

Strand 1: Living Things and Life Processes

Standard SC1.1: Understanding of the basic units of living things; the relationship between structures and functions of various systems of living things which are interlinked; having investigative process for seeking knowledge; ability to transfer and put the knowledge into practice and care for living things

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| <ol style="list-style-type: none"> 1. Compare the differences between living things and non-living things. 2. Observe and explain the characteristics and the functions of external structures of plants and animals. 3. Observe and explain the characteristics, the functions and the importance of external human organs as well as health care. | <ol style="list-style-type: none"> 1. Experiment and explain the essential of water and light to plant life. 2. Explain the nutrients, water and air are essential factors for the growth of plants and animals, and put it into practice. 3. Explore and explain abilities of plants and animals to respond to light, temperature and touch. | - | <ol style="list-style-type: none"> 1. Experiment and explain the functions of the bundles and stomas of plants. 2. Explain water, carbon dioxide, light and chlorophyll, essential factors for plants growth and photosynthesis. 3. Experiment and explain responses of plants to light, sound and touch. | <ol style="list-style-type: none"> 1. Observe and specify the components of flowers and the structures related to reproduction of angiosperms. 2. Explain reproduction of flowers, plants, plant propagation, and put it into practice. 3. Explain life cycles of some kinds of angiosperms. 4. Explain animal reproduction and propagation. | <ol style="list-style-type: none"> 1. Explain human growth from birth to adulthood. 2. Explain the interrelated functioning of digestive, respiratory and circulatory systems of human beings. 3. Analyse nutrients and discuss body requirements for nutrients in proportions with gender and age. |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| <ol style="list-style-type: none"> 1. Observe and explain the forms and the characteristics of the cells of unicellular and multicellular organisms. 2. Observe and compare the essential components of plant and animal cells. 3. Experiment and explain the functions of essential components of plant and animal cells. 4. Experiment and explain the processes of passing substances through cells by diffusion and osmosis. 5. Experiment to find some factors essential for photosynthesis of plants, and explain that light, chlorophyll carbon dioxide and water essential for photosynthesis. | <ol style="list-style-type: none"> 1. Explain the structures and the functions of digestive, circulatory, respiratory, excretory and reproductive systems of human beings and animals as well as nerve system of human beings. 2. Explain the relationship of various systems of human beings and put it into practice. 3. Observe and explain behaviour of human beings and animals responding to internal and external stimuli. 4. Explain the principles and the effects of biotechnological application in propagation to improve breeding and increase productivity of | - | <ol style="list-style-type: none"> 1. Experiment and explain the maintenance of cell equilibrium of living things. 2. Experiment and explain the mechanisms for maintenance of water equilibrium in plants. 3. Search for data and explain the mechanisms for controlling the equilibrium of water, minerals and temperature of human beings and animals, and put it into practice. 4. Explain the body's immune system, and apply this acquired knowledge for health care. |

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Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| | <p>4. Explore and explain the ability of the human body to respond to light, temperature and touch.</p> <p>5. Explain the factors essential for the life and growth of human beings.</p> | | <p>4. Explain behaviour of animals responding to light, temperature and touch, and put it into practice.</p> | <p>5. Explain life cycles of some kinds of animals and put it into practice.</p> | |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| <p>6. Experiment and explain the results of plant photosynthesis.</p> <p>7. Explain importance of the photosynthesis process of plants on living things and the environment.</p> <p>8. Experiment and explain the groups of cells involved in transportation of water in plants.</p> <p>9. Observe and explain the structures of the systems of water and nutrients transportation in plants.</p> <p>10. Experiment and explain the floral structures in plant reproduction.</p> <p>11. Explain the sexual and asexual reproduction processes of plants.</p> | <p>animals, and put it into practices.</p> <p>5. Experiment, analyse and explain nutrients in foods with energy quantity and proportion to gender and age.</p> <p>6. Discuss the effects of addictive substances on various systems of the body, and guidelines for self-protection from addictive substances.</p> | | |

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Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| <p>12. Experiment and explain the responses of plants to light, water and touch.</p> <p>13. Explain the principles and the effects of biotechnological application for propagation, improved breeding and increased productivity of plants, and put it into practice.</p> | | | |

Strand 1: Living Things and Life Processes

Standard Sc1.2: Understanding of the process and the importance of genetic transmission; the evolution of living things; the biodiversity; the application of biotechnology affecting humans and the environment; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| 1. Specify the characteristics of living things in local area, and categorise them using external characteristics as criteria. | 1. Explain the benefits of plants and animals in local area. | 1. Discuss various characteristics of living things in the immediate environment. 2. Compare and specify the similar characteristics of parents and children. 3. Explain the similar characteristics of parents and children originating from genetic transmission, and put it into practice. 4. Search for data and discuss about kinds of extinct living things and kinds that exist in the present time. | - | 1. Explore, compare and specify their own characteristics and those of their family members. 2. Explain genetic the transmission of each generation of living things. 3. Distinguish between flowering and non-flowering plants. 4. Specify the characteristics of monocellular and multicellular plants using their external organs as criteria. | - |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| - | - | <ol style="list-style-type: none"> 1. Observe and explain the characteristics of chromosomes with genetic units or genes in their nuclei. 2. Explain the importance of genes or DNA and the process of transmitting genetic characteristics. 3. Discuss the genetic diseases resulting from abnormality of genes and chromosomes, and put it into practice. 4. Explore and explain the biodiversity in local area enabling living things to maintain the balance of life. 5. Explain the effects of biodiversity on human beings animals, plants and the environment. | <ol style="list-style-type: none"> 1. Explain the processes of genetic transmission, transformation, mutation and the origin of biodiversity. 2. Search for data and discuss about the effects of biotechnology on human beings and the environment, and put it into practice. 3. Search for data and discuss about the effects of biodiversity on human beings and the environment. 4. Explain the natural selection processes and their effects on diversity of living things. |

Strand 1: Living Things and Life Processes

Standard SC1.2: Understanding of the process and the importance of genetic transmission; the evolution of living things; the biodiversity; the application of biotechnology affecting humans and the environment; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| | | | | 5. Categorise animals into groups using external characteristics and some internal characteristics as criteria. | |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| | | 6. Explain the effects of biotechnology on living of human beings and the environment. | |

Strand 2: Life and the Environment

Standard SC2.1: Understanding of the local environment; the relationship between the environment and living things; the relationship between living things in the eco-system; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| - | - | 1. Explore the environment in the local area and explain the relationship between living things and the environment. | - | - | 1. Explore and discuss about the relationship of groups of living things in various habitats. 2. Explore the relationship of living things in terms of food chain and food web. 3. Search for data and explain the relationships between the lives of living things and the environment. |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| - | - | <ol style="list-style-type: none"> 1. Explore, various eco-systems in local area and explain the relationships of the components within the eco-systems. 2. Analyse and explain the relationship of energy transmission in living things in terms of food chain and food web. 3. Explain water and carbon cycles and their importance to the eco-system. 4. Explain the factors affecting change in size of population in the eco-system. | <ol style="list-style-type: none"> 1. Explain the equilibrium of the eco-system. 2. Explain the processes of change and replacement of living things. 3. Explain the importance of biodiversity and propose guidelines for providing care and preservation. |

Strand 2: Life and the Environment

Standard SC2.2: Appreciating the importance of natural resources; the utilization of natural resources at local, national and global levels; and the application of knowledge for management of natural resources and local environment on a sustainable basis

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| - | - | <ol style="list-style-type: none"> 1. Explore natural resources and discuss about utilization of local natural resources. 2. Specify the utilization of natural resources causing environmental problems. 3. Discuss and present ideas for economical and cost-effective utilization of natural resources and participate in the practice. | - | - | <ol style="list-style-type: none"> 1. Search for data and discuss about sources of natural resources in each local area beneficial to life. 2. Analyse the effects of population increase on the utilization of natural resources. 3. Discuss about the effects on living things from environmental change due to nature and human beings. |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| - | - | <ol style="list-style-type: none"> 1. Analyse the environment and natural resources problems in the local area, and propose guidelines for problem-solving. 2. Explain the guidelines for preserving the balance of the eco-system. 3. Discuss about the sustainable utilization of natural resources. 4. Analyse and explain the utilization of natural resources in terms of the Sufficiency Economy Philosophy. 5. Discuss about the environmental problems and propose relevant guidelines for problem-solving. | <ol style="list-style-type: none"> 1. Analyse causes of the environment and natural resources problems at local, national and global levels. 2. Discuss about guidelines for preventing and solving the environment and natural resources problems. 3. Plan and observe, preserve and develop the environment and natural resources. |

Strand 2: Life and the Environment

Standard SC2.2: Appreciating the importance of natural resources; the utilization of natural resources at local, national and global levels; and the application of knowledge for management of natural resources and local environment on a sustainable basis

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| | | | | | <p>4. Discuss about guidelines for taking care of and preserving natural resources and the environment.</p> <p>5. Participate in providing care and preservation of natural resources in the local area.</p> |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| | | 6. Discuss and participate in providing care and preserving the local environment on a sustainable basis. | |

Strand 3: Substances and Properties of Substances

Standard SC3.1: Understanding of the properties of substances; the relationship between the properties of substances and the structures and binding forces between particles; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| <p>1. Observe and specify the apparent characteristics or the properties of materials for making toys or articles of everyday use.</p> <p>2. Classify the materials for making toys or articles of everyday use and specify the criteria of the classification.</p> | <p>1. Specify and compare the properties of materials for making toys and articles of everyday use.</p> <p>2. Choose and use appropriate and safe materials and articles.</p> | <p>1. Classify kinds and the properties of materials for making toys and articles of everyday use.</p> <p>2. Explain the utilization of each kind of material.</p> | - | <p>1. Experiment and explain the properties of various kinds of materials e.g elasticity, hardness, toughness, heat conductivity and density.</p> <p>2. Search for data and discuss about the application of materials in daily life.</p> | <p>1. Experiment and explain the properties of solids, liquids and gases.</p> <p>2. Categorise substances into groups.</p> <p>3. Experiment and explain the separation of materials through sifting, precipitation, filtering, sublimation and evaporation.</p> <p>4. Explore and categorise various substances used in daily life using their properties and utilization as criteria.</p> |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| <ol style="list-style-type: none"> 1. Experiment and classify substances into groups using their texture or particle size as criteria and explain the properties of each group. 2. Explain the properties and the transition of substances using particle arrangement models. 3. Experiment and explain the acid-base properties of solutions. 4. Verify pH value of solutions, and put the knowledge into practice. | <ol style="list-style-type: none"> 1. Explore and explain the components and the properties of elements and compounds. 2. Search for data and compare the properties of metallic, non-metallic, semi metallic and nuclear elements and put the knowledge into practice. 3. Experiment and explain the principles of substance separation by methods of filtering, crystallisation, expunctions, distillation and chromatography, and put the knowledge into practice. | - | <ol style="list-style-type: none"> 1. Search for data and explain the structure of atoms and nuclear symbols of elements. 2. Analyse and explain the electronic configuration in atoms and the relationship between electrons in outermost energy-level with the properties of elements and the formation of reactions. 3. Explain the sequencing of elements and predict the properties of elements in the Periodic Table. 4. Analyse and explain formation of chemical bonds in crystal network and in molecules of substances. 5. Search for data and explain the relationship between boiling point, melting point and state of substances with binding forces between particles of substances. |

Strand 3: Substances and Properties of Substances

Standard SC3.1: Understanding of the properties of substances; the relationship between the properties of substances and the structures and binding forces between particles; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| | | | | | 5. Discuss about the selection of correct and safe application of each kind of substance. |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
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Strand 3: Substances and Properties of Substances

Standard SC3.2: Understanding of the principles and the nature of change in the state of substances; the solution formation; the chemical reaction; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| - | - | <ol style="list-style-type: none"> 1. Experiment and explain the effects of change in objects upon force acts or heating or cooling. 2. Discuss about the benefits and detriments that may arise due to changes in the objects. | - | - | <ol style="list-style-type: none"> 1. Experiment and explain the properties of substances when dissolve and change their state. 2. Analyse and explain the changes resulting in transition of substances to new substances with different properties. 3. Explain the affects of the changes of substances on living things and the environment. |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| <ol style="list-style-type: none"> 1. Experiment and explain the methods of preparing solutions with density in percentage, and discuss about putting the knowledge into practice. 2. Experiment and explain the change of properties, mass and energy of substances when change state and dissolve. 3. Experiment and explain the factors affecting state changes and the dissolution of substances. | <ol style="list-style-type: none"> 1. Experiment and explain the changes in properties, mass and energy when substances have chemical reactions and explain factors affecting the chemical reactions. 2. Experiment, explain and write chemical equations of reactions of various substances, and put it into practice. 3. Search for data and discuss about the effects of chemical substances and chemical reactions on living things and the environment. 4. Search for data and explain the safe application, ways of preventing and remedying dangers from chemical substances. | - | <ol style="list-style-type: none"> 1. Experiment, explain and write equations of general chemical reactions found in daily life, the effects of chemical substances on living things and the environment. 2. Experiment and explain the rates of chemical reactions and factors affecting chemical reactions and put it into practice. 3. Search for data and explain the origin of petroleum, natural gas separation and the fractional distillation of crude oil. 4. Search for data and discuss about the application of products from natural gas and fractional distillation of crude oil and the effects of these products on living things and the environment. 5. Experiment and explain the origin of polymers and their properties. |

Strand 3: Substances and Properties of Substances

Standard SC3.2: Understanding of the principles and the nature of change in the state of substances; the solution formation; the chemical reaction; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| | | | <ol style="list-style-type: none">6. Discuss about the utilization of polymers and the effects from production and the utilization of polymers on living things and the environment.7. Experiment and explain the components, benefits and some kinds of reactions of carbohydrates.8. Experiment and explain the benefits and some kinds of reactions of fat and oil.9. Experiment and explain the components, benefits and some kinds of reactions of proteins and nucleic acids. |

Strand 4: Forces and Motion

Standard SC4.1: Understanding of the nature of electromagnetic, the gravitational and nuclear forces; having investigative process for seeking knowledge; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| 1. Experiment and explain the act of pulling or pushing objects. | 1. Experiment and explain the forces originating from a magnet. 2. Explain the application of magnets. 3. Experiment and explain the electrical forces resulting from rubbing some kinds of materials. | 1. Experiment and explain the effects of forces acting on objects. 2. Experiment the falling of objects on the ground and explain the gravity. | - | 1. Experiment and explain finding addition of two forces acting on objects. 2. Experiment and explain air pressure. 3. Experiment and explain liquid pressure. 4. Experiment and explain buoyant forces of liquid, floating and sinking of objects. | - |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| <ol style="list-style-type: none"> 1. Search for data and explain scalar and vector quantities. 2. Experiment and explain distance, speed, displacement and velocity of motion of objects. | <ol style="list-style-type: none"> 1. Experiment and explain finding resultant force of several forces on the same plane acting on objects. 2. Explain resultant forces acting on static objects or objects moving with constant velocity. | <ol style="list-style-type: none"> 1. Explain the acceleration and the effects of resultant forces acting on objects. 2. Experiment and explain the actionary and reactionary forces between objects, and put the knowledge into practice. 3. Experiment and explain buoyant forces acting on liquid. | <ol style="list-style-type: none"> 1. Experiment and explain the relationship between forces and motion of objects in gravitational fields and put the knowledge into practice. 2. Experiment and explain the relationship between forces and motion of particles in electrical fields, and put it into practice. 3. Experiment and explain the relationship between forces and motion of particles in magnetic fields, and put it into practice. 4. Analyse and explain the nuclear and electrical forces among particles in nuclei. |

Strand 4: Forces and Motion

Standard SC4.2: Understanding of the characteristics and various types of motion of natural objects; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| - | - | - | - | 1. Experiment and explain the frictional forces and put it into practice. | - |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| - | - | <ol style="list-style-type: none"> 1. Experiment and explain the differences between static, friction and forces, and put it into practice. 2. Experiment and explain the moment of forces, and put it into practice. 3. Observe and explain the motions of objects in a straight line and in curves. | <ol style="list-style-type: none"> 1. Experiment and explain the relationship between displacement, time, velocity, acceleration of the motions in a straight line. 2. Observe and explain the simple projectile, circular and harmonic motions. 3. Discuss about the results of investigation and the benefits of simple projectile, circular and harmonic motions. |

Strand 5: Energy

Standard SC5.1: Understanding of the relationship between energy and living; the energy transformation; the interrelationship between substances and energy; the effects of energy utilization on life and the environment; having investigative process for seeking knowledge; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| - | <ol style="list-style-type: none"> 1. Experiment and explain that electricity is a form of energy. 2. Explore and give examples of electric appliances transforming electrical energy into other forms of energy. | <ol style="list-style-type: none"> 1. Identify natural energy sources producing electricity. 2. Explain the importance of electrical energy and propose how to consume it safely and economically. | <ol style="list-style-type: none"> 1. Experiment and explain the motion of light from its source. 2. Experiment and explain the reflection of light on objects. 3. Experiment and classify objects based on visualising from sources of light. 4. Experiment and explain the refraction of light passing through two kinds of transparent mediums. 5. Experiment and explain the transformation of light into electrical energy, and | <ol style="list-style-type: none"> 1. Experiment and explain the origin and the propagation of sound. 2. Experiment and explain the origin of high pitched and low-pitched sound. 3. Experiment and explain loud and soft sound. 4. Explore and discuss about the detrimental effects on listening to excessively loud sounds. | <ol style="list-style-type: none"> 1. Experiment and explain how to connect a simple electrical circuit. 2. Experiment and explain the electrical conductors and the insulators. 3. Experiment and explain a series connection of cells, and put it into practice. 4. Experiment and explain the connection of bulbs in both series and parallel circuits, and put it into practice. |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| <ol style="list-style-type: none"> 1. Experiment and explain the temperature and its measurement. 2. Observe and explain the heat transmission, and put it into practice. 3. Explain heat adsorption and emission through radiation, and put it into practice. 4. Explain the thermal equilibrium and the effects of heat on substance expansion and put it into practice. | <ol style="list-style-type: none"> 1. Experiment and explain the reflection and refraction of light, and put it into practice. 2. Explain the effects of brightness on human beings and other living things. 3. Experiment and explain the absorption of light, heat, seeing colours of objects, and put it into practice. | <ol style="list-style-type: none"> 1. Explain the kinetic and gravitational potential energy, rules for conservation of energy and the relationship between these quantities, and put it into practice. 2. Experiment and explain the relationship between potential difference, electrical current and resistance, and put it into practice. 3. Calculate electrical energy of electric appliances, and put it into practice. 4. Observe and discuss about correct, safe and economical connection of electrical circuits at home. 5. Explain the resistors, diodes and transistors and experiment the connecting basic electronic circuits with transistors. | <ol style="list-style-type: none"> 1. Experiment and explain the qualities of mechanical waves and explain the relationship between speed, frequency and wavelength. 2. Explain the origin of sound waves, sound beats, sound intensity, level of sound intensity, hearing of sounds and sound quality, and put it into practice. 3. Discuss about the results of searching for data on noise pollution affecting human health and propose ways to prevent from it. 4. Explain the electromagnetic waves and their spectrums and present the results of searching for data on benefits and prevention of harm from electromagnetic waves. 5. Explain nuclear reaction, fission, fusion and the relationship between man and energy. 6. Search for data on energy originating from nuclear reactions and the effects on life and the environment. |

Strand 5: Energy

Standard SC5.1: Understanding of the relationship between energy and living; the energy transformation; the interrelationship between substances and energy; the effects of energy utilization on life and the environment; having investigative process for seeking knowledge; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| | | | put it into practice. 6. Experiment and explain that white light comprises various coloured lights, and put it into practice. | | 5. Experiment and explain origin of a magnetic field produced when electric current is present in a wire, and put it into practice. |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| | | | <p>7. Discuss about the results of nuclear power on plants and put it into practice.</p> <p>8. Explain the kinds and the properties of radiation from radioactive elements.</p> <p>9. Explain the origin of radioactivity and identify methods of checking radiation in the environment, their application, and the effects on living things and the environment.</p> |

Strand 6: Change Processes of the Earth

Standard SC6.1: Understanding of various processes on the earth surface and the interior; the relationship between various processes causing changes in climate, topography and form of the earth; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| 1. Explore, experiment and explain the components and the physical properties of soil in the local area. | 1. Explore and categorise soil using physical properties as criteria, and put it into practice. | 1. Explore and explain the physical properties of water in the local area, and put it into practice. 2. Search for data and discuss about the components of air and the importance of air. 3. Experiment and explain the motion of air resulting from different temperature. | 1. Explore and explain the soil formation. 2. Specify kinds and the properties of soil used for growing plants in the local area. | 1. Explore, experiment and explain the formation of clouds, mist, dew, rain and hail. 2. Experiment and explain the formation of water cycle. 3. Design and make simple instruments for measuring temperature, humidity and air pressure. 4. Experiment and explain the formation of wind, and put it into practice. | 1. Explain and classify rocks using their characteristics and properties as criteria, and put it into practice. 2. Explore and explain the changes of rocks. 3. Search for data and explain geological disasters affecting human beings and the environment in the local area. |

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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| <ol style="list-style-type: none"> 1. Search for relevant information and explain the components and the division of atmospheric layers covering the earth surface. 2. Experiment and explain the relationship between temperature, humidity and air pressure and climate-affecting phenomena. 3. Observe, analyse and discuss about the formation of climate phenomena affecting human beings. 4. Search for relevant information, analyse and interpret meanings of weather forecasts data. 5. Search for, analyse and explain the effects of climate on living things and the environment. | <ol style="list-style-type: none"> 1. Explore, experiment and explain the soil profile, the soil properties and the soil formation process. 2. Explore, analyse and explain the utilization of soil and improvement of soil quality. 3. Experiment geological process simulation models to explain the rock formation process and the characteristics of rock components. 4. Test and observe the components and the properties of rocks for their classification, and put it into practice. 5. Verify and explain the physical characteristics of minerals and put it into practice. | - | <ol style="list-style-type: none"> 1. Search for relevant information and explain principles for dividing the earth structure. 2. Experiment geological process simulation models and explain the earth geological change processes. 3. Experiment simulation models and explain the processes that form mountains, faults, folds, earthquakes and volcanic eruptions. 4. Search for relevant information and explain the importance of geological phenomena, earthquakes and volcanic eruptions affecting living things and the environment. 5. Explore, analyse and explain the stratigraphy from rock layer orientation, fossils and geological structures to explain the origin and development of the local area. |

Strand 6: Change Processes of the Earth

Standard SC6.1: Understanding of various processes on the earth surface and the interior; the relationship between various processes causing changes in climate, topography and form of the earth; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| <p>6. Search for relevant information, analyse and explain the natural factors and man-mode actions affecting changes of the earth temperature, ozone holes and acid rain.</p> <p>7. Search for relevant information, analyse and explain the effects of global warming, ozone holes and acid rain on living things and the environment.</p> | <p>6. Search for relevant information and explain the formation process, the characteristics and the properties of petroleum, coal and oil shale, and put it into practice.</p> <p>7. Explore and explain the characteristics of natural water sources, utilization and conservation of local water sources.</p> <p>8. Experiment with simulation models and explain the formation process of ground water sources and underground water sources.</p> | | <p>6. Search for relevant information, analyse and explain the benefits of geological data.</p> |

Strand 6: Change Processes of the Earth

Standard SC6.1: Understanding of various processes on the earth surface and the interior; the relationship between various processes causing changes in climate, topography and form of the earth; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice.

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| | <p>9. Experiment the simulation models and explain the processes of weathering, erosion, sweeping away, piling up and crystallisation and the effects of these processes.</p> <p>10. Search for relevant information, make a model and explain the earth structure and components.</p> | | |

Strand 7: Astronomy and Space

Standard SC7.1: Understanding of the evolution of the solar system, galaxies and the universe; the interrelationships within the solar system and their effects on living things on the earth; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
|-------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Specify that in the sky there are the sun, the moon and stars. | 1. Search for and discuss the importance of the sun. | 1. Observe and explain the rising and setting of the sun, the moon, causes days and nights and direction setting. | 1. Make a model to explain the characteristics of the solar system. | 1. Observe and explain the formation of directions (north, east, south, west) and the phenomena of the rising and falling of stars using star chart. | 1. Make a model and explain the formation of seasons, waxing and waning of the moon, the solar eclipses and the lunar eclipses, and put it into practice. |

| Grade-level Indicators | | | Interval Indicators |
|------------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| - | - | <ol style="list-style-type: none"> 1. Search for relevant information and explain the relationships between the sun, earth, the moon and other planets, and the effects on the environment and living things. 2. Search for relevant information and explain the components of the universe, galaxies and the solar system. 3. Specify position of constellations, and put it into practice. | <ol style="list-style-type: none"> 1. Search for relevant information and explain the formation and the evolution of the solar system, galaxies and the universe. 2. Search for relevant information and explain the nature and the evolution of fixed stars. |

Strand 7: Astronomy and Space

Standard SC7.2: Understanding of the importance of space technology utilised for space exploration and natural resources for agriculture and communication; having investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
|---------|---------|---------|---------|---------|-----------------------------------------------------------------------------------------|
| - | - | - | - | - | 1. Search for data and discuss about the progress and the benefits of space technology. |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| - | - | <ol style="list-style-type: none"> 1. Search for relevant information and discuss about the process of utilising space technology for exploration of space, objects in the sky, weather conditions, the natural resources for agriculture and communication. | <ol style="list-style-type: none"> 1. Search for relevant information and explain the launching of satellites, and calculate the velocity of satellites revolving around the earth. 2. Search for relevant information and explain the benefits of satellites in various respects. 3. Search for relevant information and explain the launching of space ships, and space exploration utilising space ships and space stations. |

Strand 8: Nature of Science and Technology

Standard SC8.1: Application of the scientific process and scientific reasoning in investigation for seeking knowledge and problem-solving; knowing that most natural phenomena assume definite patterns which are explainable and verifiable within limitations of data and instruments available during particular periods of time; and understanding that science, technology, society and the environment are interrelated

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| <p>1. Pose questions about the study matters as prescribed or in accord with their interests.</p> <p>2. Plan for observation, exploration, verification, study and research using their own ideas and of their teachers.</p> <p>3. Use materials and instruments to explore and verify and record results using simple methods.</p> | <p>1. Pose questions about the study matters as prescribed or in accord with their interests.</p> <p>2. Plan for observation, exploration, verification, study and research using their own ideas and of their teachers.</p> <p>3. Use suitable materials, instruments and equipment to explore and verify, and record the data.</p> | <p>1. Pose questions about the study matters as prescribed and in accord with their interests.</p> <p>2. Plan for observation, propose methods of exploration, verification, study and research using their own ideas, of groups, and the expectations.</p> | <p>1. Pose questions about the study issues, matters or situations as prescribed and in accord with their interests.</p> <p>2. Plan for observation and propose methods of exploration, verification, study and research, and the expectations.</p> | <p>1. Pose questions about the study issues, matters or situations as prescribed and in accord with their interests.</p> <p>2. Plan for observation and propose methods of exploration, verification, study and research, and the expectations.</p> | <p>1. Pose questions about the study issues, matters or situations as prescribed and in accord with their interests.</p> <p>2. Plan for observation and propose methods for exploration, verification, study and research, and the expectations.</p> |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| <ol style="list-style-type: none"> 1. Pose questions prescribing the issues or the important variables for exploration and verification or conduct comprehensive and reliable study and research on matters of their interest. 2. Make verifiable hypotheses and plan several methods of exploration and verification. 3. Select techniques and methods of quantitative and qualitative exploration and verification yielding accurate and safe results using appropriate materials and equipment. | <ol style="list-style-type: none"> 1. Pose questions prescribing the issues or the important variables for exploration and verification or conduct comprehensive and reliable study and research on matters of their interest. 2. Make verifiable hypotheses and plan several methods of exploration and verification. 3. Select techniques and methods of quantitative and qualitative exploration and verification yielding accurate and safe results using appropriate materials and equipment. | <ol style="list-style-type: none"> 1. Pose questions prescribing the issues or the important variables for exploration and verification and conduct comprehensive and reliable study and research on matters of their interest. 2. Make verifiable hypotheses and plan several methods of exploration and verification. 3. Select techniques and methods of quantitative and qualitative exploration and verification yielding accurate and safe results using appropriate materials and equipment. | <ol style="list-style-type: none"> 1. Pose questions based on scientific knowledge and understanding or their interests or from current issues for comprehensive and reliable exploration and verification. 2. Make hypotheses supported by theories, or the expectations, or make models or formats leading to exploration and verification. 3. Search for and collect data requiring consideration of factors or important variables, factors affecting other factors, uncontrollable factors and the number of times to repeat the exploration and verification process to ensure reliable and sufficient data. 4. Select materials, techniques, methods and instruments utilised in accurate observation, measurement, exploration and verification in width and in depth for quantitative and qualitative dimensions. |

Strand 8: Nature of Science and Technology

Standard SC8.1: Application of the scientific process and scientific reasoning in investigation for seeking knowledge and problem-solving; knowing that most natural phenomena assume definite patterns which are explainable and verifiable within limitations of data and instruments available during particular periods of time; and understanding that science, technology, society and the environment are interrelated

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
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| <p>4. Put the data obtained from the exploration and the verification into groups and present the results.</p> <p>5. Express the opinions of the exploration and the verification.</p> <p>6. Record and explain results of the exploration and the verification in the form of pictures or short writing.</p> <p>7. Verbally present their work clearly.</p> | <p>4. Put the data into groups, and compare and present the results.</p> <p>5. Pose new questions arising from the results of the exploration and the verification.</p> <p>6. Express the group opinions, and put it into a body of knowledge.</p> <p>7. Record and clearly explain the results of the exploration and the verification in the form of pictures, diagrams or explanations.</p> | <p>3. Select suitable materials, instruments and equipment to explore and verify, and record the data.</p> <p>4. Put the data into groups, compare it with the expectations and present the results.</p> <p>5. Pose new questions arising from the results of exploration and verification.</p> <p>6. Express the opinions and collect the data from groups leading to knowledge creation.</p> | <p>3. Select accurate and appropriate instruments for exploration and verification.</p> <p>4. Record the quantitative data, and present the results.</p> <p>5. Pose new questions for subsequent exploration and verification.</p> <p>6. Express the opinions and the conclusions about what they learn.</p> | <p>3. Select accurate and appropriate instruments for exploration and verification in order to obtain reliable data.</p> <p>4. Record the quantitative and qualitative data, verify the results with expectations, and present the results and the conclusions.</p> <p>5. Pose new questions for subsequent exploration and verification.</p> | <p>3. Select accurate and appropriate instruments and methods for exploration and verification in order to obtain comprehensive and reliable data.</p> <p>4. Record the quantitative and qualitative data, analyse and verify the results with expectations, and present the results and the conclusions.</p> |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| <p>4. Collect the data and process it quantitatively and qualitatively.</p> <p>5. Analyse and evaluate conformity of eye-witnesses with the conclusions both supporting and contradicting the hypotheses and data abnormality from exploration and verification.</p> <p>6. Create models or formats explaining or showing the results of exploration and verification.</p> <p>7. Pose questions leading to exploration and verification of relevant matters, and apply the knowledge gained in new situations or explain the concepts, processes and the results of the project or task clearly.</p> | <p>4. Collect the data and process it quantitatively and qualitatively.</p> <p>5. Analyse and evaluate conformity of eye-witnesses with the conclusions both supporting or contradicting the hypotheses and data abnormality from exploration and verification.</p> <p>6. Create models or formats explaining or showing the results of exploration and verification.</p> <p>7. Pose questions leading to exploration and verification of relevant matters, and apply the knowledge gained in new situations or explain the concepts, the processes and the results of the project or task clearly.</p> | <p>4. Collect the data and process it quantitatively and qualitatively.</p> <p>5. Analyse and evaluate conformity of eye-witnesses with the conclusions both supporting or contradicting the hypotheses and data abnormality from exploration and verification.</p> <p>6. Create models or formats explaining or showing the results of exploration and verification.</p> <p>7. Pose questions leading to exploration and verification of relevant matters, and apply the knowledge gained in new situations or explain the concepts, the processes and the results of the project or task clearly.</p> | <p>5. Collect the data and systematically and accurately record the results of exploration and verification addressing both quantity, and quality by verifying probability, appropriateness or errors in the data.</p> <p>6. Process the data by taking into consideration accurate quantitative reporting of the results, and present the data through appropriate techniques and methods.</p> <p>7. Analyse the data, interpret meanings of data and evaluate the conformity of the conclusions or main substance for verification with the hypotheses.</p> <p>8. Consider reliability of the methods and the results of the exploration and verification based on the principles of error of measurement and observation, and recommend improvement of the exploration and verification methods.</p> |

Strand 8: Nature of Science and Technology

Standard SC8.1: Application of the scientific process and scientific reasoning in investigation for seeking knowledge and problem-solving; knowing that most natural phenomena assume definite patterns which are explainable and verifiable within limitations of data and instruments available during particular periods of time; and understanding that science, technology, society and the environment are interrelated

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
|---------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 8. Verbally present their work clearly. | 7. Record and explain the authentic results of the exploration and verification, using diagrams. 8. Present and display work to show the processes and the results of their work clearly. | 7. Record and clearly and directly explain the results of the exploration and the verification. 8. Present and display work to explain the processes and the results of their work clearly. | 6. Freely express the opinions, the explanations and the conclusions about what they learn. 7. Record and explain the results of the exploration and verification based on real situations and references. 8. Present and display their work to explain the processes and results clearly. | 5. Pose new questions for subsequent exploration and verification. 6. Freely express the opinions, provide the explanations, the agreements, and the conclusions about what they learn. 7. Record and explain the results of the exploration and verification based on real situations, with rationality and eye-witnesses for reference. |

| Grade-level Indicators | | | Interval Indicators |
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| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| <p>8. Record and explain the results of the additional observation, exploration, verification and research from various sources and accept the changes with the new additional data, eye-witnesses or the contradictory data.</p> <p>9. Display their work, write the reports and/or explain the concepts, processes and results of the project or task clearly.</p> | <p>8. Record and explain the results of the additional observation, exploration, verification and research from various sources and accept the changes with the new additional data, eye-witnesses or the contradictory data.</p> <p>9. Display their work, write the reports and/or explain the concepts, processes and results of the project or task clearly.</p> | <p>8. Record and explain the results of the additional observation, exploration, verification and research from various sources and accept the changes with the new additional data, eye-witnesses or the contradictory data.</p> <p>9. Display their work, write the reports and/or explain the concepts, processes and results of the project or task clearly.</p> | <p>9. Apply the results obtained from the exploration and the verification, in regard to the methodology and the bodies of knowledge, pose new questions, and apply results to problem-solving to new situations and to real life.</p> <p>10. Realise the importance of the need to participate and to be responsible for explanation, agreeing on views and drawing the conclusions about the results of scientific learning presented to the public.</p> <p>11. Record and logically explain the results of the exploration and the verification; use evidence for reference or conduct additional research in order to find reliable evidence, and accept the new knowledge according to new and additional data and eye-witnesses.</p> |

Strand 8: Nature of Science and Technology

Standard SC8.1: Application of the scientific process and scientific reasoning in investigation for seeking knowledge and problem-solving; knowing that most natural phenomena assume definite patterns which are explainable and verifiable within limitations of data and instruments available during particular periods of time; and understanding that science, technology, society and the environment are interrelated

Grade-level Indicators

| Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 | Grade 6 |
|---------|---------|---------|---------|---------|----------------------------------------------------------------------------------|
| | | | | | 8. Present and display their work and explain the processes and results clearly. |

| Grade-level Indicators | | | Interval Indicators |
|------------------------|---------|---------|--------------------------------------------------------------------------------------------------------------------------------|
| Grade 7 | Grade 8 | Grade 9 | Grades 10-12 |
| | | | 12. Display their work, write the reports and/or explain the concepts, processes and results of their project or task clearly. |