

# CURRICULUM MAP

## Science and Technology 9 (Second Edition)

*Dear Teacher,*

Greetings from Abiva Publishing House, Inc.!

Thank you for adopting our textbook/s. Your chosen series titles come with functional teachers guides (TG) that provide you with a detailed curriculum map (CM) per grade level. For your reference, we are providing you below some important keys to understanding and using the components, terminologies, and abbreviations found in this teacher's companion tool.

We hope you will find the following curriculum map most helpful in your daily planning and teaching tasks. Do suggest other ways we can make your chosen Abiva textbook/s more attuned to your needs as a teacher. You may send us your comments through our official email address at [wecare@abiva.com.ph](mailto:wecare@abiva.com.ph)

Happy teaching!

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### Curriculum Map Components and Content Sources

<b>Key Stage Standards</b>	Taken from the DepEd Curriculum Guide for Science
<b>Grade Level Standards</b>	Taken from the DepEd Curriculum Guide for Science
<b>Content Standards</b>	Taken from the DepEd Curriculum Guide for Science
<b>Performance Standards</b>	Taken from the DepEd Curriculum Guide for Science
<b>Content</b>	Taken from the textbook: <b>Science and Technology 9 (Second Edition)</b>
<b>K to 12 Learning Competencies (MELCs included)</b>	Taken from the DepEd Curriculum Guide for Science. The <b>Most Essential Learning Competencies (MELCs)</b> mandated by the DepEd are identified to guide teachers as they address the instructional needs of the learners while ensuring that curriculum standards are developed among home-schooling students in the new normal.
<b>21st-Century Skills</b>	Taken from "New Vision for Education: Unlocking the Potential of Technology," World Economic Forum® (2015)
<b>Teaching Strategies/Differentiated Instruction</b>	A variety of author-suggested instructional strategies to help the teacher deliver the lessons at varying levels of difficulty based on the students' learning styles.
<b>Assessment</b>	Assessment tools and strategies categorized as either Formative or Summative
<b>Values Integration</b>	A list of values that are inherent in the subject and developed through lesson discussions and skills exercises. The teacher, however, is encouraged to emphasize values that are aligned with the school's own core values.
<b>Resources</b>	A rundown of suggested instructional materials which may take the form of traditional resources, teacher-made resources, educational software, and other digital learning resources.



**LEARNING SKILLS (Competencies):** Communication • Collaboration • Critical thinking/problem solving • Creativity  
**LITERACY SKILLS (Foundation Literacies):** Literacy and numeracy • Scientific literacy • ICT literacy • Financial literacy • Cultural literacy • Civic literacy  
**LIFE SKILLS (Character Qualities):** Initiative • Persistence • Adaptability • Curiosity • Leadership • Social and cultural awareness • Career • Work ethics

## Key Stage Standards (7–10)

At the end of grade 10, the learners should have developed scientific, technological, and environmental literacy and can make sound decisions that would lead to rational choices on issues confronting them. Having been exposed to scientific investigations related to real life, they should recognize that the central feature of an investigation is that if one variable is changed (while controlling all others), the effect of the change on another variable can be measured. The context of the investigation can be problems at the local or national level to allow them to communicate with learners in other parts of the Philippines or even from other countries using appropriate technology.

The learners should demonstrate an understanding of science concepts and apply science inquiry skills in addressing real-world problems through scientific investigations.

## Grade Level Standards

At the end of grade 9, learners have gained a deeper understanding of the digestive, respiratory, and circulatory systems to promote overall health. They have become familiar with some technologies that introduce desired traits in economically important plants and animals.

Learners can explain how new materials are formed when atoms are rearranged. They recognize that a wide variety of useful compounds may arise from such rearrangements.

Learners can identify volcanoes and distinguish between active and inactive ones. They can explain how energy from volcanoes may be tapped for human use. They are familiar with climatic phenomena that occur on a global scale. They can explain why certain constellations can be seen only at certain times of the year.

Learners can predict the outcomes of interactions among objects in real life, applying the laws of conservation of energy and momentum.

## 1st Quarter

<b>Unit 1: <i>Living Things and Their Environment</i></b>		<b>Time Frame: 50 hours</b>	
<b>Content Standards*</b>	<p>The learners demonstrate an understanding of . . .</p> <ul style="list-style-type: none"> <li>● 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>● the prevention, detection, and treatment of diseases affecting the circulatory and respiratory systems;</li> <li>● how genetic information is organized in genes on chromosomes;</li> <li>● the different patterns of inheritance;</li> <li>● how changes in the environment may affect species extinction;</li> <li>● the structure and function of plant parts and organelles involved in photosynthesis; and</li> <li>● the structure and function of mitochondrion as the main organelle involved in respiration.</li> </ul>	<b>Performance Standards*</b>	<p>The learners should be able to . . .</p> <ul style="list-style-type: none"> <li>● 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;</li> <li>● make a multimedia presentation of a timeline of extinction of representative microorganisms, plants, and animals; and</li> <li>● design and conduct an investigation to provide evidence that plants can manufacture their own food.</li> </ul>

*\* Italicized text for **Content Standards** and **Performance Standards** are add-on ones from the TG. This is applied throughout the CM.*

<b>Chapter 1: <i>Respiratory and Circulatory Systems</i></b>			
<b>Essential Questions**</b>	<ul style="list-style-type: none"> <li>● How do the respiratory and circulatory systems work with other organ systems?</li> <li>● How are nutrients, gases, and other molecules transported to the different parts of the body?</li> <li>● How do human blood groups differ?</li> <li>● Why is it important to know one's blood type?</li> <li>● How do systolic and diastolic pressures differ?</li> </ul>	<b>Enduring Understandings**</b>	<ul style="list-style-type: none"> <li>● The respiratory and circulatory systems are equally important organ systems designed to maintain and sustain normal body functioning among most animals including humans.</li> <li>● Realizing the importance of the parts of the respiratory and circulatory systems as well as the functions of each part and the intricate mechanisms involved encourages one to give the proper care these organ systems require.</li> </ul>

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	<ul style="list-style-type: none"> <li>What will happen if one of the parts of the respiratory and circulatory systems fails to function normally?</li> <li>How do the quality of air inhaled and the substances ingested by animals, including humans, affect the functioning of the respiratory and circulatory systems?</li> <li>How do harmful substances affect the respiratory and circulatory systems?</li> <li>How would you define lifestyle?</li> </ul>		
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**\*\* Contents for Essential Questions (EQ) and Enduring Understandings (EU) are set per unit in the textbook and by chapter in the teachers guide. The text under Big Ideas in the TG were considered for EU. Hence, these were integrated in the table above and not within each lesson in the CM. Furthermore, some EQs and EUs have come from the WT or are author-provided; these were considered as long as they are developed in the WT/TG content.**

Content	K to 12 Learning Competencies (MELCs included)***	21st-Century Skills	Teaching Strategies/ Differentiated Instruction	Assessment	Values Integration	Resources
<p><i>Human Respiratory System: Structures and Functions</i></p> <p><i>Mechanisms of Breathing</i></p> <p><i>Respiratory Volumes and Capacities</i></p> <p><i>Human Cardiovascular System: Structure and Functions</i></p>	<p><b>S9LT-Ia-b-26</b> <span style="background-color: #000080; color: white; padding: 2px;">MELC</span> 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</p> <p><b>S9LT-Ic-27</b> <span style="background-color: #000080; color: white; padding: 2px;">MELC</span> Infer how one's lifestyle can affect the functioning of</p>	<p><b>Communication</b></p> <ul style="list-style-type: none"> <li>Explaining answers to questions</li> <li>Demonstrating procedures</li> <li>Explaining task outputs</li> </ul> <p><b>Collaboration</b> Cooperation and teamwork in group activities</p> <p><b>Critical Thinking</b></p> <ul style="list-style-type: none"> <li>Creating a concept map/graphic organizer</li> </ul>	<ul style="list-style-type: none"> <li>Match Me activity on classifying the respiratory and circulatory organs</li> <li>Lecture-discussion</li> <li>Probing questions</li> <li>Activity on measuring lung capacity</li> <li>Laboratory activities</li> <li>Slideshow or video presentations or video animations on circulatory and respiratory systems</li> <li>Use of concept map/graphic organizer</li> </ul>	<p><b>Formative</b></p> <ul style="list-style-type: none"> <li>Answering questions in Follow-Up</li> <li>Essential questions</li> <li>Assignments</li> <li>Seatwork</li> <li>Recitation</li> </ul> <p><b>Summative</b></p> <ul style="list-style-type: none"> <li>Chapter test</li> <li>Performance tasks</li> </ul>	<ul style="list-style-type: none"> <li>Observing discipline and a healthy lifestyle for the prevention of certain illnesses</li> <li>Observing discipline in caring for the body and in leading a healthy lifestyle</li> <li>Being proactive in promoting clean air by practicing proper disposal of harmful substances at home, in school,</li> </ul>	<ul style="list-style-type: none"> <li>materials for activities or experiments</li> <li>LCD projector</li> <li>computer with internet connection</li> <li>enlarged pictures, slides/slideshow presentations</li> <li>charts or posters</li> <li>graphic organizers</li> <li>video clips, animations, or articles from online sources</li> </ul>

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<p><i>Circulatory Pathway</i></p> <p><i>Mechanisms of the Lymphatic System</i></p> <p><i>Diseases of the Respiratory and Circulatory Systems</i></p> <p><i>Effects of Lifestyle on the Respiratory and Circulatory Systems</i></p>	<p>respiratory and circulatory systems</p> <p><i>Describe some diseases and disorders that affect the respiratory and circulatory systems, as well as their signs, symptoms, treatment, and prevention</i></p>	<p><b>Scientific Literacy</b></p> <ul style="list-style-type: none"> <li>● Making informed decisions</li> </ul> <p><b>Adaptability</b></p> <ul style="list-style-type: none"> <li>● Being able to adapt and practice a healthy lifestyle</li> </ul> <p><b>Civic Literacy</b></p> <p>Doing information campaign on the importance of blood typing</p> <p><b>ICT Literacy</b></p> <ul style="list-style-type: none"> <li>● Visiting websites to view videos or read articles on circulatory and respiratory systems</li> <li>● Accessing graphic organizers from a website</li> </ul>			<p>and in the community</p>	<ul style="list-style-type: none"> <li>○ <a href="http://www.youtube.com/watch?v=hc1YtXc_84A">http://www.youtube.com/watch?v=hc1YtXc_84A</a></li> <li>○ <a href="http://www.dnatube.com/video/5331/How-the-Respiratory-System-Works">http://www.dnatube.com/video/5331/How-the-Respiratory-System-Works</a></li> <li>○ <a href="https://www.youtube.com/watch?v=8NUxvJS-_0k">https://www.youtube.com/watch?v=8NUxvJS-_0k</a></li> <li>○ <a href="https://kidshealth.org/en/teens/lungs.html">https://kidshealth.org/en/teens/lungs.html</a></li> <li>○ <a href="https://medlineplus.gov/ency/anatomyvideos/000059.htm">https://medlineplus.gov/ency/anatomyvideos/000059.htm</a></li> <li>○ <a href="https://www.youtube.com/watch?v=CWFyxn0qDEU">https://www.youtube.com/watch?v=CWFyxn0qDEU</a></li> <li>○ <a href="https://www.youtube.com/watch?v=_qmNCJxpsr0">https://www.youtube.com/watch?v=_qmNCJxpsr0</a></li> <li>○ <a href="https://www.nhsinform.scot/healthy-living/food-and-nutrition/eating-well/health-benefits-of-eating-well">https://www.nhsinform.scot/healthy-living/food-and-nutrition/eating-well/health-benefits-of-eating-well</a></li> <li>○ <a href="https://www.medicalnewstoday.com/articles/322268#bones-and-teeth">https://www.medicalnewstoday.com/articles/322268#bones-and-teeth</a></li> </ul>
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\*\*\**Italicized texts under K to 12 Learning Competencies column are add-ons. Such marking is applied throughout the CM.*

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### Chapter 2: Heredity, Evolution, and Biodiversity

<b>Essential Questions</b>	<ul style="list-style-type: none"> <li>How are traits transmitted?</li> <li>What makes character traits vary from organism to organism within a species?</li> <li>Is it important to alter organism's traits through breeding? Why?</li> <li>How do the sex chromosomes of humans determine sexual differentiation?</li> <li>What makes a trait dominant? What makes it recessive?</li> <li>Why is it important to know about Punnett squares?</li> <li>Why does genetic variability occur in a population?</li> <li>How does extinction occur?</li> </ul>	<b>Enduring Understandings</b>	<ul style="list-style-type: none"> <li>All living things in a biological community, including humans, vary in terms of character traits. Even identical twins are not born exactly alike. They may share a particular trait but differ in many other traits.</li> <li>Traits are passed on from parent to offspring or from one generation to another, unless significant modifications or alterations are intentionally introduced through human or technological interventions.</li> <li>Determining the complete genetic code of different economically important plants and animals is important in breeding.</li> </ul>
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Content	K to 12 Learning Competencies (MELCs included)	21st-Century Skills	Teaching Strategies/ Differentiated Instruction	Assessment	Values Integration	Resources
<i>Genes</i>  <i>Chromosomes</i>  <i>Fundamental Laws of Heredity</i>  <i>Genetic Linkage: An Exception to the Law of Independent Assortment</i>  <i>Sex Determination</i>  <i>Sex-Linked Traits</i>	<b>S9LT-Id-28</b> Describe the location of genes in chromosomes  <b>S9LT-Id-29</b> <span style="background-color: #0070C0; color: white; padding: 2px;">MELC</span> Explain the different patterns of non-Mendelian inheritance  <b>S9LT-Ie-f-30</b> <span style="background-color: #0070C0; color: white; padding: 2px;">MELC</span> Relate species extinction to the failure of populations of organisms to adapt to	<b>Collaboration</b> <ul style="list-style-type: none"> <li>Working with a group to perform an activity</li> <li>Working with a group to create and present a slideshow</li> </ul> <b>Critical Thinking</b> <ul style="list-style-type: none"> <li>Conducting research</li> <li>Constructive critiquing of slideshow presentations</li> </ul> <b>Communication</b> <ul style="list-style-type: none"> <li>Explaining answers to questions</li> </ul>	<ul style="list-style-type: none"> <li>Lecture-discussion</li> <li>Use of graphic organizers</li> <li>Collaborative activity on identifying genetically related coat color variations in rabbits</li> <li>Individual activities:               <ul style="list-style-type: none"> <li>Activity 2.1: Trait Bingo on determining inherited, most common and least common traits</li> <li>Activity 2.2: Genes in Beans on</li> </ul> </li> </ul>	<b>Formative</b> <ul style="list-style-type: none"> <li>Answering follow-up questions</li> <li>Seatwork</li> <li>Assignments</li> <li>Quiz on biographies of some scientists</li> </ul> <b>Summative</b> <ul style="list-style-type: none"> <li>Chapter test</li> <li>Performance task</li> </ul>	<ul style="list-style-type: none"> <li>Showing awareness on selections as practiced in hybridization to create breeds that can adapt and survive in different environments</li> <li>Respecting the uniqueness of each individual especially the physically impaired or differently abled</li> <li>Refraining from</li> </ul>	<ul style="list-style-type: none"> <li>materials for activities or experiments</li> <li>Punnett squares</li> <li>video animations</li> <li>articles</li> <li>graphic organizers</li> <li>LCD projectors</li> <li>computer with internet connection</li> <li>DVD/CD player</li> <li>TV set</li> <li>slides or slideshow presentations, charts, or enlarged images of pictures in the WT</li> </ul>

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<p><i>Multiple Alleles and Blood Types</i></p> <p><i>Genetic Variability in a Population</i></p> <p><i>Improving Varieties Through Breeding</i></p> <p><i>Interrelationship Between Evolution, Extinction, and Biodiversity</i></p>	<p>abrupt changes in the environment</p>	<ul style="list-style-type: none"> <li>● Presenting slideshows about genetic variability</li> <li>● Sharing research results with the class</li> </ul> <p><b>Scientific Literacy</b></p> <ul style="list-style-type: none"> <li>● Being able to justify pros and cons of hybridization</li> <li>● Conducting research on heredity, genetics, and biodiversity and identifying its applications</li> </ul> <p><b>Curiosity</b></p> <ul style="list-style-type: none"> <li>● Conducting (further or extended) research on heredity, genetics, biodiversity, and extinction</li> <li>● Conducting activities about genetics</li> </ul> <p><b>Career</b></p> <ul style="list-style-type: none"> <li>● Examining the life of some geneticists and scientists and considering a career in related fields</li> <li>● Determine applications of genetics in farming and horticulture</li> </ul>	<p>identifying phenotypes and genotypes and determining phenotypic and genotypic ratios</p> <ul style="list-style-type: none"> <li>○ Activity 2.3: Alleles for Coat Color in Rabbits on identifying groups of genetically related coat color variations in rabbits</li> <li>○ Activity 2.4: Cases and Causes of Species Extinctions on determining global cases of extinction and their corresponding causes</li> </ul> <ul style="list-style-type: none"> <li>● Relating heredity to real-life situations</li> <li>● Conducting extended research on hemophilia, color blindness, and categories of conservation status of species</li> <li>● Collaborative activity on creating slideshow presentations on topics about genetic variability in a population</li> </ul>		<p>exhibiting sexual or gender discrimination</p>	<ul style="list-style-type: none"> <li>● small pieces of paper for drawing lots</li> <li>● Manila paper</li> <li>● marker</li> <li>● video clips, animations, or articles from online sources such as the following: <ul style="list-style-type: none"> <li>○ <a href="https://www.youtube.com/watch?v=kMWxuF9YW38">https://www.youtube.com/watch?v=kMWxuF9YW38</a></li> <li>○ <a href="https://www.youtube.com/watch?v=D2hVgujy2E8">https://www.youtube.com/watch?v=D2hVgujy2E8</a></li> </ul> </li> </ul>
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		<b>ICT Literacy</b> <ul style="list-style-type: none"> <li>Doing online research</li> <li>Visiting links/websites to view videos and read articles</li> <li>Creating slideshow presentations using a computer application</li> </ul>	<ul style="list-style-type: none"> <li>Creating a portfolio of articles on breeding technology</li> </ul>			
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### Chapter 3: Life Energy and Environmental System

<b>Essential Questions</b>	<ul style="list-style-type: none"> <li>How does photosynthesis take place inside the leaves of plants?</li> <li>How different or similar are cyclic and noncyclic photophosphorylation different?</li> <li>How important is photosynthesis to other organisms?</li> <li>What makes the microorganisms important in plants' food production?</li> <li>Apart from food, how important are air and space in human-made or artificial habitats of organisms?</li> <li>How important is cellular respiration to organisms?</li> <li>What will happen to organisms if their population exceeds the carrying capacity of a certain ecosystem?</li> <li>What causes an ecosystem to collapse?</li> </ul>	<b>Enduring Understandings</b>	<ul style="list-style-type: none"> <li>Plants rely on sunlight to manufacture their food. Consumers, which include humans, rely on plants for food.</li> <li>They may look ordinary and useless, but the leaves of plants make life on earth possible. A spectacular event has been happening inside them—photosynthesis.</li> <li>Different organisms thrive in an ecosystem. However, when the supply of food, air, as well as the space is not enough to support a huge population, these organisms will eventually die and the ecosystem will collapse.</li> <li>Natural habitats are the comfort zone of organisms. However, they also survive in human-made habitats under a certain condition—food, space, and air must be enough.</li> </ul>
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Content	K to 12 Learning Competencies (MELCs included)	21st-Century Skills	Teaching Strategies/ Differentiated Instruction	Assessment	Values Integration	Resources
<i>Energy Production and Transport</i>	<b>S9LT-Ig-j-31</b> <span style="background-color: #0070C0; color: white; padding: 2px;">MELC</span> Differentiate basic features and	<b>Collaboration</b> <ul style="list-style-type: none"> <li>Working with a group to evaluate the relationship between</li> </ul>	<ul style="list-style-type: none"> <li>Lecture-discussion</li> <li>Creating and using graphic organizers</li> </ul>	<b>Formative</b> <ul style="list-style-type: none"> <li>Answering questions in Follow-Up</li> </ul>	<ul style="list-style-type: none"> <li>Appreciating the practicality of growing plants on recycled containers</li> </ul>	<ul style="list-style-type: none"> <li>materials for activities or experiments</li> <li>video animations</li> </ul>



<p><i>Photosynthesis</i></p> <p><i>Release of Energy Through Respiration</i></p> <p><i>Population, Communities, and Interactions</i></p>	<p>importance of photosynthesis and respiration</p> <p><b>S9LT-Ie-f-30 MELC</b></p> <p>Relate species extinction to the failure of populations of organisms to adapt to abrupt changes in the environment</p> <p><i>Demonstrate understanding of the essential roles of microorganisms in nutrient cycling</i></p> <p><i>Explain why an ecosystem can support a limited number of organisms only</i></p>	<p>population and carrying capacity</p> <p><b>Curiosity</b></p> <p>Conducting activities to determine the functions of plant parts and how photosynthesis happens</p> <p><b>Scientific Literacy</b></p> <ul style="list-style-type: none"> <li>● Performing activities on plant parts and photosynthesis</li> <li>● Making informed decisions and applying learnings of concepts about life, energy, and environmental system</li> </ul> <p><b>Social and Environmental Awareness, and Civic Literacy</b></p> <ul style="list-style-type: none"> <li>● Suggesting eco-friendly ways to increase global food production</li> <li>● Motivating others to grow plants using recyclable containers</li> </ul> <p><b>Critical Thinking</b></p> <ul style="list-style-type: none"> <li>● Conducting research on plant parts and pigments</li> </ul>	<ul style="list-style-type: none"> <li>● Individual activity: Activity 3.1: Examining External Leaf Structure</li> <li>● Collaborative activities: <ul style="list-style-type: none"> <li>○ Activity 3.2: Chlorophyll Extraction; Activity 3.3: What are Stomata? on identifying and describing the stomata of a leaf specimen under a microscope;</li> <li>○ Activity 3.4: Internal Structure of a Dicot Leaf on examining and identifying a dicot leaf;</li> <li>○ Activity 3.5: Evolution of O<sub>2</sub> in Photosynthesis on demonstrating that oxygen evolves during photosynthesis;</li> <li>○ Activity 3.6: Parts of the Stem on describing and identifying parts of dicot and monocot stems; and</li> <li>○ Activity 3.7: Population, Ecological Balance, and Sustainability on evaluating the relationship between</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Seatwork</li> <li>● Assignments</li> <li>● Essential questions</li> </ul> <p><b>Summative</b></p> <ul style="list-style-type: none"> <li>● Chapter test</li> <li>● Performance task</li> </ul>	<ul style="list-style-type: none"> <li>● Realizing that food is not easy to produce thus should not be wasted</li> <li>● Realizing the value of frugality</li> </ul>	<ul style="list-style-type: none"> <li>● graphic organizers</li> <li>● LCD projector</li> <li>● computer with internet connection</li> <li>● slides, charts, enlarged images, or pictures found in the WT</li> <li>● slideshow presentation</li> <li>● video clips, animations, or articles from online sources such as <ul style="list-style-type: none"> <li>○ <a href="http://www.youtube.com/watch?v=g78utcLQrJ4">http://www.youtube.com/watch?v=g78utcLQrJ4</a></li> <li>○ <a href="https://www.youtube.com/watch?v=Rz4yRzEonMs">https://www.youtube.com/watch?v=Rz4yRzEonMs</a></li> <li>○ <a href="https://www.youtube.com/watch?v=JQvdXX7hGqI">https://www.youtube.com/watch?v=JQvdXX7hGqI</a></li> </ul> </li> </ul>
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		<p><b>ICT Literacy</b></p> <ul style="list-style-type: none"> <li>● Visiting links/websites to watch videos</li> <li>● Giving reflection on articles about contemporary issues relating to plants</li> </ul> <p><b>Communication</b></p> <ul style="list-style-type: none"> <li>● Explaining answers to questions</li> <li>● Drawing conclusions</li> </ul> <p><b>Career</b> Examining the profession of a vascular surgeon</p>	<p>population and carrying capacity</p> <ul style="list-style-type: none"> <li>○ Paint Me a Picture on portraying given scenarios about the ecosystem</li> </ul> <ul style="list-style-type: none"> <li>● Collage-making or slogan-creating</li> </ul>		
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## 2nd Quarter

<b>Unit 2: Matter</b>		<b>Time Frame: 50 hours</b>	
<b>Content Standards*</b>	<p>The learners demonstrate an understanding of:</p> <ul 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> <li>● the type of bonds that carbon forms that result in the diversity of carbon compounds; and</li> <li>● the unit, mole, that quantitatively measures the number of very small particles of matter.</li> </ul>	<b>Performance Standards*</b>	<p>The learners should be able to analyze the percentage composition of different brands of two food products and decide on the products' appropriate percentage composition.</p>

\* *Italicized text for Content Standards and Performance Standards are add-on ones from the TG. This is applied throughout the CM.*

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### Chapter 4: Chemical Bonding

<b>Essential Questions**</b>	<ul style="list-style-type: none"> <li>How do atoms bind to make molecules and compounds?</li> <li>Why do atoms of different elements combine?</li> <li>How does chemical bonding influence the nature of a substance?</li> <li>How can a covalent bond be polar or nonpolar?</li> <li>How are positive ions (cations) and negative ions (anions) created?</li> <li>How do metallic bonds form?</li> </ul>	<b>Enduring Understandings**</b>	<ul style="list-style-type: none"> <li>When elements form compounds, they either lose, gain, or share electrons in their outermost shell, allowing them to achieve stable configurations similar to those of the noble gases.</li> <li>Ionic (electrovalent) bonds involve attraction between positively charged ions and are formed between metals and nonmetals.</li> <li>Covalent bonds involve sharing of electrons between nonmetal atoms.</li> <li>The geometry of molecules determines the many physical and chemical properties of molecules. By simply knowing the number of valence electrons surrounding the central atom, the shape of a molecule can already be predicted.</li> <li>When metals and nonmetals react, they form an ionic or electrovalent bond, resulting to ionic compounds which are mostly salts. Oppositely charged particles in this ionic bond are held together by this electrostatic force.</li> <li>Metallic bonds are forces of attraction between the metal cations and the surrounding “sea” of highly mobile valence electrons in a metal.</li> </ul>
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\*\* Contents for **Essential Questions (EQ)** and **Enduring Understandings (EU)** are set per unit in the textbook and by chapter in the teachers guide. The text under *Big Ideas* in the TG were considered for EU. Hence, these were integrated in the table above and not within each lesson in the CM. Furthermore, some EQs and EUs have come from the WT or are author-provided; these were considered as long as they are developed in the WT/TG content.

Content	K to 12 Learning Competencies (MELCs included)***	21st-Century Skills	Teaching Strategies/ Differentiated Instruction	Assessment	Values Integration	Resources
<i>Revisiting Electronic Structure of Atom</i>  <i>Bohr's Atomic Model</i>	<b>S9MT-IIa-13</b> Explain the formation of ionic and covalent bonds conductivity	<b>Collaboration</b> <ul style="list-style-type: none"> <li>Working with a group to conduct activities or experiments</li> <li>Peer tutoring on difficult lessons</li> </ul>	<ul style="list-style-type: none"> <li>Lecture-discussion</li> <li>Solving nomenclature drills</li> <li>Drawing Lewis structure drills</li> <li>Conducting activities or experiments:</li> </ul>	<b>Formative</b> <ul style="list-style-type: none"> <li>Answering questions in Follow-Up</li> <li>Seatwork</li> <li>Assignments</li> <li>Solving problems</li> </ul>	<ul style="list-style-type: none"> <li>Showing unity and cooperation</li> <li>Realizing the secret to having strong bonds between people who have been spending</li> </ul>	<ul style="list-style-type: none"> <li>materials for activities or experiments</li> <li>video animations</li> <li>models of compounds and molecules</li> <li>graphic organizers</li> </ul>

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<p><i>Dual Nature of Electron</i></p> <p><i>Quantum Mechanical Model of Atom</i></p> <p><i>Quantum Numbers</i></p> <p><i>Electron Configuration</i></p> <p><i>Electron Configuration and Periodicity</i></p> <p><i>Valence Electrons and Chemical Bonds</i></p> <p><i>Properties of Ionic Compounds</i></p> <p><i>Chemical Nomenclature of Ionic Compounds</i></p> <p><i>Covalent Bonding</i></p> <p><i>Lewis Structure of Covalent Compounds</i></p> <p><i>Chemical Nomenclature of</i></p>	<p><i>Draw Lewis structure of covalent compounds</i></p> <p><i>Give the systematic names of ionic and covalent compounds based on their chemical formulas</i></p> <p><b>S9MT-IIb-14 MELC</b> Recognize different types of compounds (ionic or covalent) based on their properties such as melting point, hardness, polarity, and electrical and thermal conductivity</p> <p><b>S9MT-IIc-d-15</b> Explain properties of metals in terms of their structure</p> <p><b>S9MT-IIe-f-16 MELC</b> Explain how ions are formed</p>	<p><b>Scientific Literacy and Adaptability</b></p> <ul style="list-style-type: none"> <li>Applying knowledge of chemical bonding</li> <li>Describing scenarios where properties of water are significant biologically and environmentally</li> </ul> <p><b>Curiosity</b></p> <ul style="list-style-type: none"> <li>Performing activities or experiments</li> <li>Doing research and investigative work</li> </ul> <p><b>Critical Thinking</b></p> <ul style="list-style-type: none"> <li>Predicting the type of chemical bond and polarity</li> <li>Drawing conclusions</li> </ul> <p><b>Communication</b></p> <ul style="list-style-type: none"> <li>Explaining answers to questions</li> <li>Sharing experiences and insights</li> </ul> <p><b>ICT Literacy</b> Visiting website/s to watch videos</p>	<ul style="list-style-type: none"> <li>Activity 4.1: Is It Really Ionic? on observing chemical reaction that causes ionic compound formation;</li> <li>Activity 4.2: Forming Shapes with Plastic Eggshells on constructing and illustrating models of atom bonding;</li> <li>Activity 4.3: Survey of Conductors on testing conductivity and relating it to its type of chemical bond;</li> <li>Activity 4.4: Magic Coins on demonstrating formation of alloy on coins; and</li> <li>Activity 4.5: Mighty Bonds on classifying substances into ionic, covalent, or metallic based on their properties</li> </ul> <ul style="list-style-type: none"> <li>Presentation of video animations about chemical bonding</li> <li>Creating a concept map or graphic organizer</li> </ul>	<p>and drills</p> <p><b>Summative</b></p> <ul style="list-style-type: none"> <li>Chapter test</li> <li>Performance task</li> </ul>	<p>years through thick and thin</p>	<ul style="list-style-type: none"> <li>LCD projector</li> <li>computer with internet connection</li> <li>slides, charts, or enlarged images</li> <li>slideshow presentations</li> <li>pictures of scientists</li> <li>video clips, animations, or articles from online sources such as             <ul style="list-style-type: none"> <li><a href="https://www.youtube.com/watch?v=XWag7trUxeo&amp;t=4s">https://www.youtube.com/watch?v=XWag7trUxeo&amp;t=4s</a></li> <li><a href="https://www.youtube.com/watch?v=PoQjsnQmxok">https://www.youtube.com/watch?v=PoQjsnQmxok</a></li> </ul> </li> </ul>
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<p><i>Binary Molecular Compounds</i></p> <p><i>Polar and Nonpolar Covalent Bonds</i></p> <p><i>Predicting Ionic and Covalent Bonds</i></p> <p><i>Predicting the Polarity of Covalent Molecules</i></p> <p><i>Properties of Covalent Compounds</i></p> <p><i>Molecular Geometry</i></p> <p><i>Metallic Bonding</i></p> <p><i>Properties of Metallic Compounds</i></p> <p><i>Metal Alloys</i></p>						
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\*\*\**Italicized texts under K to 12 Learning Competencies column are add-ons. Such marking is applied throughout the CM.*

### Chapter 5: Carbon and Its Compounds

<b>Essential Questions</b>	<ul style="list-style-type: none"> <li>Why are there many compounds of carbon?</li> <li>What is it about carbon that makes it unique?</li> <li>Why does carbon form a large number of compounds?</li> <li>How do the characteristics of carbon affect the bonds that carbon forms in a compound?</li> <li>How are organic compounds classified?</li> <li>How does a functional group affect the properties of a compound?</li> <li>Why is organic chemistry important?</li> <li>How do functional groups affect the properties of carbon compounds?</li> <li>Why are some carbon compounds useful and some are not?</li> </ul>	<b>Enduring Understandings</b>	<ul style="list-style-type: none"> <li>Carbon is one of the most important elements because all living things contain carbon compounds.</li> <li>Carbon has the ability to form one to four strong bonds with other carbon atoms to form chains. This means that a chain of carbon atoms can have many different groups attached to it leading to the formation of varieties of carbon compounds.</li> <li>Carbon exhibits <i>catenation</i>, which allows it to form bonds with straight chains, branched chains, and rings.</li> <li>There are several classes of organic compounds based on functional groups that determine the properties of a compound.</li> <li>There is a systematic way of naming organic compounds.</li> <li>Carbon is very popular for having many uses and applications. It is used as fuel and as a raw material in making plastic, and in manufacturing synthetic drugs and medicines.</li> </ul>
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Content	K to 12 Learning Competencies (MELCs included)	21st-Century Skills	Teaching Strategies/ Differentiated Instruction	Assessment	Values Integration	Resources
Characteristics of Carbon  Classes of Hydrocarbons  Properties and Uses of Hydrocarbons and Other Carbon Compounds	<b>S9MT-IIg-17</b> <span style="background-color: #0070C0; color: white; padding: 2px;">MELC</span> Explain how the structure of the carbon atom affects the type of bonds it forms  <b>S9MT-IIh-18</b> <span style="background-color: #0070C0; color: white; padding: 2px;">MELC</span> Recognize the general classes and uses of organic compounds	<b>Collaboration</b> <ul style="list-style-type: none"> <li>Working with a group to categorize structures of hydrocarbons</li> <li>Working with a group to interpret the differences in the physical properties and uses of hydrocarbons and other carbon compounds</li> <li>Playing a relay game on pointing out structures of functional groups present in organic molecules</li> </ul>	<ul style="list-style-type: none"> <li>Lecture-discussion</li> <li>Drills on solving nomenclature drills and drawing Lewis structure drills</li> <li>Individual or collaborative activities:               <ul style="list-style-type: none"> <li>categorizing structures of hydrocarbons,</li> <li>interpreting difference in physical properties and uses of carbon compounds,</li> </ul> </li> </ul>	<b>Formative</b> <ul style="list-style-type: none"> <li>Answering questions in Follow-Up</li> <li>Seatwork</li> <li>Assignment</li> <li>Quiz on properties and uses of hydrocarbons and other carbon compounds</li> </ul> <b>Summative</b> <ul style="list-style-type: none"> <li>Chapter test</li> </ul>	<ul style="list-style-type: none"> <li>Being aware of health and environmental concerns related to the use of plastic materials and management of plastic wastes</li> <li>Realizing the values of cooperation and belongingness</li> <li>Relating the way carbon affects the</li> </ul>	<ul style="list-style-type: none"> <li>materials for activities or experiments</li> <li>video clips</li> <li>graphic organizers</li> <li>LCD projector</li> <li>computer with internet connection</li> <li>flash cards</li> <li>slideshow presentation</li> <li>molecular model kit, modeling clay or ball, and sticks</li> </ul>

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<p><i>The Chemistry of Functional Groups</i></p> <p><i>Uses of Carbon Compounds: Their Societal Implication to Consumers</i></p>		<p><b>Creativity and Collaboration</b> Preparing short skits</p> <p><b>Scientific Literacy and Adaptability</b> Applying learnings by preferring products that take into consideration of health and environmental concerns</p> <p><b>Curiosity and Critical Thinking</b></p> <ul style="list-style-type: none"> <li>● Conducting research on alternative sources of fuel and energy</li> <li>● Reflecting on the disadvantages of improper use or handling of materials/substances that contain organic compounds</li> <li>● Doing research on the allowed standard for VOC and other contents in paints used by consumers in the Philippines</li> </ul> <p><b>Environmental Awareness and Civic Literacy</b> Limiting the use of plastic at home and helping the</p>	<ul style="list-style-type: none"> <li>○ relay game on pointing out functional groups in organic molecules,</li> <li>○ performing activities or experiments</li> </ul> <p>Activity 5.1: Preparation of Aspirin</p> <ul style="list-style-type: none"> <li>● Using concept maps or graphic organizers</li> </ul>	<ul style="list-style-type: none"> <li>● Performance task</li> </ul>	<p>bonds it forms to how one can influence and help other people</p>	<ul style="list-style-type: none"> <li>● video clips, animations, or articles from online sources such as             <ul style="list-style-type: none"> <li>○ <a href="http://www.youtube.com/watch?v=Ocl_DPPNNV8">http://www.youtube.com/watch?v=Ocl_DPPNNV8</a></li> <li>○ <a href="http://www.youtube.com/watch?v=Kjn5Ht0Vn30&amp;list=PL_D1rGgPr31MK6I5IAwqz0CSeFKwIZEhA">http://www.youtube.com/watch?v=Kjn5Ht0Vn30&amp;list=PL_D1rGgPr31MK6I5IAwqz0CSeFKwIZEhA</a></li> <li>○ <a href="http://www.youtube.com/watch?v=QuW4_bRHbUk">http://www.youtube.com/watch?v=QuW4_bRHbUk</a></li> </ul> </li> </ul>
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		community manage plastic wastes			
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### Chapter 6: Mole Concept

<b>Essential Questions</b>	<ul style="list-style-type: none"> <li>How can one determine the mass of an atom?</li> <li>What makes atomic mass different from molecular mass?</li> <li>How can one count extremely minute particles?</li> <li>Why is it necessary to convert one measurement to another?</li> <li>How is mole used as a quantifying unit of matter?</li> <li>How can mole be related to a more understandable amount of substance such as mass?</li> <li>How important is getting the percentage mass composition of a compound? Why?</li> <li>How do empirical and molecular formulas differ?</li> </ul>	<b>Enduring Understandings</b>	<ul style="list-style-type: none"> <li>Isotopes are variants of a particular element that have the same number of protons but different number of neutrons. The atomic mass of an element is the average of the masses of the naturally occurring isotopes of that element</li> <li>The mole is the unit used to measure the amount of a substance.</li> <li>The composition of compounds in terms of the number of atoms in their particles is shown in the chemical formula.</li> </ul>
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Content	K to 12 Learning Competencies (MELCs included)	21st-Century Skills	Teaching Strategies/ Differentiated Instruction	Assessment	Values Integration	Resources
<i>Atomic Masses and Molecular Masses</i>  <i>The Mole: A Chemist's Counting Unit</i>  <i>Molar Mass</i>  <i>Molar Conversions</i>	<b>S9MT-III-19 MELC</b> Use the mole concept to express mass of substances  <i>Solve problems involving molar conversions</i>  <b>S9MT-IIj-20 MELC</b> Determine the percentage composition of a	<b>Collaboration</b> <ul style="list-style-type: none"> <li>Peer tutoring to understand lessons and solve problems</li> <li>Working with a group to do activities or experiments</li> </ul> <b>Critical Thinking</b> <ul style="list-style-type: none"> <li>Doing activities or experiments to learn about the mole concept</li> <li>Drawing conclusions</li> </ul>	<ul style="list-style-type: none"> <li>Lecture-discussion</li> <li>Probing questions</li> <li>Problem solving drills and guided practice on stoichiometric calculation</li> <li>Conducting activities or experiments:               <ul style="list-style-type: none"> <li>Activity 6.1: Understanding the Mole on showing understanding of mole and molar mass</li> </ul> </li> </ul>	<b>Formative</b> <ul style="list-style-type: none"> <li>Answering questions in Follow-Up</li> <li>Seatwork</li> <li>Assignments</li> <li>Solving problems or guided practice</li> </ul> <b>Summative</b> <ul style="list-style-type: none"> <li>Chapter test</li> <li>Performance tasks</li> </ul>	<ul style="list-style-type: none"> <li>Realizing the significance of using standard units in aiming for consistency and accuracy</li> <li>Allotting time wisely for every aspect of one's life</li> <li>Recognizing the importance of time and consistency in doing a task</li> </ul>	<ul style="list-style-type: none"> <li>materials for activities or experiments</li> <li>graphic organizers</li> <li>LCD projector</li> <li>computer with internet connection</li> <li>slides, charts, or enlarged images</li> <li>slideshow presentations</li> <li>video clips, animations, or articles from online</li> </ul>



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<p><i>Mass Percentage Composition</i></p> <p><i>Empirical and Molecular Formulas</i></p>	<p>compound given its chemical formula and vice versa</p> <p><i>Solve problems involving atomic and molecular masses</i></p>	<p><b>Curiosity</b></p> <ul style="list-style-type: none"> <li>• Doing an extended research on the biography of Amadeo Avogadro</li> <li>• Doing a research about common products that contain freon and solutions to minimize their use</li> </ul> <p><b>Problem Solving and Scientific Literacy</b></p> <ul style="list-style-type: none"> <li>• Showing and applying understanding of the mole concept</li> </ul> <p><b>Adaptability</b> Managing one's time as a student</p> <p><b>Communication</b></p> <ul style="list-style-type: none"> <li>• Answering questions</li> <li>• Sharing experiences and insights</li> </ul> <p><b>Career</b> Associate science concepts with solving criminal cases in forensic science</p>	<p>through analogy using a model; and</p> <ul style="list-style-type: none"> <li>○ Activity 6.2: Mole in a Crystal on determining the mass of water and converting mass into moles</li> </ul> <ul style="list-style-type: none"> <li>• Doing extended research on a scientist's biography</li> <li>• Collaborative activity on doing tasks on understanding mole and molar mass concepts</li> <li>• Using concept maps or graphic organizers</li> </ul>		<ul style="list-style-type: none"> <li>• Recognizing negative attitudes such as ningas-kugon and Filipino time that should be avoided</li> <li>• Giving importance to great and small things in life</li> <li>• Applying the meanings of dictums such as "an ounce of prevention is better than a pound of cure" and "a journey of thousand miles begins with a single step"</li> </ul>	<p>sources such as <a href="http://www.enchantedlearning.com/graphicorganizers/">http://www.enchantedlearning.com/graphicorganizers/</a></p>
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## 3rd Quarter

<b>Unit 3: Earth and Space</b>		<b>Time Frame: 40 hours</b>	
<b>Content Standards*</b>	The learners demonstrate an understanding of . . . <ul style="list-style-type: none"> <li>volcanoes found in the Philippines;</li> <li>factors that affect climate, and the effects of changing climate and how to adapt accordingly; and</li> <li>the relationship between the visible constellations in the sky and Earth’s position along its orbit.</li> </ul>	<b>Performance Standards*</b>	The learners should be able to . . . <ul style="list-style-type: none"> <li>participate in activities that reduce risks and lessen effects of climate change; and</li> <li>discuss whether or not popular beliefs and practices with regard to constellations and astrology have scientific basis.</li> </ul>

*\*Italicized text for **Content Standards** and **Performance Standards** are add-on ones from the TG. This is applied throughout the CM.*

<b>Chapter 7: Volcanoes and the Interior of the Earth</b>			
<b>Essential Questions**</b>	<ul style="list-style-type: none"> <li>How can the nature of volcanic eruption be explained so that people can take necessary precaution?</li> <li>How can information about the interior of Earth provided by volcanoes become useful?</li> <li>Do volcanoes give renewable energy source for human use? How can people make use of this energy?</li> <li>How do the knowledge and understanding of the processes and materials associated with volcanic activities prepare people from the catastrophic effects of volcanic eruptions?</li> </ul>	<b>Enduring Understandings**</b>	<ul style="list-style-type: none"> <li>Volcanoes may be classified in terms of their behavior, eruptive patterns, and characteristic forms.</li> <li>The primary factors that determine the strength of volcanic eruptions include the magma’s temperature, its composition, and the amount of dissolved gases it contains.</li> <li>The most important sign of an impending volcanic eruption is seismic activity beneath the volcanic area.</li> <li>Understanding the nature and important signs of an impending volcanic eruption will guide people in advocating for disaster response preparedness and make informed decisions based on declared permanent danger zones around active volcanoes.</li> <li>The internal heat associated with young volcanic systems has been harnessed to produce geothermal energy.</li> </ul>

*\*\* Contents for **Essential Questions (EQ)** and **Enduring Understandings (EU)** are set per unit in the textbook and by chapter in the teachers guide. The text under **Big Ideas** in the TG were considered for EU. Hence, these were integrated in the table above and not within each lesson in the CM. Furthermore, some EQs and EUs have come from the WT or are author-provided; these were considered as long as they are developed in the WT/TG content.*

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Content	K to 12 Learning Competencies (MELCs included)***	21st-Century Skills	Teaching Strategies/ Differentiated Instruction	Assessment	Values Integration	Resources
<p><i>Formation of Volcanoes</i></p> <p><i>Classification of Volcanoes Based on Behavior</i></p> <p><i>Classification of Volcanoes Based on Eruptive Patterns and Characteristic Forms</i></p> <p><i>Nature of Volcanic Eruptions</i></p> <p><i>Theories of Volcanic Eruptions</i></p> <p><i>Strength of Volcanic Eruptions</i></p> <p><i>Effects of Volcanic Eruptions</i></p> <p><i>Signs of an Impending Volcanic Eruption</i></p>	<p><b>S9ES -IIIa-25</b> Describe the different types of volcanoes</p> <p><b>MELC</b> Describe the different types of volcanoes and volcanic eruption</p> <p><b>S9ES-IIIa-27</b> Differentiate between active and inactive volcanoes</p> <p><i>Identify the volcanoes in your community or region</i></p> <p><b>S9ES -IIIb-28 MELC</b> Explain what happens when volcanoes erupt</p> <p><i>Use models or illustrations to explain what happens when volcanoes erupt</i></p> <p><b>S9ES-IIIc-d-29 MELC</b> Illustrate how energy from volcanoes may be tapped for human use</p>	<p><b>Communication</b> Explaining or discussing answers to questions</p> <p><b>Collaboration</b></p> <ul style="list-style-type: none"> <li>Studying about active volcanoes</li> <li>Creating graphic organizers</li> <li>Performing an activity or experiment simulating a volcanic eruption</li> </ul> <p><b>Critical Thinking</b></p> <ul style="list-style-type: none"> <li>Making inferences and analogies about volcanic eruptions and their role in global climate change patterns</li> <li>Comparing and contrasting active, potentially active, and inactive volcanoes</li> </ul> <p><b>Scientific Literacy</b></p> <ul style="list-style-type: none"> <li>Understanding and applying learnings on volcanoes</li> <li>Making informed decisions on a course</li> </ul>	<ul style="list-style-type: none"> <li>Lecture-discussion</li> <li>Blended learning</li> <li>Think-Pair-Share on reading and discussing the chapter introduction, objectives, and focus</li> <li>Using KWL (What I Know, What I Want to Learn, What I Did Learn) to pose essential questions</li> <li>Gallery walk on showcasing graphic organizers about volcanoes</li> <li>Collaborative activities: studying about volcanoes; doing Activity 7.1 Making A Model Volcano</li> <li>Video presentations on volcanoes</li> <li>Read-aloud and study of an article about the Pacific Ring of Fire</li> <li>Graphic organizers about volcanoes</li> </ul>	<p><b>Formative</b></p> <ul style="list-style-type: none"> <li>Answering questions in Follow-Up</li> <li>Seatwork</li> <li>Assignments</li> </ul> <p><b>Summative</b></p> <ul style="list-style-type: none"> <li>Chapter test</li> <li>Performance task</li> </ul>	<ul style="list-style-type: none"> <li>Promoting resiliency during difficult moments</li> <li>Recognizing the values of urgency and alertness</li> <li>Realizing that emergency preparedness is helpful in preventing damages and loss of lives</li> </ul>	<ul style="list-style-type: none"> <li>materials for activities or experiments</li> <li>video clips</li> <li>geological maps</li> <li>volcanic eruption illustration</li> <li>LCD projector</li> <li>computer with internet connection</li> <li>models of types of volcanoes</li> <li>slides, charts, or posters</li> <li>slideshow presentations</li> <li>video clips, animations, or articles from online sources <ul style="list-style-type: none"> <li><a href="https://www.youtube.com/watch?v=NGcbNn4Vk1w">https://www.youtube.com/watch?v=NGcbNn4Vk1w</a></li> <li><a href="https://www.youtube.com/watch?v=VNGUdObDoLk">https://www.youtube.com/watch?v=VNGUdObDoLk</a></li> <li><a href="https://www.youtube.com/watch?v=kAlawvE8IVw">https://www.youtube.com/watch?v=kAlawvE8IVw</a></li> <li><a href="http://pubs.usgs.gov/fs/fs002-97/images/volcB_Meyers.png">http://pubs.usgs.gov/fs/fs002-97/images/volcB_Meyers.png</a></li> </ul> </li> </ul>

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<p><i>Emergency Preparedness</i></p>	<p><i>Describe the processes and materials associated with volcanic eruptions</i></p> <p><i>Demonstrate precautionary measures before, during, and after a volcanic eruption</i></p>	<p>of action to take during a volcanic eruption</p> <p><b>Social Awareness</b> Planning for emergency situations</p> <p><b>Leadership</b> Taking the lead in planning for emergency situations</p> <p><b>ICT Literacy</b> Visiting websites to watch video clips</p> <p><b>Creativity</b> Visualizing how eruptive patterns affect the forms of volcanoes</p> <p><b>Career</b> Learning about volcanoes and considering a career in geology</p>				<ul style="list-style-type: none"> <li>○ <a href="http://www.youtube.com/watch?v=SMe0VPQftsc">http://www.youtube.com/watch?v=SMe0VPQftsc</a></li> <li>○ <a href="http://www.youtube.com/watch?v=VpBbiCG-7s">http://www.youtube.com/watch?v=VpBbiCG-7s</a></li> <li>○ <a href="http://www.youtube.com/watch?v=74QkHh45bjw">http://www.youtube.com/watch?v=74QkHh45bjw</a></li> <li>○ <a href="https://www.youtube.com/watch?v=BEr9INBDBGk">https://www.youtube.com/watch?v=BEr9INBDBGk</a></li> <li>○ <a href="https://www.youtube.com/watch?v=ywifHuXYVBI">https://www.youtube.com/watch?v=ywifHuXYVBI</a></li> <li>○ <a href="https://www.youtube.com/watch?v=2ek8nfXy-cg">https://www.youtube.com/watch?v=2ek8nfXy-cg</a></li> </ul>
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\*\*\**Italicized texts under K to 12 Learning Competencies column are add-ons. Such marking is applied throughout the CM.*

<b>Chapter 8: Climate</b>			
<b>Essential Questions</b>	<ul style="list-style-type: none"> <li>• How can weather and climate be differentiated?</li> <li>• How do the factors in an area influence the climate classification?</li> <li>• How does the climate of an area affect the kinds of vegetation it has?</li> <li>• How do human activities affect climate?</li> <li>• How does high concentration of carbon dioxide in the atmosphere affect the world's temperature?</li> </ul>	<b>Enduring Understandings</b>	<ul style="list-style-type: none"> <li>• Climate is influenced by temperature and precipitation. Temperature is influenced by factors such as latitude, altitude, distance from the sea, and ocean currents. Precipitation is affected by the prevailing winds and the presence of mountains.</li> <li>• Climate change includes increasing global temperature, rising sea levels, and having more extreme weather events.</li> <li>• To minimize the risks caused by the consequences of climate change, adaptation measures should be planned in advance.</li> </ul>

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	<ul style="list-style-type: none"> <li>• How does climate change affect your life?</li> <li>• Why is the study of climate important?</li> <li>• How must people adapt to the effects of climate change?</li> </ul>		<ul style="list-style-type: none"> <li>• One should be more resilient in times of difficult conditions brought about by climate change. It is important to plan for the changes that are expected to occur.</li> </ul>
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Content	K to 12 Learning Competencies (MELCs included)	21st-Century Skills	Teaching Strategies/ Differentiated Instruction	Assessment	Values Integration	Resources
<p><i>Weather and Climate</i></p> <p><i>Classification of Climate</i></p> <p><i>Factors Affecting Climate</i></p> <p><i>Global Climate Phenomena</i></p> <p><i>Effects of Climate Change</i></p>	<p><b>S9ES-IIIe-30 MELC</b> Explain how different factors affect the climate of an area</p> <p><i>Cite the importance of studying climate</i></p> <p><i>Describe the five major classifications of climates and their characteristics</i></p> <p><i>Determine the type of climate in an area</i></p> <p><b>S9ES-III f-31 MELC</b> Describe certain climatic phenomena that occur on a global level</p> <p><i>List some effects of climate change</i></p> <p><i>Identify some</i></p>	<p><b>Communication</b> Explaining answers to questions</p> <p><b>Collaboration</b></p> <ul style="list-style-type: none"> <li>• Working with a group to do an activity</li> <li>• Playing a short tableau game to depict a usual scenario in a given climate</li> <li>• Discussing with a group the answers to the Essential Questions</li> </ul> <p><b>Critical thinking</b></p> <ul style="list-style-type: none"> <li>• Determining the effects of humidity</li> <li>• Analyzing the effects of a factor on the climate in an area</li> <li>• Drawing conclusions</li> </ul> <p><b>Scientific Literacy, Initiative, Adaptability, and Leadership</b></p>	<ul style="list-style-type: none"> <li>• Lecture-discussion</li> <li>• Collaborative activities: short tableau game, answering the essential questions, and experiments               <ul style="list-style-type: none"> <li>○ Activity 8.1: Modeling a Humid Climate on determining how temperature affects the humidity of the surroundings;</li> <li>○ Activity 8.2 Factors Affecting Climate</li> </ul> </li> <li>• Cooperative learning: circle talk on expressing thoughts about adapting to climate change</li> <li>• Presentation of video clips about climate</li> </ul>	<p><b>Formative</b></p> <ul style="list-style-type: none"> <li>• Answering questions in Follow-Up</li> <li>• Seatwork</li> <li>• Assignments</li> <li>• Quiz on factors affecting climate</li> </ul> <p><b>Summative</b></p> <ul style="list-style-type: none"> <li>• Chapter test</li> <li>• Performance task</li> </ul>	<ul style="list-style-type: none"> <li>• Recognizing the economic and environmental impact of fighting climate change phenomena</li> <li>• Realizing the responsibility in taking care of the surroundings</li> </ul>	<ul style="list-style-type: none"> <li>• materials for activities or experiments</li> <li>• video animations</li> <li>• video clip</li> <li>• LCD projector</li> <li>• computer with internet connection</li> <li>• slides or enlarged images</li> <li>• world map</li> <li>• globe</li> <li>• video clips, animations, or articles from online sources               <ul style="list-style-type: none"> <li>○ <a href="http://www.youtube.com/watch?v=dC_2WXyORGA">http://www.youtube.com/watch?v=dC_2WXyORGA</a></li> <li>○ <a href="http://www.youtube.com/watch?v=W7a-Hs9UxYo">http://www.youtube.com/watch?v=W7a-Hs9UxYo</a></li> <li>○ <a href="http://climate.nasa.gov/">http://climate.nasa.gov/</a></li> <li>○ <a href="http://environment.nationalgeographic.com">http://environment.nationalgeographic.com</a></li> </ul> </li> </ul>

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	<p><i>solutions to solve climate change on a global level</i></p> <p><i>Cite activities that reduce the risks and harmful effects of climate change</i></p> <p><i>Explain how one adapts to the effects of changing climates</i></p>	<ul style="list-style-type: none"> <li>• Suggesting planning tools and strategies to aid sustainability of reforestation projects</li> <li>• Making informed decisions on what one can do regarding climate change</li> </ul> <p><b>ICT Literacy</b> Visiting links/websites to watch videos</p> <p><b>Civic Literacy and Environmental Awareness</b> Conducting a lecture presentation on climate change to a community</p>				<p><i>com/environment/global-warming/</i></p> <ul style="list-style-type: none"> <li>○ <a href="https://www.youtube.com/watch?v=_Tuou_Qc9xl">https://www.youtube.com/watch?v=_Tuou_Qc9xl</a></li> <li>○ <a href="https://www.youtube.com/watch?v=LKMPpSPdczk">https://www.youtube.com/watch?v=LKMPpSPdczk</a></li> <li>○ <a href="https://www.youtube.com/watch?v=fAvk4RXrW_E">https://www.youtube.com/watch?v=fAvk4RXrW_E</a></li> <li>○ <a href="https://www.youtube.com/watch?v=PknFWSQOx9Q">https://www.youtube.com/watch?v=PknFWSQOx9Q</a></li> <li>○ <a href="https://www.youtube.com/watch?v=wVlfyhs64IY">https://www.youtube.com/watch?v=wVlfyhs64IY</a></li> <li>○ <a href="https://homedesignlover.com/architecture/eco-friendly-green-homes/">https://homedesignlover.com/architecture/eco-friendly-green-homes/</a></li> </ul>
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### Chapter 9: Stars and Constellations

<b>Essential Questions</b>	<ul style="list-style-type: none"> <li>• How are stars different from other heavenly bodies such as planets, meteors, and comets?</li> <li>• How do stars develop and change through time?</li> <li>• Why do stars appear to change in position through time?</li> <li>• How does Earth's rotation affect the positions of the stars across the sky?</li> <li>• How can constellations help in navigation and prediction of seasonal changes?</li> <li>• Using the characteristics of the Sun as basis, what are the inferences that can be gathered about other stars?</li> </ul>	<b>Essential Understandings</b>	<ul style="list-style-type: none"> <li>• Stars are large heavenly bodies primarily composed of gas and plasma capable of emitting different forms of energy such as heat and light. They only appear small because of their vast distance from Earth.</li> <li>• Stars undergo different stages of development, which may encompass billions of years. At the different stages, stars change their properties, specifically temperature, color, and size.</li> <li>• The equatorial coordinate system divides the celestial sphere into coordinates to keep track of the positions of the cosmic bodies in the sky.</li> <li>• Constellations are observable patterns of stars in the sky. Currently, constellations are used as maps or calendars, which</li> </ul>
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	<ul style="list-style-type: none"> <li>How are stars classified?</li> <li>How long do stars live?</li> </ul>		are helpful in determining locations and seasonal changes.
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Content	K to 12 Learning Competencies (MELCs included)	21st-Century Skills	Teaching Strategies/ Differentiated Instruction	Assessment	Values Integration	Resources
<p><i>Stars</i></p> <p><i>Constellations</i></p> <p><i>The Equatorial System</i></p>	<p><b>S9ES-IIIg-32</b> Infer the characteristics of stars based on the characteristics of the Sun</p> <p><i>Compare the Sun in size and brightness to other main-sequence stars</i></p> <p><b>S9ES-IIIh-33</b> Infer that the arrangement of stars in a group (constellation) does not change</p> <p><b>S9ES-IIIi-34</b> Observe that the position of a constellation changes in the course of a night</p> <p><b>S9ES-IIIj-35</b> <span style="background-color: #000080; color: white; padding: 2px;">MELC</span> Show which constellations may be observed at different</p>	<p><b>Communication</b></p> <ul style="list-style-type: none"> <li>Explaining answers to questions</li> <li>Reporting research findings</li> </ul> <p><b>Collaboration</b> Doing storytelling or skit presentation about mythological characters</p> <p><b>Critical Thinking</b></p> <ul style="list-style-type: none"> <li>Drawing conclusions</li> <li>Predicting what will happen to the Sun and the Earth's inhabitants as the Sun undergoes changes</li> <li>Doing a research on the myths behind constellations</li> </ul> <p><b>Scientific Literacy</b> Making informed decisions in applying understanding of stars and constellations</p> <p><b>ICT Literacy</b> Visiting websites/links to watch videos</p>	<ul style="list-style-type: none"> <li>Lecture-discussion</li> <li>Collaborative activities: storytelling or skit presentation about mythological characters; constellation search by looking for stellar patterns and tracing them on star maps; and observing constellations in the night sky</li> <li>Activities or experiments               <ul style="list-style-type: none"> <li>Activity 9.1 Model of a Black Hole on using a model to determine the effect of a black hole to the objects surrounding it; and</li> <li>Activity 9.2 Interactive Night-Sky Map on identifying and observing changes in positing of constellations in the night sky</li> </ul> </li> <li>Demonstration of stellar evolution</li> <li>Research work</li> </ul>	<p><b>Formative</b></p> <ul style="list-style-type: none"> <li>Answering questions in Follow-Up</li> <li>Seatwork</li> <li>Assignments</li> <li>Identifying star patterns</li> </ul> <p><b>Summative</b></p> <ul style="list-style-type: none"> <li>Chapter test</li> <li>Performance task</li> </ul>	<ul style="list-style-type: none"> <li>Discipline in caring for Mother Earth</li> <li>Humility at realizing that there are things far greater than Earth</li> <li>Wisdom in making decisions</li> </ul>	<ul style="list-style-type: none"> <li>materials for activities or experiments</li> <li>celestial map application</li> <li>LCD projector</li> <li>computer with internet connection</li> <li>Bunsen burner</li> <li>video clips, animations, or articles from online sources such as               <ul style="list-style-type: none"> <li><a href="http://science.nationalgeographic.com/science/space/universe/stars-article">http://science.nationalgeographic.com/science/space/universe/stars-article</a></li> <li><a href="http://www.nasa.gov/home/index.html">http://www.nasa.gov/home/index.html</a></li> <li><a href="http://www.universetoday.com/39974/hertzprung-russell-diagram">http://www.universetoday.com/39974/hertzprung-russell-diagram</a></li> <li><a href="http://imagine.gsfc.nasa.gov/docs/teachers/lifecycles/Imagine2.pdf">http://imagine.gsfc.nasa.gov/docs/teachers/lifecycles/Imagine2.pdf</a></li> <li><a href="http://www.windowsontheuniverse.org/the_universe/Constell">http://www.windowsontheuniverse.org/the_universe/Constell</a></li> </ul> </li> </ul>

	<p>times of the year using models</p> <p><i>Use a model to show how constellations may be observed at different times of the year</i></p> <p><i>Relate the influence of distant heavenly bodies to the beliefs and practices</i></p>	<p><b>Environmental Awareness</b> Contributing to the reduction of light pollution affects organisms and the environment and helping to solve or limit it</p>				<p><i>ations/constrnavi.html</i></p> <ul style="list-style-type: none"> <li>○ <i>http://www.universe today.com/19516/c onstellations</i></li> <li>○ <i>http://planetquest.jp l.nasa.gov</i></li> <li>○ <i>https://solarsystem. nasa.gov/missions/ kepler/in-depth/</i></li> </ul>
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## 4th Quarter

<b>Unit 4: Force, Motion, and Energy</b>		<b>Time Frame: 50 hours</b>	
<b>Content Standards*</b>	<p>The learners demonstrate an understanding of . . .</p> <ul style="list-style-type: none"> <li>● projectile motion, impulse and momentum, and conservation of linear momentum;</li> <li>● conservation of mechanical energy;</li> <li>● the relationship among heat, work, and efficiency;</li> <li>● generation, transmission, and distribution of electrical energy from power plants (hydroelectric, geothermal, wind, nuclear) to home;</li> <li>● <i>sound resonance, interference, and basic acoustics;</i></li> <li>● <i>light through various media;</i> and</li> <li>● <i>nature and applications of electromagnetism.</i></li> </ul>	<b>Performance Standards*</b>	<p>The learners should be able to . . .</p> <ul style="list-style-type: none"> <li>● propose ways to enhance sports related to projectile motion;</li> <li>● create a device that shows conservation of mechanical energy;</li> <li>● analyze how power plants generate and transmit electrical energy;</li> <li>● <i>advocate road safety;</i></li> <li>● <i>manage energy sources suitable to one's lifestyle;</i> and</li> <li>● <i>choose appropriate materials for a specific function.</i></li> </ul>

\* *Italicized text for Content Standards and Performance Standards are add-on ones from the TG. This is applied throughout the CM.*



# CURRICULUM MAP

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### Chapter 10: Projectile and Momentum

<b>Essential Questions**</b>	<ul style="list-style-type: none"> <li>How does gravitational force affect the motion of projectiles?</li> <li>How can vertical velocity and horizontal velocity be differentiated?</li> <li>Why is it hard to stop an object that is in the state of momentum?</li> <li>How do the mass and acceleration of an object affect its net force?</li> <li>How is impulse related to momentum?</li> <li>What makes collision and explosion different?</li> </ul>	<b>Essential Understandings**</b>	<ul style="list-style-type: none"> <li>Projectiles follow a curved path called <i>trajectory</i>. Their speed is affected by gravitational force. Their upward vertical speed is equal to their downward vertical speed. The sports equipment that are usually thrown by a player to hit a target are all examples of projectiles.</li> <li>An object that is in the state of momentum is hard to stop unless significant amount of force is applied against it. The more intense the momentum, the harder to put an object to rest. The mass and velocity of an object determine the momentum. The force applied and the time involved determine the impulse.</li> <li>The momentum before collision is equal to the momentum after collision. Thus, momentum is conserved.</li> </ul>
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\*\* Contents for **Essential Questions (EQ)** and **Enduring Understandings (EU)** are set per unit in the textbook and by chapter in the teachers guide. The text under *Big Ideas* in the TG were considered for EU. Hence, these were integrated in the table above and not within each lesson in the CM. Furthermore, some EQs and EUs have come from the WT or are author-provided; these were considered as long as they are developed in the WT/TG content.

Content	K to 12 Learning Competencies (MELCs included)***	21st-Century Skills	Teaching Strategies/ Differentiated Instruction	Assessment	Values Integration	Resources
<i>Projectile Motion</i>  <i>Real-Life Applications Involving Projectile Motion</i>  <i>Momentum and Impulse</i>  <i>Conservation of Momentum in</i>	<b>S9FE-IVa-34</b> <span style="background-color: #0070C0; color: white; padding: 2px;">MELC</span> Describe the horizontal and vertical motions of a projectile  <b>S9FE-IVa-35</b> <span style="background-color: #0070C0; color: white; padding: 2px;">MELC</span> Investigate the relationship between the angle of release and the height and range of the projectile	<b>Critical Thinking</b> <ul style="list-style-type: none"> <li>Analyzing data from activities or experiments</li> <li>Drawing conclusions</li> <li>Gathering accurate data</li> </ul> <b>Problem Solving</b> Solving problems on projectile motion and momentum and collision	<ul style="list-style-type: none"> <li>Lecture-discussion</li> <li>Collaborative activities: Aim High or Low on shooting objects with a slingshot; peer tutoring on solving problems; calculating impulse and momentum; and demonstrating conservation of linear momentum</li> <li>Explicit teaching with a series of guided practice</li> </ul>	<b>Diagnostic</b> Test/Quiz to assess prior knowledge  <b>Formative</b> <ul style="list-style-type: none"> <li>Answering questions in Follow-Up</li> <li>Seatwork</li> <li>Assignments</li> <li>Test/quiz on solving projectile motion and collision</li> </ul>	<ul style="list-style-type: none"> <li>Realizing the values of patience, self-control, and persistence</li> <li>Applying patience in traffic situations and in daily encounters with others</li> </ul>	<ul style="list-style-type: none"> <li>materials for activities or experiments</li> <li>collision simulations</li> <li>video clips</li> <li>graphic organizers</li> <li>LCD projector</li> <li>computer with internet connection</li> <li>slides, charts, or enlarged images of what are shown on the pages of the TX</li> <li>slideshow</li> </ul>

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<p><i>Collisions and Explosions</i></p>	<p><i>Solve problems involving horizontal or angled projectile motion</i></p> <p><b>S9FE-IVb-36</b> <span style="background-color: #0056b3; color: white; padding: 2px;">MELC</span> Relate impulse and momentum to collision of objects (e.g., vehicular collision)</p> <p><b>S9FE-IVb-37</b> <span style="background-color: #0056b3; color: white; padding: 2px;">MELC</span> Infer that the total momentum before and after collision is equal</p> <p><b>S9FE-IVc-38</b> Examine effects and predict causes of collision-related damages/injuries</p> <p><i>Analyze factors required to produce a change in momentum</i></p> <p><i>Analyze one-dimensional elastic and inelastic collisions and explosion situations</i></p>	<p><b>Numeracy</b> Interpreting and predicting outcomes</p> <p><b>Scientific Literacy</b></p> <ul style="list-style-type: none"> <li>• Demonstrating understanding of how improved technology lessens the occurrence of high-impact collisions</li> <li>• Making informed decisions by applying concepts in sports and by observing traffic safety</li> </ul> <p><b>Curiosity</b> Investigating applications of projectile motion and momentum in daily life</p> <p><b>Communication</b></p> <ul style="list-style-type: none"> <li>• Sharing experiences and insights</li> <li>• Explaining and justifying answers</li> </ul> <p><b>ICT Literacy</b></p> <ul style="list-style-type: none"> <li>• Visiting links/websites to watch videos</li> <li>• Accessing graphic organizers from websites</li> </ul>	<p>problem solving on projectile and momentum</p> <ul style="list-style-type: none"> <li>• Activities or experiments: <ul style="list-style-type: none"> <li>○ Activity 10.1 How Long, How Far on determining height, time, and range of horizontal projectile;</li> <li>○ Activity 10.2 Go Skateboard on calculating impulse and momentum; and</li> <li>○ Activity 10.3 Let's Separate! on showing conservation of linear momentum in explosion</li> </ul> </li> <li>• Use of concept maps or graphic organizers</li> <li>• Presentation of videos of collisions</li> </ul>	<p>problems</p> <p><b>Summative</b></p> <ul style="list-style-type: none"> <li>• Chapter test</li> <li>• Performance task</li> </ul>	<p>presentations</p> <ul style="list-style-type: none"> <li>• video clips, animations, or articles from online sources such as <ul style="list-style-type: none"> <li>○ <a href="http://www.youtube.com/watch?v=08yTxXVQR1Y">http://www.youtube.com/watch?v=08yTxXVQR1Y</a></li> <li>○ <a href="https://www.youtube.com/watch?v=Y2sjYOGSV7E">https://www.youtube.com/watch?v=Y2sjYOGSV7E</a></li> </ul> </li> </ul>
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		<p><b>Environmental Awareness</b> Suggesting alternatives to minimize pollution and toxicity in the surroundings caused by fireworks</p>			
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\*\*\**Italicized texts under K to 12 Learning Competencies column are add-ons. Such marking is applied throughout the CM.*

### Chapter 11: Work, Power, and Energy

<b>Essential Questions</b>	<ul style="list-style-type: none"> <li>How are force and distance related to work?</li> <li>Why does it require greater amount of force going up than going down the stairs?</li> <li>How are power and work related?</li> <li>How are energy and force related?</li> <li>How does change in potential energy affect kinetic energy and vice versa?</li> <li>How is mechanical energy conserved?</li> <li>How do principles of work, power, and energy affect your daily life?</li> <li>How do you know if an object has energy?</li> <li>How do work, power, and energy relate to force?</li> </ul>	<b>Essential Understandings</b>	<ul style="list-style-type: none"> <li>The work done on an object is the product of the average force exerted on it and the distance travelled in the direction of that force. Force and distance should be in the same direction for work to be done.</li> <li>Power is the rate of doing work. A person or a machine with greater power has the capacity of doing greater amount of work or the capability of finishing the same task at lesser amount of time.</li> <li>Power is inversely proportional to the length of time the work is done and directly proportional to the amount of work done.</li> <li>Energy is the capacity to do work. The chemical potential energy stored in the body of a person and the fuel used to run a machine can be spent to perform work. In this mechanism, the one who does the work transfers mechanical energy to the object on which the work is done. Energy cannot be created nor destroyed but can only be transformed.</li> </ul>
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Content	K to 12 Learning Competencies (MELCs included)	21st-Century Skills	Teaching Strategies/ Differentiated Instruction	Assessment	Values Integration	Resources
<i>Work</i>  <i>Power</i>  <i>Energy</i>	<p><b>S9FE-IVc-39</b> Explain energy transformation in various activities or events (e.g.,</p>	<p><b>Problem Solving</b></p> <ul style="list-style-type: none"> <li>Computing and comparing power outputs</li> </ul>	<ul style="list-style-type: none"> <li>Lecture-discussion</li> <li>Collaborative activities: game of Charades and peer tutoring</li> </ul>	<p><b>Diagnostic</b> Test to assess prior knowledge</p>	<ul style="list-style-type: none"> <li>Being responsible in using of power</li> <li>Realizing the values of industriousness</li> </ul>	<ul style="list-style-type: none"> <li>materials for activities or experiments</li> <li>pictures of people doing different jobs</li> </ul>

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	<p>waterfalls, archery, amusement rides)</p> <p><b>S9FE-IVd-40</b> Perform activities to demonstrate conservation of mechanical energy</p> <p><b>S9FE-IVe-41</b> Infer that the total mechanical energy remains the same during any process</p> <p><b>S9FE-IVe-42</b> <span style="background-color: #0056b3; color: white; padding: 2px;">MELC</span> Construct a model to demonstrate that heat can do work</p> <p><i>Relate the concept of work and power to energy</i></p> <p><i>Explain how different types of mechanical energy change from one form to another</i></p> <p><i>Use the equation for conservation of energy in solving problems involving potential and kinetic energy</i></p>	<ul style="list-style-type: none"> <li>● Calculating potential energy and kinetic energy</li> </ul> <p><b>Critical Thinking</b> Drawing conclusions</p> <p><b>Numeracy</b> Interpreting and using gathered data to calculate and solve given problems</p> <p><b>Curiosity</b> Investigating applications of power and energy through activities or experiments</p>	<ul style="list-style-type: none"> <li>● Activities or experiments: <ul style="list-style-type: none"> <li>○ Activity 11.1 Power Up or Down on computing and comparing power outputs in going up and down the stairs</li> <li>○ Activity 11.2 Kinetic Energy and Potential Energy of Dropped Balls on calculating potential and kinetic energies of different kinds of balls dropped from a constant height</li> </ul> </li> <li>● Guided practice on problem solving or calculations</li> </ul>	<p><b>Formative</b></p> <ul style="list-style-type: none"> <li>● Answering questions in Follow-Up</li> <li>● Problem solving</li> <li>● Seatwork</li> <li>● Assignments</li> </ul> <p><b>Summative</b></p> <ul style="list-style-type: none"> <li>● Chapter test</li> <li>● Performance task</li> </ul>	<p>and willingness to do work at home, in school, and in the community</p> <ul style="list-style-type: none"> <li>● Realizing the importance of conserving energy at home and in school</li> </ul>	<ul style="list-style-type: none"> <li>● graphic organizers</li> <li>● LCD projector</li> <li>● computer with internet connection</li> <li>● slides, charts, or enlarged versions of images in the TX</li> <li>● slideshow presentations</li> <li>● pieces of paper</li> <li>● marker</li> <li>● video clips, animations, or articles from online sources <ul style="list-style-type: none"> <li>○ <a href="https://www.google.com.ph/search?q=images+of+different+jobs&amp;tbm=isch&amp;tbo=u&amp;source=univ&amp;sa=X&amp;ei=6jWXUra2C4K0rAfiiIGwDg&amp;sqi=2&amp;ved=0CCcQsA">https://www.google.com.ph/search?q=images+of+different+jobs&amp;tbm=isch&amp;tbo=u&amp;source=univ&amp;sa=X&amp;ei=6jWXUra2C4K0rAfiiIGwDg&amp;sqi=2&amp;ved=0CCcQsA</a></li> <li>○ <a href="https://www.google.com.ph/search?q=images+of+different+jobs&amp;tbm=isch&amp;tbo=u&amp;source=univ&amp;sa=X&amp;ei=6jWXUra2C4K0rAfiiIGwDg&amp;sqi=2&amp;ved=0CCcQsA">Q&amp;biw=1680&amp;bih=948</a></li> </ul> </li> </ul>
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### Chapter 12: Energy at Home and in the Environment

<b>Essential Questions</b>	<ul style="list-style-type: none"> <li>How are sounds generated?</li> <li>How do reflection, refraction, and diffraction of sound differ?</li> <li>How are sound, light, heat, and electrical energies helpful? How are they harmful?</li> <li>How important are the senses of sight and hearing?</li> <li>How does one see an object?</li> <li>In what ways can heat be transferred from one body to another?</li> <li>How does a power plant generate electrical energy?</li> </ul>	<b>Essential Understandings</b>	<ul style="list-style-type: none"> <li>Sound is a wave caused by a series of disturbances of vibrations in some media. It has corresponding frequency when it is generated from a vibrating source. Resonance is a sound phenomenon that occurs when the frequency of one vibrating body matches the natural frequency of the other body.</li> <li>One can see an object when the object is the source of light or when a source of light hits an object one is looking, where light is reflected and goes to the eye of the observer.</li> <li>Heat is the energy that transfers from one body to another due to difference in temperature. By nature, heat transfers spontaneously from the hotter body to the colder one.</li> <li>Studying thermodynamics helps in understanding heat through its relationship with mechanical work, pressure, and temperature, and its role in energy transformation.</li> </ul>
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Content	K to 12 Learning Competencies (MELCs included)	21st-Century Skills	Teaching Strategies/ Differentiated Instruction	Assessment	Values Integration	Resources
<i>Sound</i>  <i>Light</i>  <i>Heat and Thermodynamics</i>  <i>Electrical Energy Generation and Transformation</i>	<i>Demonstrate understanding of resonance and interference</i>  <i>Explain how resonance causes sound production in musical instrument</i>  <i>Demonstrate the propagation of light in different media</i>	<b>Critical Thinking or Problem Solving, and Literacy and Numeracy</b> <ul style="list-style-type: none"> <li>Doing calculations on problems on photometry, heat, and energy</li> <li>Drawing conclusions</li> </ul>	<ul style="list-style-type: none"> <li>Lecture-discussion</li> <li>Collaborative activity: extended research on how different natural power sources have been generating electricity; presenting how power plants generate and transform energy; peer tutoring on understanding lessons and solving problems; and doing activities or</li> </ul>	<b>Diagnostic</b> Test to assess prior knowledge  <b>Formative</b> <ul style="list-style-type: none"> <li>Answering questions in Follow-Up</li> <li>Seatwork</li> <li>Assignments</li> </ul> <b>Summative</b> <ul style="list-style-type: none"> <li>Chapter test</li> </ul>	<ul style="list-style-type: none"> <li>Recognize the value of obedience in following energy conservation practices</li> <li>Sympathizing with and showing respect for people who are denied of the sense of sight and hearing</li> <li>Recognizing the importance of the</li> </ul>	<ul style="list-style-type: none"> <li>materials for activities or experiments</li> <li>video clips</li> <li>graphic organizers</li> <li>LCD projector</li> <li>computer with internet connection</li> <li>slides, charts, or enlarged copies of images in the TX</li> <li>slideshow presentations</li> </ul>

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<p><i>Electrical Power Transmission and Distribution</i></p> <p><i>Energy Sources in the Philippines</i></p>	<p><i>Investigate the effect of light in various materials</i></p> <p><b>S9FE-IVf-43</b> Infer that heat transfer can be used to do work, and that work involves the release of heat</p> <p><b>S9FE-IVf-44</b> Explain why machines are never 100-percent efficient</p> <p><b>S9FE-IVg-45</b> Explain how heat transfer and energy transformation make heat engines like geothermal plants work</p> <p><b>S9FE-IVg-45</b> <b>MELC</b> Explain how heat transfer and energy transformation make heat engines like geothermal plants work</p>	<p><b>Scientific Literacy, Environmental Awareness, and Adaptability</b></p> <ul style="list-style-type: none"> <li>• Learning about and suggesting steps to control thermal pollution</li> <li>• Researching on the development of solar energy and listing ways to minimize energy waste in the transportation system</li> </ul> <p><b>Curiosity</b> Investigating sound, light, and heat through activities or experiments</p> <p><b>Communication</b> Sharing related experiences and insights</p> <p><b>Collaboration</b></p> <ul style="list-style-type: none"> <li>• Performing activities or experiments</li> <li>• Peer tutoring</li> <li>• Doing a group presentation on how power plants generate and transform energy</li> </ul> <p><b>ICT Literacy</b> Visiting links/websites to watch videos about how gasoline engines,</p>	<p>experiments on sound, light, heat, work, and energy</p> <ul style="list-style-type: none"> <li>• Activities or experiments: <ul style="list-style-type: none"> <li>○ Activity 12.1 Velocity of Sound in Air on determining the velocity of sound in air by using a resonating air column;</li> <li>○ Activity 12.2 Light Propagation on demonstrating that light travels in a straight line;</li> <li>○ Activity 12.3 Illuminance on studying the factors affecting illuminance;</li> <li>○ Activity 12.4 Heat Transfer on investigating and describing the methods of heat transfer; and</li> <li>○ Activity 12.5 Electricity and Magnetism on determining the process of generating electrical</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Performance task</li> </ul>	<p>senses</p>	<ul style="list-style-type: none"> <li>• video clips, animations, or articles from online sources such as <ul style="list-style-type: none"> <li>○ <a href="http://www.youtube.com/watch?v=KIVdPaTSot8">http://www.youtube.com/watch?v=KIVdPaTSot8</a></li> <li>○ <a href="http://www.youtube.com/watch?v=5vA8Ksv5kVY">http://www.youtube.com/watch?v=5vA8Ksv5kVY</a></li> <li>○ <a href="http://www.youtube.com/watch?v=m-ehwxV4nf0">http://www.youtube.com/watch?v=m-ehwxV4nf0</a></li> <li>○ <a href="http://www.youtube.com/watch?v=ZjwzpoCiF8A">http://www.youtube.com/watch?v=ZjwzpoCiF8A</a></li> </ul> </li> </ul>
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	<p><b>S9FE-IVh-j-46</b> <b>MELC</b>          Explain how electrical energy is generated, transmitted, and distributed</p>	<p>refrigerators, generators, and transformers work</p>	<p>energy through electromagnetic induction</p> <ul style="list-style-type: none"> <li>• Applications in real-life situations</li> <li>• Thought-provoking questions</li> <li>• Guided practice on problem solving</li> </ul>			
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