

**K to 12 BASIC EDUCATION CURRICULUM  
SPIRALLING OF CONCEPTS GRADE 3 – GRADE 10**

**MATTER**

Grade 3	Grade 4	Grade 5	Grade 6
<b>PROPERTIES OF MATTER</b>			
When learners observe different objects and materials, they become aware of their different characteristics such as shape, weight, definiteness of volume and ease of flow. Using characteristics, objects and materials can be grouped into solids, liquids or gases.	Aside from being grouped into solids, liquids, or gases, materials may also be grouped according to their ability to absorb water, ability to float or sink, and whether they decay or not	After learning how to read and interpret product labels, learners can critically decide whether these materials are harmful or not. They can also describe ways in which they can use their knowledge of solids and liquids in making useful materials and products.	In Grade 4, the learners have observed the changes when mixing a solid in a liquid or a liquid in another liquid. From these investigations, learners can now describe the appearance of mixtures as uniform or non-uniform and classify them as homogeneous or heterogeneous mixtures.
<b>CHANGES THAT MATTER UNDERGO</b>			
Using the characteristics observed among solids, liquids, and gases, learners investigate ways in which solid turns into liquid, solid into gas, liquid into gas, and liquid into solid, as affected by temperature.	<p>Changes in some characteristics of solid materials can be observed when these are bent, hammered, pressed, and cut.</p> <p>After investigating the changes in some observable characteristics of materials due to temperature in Grade 3, learners can now inquire about changes observed when a solid is mixed with a liquid or when a liquid is mixed with another liquid.</p> <p>Learners learn that some changes in the characteristics of a product such as food or medicine may affect its quality. One way of finding out is by reading and interpreting product labels. This information helps them decide when these products become harmful.</p>	In Grade 4, learners investigated changes in materials that take place at certain conditions, such as applying force, mixing materials, and changing the temperature. In Grade 5, they investigate changes that take place under the following conditions: presence or lack of oxygen (in air), and applying heat. They learn that some of these conditions can result in a new product. Knowing these conditions enable them to apply the "5R method" (recycling, reducing, reusing, recovering and repairing) at home and in school.	Based on the characteristics of the components of a heterogeneous mixture, learners investigate ways of separating these components from the mixture. They will infer that the characteristics of each of the components remain the same even when the component is part of the mixture.

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Grade 7	Grade 8	Grade 9	Grade 10
<b>PROPERTIES AND STRUCTURE OF MATTER</b>			
<p>In Grade 6, learners learned how to distinguish homogenous from heterogeneous mixtures. In Grade 7, learners investigate properties of solutions that are homogeneous mixtures. They learn how to express concentrations of solutions qualitatively and quantitatively. They distinguish mixtures from substances based on a set of properties.</p> <p>Learners begin to do guided and semi-guided investigations, making sure that the experiment they are conducting is a fair test.</p>	<p>Using models, learners learn that matter is made up of particles, the smallest of which is the atom. These particles are too small to be seen through a microscope. The properties of materials that they have observed in earlier grades can now be explained by the type of particles involved and the attraction between these particles.</p>	<p>Using their understanding of atomic structure learned in Grade 8, learners describe how atoms can form units called molecules. They also learn about ions. Further, they explain how atoms form bonds (ionic and covalent) with other atoms by the transfer or sharing of electrons.</p> <p>They also learn that the forces holding metals together are caused by the attraction between flowing electrons and the positively charged metal ions.</p> <p>Learners explain how covalent bonding in carbon forms a wide variety of carbon compounds.</p> <p>Recognizing that matter consists of an extremely large number of very small particles, counting these particles is not practical. So, learners are introduced to the unit—mole.</p>	<p>Learners investigate how gases behave in different conditions based on their knowledge of the motion of and distances between gas particles. Learners then confirm whether their explanations are consistent with the Kinetic Molecular Theory. They also learn the relationships between volume, temperature, and pressure using established gas laws.</p> <p>In Grade 9, learners learned that the bonding characteristics of carbon result in the formation of large variety of compounds. In Grade 10, they learn more about these compounds that include biomolecules such as carbohydrates, lipids, proteins, and nucleic acids. Further, they will recognize that the structure of these compounds comprises repeating units that are made up of a limited number of elements such as carbon, hydrogen, oxygen, and nitrogen.</p>
<b>CHANGES THAT MATTER UNDERGO</b>			
<p>Learners recognize that materials combine in various ways and through different processes, contributing to the wide variety of materials. Given this diversity, they recognize the importance of a classification system. They become familiar with elements and compounds, metals and non-metals, and acids and bases.</p> <p>Further, learners demonstrate that homogeneous mixtures can be separated using various techniques.</p>	<p>Learners learn that particles are always in motion. They can now explain that the changes from solid to liquid, solid to gas, liquid to solid, and liquid to gas, involve changes in the motion of and relative distances between the particles, as well as the attraction between them.</p> <p>They also recognize that the same particles are involved when these changes occur. In effect, no new substances are formed.</p>	<p>Learners explain how new compounds are formed in terms of the rearrangement of particles. They also recognize that a wide variety of useful compounds may arise from such rearrangements.</p>	<p>In Grade 9, learners described how particles rearrange to form new substances. In Grade 10, they learn that the rearrangement of particles happen when substances undergo chemical reaction. They further explain that when this rearrangement happens, the total number of atoms and total mass of newly formed substances remain the same. This is the Law of Conservation of Mass. Applying this law, learners learn to balance chemical equations and solve simple mole-mole, mole-mass, and mass-mass problems.</p>

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### LIVING THINGS AND THEIR ENVIRONMENT

Grade 3	Grade 4	Grade 5	Grade 6
<b>PARTS AND FUNCTION OF ANIMALS AND PLANTS</b>			
<p>In Grade 3, learners observe and describe the different parts of living things focusing on the sense organs of humans and the more familiar external parts of animals and plants.</p> <p>They also explore and describe characteristics of living things that distinguish them from non-living things.</p>	<p>In Grade 4, the learners are introduced to the major organs of the human body.</p> <p>They also learn about some parts that help plants and animals survive in places where they live.</p>	<p>After learning in Grade 4 how the major organs of the human body work together, the learners now focus on the organs of the reproductive systems of humans, animals, and plants.</p>	<p>In Grade 6, learners describe the interactions among parts of the major organs of the human body.</p> <p>They also learn how vertebrates and invertebrates differ and how non-flowering plants reproduce,</p>
<b>HEREDITY: INHERITANCE AND VARIATION</b>			
<p>Learners learn that living things reproduce and certain traits are passed on to their offspring/s.</p>	<p>Learners learn that humans, animals, and plants go through life cycles. Some inherited traits may be affected by the environment at certain stages in their life cycles.</p>	<p>Learners learn how flowering plants and some non-flowering plants reproduce.</p> <p>They are also introduced to the sexual and asexual modes of reproduction.</p>	<p>Learners learn how non-flowering plants (spore-bearing and cone-bearing plants, ferns, and mosses) reproduce.</p>
<b>BIODIVERSITY AND EVOLUTION</b>			
<p>Different kinds of living things are found in different places.</p>	<p>Learners investigate that animals and plants live in specific habitats.</p>	<p>Learners learn that reproductive structures serve as one of the bases for classifying living things.</p>	<p>They learn that plants and animals share common characteristics which serve as bases for their classification.</p>
<b>ECOSYSTEMS</b>			
<p>Learners learn that living things depend on their environment for food, air, and water to survive.</p>	<p>Learners learn that there are beneficial and harmful interactions that occur among living things and their environment as they obtain their basic needs.</p>	<p>Learners are introduced to the interactions among components of larger habitats such as estuaries and intertidal zones, as well as the conditions that enable certain organisms to live.</p>	<p>Learners are introduced to the interactions among components of habitats such as tropical rainforests, coral reefs, and mangrove swamps.</p>

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Grade 7	Grade 8	Grade 9	Grade 10
<b>PARTS AND FUNCTION: ANIMAL AND PLANTS</b>			
<p>In Grade 7, learners are introduced to the levels of organization in the human body and other organisms. They learn that organisms consist of cells, most of which are grouped into organ systems that perform specialized functions.</p>	<p>In Grade 8, learners gain knowledge of how the body breaks down food into forms that can be absorbed through the digestive system and transported to cells.</p> <p>Learners learn that gases are exchanged through the respiratory system. This provides the oxygen needed by cells to release the energy stored in food.</p> <p>They also learn that dissolved wastes are removed through the urinary system while solid wastes are eliminated through the excretory system.</p>	<p>Learners study the coordinated functions of the digestive, respiratory, and circulatory systems.</p> <p>They also learn that nutrients enter the bloodstream and combine with oxygen taken in through the respiratory system. Together, they are transported to the cells where oxygen is used to release the stored energy.</p>	<p>Learners learn that organisms have feedback mechanisms that are coordinated by the nervous and endocrine systems. These mechanisms help the organisms maintain homeostasis to reproduce and survive.</p>
<b>HEREDITY: INHERITANCE AND VARIATION</b>			
<p>After learning how flowering and non flowering plants reproduce, Grade 7 learners are taught that asexual reproduction results in genetically identical offspring whereas sexual reproduction gives rise to variation.</p>	<p>Learners study the process of cell division by mitosis and meiosis. They understand that meiosis is an early step in sexual reproduction that leads to variation.</p>	<p>Learners study the structure of genes and chromosomes, and the functions they perform in the transmission of traits from parents to offspring.</p>	<p>Learners are introduced to the structure of the DNA molecule and its function.</p> <p>They also learn that changes that take place in sex cells are inherited while changes in body cells are not passed on.</p>
<b>BIODIVERSITY AND EVOLUTION</b>			
<p>Learners learn that the cells in similar tissues and organs in other animals are similar to those in human beings but differ somewhat from cells found in plants.</p>	<p>Learners learn that <i>species</i> refers to a group of organisms that can mate with one another to produce fertile offspring. They learn that biodiversity is the collective variety of species living in an ecosystem. This serves as an introduction to the topic on hierarchical taxonomic system.</p>	<p>Learners learn that most species that have once existed are now extinct. Species become extinct when they fail to adapt to changes in the environment.</p>	<p>Learners revisit the mechanisms involved in the inheritance of traits and the changes that result from these mechanisms. Learners explain how natural selection has produced a succession of diverse new species. Variation increases the chance of living things to survive in a changing environment.</p>

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Grade 7	Grade 8	Grade 9	Grade 10
<b>ECOSYSTEMS</b>			
Learners learn that interactions occur among the different levels of organization in ecosystems. Organisms of the same kind interact with each other to form populations; populations interact with other populations to form communities.	Learners learn how energy is transformed and how materials are cycled in ecosystems.	Learners learn how plants capture energy from the Sun and store energy in sugar molecules (photosynthesis). This stored energy is used by cells during cellular respiration. These two processes are related to each other.	Learners investigate the impact of human activities and other organisms on ecosystems.  They learn how biodiversity influences the stability of ecosystems.

### FORCE, MOTION AND ENERGY

Grade 3	Grade 4	Grade 5	Grade 6
<b>FORCE AND MOTION</b>			
Learners observe and explore and investigate how things around them move and can be moved. They also identify things in their environment that can cause changes in the movement of objects.	Learners now learn that if force is applied on an object, its motion, size, or shape can be changed. They will further understand that these changes depend on the amount of force applied on it (qualitative). They also learn that magnets can exert force on some objects and may cause changes in their movements.	This time, learners begin to accurately measure the amount of change in the movement of an object in terms of its distance travelled and time of travel using appropriate tools.	Aside from the identified causes of motion in Grade 3, such as people, animals, wind, and water, learners also learn about gravity and friction as other causes or factors that affect the movement of objects.
<b>ENERGY</b>			
Learners observe and identify different sources of light, heat, sound, and electricity in their environment and their uses in everyday life.	Learners learn that light, heat, and sound travel from the source. They perform simple activities that demonstrate how they travel using various objects. <i>Note: Electricity is not included in Grade 4 because the concept of 'flow of charges' is difficult to understand at this grade level.</i>	This time, learners explore how different objects interact with light, heat, sound, and electricity (e.g., identifying poor and good conductors of electricity using simple circuits). They learn about the relationship between electricity and magnetism by constructing an electromagnet. They also learn about the effects of light, heat, sound, and electricity on people.	At this grade level, learners are introduced to the concept of energy. They learn that energy exists in different forms, such as light, heat, sound and electricity, and it can be transformed from one form to another. They demonstrate how energy is transferred using simple machines.

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<b>FORCE AND MOTION</b>			
<p>From a simple understanding of motion, learners study more scientific ways of describing (in terms of distance, speed, and acceleration) and representing (using motion diagrams, charts, and graphs) the motion of objects in one dimension.</p>	<p>This time, learners study the concept of force and its relationship to motion. They use Newton’s Laws of Motion to explain why objects move (or do not move) the way they do (as described in Grade 7). They also realize that if force is applied on a body, work can be done and may cause a change in the energy of the body.</p>	<p>To deepen their understanding of motion, learners use the Law of Conservation of Momentum to further explain the motion of objects. From motion in one dimension in the previous grades, they learn at this level about motion in two dimensions using projectile motion as an example.</p>	<p>From learning the basics of forces in Grade 8, learners extend their understanding of forces by describing how balanced and unbalanced forces, either by solids or liquids, affect the movement, balance, and stability of objects.</p>
<b>ENERGY</b>			
<p>This time learners recognize that different forms of energy travel in different ways—light and sound travel through waves, heat travels through moving or vibrating particles, and electrical energy travels through moving charges. In Grade 5, they learned about the different modes of heat transfer. This time, they explain these modes in terms of the movement of particles.</p>	<p>Learners realize that transferred energy may cause changes in the properties of the object. They relate the observable changes in temperature, amount of current, and speed of sound to the changes in energy of the particles.</p>	<p>Learners explain how conservation of mechanical energy is applied in some structures, such as roller coasters, and in natural environments like waterfalls. They further describe the transformation of energy that takes place in hydroelectric power plants. Learners also learn about the relationship between heat and work, and apply this concept to explain how geothermal power plants operate. After they have learned how electricity is generated in power plants, learners further develop their understanding of transmission of electricity from power stations to homes.</p>	<p>Learners acquire more knowledge about the properties of light as applied in optical instruments. Learners also use the concept of moving charges and magnetic fields in explaining the principle behind generators and motors.</p>

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### EARTH AND SPACE

Grade 3	Grade 4	Grade 5	Grade 6
<b>GEOLOGY</b>			
Learners will describe what makes up their environment, beginning with the landforms and bodies of water found in their community.	After familiarizing themselves with the general landscape, learners will investigate two components of the physical environment in more detail: soil and water. They will classify soils in their community using simple criteria. They will identify the different sources of water in their community. They will infer the importance of water in daily activities and describe ways of using water wisely.	In this grade level, learners will learn that our surroundings do not stay the same forever. For example, rocks undergo weathering and soil is carried away by erosion. Learners will infer that the surface of the Earth changes with the passage of time.	Learners will learn that aside from weathering and erosion, there are other processes that may alter the surface of the Earth: earthquakes and volcanic eruptions. Only the effects of earthquakes and volcanic eruptions are taken up in this grade level, not their causes (which will be tackled in Grades 8 and 9). Learners will also gather and report data on earthquakes and volcanic eruptions in their community or region.
<b>METEOROLOGY</b>			
Learners will describe the different types of local weather,	After making simple descriptions about the weather in the previous grade, learners will now measure the components of weather using simple instruments. They will also identify trends in a simple weather chart.	Learners will learn that the weather does not stay the same the whole year round. Weather disturbances such as typhoons may occur. Learners will describe the effects of typhoons on the community and the changes in the weather before, during, and after a typhoon.	After learning how to measure the different components of weather in Grades 4 and 5, learners will now collect weather data within the span of the school year. Learners will interpret the data and identify the weather patterns in their community.
<b>ASTRONOMY</b>			
Learners will describe the natural objects that they see in the sky.	After describing the natural objects that are seen in the sky, learners will now focus on the main source of heat and light on Earth: the Sun, its role in plant growth and development, and its effect on the activities of humans and other animals.	After learning about the Sun, learners will now familiarize themselves with the Moon and the stars. They will describe the changes in the appearance of the Moon and discover that the changes are cyclical, and that the cycle is related to the length of a month. Learners will identify star patterns that can be seen during certain times of the year.	In Grade 6, learners will turn their attention to Earth as another natural object in space (in addition to the Sun, Moon, and stars). Learners will learn about the motions of the Earth: rotation and revolution. Learners will also compare the different members that make up the Solar System and construct models to help them visualize their relative sizes and distances.

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Grade 7	Grade 8	Grade 9	Grade 10
<b>GEOLOGY</b>			
Learners will explore and locate places using a coordinate system. They will discover that our country's location near the equator and along the Ring of Fire influences elements of up Philippine environment (e.g., natural resources and climate).	As a result of being located along the Ring of Fire, the Philippines is prone to earthquakes. Using models, learners will explain how quakes are generated by faults. They will try to identify faults in the community and differentiate active faults from inactive ones.	Being located along the Ring of Fire, the Philippines is home to many volcanoes. Using models, learners will explain what happens when volcanoes erupt. They will describe the different types of volcanoes and differentiate active volcanoes from inactive ones. They will also explain how energy from volcanoes may be tapped for human use.	Using maps, learners will discover that volcanoes, earthquake epicenters, and mountain ranges are not randomly scattered in different places but are located in the same areas. This will lead to an appreciation of plate tectonics—a theory that binds many geologic processes such as volcanism and earthquakes.
<b>METEOROLOGY</b>			
Learners will explain the occurrence of atmospheric phenomena (breezes, monsoons, and ITCZ) that are commonly experienced in the country as a result of the Philippines' location with respect to the equator, and surrounding bodies of water and landmasses.	Being located beside the Pacific Ocean, the Philippines is prone to typhoons. In Grade 5, the effects of typhoons were tackled. Here, learners will explain how typhoons develop, how typhoons are affected by landforms and bodies of water, and why typhoons follow certain paths as they move within the Philippine Area of Responsibility.	In this grade level, learners will distinguish between weather and climate. They will explain how different factors affect the climate of an area. They will also be introduced to climatic phenomena that occur over a wide area (e.g., El Niño and global warming).	<b>Note:</b> The theory of plate tectonics is the sole topic in Earth and Space in Grade 10. This is because the theory binds many of the topics in previous grade levels, and more time is needed to explore connections and deepen learners' understanding.
<b>ASTRONOMY</b>			
Learners will explain the occurrence of the seasons and eclipses as a result of the motions of the Earth and the Moon. Using models, learners will explain that because the Earth revolves around the Sun, the seasons change, and because the Moon revolves around the Earth, eclipses sometimes occur.	Learners will complete their survey of the Solar System by describing the characteristics of asteroids, comets, and other members of the Solar System.	Learners will now leave the Solar System and learn about the stars beyond. They will infer the characteristics of stars based on the characteristics of the Sun. Using models, learners will show that constellations move in the course of a night because of Earth's rotation, while different constellations are observed in the course of a year because of the Earth's revolution.	



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**GRADE 9**

<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<b>Grade 9 – Living Things and Their Environment FIRST QUARTER/ FIRST GRADING PERIOD</b>						
<b>1. Respiratory and Circulatory Systems Working with the other Organ Systems</b>	<p><i>The learners demonstrate an understanding of:</i></p> <ol style="list-style-type: none"> <li>1. how the different structures of the circulatory and respiratory systems work together to transport oxygen-rich blood and nutrients to the different parts of the body</li> <li>2. the prevention, detection, and treatment of diseases affecting the circulatory and respiratory systems</li> </ol>	<p><i>The learners should be able to:</i></p> <p>conduct an information dissemination activity on effective ways of taking care of the respiratory and circulatory systems based on data gathered from the school or local health workers</p>	<p><i>The learners should be able to...</i></p> <ol style="list-style-type: none"> <li>1. explain how the respiratory and circulatory systems work together to transport nutrients, gases, and other molecules to and from the different parts of the body;</li> </ol>	<b>S9LT-la-b-26</b>	<ol style="list-style-type: none"> <li>1. BEAM II. 4 Organ Systems. Circulatory System. June 2008.</li> <li>2. EASE Biology. Module 11. Lessons 2 and 3.</li> <li>3. NFE. Ang Respiratory System. 2001. pp. 3-5.</li> </ol>	Human torso model
			<ol style="list-style-type: none"> <li>2. infer how one's lifestyle can affect the functioning of respiratory and circulatory systems;</li> </ol>	<b>S9LT-1c-27</b>	<ol style="list-style-type: none"> <li>1. APEX. Biology Unit 4. Lessons 11 and 12.</li> <li>2. NFE. Ang Respiratory System. 2001. pp. 16-24.</li> <li>3. Science for Daily Use 5. Tan, Conchita T. 2012. pp. 34-35 and 38-39. *</li> </ol>	

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<b>2. Heredity: Inheritance and Variation</b>  2.1 Location of genes on chromosomes 2.2 Non-Mendelian inheritance 2.2.1 Incomplete dominance 2.2.2 Sex-linked traits 2.2.3 Multiple alleles 2.3 Multiple genes	<i>The learners demonstrate an understanding of:</i>  1. how genetic information is organized in genes on chromosomes  2. the different patterns of inheritance	<i>The learners should be able to:</i>  conduct an information dissemination activity on effective ways of taking care of the respiratory and circulatory systems based on data gathered from the school or local health workers	3. describe the location of genes in chromosomes;	<b>S9LT-Id-28</b>	1. BEAM II. Your Genetic Book of Life. 2. APEX. Unit 6. Lesson 3. 3. Science and Technology II: Biology Textbook. NISMED. 2012. pp. 184-185. 4. Science and Technology II: Biology Textbook. NISMED. 2004. pp. 184-185.	
			4. explain the different patterns of non-Mendelian inheritance ;	<b>S9LT-Id-29</b>	1. EASE Biology. Module 14. Lesson 3. 2. Science and Technology: Biology Textbook. NISMED. 2012. pp. 179-182. 3. Science and Technology II: Biology Textbook. NISMED. 2004. PP. 179-182.	

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CONTENT	CONTENT STANDARDS	PERFORMANCE STANDARDS	LEARNING COMPETENCY	CODE	LEARNING MATERIALS	SCIENCE EQUIPMENT
<p><b>3. Biodiversity and Evolution</b></p> <p><b>3.1 Causes of Species Extinction</b></p> <p>3.1.1 natural</p> <p>3.1.2 anthropogenic</p>	<p><i>The learners demonstrate an understanding of:</i></p> <p>how changes in the environment may affect species extinction</p>	<p><i>The learners should be able to:</i></p> <p>make a multimedia presentation of a timeline of extinction of representative microorganisms, plants, and animals</p>	<p>5. relate species extinction to the failure of populations of organisms to adapt to abrupt changes in the environment; and</p>	<p><b>S9LT-Ie-f-30</b></p>	<ol style="list-style-type: none"> <li>1. EASE Science I. Module 11. Lesson 6.</li> <li>2. Science and Technology II: Biology Textbook. NISMED. 2012. pp. 328-329.</li> <li>3. Science and Technology II: Biology Textbook. NISMED. 2004. 328-329.</li> <li>4. Science and Technology I: Integrated Science Textbook. NISMED. 2012. pp. 146-147.</li> </ol>	

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CONTENT	CONTENT STANDARDS	PERFORMANCE STANDARDS	LEARNING COMPETENCY	CODE	LEARNING MATERIALS	SCIENCE EQUIPMENT
<p><b>4. Ecosystems</b></p> <p><b>4.1 Flow of Energy and Matter in Ecosystems</b></p> <p>4.1.1 Photosynthesis 4.1.2 Respiration</p>	<p><i>The learners demonstrate an understanding of:</i></p> <ol style="list-style-type: none"> <li>1. the structure and function of plant parts and organelles involved in photosynthesis</li> <li>2. the structure and function of mitochondrion as the main organelle involved in respiration</li> </ol>	<p><i>The learners should be able to:</i></p> <p>design and conduct an investigation to provide evidence that plants can manufacture their own food</p>	<p>6. differentiate basic features and importance of photosynthesis and respiration.</p>	<p><b>S9LT-Ig-j-31</b></p>	<ol style="list-style-type: none"> <li>1. BEAM Learning Guide Biology Food for Life</li> <li>2. BEAM Learning Guide Biology Creating Energy for Life</li> <li>3. EASE Biology Module 4 Photosynthesis</li> <li>4. EASE Biology Module 5 Cellular Respiration</li> <li>5. APEX Biology Unit 3 Life Energy</li> <li>6. Science for Daily Use 5. Tan, Conchita T. 2012. pp. 96-99. *</li> <li>7. Science and Technology II: Biology Textbook. NISMED. 2012. pp. 58-66 and 70-72.</li> <li>8. Science and Technology II: Biology</li> </ol>	<ol style="list-style-type: none"> <li>1. Beaker</li> <li>2. Funnel</li> <li>3. Test tube</li> <li>4. Thermometer</li> <li>5. Tripod</li> <li>6. Alcohol lamp</li> <li>7. Wire gauze</li> <li>8. Test tube rack</li> <li>9. pH paper</li> </ol>

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<b>4. Ecosystems</b>  <b>4.1 Flow of Energy and Matter in Ecosystems</b>  4.1.1 Photosynthesis 4.1.2 Respiration	<i>The learners demonstrate an understanding of:</i>  1. the structure and function of plant parts and organelles involved in photosynthesis  2. the structure and function of mitochondrion as the main organelle involved in respiration	<i>The learners should be able to:</i>  design and conduct an investigation to provide evidence that plants can manufacture their own food	6. differentiate basic features and importance of photosynthesis and respiration.	<b>S9LT-Ig-j-31</b>	Textbook. NISMED. 2004. pp. 58-66 and 70-72.  9. NFE. Food Production and Utilization in Plants. 2001. pp. 4-25.	
<b>Grade 9 – Matter</b> <b>SECOND QUARTER/SECOND GRADING PERIOD</b>						
<b>1. Electronic Structure of Matter</b>	<i>The learners demonstrate an understanding of...</i>  the development of atomic models that led to the description of the behavior of electrons within atoms		<i>The learners should be able to:</i>  1. describe how the Bohr model of the atom improved Rutherford's atomic model  2. explain how the Quantum Mechanical Model of the atom describes the energies and positions of the electrons	<b>S9MT-IIa-21</b>  <b>S9MT-IIa-22</b>		

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<p><b>1. Chemical Bonding</b>                      1.1 Ionic and Covalent Bonding                      1.2 Metallic Bonding</p>	<p><i>The learners demonstrate an understanding of...</i></p> <ol style="list-style-type: none"> <li>how atoms combine with other atoms by transferring or by sharing electrons</li> <li>forces that hold metals together</li> </ol>	<p><i>The learners shall be able to:</i></p> <p>analyze the percentage composition of different brands of two food products and decide on the products' appropriate percentage composition</p>	<ol style="list-style-type: none"> <li>explain the formation of ionic and covalent bonds;</li> </ol>	<p><b>S9MT-IIa-13</b></p>	<ol style="list-style-type: none"> <li>EASE II. Chemistry Module 14. Lesson 1.</li> <li>BEAM III. Unit 7. 18 Demonstrate Understanding of the Processes. Bonding. Module 1. March 2009.</li> <li>EASE Science 1. Module 6. Lesson 1.</li> <li>Science and Technology III: Chemistry Textbook for Third Year. Mapa, Amelia P., Ph.D., et al. 1999. pp. 111-115. *</li> <li>Chemistry III Textbook. Mapa, Amelia P., Ph.D., et al. 2001. pp. 107-112. *</li> <li>Science and Technology III. NISMED. 1997. pp.</li> </ol>	<ol style="list-style-type: none"> <li>Improvised covalent bonding model (H<sub>2</sub>, O<sub>2</sub>, N<sub>2</sub>)</li> <li>Improvised ionic bonding model (NaCl)</li> <li>Molecular Models (Inorganic/organic)</li> <li>VSEPR kit</li> </ol>

**K to 12 BASIC EDUCATION CURRICULUM**

<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<b>1. Chemical Bonding</b> 1.1 Ionic and Covalent Bonding 1.2 Metallic Bonding	<i>The learners demonstrate an understanding of...</i>  1. how atoms combine with other atoms by transferring or by sharing electrons  2. forces that hold metals together	<i>The learners shall be able to:</i>  analyze the percentage composition of different brands of two food products and decide on the products' appropriate percentage composition			270-273. 7. Science and Technology III: Chemistry Textbook. NISMED. 2012. pp. 329-333.	
			2. recognize different types of compounds (ionic or covalent) based on their properties such as melting point, hardness, polarity, and electrical and thermal conductivity;  2. recognize different types of compounds (ionic or covalent) based on their properties such as melting point, hardness, polarity, and electrical and thermal conductivity;	<b>S9MT-IIb-14</b>  <b>S9MT-IIb-14</b>	1. EASE Science II. Chemistry Module 14. Lesson 1. 2. Chemistry III Textbook. Mapa, Amelia P., Ph.D., et al. 2001. pp. 117-120. 3. Science and Technology III. NISMED. 1997. p. 283.	
			3. explain properties of metals in terms of their structure;	<b>S9MT-IIc-d-15</b>	1. BEAM III. Unit 8. 20 Demonstrate Understanding of Chemical Bonds. Metallic Link. Module 3. 2. Chemistry III Textbook.	

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<b>1. Chemical Bonding</b> 1.1 Ionic and Covalent Bonding  1.2 Metallic Bonding	<i>The learners demonstrate an understanding of...</i>  1. how atoms combine with other atoms by transferring or by sharing electrons  2. forces that hold metals together	<i>The learners shall be able to:</i>  analyze the percentage composition of different brands of two food products and decide on the products' appropriate percentage composition			Mapa, Amelia P., Ph.D., et al. 2001. pp. 113-115.  3. Science and Technology III. NISMED. 1997. pp. 279-280.  4. Science and Technology III: Chemistry Textbook. NISMED. 2012. pp. 333-33.	
			4. explain how ions are formed;	<b>S9MT-IIe-f-16</b>	1. EASE Science I. Module 6. 2. EASE Science II. Module 14. Lesson 1. 3. Chemistry III Textbook. Mapa, Amelia P., Ph.D., et al. 2001. pp. 92-94. *  4. Science and Technology III. NISMED. 1997. pp. 277-279.  5. Science and Technology III:	



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CONTENT	CONTENT STANDARDS	PERFORMANCE STANDARDS	LEARNING COMPETENCY	CODE	LEARNING MATERIALS	SCIENCE EQUIPMENT
					Chemistry Textbook. NISMED. 2012. pp. 293-294. 6. Science and Technology III: Chemistry Textbook for Third Year. Mapa, Amelia P., Ph.D., et al. 1999. P. 110. *	
<p><b>2. The Variety of Carbon Compounds</b></p> <p>2.1 Carbon Atoms 2.2 Organic Compounds</p>	<p><i>The learners demonstrate an understanding of...</i></p> <p>the type of bonds that carbon forms that result in the diversity of carbon compounds</p>	<p><i>The learners shall be able to:</i></p> <p>analyze the percentage composition of different brands of two food products and decide on the products' appropriate percentage composition</p>	<p>5. explain how the structure of the carbon atom affects the type of bonds it forms;</p>	<p><b>S9MT-IIg-17</b></p>	<p>1. EASE II. Module 14. 2. Chemistry III Textbook. Mapa, Amelia P., Ph.D., et al. 2001. pp. 343-356. * 3. Science and Technology. NISMED. 1997. pp. 334-340. 4. Science and Technology III: Chemistry Textbook for Third Year. Mapa, Amelia</p>	

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<b>2. The Variety of Carbon Compounds</b>  2.1 Carbon Atoms 2.2 Organic Compounds	<i>The learners demonstrate an understanding of...</i>  the type of bonds that carbon forms that result in the diversity of carbon compounds	<i>The learners shall be able to:</i>  analyze the percentage composition of different brands of two food products and decide on the products' appropriate percentage composition			P., Ph.D., et al. 1999. pp. 349-353. *	
			6. recognize the general classes and uses of organic compounds;	<b>S9MT-IIh-18</b>	1. Chemistry III Textbook. Mapa, Amelia P., Ph.D., et al. 2001. pp. 356-367. * 2. Science and Technology III. NISMED. 1997. pp. 331-340. 3. Science and Technology III: Chemistry Textbook for Third Year. Mapa, Amelia P., Ph.D., et al. 1999. pp. 367-373. *	Improvised Hydrocarbons model
<b>3. Mole Concept</b>  3.1 Mass 3.2 Moles 3.3 Percentage Composition of a Compound	the unit, <b>mole</b> , that quantitatively measures the number of very small particles of matter		7. use the mole concept to express mass of substances; and	<b>S9MT-III-19</b>	1. EASE Science II. Chemistry Module 16. Lesson 2. 2. OHSP. Chemistry Module 16. Lesson 2. 3. Science and Technology III:	Triple beam balance

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<b>3. Mole Concept</b> 3.1 Mass 3.2 Moles 3.3 Percentage Composition of a Compound	<i>The learners demonstrate an understanding of...</i>  the unit, <b>mole</b> , that quantitatively measures the number of very small particles of matter	<i>The learners shall be able to:</i>  analyze the percentage composition of different brands of two food products and decide on the products' appropriate percentage composition			Chemistry Textbook. NISMED. 2012. pp. 84-91. 4. Chemistry III Textbook. Mapa, Amelia P., Ph.D., et al. 2001. pp. 174-183. * 5. Science and Technology III. NISMED. 1997. pp. 112-123.	
			8. determine the percentage composition of a compound given its chemical formula and vice versa.	<b>S9MT-IIj-20</b>	1. EASE Science II. Chemistry Module 16. Lesson 4. 2. OHSP. Chemistry Module 16. Lesson 4. 3. Chemistry III Textbook. Mapa, Amelia P., Ph.D., et al. 2001. pp. 174-183. * 4. Science and Technology III. NISMED. 1997. pp. 112-123. 5. Science and	

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
					Technology III: Chemistry Textbook for Third Year. Mapa, Amelia P., Ph.D., et al. 1999. pp. 157-158. *	
<b>Grade 9 – Earth and Space THIRD QUARTER/THIRD GRADING PERIOD</b>						
<b>1.Volcanoes</b>  1.1 Type of volcanoes 1.2 Volcanic Eruption 1.3 Energy from volcanoes	<i>The learners demonstrate an understanding of:</i>  volcanoes found in the Philippines	<i>The learners shall be able to:</i>  participate in activities that reduce risks and lessen effects of climate change	<i>The learners should be able to...</i>  1. describe the different types of volcanoes;	<b>S9ES -IIIa-25</b>	EASE Science I. Module 12. p. 24.	
			2. differentiate between active and inactive volcanoes;	<b>S9ES -IIIa-27</b>	MISOSA 6. Active and Inactive Volcanoes.	
			3. explain what happens when volcanoes erupt;	<b>S9ES -IIIb-28</b>	1. MISOSA 6. Module 29. 2. BEAM 6. Unit 5. 12 Volcanic Eruptions. Volcano Mania. Module 12. Activity 3.2. 3. Science and Technology I: Integrated Science Textbook.	

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
					NISMED. 2012. pp. 189-191.	
			4. illustrate how energy from volcanoes may be tapped for human use;	<b>S9ES –IIIc-d-29</b>	MISOSA 6. Module 30. p. 8.	
<b>2.Climate</b>  2.1 Factors that affect climate 2.2 Global climate phenomenon	<i>The learners demonstrate an understanding of:</i>  factors that affect climate, and the effects of changing climate and how to adapt accordingly	<i>The learners shall be able to:</i>  participate in activities that reduce risks and lessen effects of climate change	5. explain how different factors affect the climate of an area;	<b>S9ES-IIIe-30</b>	1. BEAM 6. Unit 5. Module 13. 2. Science and Technology I: Integrated Science Textbook. NISMED. 2012. pp. 275-282. 3. Science and Technology I: Integrated Science Textbook for First Year. Villamil, Aurora M., Ed.D. 1998. pp. 185-202. *	Thermocline
			6. describe certain climatic phenomena that occur on a global level;	<b>S9ES-III f-31</b>	1. BEAM 6. Unit 5. Module 13. 2. Science and Technology I:	

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
					Integrated Science Textbook. NISMED. 2012. pp. 300-301.	
<b>3. Constellations</b> 3.1 Characteristics of stars 3.2 Arrangement of stars in a group 3.3 Changing position of constellations during the night and at different times of the year 3.4 Beliefs and practices about constellations and astrology	<i>The learners demonstrate an understanding of:</i>  the relationship between the visible constellations in the sky and Earth's position along its orbit	<i>The learners shall be able to:</i>  discuss whether or not popular beliefs and practices with regard to constellations and astrology have scientific basis	7. infer the characteristics of stars based on the characteristics of the Sun;	<b>S9ES-IIIg-32</b>	1. BEAM 5. Unit 7. 20 The Sun. 2. EASE Science I. Module 18. 3. Science and Technology I: Integrated Science Textbook. Villamil, Aurora M., Ed.D. 1998. pp. 268-270. *	Celestial globe
			8. infer that the arrangement of stars in a group (constellation) does not change;	<b>S9ES-IIIh-33</b>	1. EASE Science I. Module 18. 2. Science and Technology I: Integrated Science Textbook. Villamil, Aurora M., Ed.D. 1998. p. 272. *	

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<b>3. Constellations</b> 3.1 Characteristics of stars 3.2 Arrangement of stars in a group 3.3 Changing position of constellations during the night and at different times of the year 3.4 Beliefs and practices about constellations and astrology	<i>The learners demonstrate an understanding of:</i>  the relationship between the visible constellations in the sky and Earth's position along its orbit	<i>The learners shall be able to:</i>  discuss whether or not popular beliefs and practices with regard to constellations and astrology have scientific basis	9. observe that the position of a constellation changes in the course of a night; and	<b>S9ES-IIIi-34</b>	EASE Science I. Module 18.	
			10. show which constellations may be observed at different times of the year using models.	<b>S9ES-IIIj-35</b>	EASE Science I. Module 18.	Celestial globe
<b>Grade 9 – Force, Motion, and Energy</b> <b>FOURTH QUARTER/FOURTH GRADING PERIOD</b>						
<b>Motion in Two Dimensions</b>  1. Projectile Motion 1.2.Impulse, Momentum and Impulse 1.3.Conservation of Linear Momentum	<i>The learners demonstrate an understanding of:</i>  projectile motion, impulse and momentum, and conservation of linear momentum	<i>The learners shall be able to:</i>  propose ways to enhance sports related to projectile motion	<i>The learners should be able to...</i>  1. describe the horizontal and vertical motions of a projectile;	<b>S9FE-IVa-34</b>	1. OHSP Integrated Science. Quarter 2. Module 3. pp. 4-5. 2. EASE Physics. Module 9. Lesson 3. 3. Science and Technology IV: Physics Textbook for Fourth Year. Rabago, Lilia M., Ph.D., et al. 2001. pp. 93-109. *	

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<b>Motion in Two Dimensions</b>  1. Projectile Motion 1.2.Impulse, Momentum and Impulse 1.3.Conservation of Linear Momentum	<i>The learners demonstrate an understanding of:</i>  projectile motion, impulse and momentum, and conservation of linear momentum	<i>The learners shall be able to:</i>  propose ways to enhance sports related to projectile motion	2. investigate the relationship between the angle of release and the height and range of the projectile;	<b>S9FE-IVa-35</b>	1. EASE Physics. Module 9. Lesson 3. 2. Science and Technology IV: Physics Textbook for Fourth Year. Rabago, Lilia M., Ph.D., et al. 2001. pp. 93-109. *	
			3. relate impulse and momentum to collision of objects (e.g., vehicular collision);	<b>S9FE-IVb-36</b>	Science and Technology IV: Physics Textbook. NISMED. 2012. pp. 298-301.	
			4. infer that the total momentum before and after collision is equal;	<b>S9FE-IVb-37</b>	1. BEAM IV. Unit 5. 12 Force and Motion. Energy in Transportation. August 2008. 2. Science and Technology IV: Physics Textbook for Fourth Year. Rabago, Lilia M., Ph.D., et al. 2001. pp.	NSTIC SciKit Basic and Mechanics: Cart-Rail System; Cylindrical Masses; Meter Stick



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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<b>Motion in Two Dimensions</b>  1. Projectile Motion 1.2.Impulse, Momentum and Impulse 1.3.Conservation of Linear Momentum	<i>The learners demonstrate an understanding of:</i>  projectile motion, impulse and momentum, and conservation of linear momentum	<i>The learners shall be able to:</i>  propose ways to enhance sports related to projectile motion	4. infer that the total momentum before and after collision is equal;	<b>S9FE-IVb-37</b>	112-114. * 3. Science and Technology IV: Physics Textbook. NISMED. 2012. pp. 301-303 and 306.	
			5. examine effects and predict causes of collision-related damages/injuries;	<b>S9FE-IVc-38</b>	Science and Technology IV: Physics Textbook. NISMED. p. 298.	
<b>2. Work Power and Energy</b>  2.1 Changes in form of mechanical energy 2.2 Conservation of energy	<i>The learners demonstrate an understanding of:</i>  conservation of mechanical energy	<i>The learners shall be able to:</i>  create a device that shows conservation of mechanical energy	6. explain energy transformation in various activities/events (e.g., waterfalls, archery, amusement rides);	<b>S9FE-IVc-39</b>	1. EASE Science I. Module 8. p. 18. 2. BEAM 5. Unit 5. 11. Electric Circuits. DLP 35. 3. Science and Technology IV: Physics Textbook for Fourth Year. Rabago, Lilia M., Ph.D., et al. 2001. pp. 170-171. * 4. Science and Technology I: Integrated	

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<b>2. Work Power and Energy</b> 2.1 Changes in form of mechanical energy 2.2 Conservation of energy	<i>The learners demonstrate an understanding of:</i>  conservation of mechanical energy	<i>The learners shall be able to:</i>  create a device that shows conservation of mechanical energy		<b>S9FE-IVc-39</b>	Science Textbook. NISMED. 2012. pp. 116-119.	
			7. perform activities to demonstrate conservation of mechanical energy;	<b>S9FE-IVd-40</b>	1. BEAM IV. Unit 5. 11 Force, Power, Work and Energy. August 2009. 2. EASE Physics. Module 11. pp. 18-22. 3. OHSP Modules. Module 11. pp. 18-22. 4. Science and Technology IV: Physics Textbook for Fourth Year. Rabago, Lilia M., Ph.D., et al. 2001. pp. 179-181. * 5. Science and Technology I: Integrated Science Textbook.	NSTIC SciKit: Basic and Mechanics: Stand base, Stand support, Stand rods, Lever beam; Pulleys; Cart-Rail System; Hooked Masses; Meter Stick; Spring Balances

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CONTENT	CONTENT STANDARDS	PERFORMANCE STANDARDS	LEARNING COMPETENCY	CODE	LEARNING MATERIALS	SCIENCE EQUIPMENT
<p><b>2. Work Power and Energy</b></p> <p>2.1 Changes in form of mechanical energy</p> <p>2.2 Conservation of energy</p>	<p><i>The learners demonstrate an understanding of:</i></p> <p>conservation of mechanical energy</p>	<p><i>The learners shall be able to:</i></p> <p>create a device that shows conservation of mechanical energy</p>	<p>7. perform activities to demonstrate conservation of mechanical energy;</p>	<p><b>S9FE-IVd-40</b></p>	<p>NISMED. 2012. pp. 119-121.</p> <p>6. Science and Technology IV: Physics Textbook. NISMED. 2012. pp. 314-316.</p>	
			<p>8. infer that the total mechanical energy remains the same during any process;</p>	<p><b>S9FE-IVe-41</b></p>	<p>1. EASE Physics. Module 11. Lesson 2.</p> <p>2. OHSP Modules. Module 11, Lesson 2.</p> <p>3. Science and Technology IV: Physics Textbook for Fourth Year. Rabago, Lilia M., Ph.D., et al. 2001. p. 177. *</p> <p>4. Science and Technology I: Integrated Science Textbook. NISMED. 2012. pp.</p>	

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<b>2. Work Power and Energy</b> 2.1 Changes in form of mechanical energy 2.2 Conservation of energy	<i>The learners demonstrate an understanding of:</i>  conservation of mechanical energy	<i>The learners shall be able to:</i>  create a device that shows conservation of mechanical energy	8. infer that the total mechanical energy remains the same during any process;	<b>S9FE-IVe-41</b>	121-122. 5. Science and Technology IV: Physics Textbook. NISMED. 2012. p. 315.	
<b>3. Heat, Work, and Efficiency</b>	the relationship among heat, work, and efficiency	analyze how power plants generate and transmit electrical energy	9. construct a model to demonstrate that heat can do work;	<b>S9FE-IVe-42</b>	Science and Technology IV: Physics Textbook for Fourth Year. Rabago, Lilia M., Ph. D., et al. 2001. pp. 187-188. *	
			10. infer that heat transfer can be used to do work, and that work involves the release of heat;	<b>S9FE-IVf-43</b>	Science and Technology IV: Physics Textbook for Fourth Year. Rabago, Lilia M., Ph. D., et al. 2001. pp. 187-188. *	
			11. explain why machines are never 100-percent efficient;	<b>S9FE-IVf-44</b>	1. OHSP. Module 11. 2. EASE Physics. Module 11.	

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<b>3. Heat, Work, and Efficiency</b>	<p><i>The learners demonstrate an understanding of:</i></p> <p>the relationship among heat, work, and efficiency</p>	<p><i>The learners shall be able to:</i></p> <p>analyze how power plants generate and transmit electrical energy</p>	12. explain how heat transfer and energy transformation make heat engines like geothermal plants work; and	<b>S9FE-IVg-45</b>	<ol style="list-style-type: none"> <li>Science and Technology IV: Physics Textbook for Fourth Year. Ragabo, Lilia M., Ph.D., et al. 2001. pp. 188-191. *</li> <li>Science and Technology IV: Physics Textbook. NISMED. 2012. pp. 325-327.</li> </ol>	
<b>4. Electricity and magnetism</b> 4.1 Power generation and energy losses 4.2 Transmission and distribution of electrical energy from power plants to homes	<p><i>The learners demonstrate an understanding of:</i></p> <p>generation, transmission, and distribution of electrical energy from power plants (hydroelectric, geothermal, wind, nuclear) to home</p>		13. explain how electrical energy is generated, transmitted, and distributed.	<b>S9FE-IVh-j-46</b>	<ol style="list-style-type: none"> <li>BEAM IV. 9 Electrical Energy Generation. Electrical Energy.</li> <li>Science and Technology IV: Physics Textbook for Fourth Year. Rabago, Lilia M., Ph.D., et al. 2001. pp. 342-343. *</li> <li>Science and Technology I: Integrated Science.</li> </ol>	<ol style="list-style-type: none"> <li>DC Ammeter</li> <li>DC Voltmeter</li> <li>Dry Cell Holder Size D ( 1set= 4 pcs)</li> <li>Dry Cell Size D, 1.5 volts</li> <li>Dry Cell, 9 volts</li> <li>Galvanometer</li> <li>Miniature Light Bulb (1 set = 3 pcs)</li> <li>Miniature Light Bulb Base (1set = 3 pcs)</li> </ol>

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<b>CONTENT</b>	<b>CONTENT STANDARDS</b>	<b>PERFORMANCE STANDARDS</b>	<b>LEARNING COMPETENCY</b>	<b>CODE</b>	<b>LEARNING MATERIALS</b>	<b>SCIENCE EQUIPMENT</b>
<p><b>4. Electricity and magnetism</b>                      4.1 Power generation and energy losses                      4.2 Transmission and distribution of electrical energy from power plants to homes</p>	<p><i>The learners demonstrate an understanding of:</i>                       generation, transmission, and distribution of electrical energy from power plants (hydroelectric, geothermal, wind, nuclear) to home</p>	<p><i>The learners shall be able to:</i>                       analyze how power plants generate and transmit electrical energy</p>	<p>13. explain how electrical energy is generated, transmitted, and distributed.</p>	<p><b>S9FE-IVh-j-46</b></p>	<p>NISMED. 2012. pp. 131-134.                      4. Science and Technology IV: Physics Textbook. NISMED. 2012. pp. 242-246.                      5. NFE. Proper Use of Electricity. 2001. pp. 4-6.</p>	<p>9. Motor-Generator Model                      10. Set of Coils                      11. Set of Connectors (1 set = 3- red, 3- black, 2- white, 2- blue)                      12. Switches, Knife Type                      13. Variable Power Supply, AC-DC</p>

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### GLOSSARY

<b>Climate change</b>	A significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years.
<b>Earth</b>	The third planet from the Sun; the densest and the fifth-largest of the eight planets in the Solar System.
<b>Earthquake</b>	The result of a sudden release of energy in the Earth's crust that creates seismic waves.
<b>Ecosystem</b>	A community of living organisms (plants, animals and microbes) in conjunction with the non-living components (air, water and mineral soil), interacting as a system.
<b>Electricity</b>	In physics, it is one of the basic quantitative properties describing a physical system or an object's state
<b>Energy</b>	The set of physical phenomena associated with the presence and flow of electric charge.
<b>Environment</b>	Surroundings.
<b>Force</b>	The exertion of physical strength.
<b>Friction</b>	The force which opposes the movement of one surface sliding or rolling over another with which it is in contact; the act of rubbing the surface of the body.
<b>Gas</b>	One of the four fundamental states of matter (the others being solid, liquid and plasma); its particles are widely separated from one another.
<b>Gravity</b>	A natural phenomenon by which all physical bodies attract each other.
<b>Heat</b>	The condition of being hot; the energy of a material body associated with the random motions of a constituent particles.
<b>Light</b>	An electromagnetic radiation that is visible to the human eye.
<b>Liquid</b>	One of the four fundamental states of matter (the others being solid, gas and plasma); the only state with definite volume but no fixed shape.
<b>Living Things</b>	Anything that has life; all objects that have self-sustaining processes.
<b>Magnetism</b>	A group of physical phenomenon associated with the interaction of a magnetic field with matter.
<b>Matter</b>	Anything that has space and mass.
<b>Motion</b>	A push or a pull; any movement or change in position.
<b>Natural event</b>	An event pertaining to, existing in or produced by nature.
<b>Solar system</b>	Comprises the Sun and its planetary system of eight planets, as well as a number of dwarf planets, satellites, and other objects that orbit the Sun.

## K to 12 BASIC EDUCATION CURRICULUM

### GLOSSARY

<b>Solid</b>	Characterized by structural rigidity and resistance to changes of shape or volume; one of the four fundamental states of matter.
<b>Sound</b>	The sensation experienced when the brain interprets vibration within the structure of the ear caused by rapid variations of air pressure.
<b>Space</b>	The distance between two points or objects.
<b>Volcanic eruption</b>	A phenomenon in which material from the depths of the earth explodes to the surface in the form of lava, or clouds of gas and ashes.
<b>Weather</b>	The state of the atmosphere, to the degree that it is hot or cold, wet or dry, calm or stormy, clear or cloudy.



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### CODE BOOK LEGEND

Sample: **S8ES-IIId-19**

LEGEND		SAMPLE	
<b>First Entry</b>	Learning Area and Strand/ Subject or Specialization	Science	<b>S8</b>
	Grade Level	Grade 8	
<b>Uppercase Letter/s</b>	Domain/Content/Component/ Topic	Earth and Space	<b>ES</b>
			-
<b>Roman Numeral</b> <i>*Zero if no specific quarter</i>	Quarter	Second Quarter	<b>II</b>
<b>Lowercase Letter/s</b> <i>*Put a hyphen (-) in between letters to indicate more than a specific week</i>	Week	Week Four	<b>d</b>
			-
<b>Arabic Number</b>	Competency	Infer why the Philippines is prone to typhoons	<b>19</b>

DOMAIN/ COMPONENT	CODE
Living things and their Environment	LT
Force, Motion and Energy	FE
Earth and Space	ES
Matter	MT

## K to 12 BASIC EDUCATION CURRICULUM

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