GRADE 10 – QUARTER 1: EARTH AND SPACE SCIENCE

Content	**Content Standards** *The learners learn that:*	**Learning Competencies** *The learners…*
1. Plate Tectonics 2. Global climate 3. Global interactions 4. Global and local Sustainability	1. Current models explain tectonic plate movement as part of a gravity-driven convection system that pushes young hot plates away from spreading ridges and pulls old cold plates down into subduction zones. 2. Plate movements and continental evolution account for the major surface features of the Earth. 3. Climate change and its impacts on the environment and people pose serious challenges which require solutions and action at local and global levels. 4. The rich natural resources of the Philippines require sustainable management.	1. identify modern scientific processes used to detect and measure the displacement of tectonic plates; 2. describe the structures, movements and events that occur at each type of plate boundary; 3. identify the locations of major mountains, faults, volcanos, and ocean trenches using a map of the Philippine Archipelago, and interpret the features in relation to plate tectonics; 4. predict the position and shape of the Philippine Archipelago in 50 million years, based on the current velocity of the Philippine Plate; 5. gather information from secondary sources to describe and explain what mechanisms that drive the movement of tectonic plates including the role of the asthenosphere; 6. explain how the subduction of an oceanic plate impacts on the plate above it; 7. explain how plate tectonics can be used to explain the formation of the largest mountain ranges on Earth including the Himalayas and the Andes mountains; 8. identify evidence of global warming and climate change; 9. identify the role of greenhouse gases in enhanced global warming and climate change; 10. describe how global climatic phenomena, such as the El Niño Southern Oscillation, may impact weather systems; 11. identify local impacts of global climate change and suggest ways that individuals can do to reduce the impact of global warming; and 12. explain how increased societal uses of renewable energies could mitigate the effects of global climate change, including how the Philippines could make better use of its plentiful natural resources.

Performance Standard

By the end of the Quarter, learners describe and explain the geologically dynamic nature of the Philippine Archipelago in relation to its plate tectonic setting and use models to explain the earth structures, movements, and natural events that occur. They use critical thinking and modeling to explain mechanisms that have contributed to the current distributions of continents and make predictions about changes that can be expected in the future. Learners gather information from secondary sources to describe rapid changes that are occurring in local and global climate patterns and propose solutions to address these changes at the local and global levels by drawing on awareness, responsible personal behavior to conserve materials and energy, and through the better societal management of the natural resources of the country.

Suggested Performance Tasks

A. Plan and enact a community education strategy based on scientific understanding, data, and processes, to encourage and empower viewers to be responsible in their use of local natural resources.

B. Develop a discussion paper on the value of mining green metals, such as cobalt and nickel for modern battery production. Include information about how modern batteries can contribute to addressing energy supply and other energy-related issues. The paper should provide information about the green metal reserves of the Philippines and what would be involved in establishing industries to produce batteries locally.

GRADE 10 – QUARTER 2: FORCE, MOTION, AND ENERGY

Content	**Content Standards** *The learners learn that:*	**Learning Competencies** *The learners*:
1. Projectile motion 2. Momentum and Collisions 3. Large-scale generation and distribution of electricity 4. Renewable and non-renewable energy	1. Newton's laws can be used to explain projectile motion and collisions. 2. Momentum in collisions increases as mass or velocity increases. 3. The electric companies provides high voltage electricity through power generation, transmission, and distribution to many parts of the archipelago. 4. Responsible planning and innovation lead to efficient generation and distribution of electricity in the Philippines.	1. investigate and describe the relationship among the projectile variables including the angle and velocity of release, and projectile height and range, using everyday activities such as shooting basketballs or kicking footballs; 2. describe different types of collisions as elastic or inelastic by providing some examples; 3. use models to investigate elastic or inelastic collisions and describe the forces involved and their effects; 4. explain that momentum depends on the mass and the velocity of a moving object that can be used to predict the impact the object will have if it hits another object; 5. carry out guided investigations using different objects to describe momentum-related relationships, such as the more momentum an object has, the harder for it to stop; 6. identify and explain that to change the momentum of an object, it is necessary to apply a force on the object over a period of time; 7. gather information from secondary sources to identify ways to reduce the impact of collisions such as seatbelts, airbags, and crumple zones in vehicles; 8. identify that momentum is conserved before and after the collision of objects; 9. describe how high voltage electricity from power plants is generated and safely distributed to industries, businesses, and homes, including the role of substations (grid stations), and electric meters; 10. describe and explain the need for safety precautions in handling household electrical devices; 11. describe the similarities and differences between electric motors and electric generators; 12. collaborate in a class discussion to identify ways to reduce the use of electrical energy in Filipino houses and communities and explain what local and global benefits can be achieved; and 13. gather information from secondary sources to evaluate how renewable and non-renewable generation of electricity in the Philippines impacts human activities and the environment.

Performance Standard

By the end of the Quarter, learners display critical thinking in describing the factors that affect the trajectory of projectiles. They distinguish between different types of collisions and describe the impacts on the motion of objects. They carry out investigations using models to identify relationships that affect the motion of objects and apply their understanding to real-life situations. Learners gather information from secondary sources to identify, describe, and explain how science impacts human activities and the environment.

Suggested Performance Tasks

A. Conduct a survey of recent vehicular accidents in your locality to identify a high-risk spot where collisions are frequent. Offer a solution to mitigate collisions at the high-risk area by:

1. designing a structure aimed at reducing the impact of collisions, or
2. describe a system aimed at changing riders' or drivers' behavior by educating them about the collision danger in the location.

B. Design and describe the significant features (rationale) of a 'vehicle' that will save a raw egg from breaking when dropped onto a concrete surface from 3 meters. Learners will test their model in a class event.

GRADE 10 – QUARTER 3: SCIENCE OF MATERIALS

Content	**Content Standards** *The learners learn that:*	**Learning Competencies** *The learners…*
1. Chemical reactions 2. Acids, bases, and salts. 3. Types of chemical reactions 4. Chemical reactions in the environment. 5. Chemical equations 6. Rates of reactions	1. Several simple observations indicate if a chemical reaction has taken place. 2. Chemical indicators produce color changes with acids, bases, and salts. 3. Valid and reliable scientific investigations identify the dependent and independent variables and control other variables. 4. Many types of chemical reactions are important in our daily lives and in the biotic and abiotic parts of the environment. 5. Atoms rearrange during chemical reactions but abide by the principle of conservation of mass as illustrated in balanced chemical equations. 6. Rates of chemical reactions are critical in production and preservation of many useful materials.	1. describe the indicators for a chemical reaction as color change, the formation of a precipitate, the release of gas, and or odor, or a change in temperature; 2. identify common acids, bases, and salts (e.g., hydrochloric acid, sodium hydroxide, and saline solution) using different indicators; 3. describe important types of chemical reactions (combination, decomposition, single replacement, double replacement); 4. explain how important types of chemical reactions, such as combustion, acids on metals, acids on carbonates, photosynthesis, and respiration, relate to or impact the natural and built environments using information from secondary sources; 5. recognize that scientists: a. use chemical equations to describe chemical reactions, and b. write equations in word form and using formula for common chemical reactions; 6. explain that chemical equations demonstrate a rearrangement of atoms but the total mass of the system remains the same during a chemical reaction; 7. apply the principles of conservation of mass to balance chemical equations; 8. explain the factors affecting the rates of chemical reactions as applied in food preservation and materials production, control of fire, pollution, and corrosion; and 9. identify that chemical reactions may be exothermic or endothermic

Performance Standard

By the end of the Quarter, learners demonstrate an understanding that household products can act as indicators for important chemicals. They describe the indicators of a chemical reaction and identify important types of chemical reactions. They explain how some important chemical reactions impact the natural and built environment. They write balanced chemical equations using formula and apply the principles of conservation of mass. They explain factors that affect the rate of a reaction and that some reactions are exothermic, and some are endothermic. They demonstrate skills to plan and conduct valid and reliable scientific investigations and record them appropriately.

Suggested Performance Task/s
A. Conduct a valid and reliable investigation to test a number of vegetables, such as carrots and red cabbage to determine their usefulness as indicators for common acids and bases, such as vinegar, lemon juice, and bleach.
B. Explore materials in the home to produce specific chemical reactions, such as mixing a solution of washing powder with a solution of baking powder.

GRADE 10 – QUARTER 4: LIFE SCIENCE

Content	**Content Standards** *The learners learn that:*	**Learning Competencies** *The learners…*
1. Homeostasis 2. Mechanisms of evolution 3. Biotechnology 4. Ecosystem's carrying capacity and population growth	1. Homeostasis is a self-regulating process that allows an organism to maintain stability. 2. Several theories provide lines of evidence about how organisms evolve. 3. The products and processes of biotechnology can have both beneficial and harmful effects on society and the environment. 4. Population growth influences the carrying capacity of an ecosystem	1. describe homeostasis as a state of balance among all the body systems in humans that needs to be maintained for survival and proper functioning; its indicators include body temperature, glucose level, and blood pressure; 2. explain how homeostasis is maintained through various feedback mechanisms, both positive and negative; 3. use information from secondary sources to describe natural selection as the primary mechanism driving evolutionary change; 4. discuss in small groups important concepts in the theories of evolution, such as variation, heredity, isolation, selection, and adaptation; 5. use information from secondary sources to explain how lines of evidence, such as fossils, biogeography, and comparative morphology, support the occurrence of evolution; 6. explain the term biotechnology and provide examples; 7. use information from secondary sources to identify the products of traditional biotechnology through fermentation (e.g. cheese, soy sauce, vinegar, *nata de coco*); 8. use information from secondary sources to identify examples of modern biotechnology, such as genetically modified organisms and processes (e.g. in vitro fertilization); 9. participate in a class debate on the societal, environmental, and ethical implications of using biotechnological products and methods; 10. discuss the factors that limit the ecosystem's carrying capacity, such as adequate food, shelter, water, and mates; and 11. explain that the ecosystem's population growth slows down as it gets closer to the carrying capacity.
Performance Standard *By the end of the Quarter, learners* describe homeostasis as a process that allows an organism to maintain stability. They describe and discuss in small groups that natural selection is the driving mechanism of evolutionary change. They explain the meaning of the term biotechnology and debate the societal, environmental, and ethical implications of utilizing biotechnological products and methods. They discuss the factors that limit the ecosystem's carrying capacity and the role of population growth.		
Suggested Performance Task Write a critical analysis of the use of biotechnology and its impacts on society or the environment.		