetals, noble gases).</p> <p>3.3f There are more than 100 elements. Elements combine in a multitude of ways to produce compounds that</p>

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Weather (4 weeks)	Heating Earth's Surface Heat Transfer and movement of air Convection currents in air Temperature, Pressure, and Cloud Formation Ocean Currents and Global Climate	<ul style="list-style-type: none"> <li>• Tornado Bottle</li> <li>• Soil and Water Lab</li> <li>• Reading Weather Maps</li> <li>• Weather Front Analysis</li> <li>• Tracking a Hurricane</li> </ul>	<p>account for all living and nonliving substances. Few elements are found in their pure form.</p> <p>3.2d Substances are often placed in categories if they react in similar ways. Examples include metals, nonmetals, and noble gases.</p> <p>4.3a In chemical reactions, energy is transferred into or out of a system.</p> <p><b>Physical Setting Skills</b></p> <p>12. Using the periodic table, identify an element as a metal, nonmetal, or noble gas (8th must add)</p> <p>13. Determine the identity of an unknown element, using physical and chemical properties</p> <p>2.1a 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.</p> <p>2.1b As altitude increases, air</p>

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	<p>Weathering and Soil Evidence of weathering</p>		<p>pressure decreases.</p> <p>2.1j Water circulates through the atmosphere, lithosphere, and hydrosphere in what is known as the water cycle.</p> <p>2.2l 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.</p> <p>2.2m Most local weather condition changes are caused by movement of air masses.</p> <p>2.2n The movement of air masses is determined by prevailing winds and upper air currents.</p> <p>2.2o Fronts are boundaries between air masses. Precipitation is likely to occur at these boundaries.</p> <p>2.2p High-pressure systems generally bring fair weather. Low-pressure systems usually bring cloudy, unstable</p>

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	<p>Mechanical and Chemical Weathering Wind and Water Erosion</p> <p>Genetics Meteorology Environmental Chemistry</p>	<p>Power Point</p>	<p>conditions. The general movement of highs and lows is from west to east across the United States.</p> <p>2.2q Hazardous weather conditions include thunderstorms, tornadoes, hurricanes, ice storms, and blizzards. Humans can prepare for and respond to these conditions if given sufficient warning.</p> <p>2.2r 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><b>General Skills</b></p> <p>1. Given the latitude and longitude of a location, indicate its position on a map and determine the latitude and longitude of a given location on a map</p> <p>7. Generate and interpret field maps including topographic and weather maps</p> <p>8. Predict the characteristics of an air mass based on the origin of the air mass</p> <p>9. Measure weather variables such as wind speed and direction, relative humidity, barometric pressure</p>

