

Curriculum Standard for Junior High School Integrated Science

Part I Preface

Everyone living in the era of rapid development of science and technology has obviously felt the impact of science and technology from an early age. Therefore, we must pay attention to cultivating their good scientific literacy since their childhood. Through science education, students will gradually understand the essence of science, be willing to explore and love science; learn to use scientific thinking to solve problems encountered in daily life, and continue to carry out self-learning.

The science curriculum should focus on students' in-depth interest and needs in the surrounding environment, emphasising the study of science in a way that is consistent with the age characteristics of students, and advocating science courses close to the lives of students. All of these provide new ideas and concepts for the reform of science curriculum in theory and practice.

The development of comprehensive science curriculum aims to cultivate students' scientific literacy. It actively advocates students to experience the learning activities based on inquiry, cultivate their curiosity and desire to explore, develop their understanding of the nature of science, and enable them to learn to solve problems with strategies, develop the habit of paying attention to scientific, technical and social issues, form a scientific attitude and value orientation, establish a sense of social responsibility, and lay a good foundation for their lifelong learning.

1. The Nature of the Course

The integrated science curriculum is a science course that aims to develop students' scientific literacy. The formation of scientific literacy is long-term, and early science education will play a decisive role in the formation of scientific literacy. To undertake the science enlightenment task, we must carefully care for the students' inherent curiosity, cultivate their interest in science and curiosity, guide them to learn scientific knowledge related to their surroundings, and help them experience the process of scientific activities and ways to make them understand the relationship between science, technology and society, thus to be willing to cooperate with others, to live in harmony with the environment, to lay the foundation for subsequent scientific study, study for other disciplines and lifelong learning and comprehensive development.

2. The Basic Concept

The integrated science curriculum is open to all students. This means providing each student with a fair opportunity to learn science with effective guidance. At the same time,

it needs to fully consider the differences between students in terms of gender, talent, interest, living environment, cultural background, region, etc., and encourage diversity and flexibility in curriculum, teaching materials, teaching, evaluation and the like.

Students are the subject of learning. Students have a strong curiosity and a positive desire to explore the world around them. Learning science should be the process of their active participation. Comprehensive science courses must be based on meeting the development needs of students and existing experience, providing a variety of scientific inquiry activities that they can directly participate in. Asking them to ask questions and solve problems is more effective than simply teaching them. Teachers are the organisers and guides of scientific learning activities. They should give full understanding and respect to students' performance in scientific learning activities, and have a positive impact on students with their own teaching behaviors.

Scientific learning should be based on inquiry. Inquiry is both the goal of scientific learning and the way of scientific learning. Experiential learning activities are the main way for students to learn science. The comprehensive science curriculum should provide students with sufficient scientific inquiry opportunities to experience the pleasure of learning science, enhance scientific inquiry ability, acquire scientific knowledge, and form a scientific attitude of respecting facts and being questionable in the process of scientific inquiry like scientists and to understand the history of scientific development. But teachers and students should also need to understand that inquiry is not the only learning model. In science teaching, flexible and comprehensive use of various pedagogical methods and strategies is necessary.

The content of the integrated science curriculum meets the needs of both society and students. Its content should be close to student's life, is in line with the development trend of modern science and technology. Content that meets the needs of social development and lays the foundation for their lifelong learning should be selected. These elements need to strengthen the organic links between the various fields of science, emphasising the integration of knowledge, abilities and emotional attitudes and values.

The integrated science curriculum should be open. This openness means that the curriculum should provide teachers and students with opportunities for choice and innovation in terms of learning content, activity organisation, homework and practice, evaluation, etc., so that the course can satisfy the different regions and different experience backgrounds to the greatest extent as students need to learn science.

Part II Course Objectives

The curriculum objectives of the Junior High School Integrated Science Curriculum Standard (hereinafter referred to as the “Curriculum standard”) consist of the overall goals and four sub-goals, as well as the interrelationships between the various objectives. The four sub-goals are based on four areas: 1) scientific inquiry, 2) scientific attitudes, emotions and values, 3) scientific knowledge and skills, and 4) the relationship between science, technology and society.

1. The Overall Goal

Through this integrated science curriculum, students will obtain the simple scientific knowledge related to the common things around which are applicable to daily life. They can gradually develop scientific behavioural habits and living habits, understand the process and methods of scientific inquiry, dare to apply Scientific inquiry activities, and gradually learn to look at problems from a scientific point of view, as well as to think about problems and solve problems; maintain and develop curiosity and curiosity about their surroundings, form a scientific attitude of bold imagination, respect for evidence, and dare to innovate, get close to nature, appreciate nature, respect life, actively participate in the protection of resources and the environment, and care about the new development of science and technology.

2. The Sub-goal

(1) Scientific inquiry (process, method and ability)

Students should be able to:

1. Observe the natural phenomenon and ask questions;
2. Present hypotheses and design methods to validate hypotheses;
3. Conduct an experiment, draw conclusions based on the results obtained, and use the conclusions to explain the problem;
4. Collect and process information and data;
5. Analyse the data, obtain meaningful information, and infer reliable and untrustworthy data;
6. Use scientific terms and symbols correctly and use expressions to exchange ideas on issues related to science commonly;
7. Apply creative thinking strategies or use new methods to solve scientific problems; and
8. Apply scientific methods to solve problems in life.

(2) Scientific attitudes, affect and values

Students should be able to:

1. Be curious and curiosity about the surrounding and natural phenomena;
2. Discover the mystery of nature, respect and care for life and non-life world, and form a life attitude that is in harmony with nature;
3. Pay attention to and reflect on the impact of science on the environment, society and economy;
4. Know the urgency of environmental protection and be willing to participate in activities to protect the environment.
5. Respect the objective facts, maintain a skeptical and open attitude, respect different opinions, and dare to express their opinions; and
6. Understand the contributions and limitations of science, not superstitious towards authority.

(3) Scientific knowledge and skills

Students should be able to:

1. Master basic scientific knowledge, concepts, principles and laws;
2. Master some scientific vocabulary and terminology;
3. Recognise the application of science in daily life and society; and
4. Understand and accept the evolving nature of scientific knowledge.

(4) The relationship between science, technology and society

Students should be able to:

1. Understand the impact of the development of science and technology on the natural environment, human life and society;
2. Identify the pros and cons of science and technology applications to make objective and informed decisions;

3. Understand the importance of science and technology in social and economic development;
4. Know that the initial understanding of social needs is a powerful driving force for the development of science and technology; and
5. Know primarily the significance of implementing sustainable development.

Part III Content Standard

The content standard is the core of the “curriculum standard”, which is the further embodiment of the overall goal and sub-goal. The Curriculum Standard covers four areas , namely scientific inquiry, scientific attitudes, emotions and values, scientific knowledge and skills, and the relationship between science, technology, and society through four aspects as follows: going into the scientific world, life sciences, physical sciences and Earth, Universe and Space Science.

1. Course Summary

(A) Going into the scientific world

“Going into the scientific world” is mainly to cultivate students’ interest and curiosity in learning and exploring natural sciences, so that students can actively acquire scientific knowledge, and at the same time, it lets students understand scientific processes and scientific methods thus to form certain scientific inquiry ability and science attitudes and values, and cultivate students’ innovative spirit.

The basic processes of scientific inquiry include asking questions, guessing results, making plans, observing, experimenting, producing, collecting evidence, explaining, expressing and communicating. Scientific inquiry ability is formed and developed through the completion of inquiry activities, and students should be personally involved in scientific inquiry activities and inquiry learning. The content of this part of the course is as follows:

1 What is science?

2 Science Laboratory

3 Scientific Inquiry Steps

4 Basic Units and Measurements

(1) Physical Quantity and Basic Unit

(2) International Unit

(3) Use of Measuring Tools

(B) Life Sciences

Through the study of “life sciences”, students will understand the basic facts, laws and basic concepts and principles of life sciences, and be able to apply relevant knowledge to explain some phenomena and solve related problems in life. At the same time, students can enjoy the beauty and harmony of the world of life through the observation and exploration of the world of life, thus stimulating the love of life and understanding the significance of the harmonious development of man and nature. The content of this part of the course is as follows:

1 Phenomenon of Life

2 Composition of Organisms

(1) The Unit of the Organism

(2) The Basic Structure of the Cell

(3) Differences between Animal and Plant Cells

(4) Significance of Cell Division and Differentiation

(5) The Concept of Single Cell and Multicellular Organisms

(6) Structure of the Human Body

3 Life Activities

3.1 Nutrition and Transportation

(1) Nutrition and Health

(2) Photosynthesis

(3) Digestion and Absorption

(4) Breathing

(5) Transportation of Substances

3.2 Coordination and Constant

- (1) Stimulation of Reception and Neuromodulation
- (2) Endocrine Regulation
- (3) Excretion
- (4) Support and Movement of Living Organisms

3.3 Reproduction and Development

- (1) Sexual Reproduction and Asexual Reproduction
- (2) Human Reproduction
- (3) Plant Reproduction
- (4) Growth and Development

3.4 Genetics and Evolution

- (1) Biological Inheritance
- (2) Biological Evolution

4 Biology and the Environment

4.1 Ecosystem

- (1) What is an ecosystem?
- (2) Relationship between Living things and the Environment
- (3) The Relationship between Living Things
- (4) Energy Flow in the Ecosystem
- (5) Material Circulation of Ecosystems
- (6) The Importance of Ecological Balance
- (7) The Role of Human Beings in Maintaining Ecological Balance

5 Biological Diversity

(1) Biological Diversity

(2) Biological Classification Methods and Classification Systems

(C) Material Science

Through the study of “material science”, students will be able to understand the subtleties of the material world, understand the basic properties of matter, understand the most basic principles of the movement of matter and their interactions, understand the meaning of energy transformation and conservation, and learn that the knowledge gained is linked to natural phenomena and daily life. The content of this part of the course is as follows:

1 Objects and Matters

(1) What is a matter?

(2) Particles that make up the Matter

(3) Physical Properties of the Matter

(4) Density of Matter

(5) Use of the Matter

(6) Elements

(7) Atoms and Molecules

(8) Chemical Formula

(9) Classification of Substances

(10) Ways of Changing Substances

(11) Chemical Reaction

2 Law of Conservation of Mass

3 Energy

3.1 Energy Sources and Energy

(1) Types of Energy and Energy Sources

(2) Conversion of Energy

(3) Conservation of Energy

3.2 Renewable and Non-renewable Energy

3.3 Protection and Energy Conservation

3.4 Heat

(1) Thermal energy

(2) Heat Transfer and Effect

3.5 Sound

(1) Wave

(2) Generation of Sound Waves

(3) Propagation of Sound Waves

(4) Reflection and Absorption of Sound Waves

(5) Electromagnetic Waves

(6) Music and Noise

3.6 Light and Colour

(1) Propagation of Light

(2) Reflection of Light

(3) Refraction of Light

(4) Dispersion of Light

3.7 Electricity and Magnetic

(1) Static Electricity

(2) Current

(3) Current, Voltage and Resistance

(4) Ohm's Law

(5) Magnetic

(6) Current Effect and Electromagnetic Induction

- (7) Power Generation
- (8) Wiring and Components of the Home Circuit
- (9) Electrical Work and Electric Power
- (10) Ground Wire and Fuse
- (11) Safe Use of Electricity
- (12) Saving Electricity

4 Force and Movement

- (1) Force
- (2) Motion
- (3) Work
- (4) Simple Machinery
- (5) Center of Gravity, Balance and Stability
- (D) Earth, Universe and Space Science

The purpose of this part of the course is to enable students to understand the relationship between the Earth, the Earth and the Sun and the Moon, the galaxies and the universe, and the history and significance of human exploration of space. The content of this part of the course is as follows:

1 Earth Movement and Effects

- (1) Earth's Movement
- (2) The Cause of Day and Night and the Four Seasons
- (3) The Movement of the Moon
- (4) Moon Phase
- (5) Causes of Tides

2 Overview of the Earth

- (1) Earth's Surface and Interior
- (2) Earth's Circle
- (3) Changes in the Nature of the Layers and Their Importance

3 Earth Resources

3.1 Soil

- (1) Soil
- (2) Effects of Human Activities on Soil

3.2 Rock

3.3 Minerals

- (1) The Relationship between the Main Mineral Resources and Characteristics of the Earth and Human Life

3.4 Water

- (1) Physical Properties of Water
- (2) Water Inspection Method
- (3) Composition of Water
- (4) Evaporation and Boiling
- (5) Solution
- (6) Acids and Bases
- (7) Water Purification and Water Supply
- (8) Sewage and Sewage Treatment

3.5 Atmosphere

- (1) Composition of Air
- (2) Oxygen, Carbon Dioxide and Other Gases
- (3) Burning
- (4) Pressure and Pressure
- (5) Air Pollution

3.6 Living Things

4 Solar System, the Galaxy and the Universe

4.1 Solar System

- (1) Solar System
- (2) The Sun
- (3) Structure of the Solar Atmosphere
- (4) The Phenomenon of the Surface of the Sun
- (5) How does the Sun produce energy?
- (6) Planet

4.2 Stars and Galaxies

- (1) Star
- (2) The Nature of Each Star and the Birth and Death of the Star
- (3) Galaxy
- (4) The Milky Way
- (5) Light Years

4.3 Universe

4.4 Development of Astronomy and Space Exploration

(1) History and Development of Astronomy and Space Exploration

2. Course Content

This science course content is designed as 6 lessons per week and 40 minutes per class. The course content is organised around four themes. Each topic contains several problem centers, each of which contains a number of learning objectives as well as corresponding learning outcomes. The activity proposal provides some guidance on how to achieve the learning outcomes.

The learning outcomes cover knowledge, skills and emotions. The target verbs for knowledge and skills are as follows:

Knowledge

1. Level of Understanding

Tell, give examples, list, describe, identify, know, identify

2. Level of Understanding

State, explain, compare, recognise, understand, distinguish, contrast, understand

3. Application Level

Use, classification, mastery, inference

Skills

1. Imitation Level

2. Individual Operation Level

1. Imitation Level

2. Independent Operation Level

Drawing, measuring, determining, reviewing, learning, calculating, mastering

3. Lateral Transfer Level

Connection

The target verbs for contacting the experiential requirements are as follows:

1. Experience (Feeling) Level

Feel, experience, realise, perceive

2. Reaction (Identification) Level

Follow with interest, pay attention to

3. Comprehension (Internalisation) Level

Form, establish, build, comprehend

Integrated Science Course Content

Theme	Problem Center	Learning Target		Learning Result	Activity Suggestion
Going into the Scientific World	1. What is science?		Know what science is	1. Know what science does; 2. Know the relationship between science and life; 3. Know the realm of science 4. Respect objective facts and maintain a skeptical and open attitude; 5. Be able to respect different opinions and dare to express your opinions; 6. Be able to recognise the contributions and limitations of science and not be superstitious; and 7. Recognise the impact of scientific applications and technology on society	1. Discuss what science is; 2. Collect clippings on science and technology; and 3. Collect inventions and discoveries about famous scientists and discuss their contributions to society
	2. Science Laboratory		Know the science laboratory	1. Get to know our lab; 2. Know the safety regulations of the laboratory; 3. Be able to follow the safety rules in the laboratory; 4. Recognise the safety signs of hazardous chemicals; 5. Be able to perform emergency response measures for general accidents in the	1. Familiarise with the safety regulations of the laboratory; 2. Identify potential hazards in the laboratory from the picture and propose appropriate precautions; 3. Collect safety signs for hazardous chemicals; 4. Practice general emergency response

				laboratory; 6. Know the equipment commonly used in the laboratory and be familiar with its application; 7. Understand the structure of Bunsen burners and how to use them; and 8. Can work with others to maintain the safety of the laboratory	measures; 5. Judgment Exercise: How to deal with accidents that may occur in the laboratory, such as accidental dumping of fire and acid; 6. Demonstrate how to use a fire extinguisher; 7. Observe the structure of the Bunsen burner and be familiar with the way to adjust its flame; and 8. Use the correct method to dispose waste and waste gases from the laboratory
	3. Scientific Inquiry Steps		Understand the steps of scientific inquiry	1. Know the steps of scientific inquiry: a) set the inquiry question; b) determine the variables involved; c) make assumptions; d) design exploration method; e) select the appropriate instrument; f) conduct inquiry activities; g) observe; h) collect data; i) analyse data; and j) make a conclusion 2. Can try simple scientific inquiry;	1. Design a simple scientific inquiry activity and conduct the activity; 2. Perform a black box experiment; and 3. Watch a video of how scientists are exploring

				3. Be able to record the results of the experiment honestly; 4. Can respect different opinions; and 5. Be able to recognise that scientific inquiry is constantly improving	
	4. Basic Units and Measurements		1. Recognise physical quantities and basic units; 2. Know the international unit; and 3. Master the use of measurement tools	1. Be able to measure physical quantities and apply appropriate metric units; 2. Can master the common unit prefix; 3. Know the international unit; 4. Master the skills to use basic tools and instruments for measurement and observation: -length -volume -area -quality -time -temperature 5. Be able to record the measurement results honestly; 6. Respect objective facts; and 7. Know that technology helps us make more accurate measurements	1. Measure the length of the line; 2. Measure the length of the curve; 3. Measure the inside and outside diameter of the object; 4. Know that the measuring cylinder measures the volume of the irregular shaped object; 5. Measure the volume of the liquid with a measuring cylinder; 6. Use squared paper to find the area of the irregular shape; 7. Measure the mass of the object with a balance; 8. Measure time with a stopwatch; 9. Use a thermometer to measure the temperature of the fluid;

					<p>10. Know the Kelvins and Celsius temperature scales; and</p> <p>11. Observe the structure of the thermometer and know how to use it</p>
Life Sciences	1. The Phenomenon of Life		Know the phenomenon of life	<p>1. Being able to tell the phenomenon of life;</p> <p>2. Be curious about the phenomenon of life;</p> <p>3. Be able to feel the mystery of life; and</p> <p>4. Know the living conditions of the living body</p>	<p>1. Collect, discuss and report through the Internet, educational software, books or videos:</p> <p>a) Life phenomenon; and</p> <p>b) How the life sustains life</p>
	2. Composition of the Organism		<p>1. Know that cells are the basic unit of the living organism;</p> <p>2. Know the basic structure of the cell;</p> <p>3. Know the difference between animals and plant cells;</p> <p>4. Know the significance of cell division and differentiation;</p> <p>5. Know the concept of single cell and multicellular</p>	<p>1. Be able to tell the basic structure of the cell and its function;</p> <p>2. Be able to tell the difference between animal and plant cells;</p> <p>3. Know that cells increase their number through division;</p> <p>4. Know the concept and meaning of cell differentiation;</p> <p>5. Know the basic structure of the microscope;</p> <p>6. Master the method of using the microscope;</p> <p>7. Master the method of making simple slide specimens;</p> <p>8. Be able to describe the definitions and examples of</p>	<p>1. Collect, discuss and report through the Internet, educational software, books or videos:</p> <p>a) the structure of animal and plant cells;</p> <p>b) the function of various parts of the cell;</p> <p>c) single cell and multicellular organisms;</p> <p>d) the hierarchical relationship between cells, tissues, organs, systems and individuals; and</p> <p>e) Cell division</p> <p>2. Practice using the microscope;</p>

			<p>organisms; and</p> <p>6. Know the structure of the human body</p>	<p>single-cell and multi-cell organisms;</p> <p>9. Be able to tell a variety of human cells and their functions;</p> <p>10. Be able to identify what is tissue, organ and system; and</p> <p>11. Be able to tell the structure of the human body</p>	<p>3. Practice making slide specimens;</p> <p>4. Observe the plant cells and animal cells with a microscope, draw pictures according to the observations and indicate the basic structure of the cells, and explain the similarities and differences between the structure and function of the plants and animals;</p> <p>5. Observe with a microscope:</p> <p>a) Single-celled organisms such as amoeba, paramecium, bacteria, and yeast;</p> <p>b) Multicellular organisms such as leeches and sponges of invertebrates; and</p> <p>6. Show by drawing the basic structure of these creatures</p>
	3. Life Activities	1. Nutrition and Transportation	<p>Nutrition and Health</p> <p>1. Know all kinds of nutrients;</p> <p>2. Know the function of nutrients; and</p> <p>3. Recognise a</p>	<p>1. Know how organisms get nutrients;</p> <p>2. Know the different types of nutrients and their main sources: sugars, proteins, fats, vitamins, inorganic salts and water;</p> <p>3. Be able to give examples of</p>	<p>1. Collect, discuss and report through the Internet, educational software, books or videos:</p> <p>a) the main sources and functions of various nutrients;</p> <p>b) malnutrition and disease;</p>

			<p>balanced diet</p> <p>4. Know the relationship between diet balance and health</p>	<p>the functions of various nutrients;</p> <p>4. Be able to do experiments to detect starch, glucose, protein, fat and vitamin C;</p> <p>5. Be able to explain what is a balanced diet;</p> <p>6. Be able to explain the factors that need to be considered in determining a balanced diet;</p> <p>7. Know the relationship between diet balance and health;</p> <p>8. Recognise the importance of eating nutritious food;</p> <p>9. Be able to tell the disease caused by malnutrition; and</p> <p>10. Understand how technological development affects human diet and health</p>	<p>c) What a healthy diet is;</p> <p>2. Perform experimental tests: starch, glucose, protein, fat and vitamin C;</p> <p>3. Discuss factors that determine a balanced diet: age, physique, gender, occupation, climate, and health;</p> <p>4. Design a balanced diet for the day, including breakfast, lunch and dinner; and</p> <p>5. Understand the nutrients of food on the market</p>
			<p>Photosynthesis</p> <p>1. Understanding photosynthesis; and</p> <p>2. Recognise the importance of photosynthesis</p>	<p>1. Be able to explain what photosynthesis is;</p> <p>2. Be able to explain the conditions and substances produced by photosynthesis;</p> <p>3. Be able to control variables for photosynthesis experiments; and</p> <p>4. Be able to explain the importance of photosynthesis</p>	<p>1. Collect, discuss and report through the Internet, educational software, books or videos:</p> <p>a) What photosynthesis is;</p> <p>b) The importance of photosynthesis;</p> <p>2. Perform plant photosynthesis experiments to determine the required conditions: carbon dioxide,</p>

					<p>water, light, and chlorophyll;</p> <p>3. Observe the cut surface of the leaf with a microscope; and</p> <p>4. Observe the chloroplast of plant cells with a microscope</p>
			<p>Digestion and Absorption</p> <p>1. Recognise the body's digestive system;</p> <p>2. Recognise the digestion process of food and the process of absorption of nutrients;</p> <p>3. Recognise the absorption and drainage of water; and</p> <p>4. Know what a good eating habit is</p>	<p>1. Know what digesting is;</p> <p>2. Know the digestive system of the human body;</p> <p>3. Know the composition of the digestive system and the function of each component;</p> <p>4. Recognise the structure and health of the teeth;</p> <p>5. Be able to explain the digestion process of food, know the main enzymes and the absorption process of nutrients;</p> <p>6. Be able to tell the products of sugar, protein and fat digestion;</p> <p>7. Be able to infer from the artificial casing experiment how glucose is absorbed;</p> <p>8. Be able to explain what digestion is;</p> <p>9. Be able to explain the relationship between constipation and eating habits; and</p> <p>10. Develop good eating habits and lifestyles</p>	<p>1. Collect, discuss and report through the Internet, educational software, books, models or videos:</p> <p>a) the composition of the digestive system;</p> <p>b) the role of the teeth in the digestion process;</p> <p>c) dental care;</p> <p>d) the tooth type of different animals;</p> <p>e) the function of the digestive organs;</p> <p>f) absorption and utilisation of nutrients;</p> <p>g) Good eating habits to avoid constipation;</p> <p>2. Experiment: The effect of acid on the teeth;</p> <p>3. Experiment: The effect of salivary enzyme on starch;</p> <p>4. Perform an artificial casing test to illustrate the absorption process of glucose; and</p>

					5. Discussion and report: What is good eating habits?
			<p>Breathe</p> <ol style="list-style-type: none"> 1. Recognise the respiratory system of the human body; 2. Recognise the respiratory mechanism of the human body; 3. Know the gas exchange in the human body; 4. Recognise the importance of respiratory health; and 5. Understand the gas exchange of plants 	<ol style="list-style-type: none"> 1. Know the composition of the respiratory system and the function of each component; 2. Be able to draw a sketch to represent the body's respiratory system; 3. Be able to explain the structure of the lungs; 4. Be able to tell the principle of respiratory movement; 5. Be able to tell the exchange process of oxygen and carbon dioxide in the alveoli; 6. Know that oxygen is transported by the blood's oxyhemoglobin; 7. Be able to describe the exchange process of oxygen and carbon dioxide in tissue cells; 8. Be able to list substances that are harmful to the respiratory system; 9. Be able to explain the effects of air pollution on the respiratory system; 10. Be able to list diseases of the respiratory system; 11. Know how to protect the 	<ol style="list-style-type: none"> 1. Collect, discuss and report through the Internet, educational software, books, models or videos: <ol style="list-style-type: none"> a) What constitutes the respiratory system; b) the exchange process of oxygen and carbon dioxide; c) how blood transports oxygen; d) Substances harmful to the respiratory system: nicotine and tar from cigarettes, sulfur dioxide emitted from factories, car exhaust and carbon monoxide in soot; e) how toxins and carcinogens affect the respiratory system; f) the harmful effects of smoking, smoking cessation and smoking bans; g) how carbon monoxide is produced and avoids poisoning; h) diseases of the respiratory system and health care of the respiratory system; i) how plants exchange gases

				<p>health of your respiratory system;</p> <p>12. Be able to tell the harm of smoking;</p> <p>13. Be able to indicate the toxicity of carbon monoxide;</p> <p>14. Know the importance of maintaining air cleanliness;</p> <p>15. Be able to explain how plants exchange gas;</p> <p>16. Know the substances produced by respiration;</p> <p>17. Be able to tell the importance of respiration; and</p> <p>18. Be able to explain the connection and difference between respiration and photosynthesis</p>	<p>2. Identify using the lung model: bronchus, bronchioles, alveoli;</p> <p>3. Make a model of the operable human respiratory system to illustrate the relationship between chest air pressure and breathing;</p> <p>4. Draw a picture of the respiratory system and its organs;</p> <p>5. Undergo experiments to show that organisms absorb oxygen and release carbon dioxide during respiration;</p> <p>6. Undergo experiments to show the effect of smoking on the lungs;</p> <p>7. Organise an exhibition that explains the consequences of smoking and lung disease; and</p> <p>8. Brainstorm how to maintain air cleanliness</p>
			<p>Material Transportation</p> <p>1. Understand the circulatory system;</p> <p>2. Recognise the transportation function of the</p>	<p>1. Know the composition of the circulatory system;</p> <p>2. Be able to explain the function of the circulatory system;</p> <p>3. Be able to describe the blood circulation of the human body;</p>	<p>1. Collect, discuss and report through the Internet, educational software, books, models or videos:</p> <p>a) What is the circulatory system of the human body;</p> <p>b) the function of each</p>

			<p>circulatory system; and</p> <p>3. Recognise the transport system of plants</p>	<p>4. Be able to draw a simple heart structure diagramme and the name of each part;</p> <p>5. Know the type, structure and function of the blood vessels;</p> <p>6. Know the composition and function of the blood;</p> <p>7. Know the different blood types;</p> <p>8. Be able to explain how plants transport water and nutrients;</p> <p>9. Know the evapotranspiration of plants;</p> <p>10. Know the composition of the plant's transportation system;</p> <p>11. Know the function of plant vascular bundles;</p> <p>12. Can be observed with a microscope:</p> <p>a) human blood smear; and</p> <p>b) the surface of the leaves;</p> <p>13. Know how to care about the health of your circulatory system;</p> <p>14. Know the composition of the lymphatic system; and</p> <p>15. Know the function of the lymphatic system</p>	<p>component of the circulatory system;</p> <p>c) the composition of the blood;</p> <p>d) the shape of the blood cell;</p> <p>e) the function of the various components of the blood;</p> <p>f) the type of blood type;</p> <p>g) the structure and function of the heart;</p> <p>h) the similarities and differences between arterial and venous structures;</p> <p>i) Transportation systems and functions of plants;</p> <p>2. Dissect and observe an animal's heart and draw an icon showing the structure of the heart;</p> <p>3. Dissect and observe the arteries and veins of an animal, and draw a picture of the similarities and differences of their structure;</p> <p>4. Observe the blood flow in the fishtail or the appendix with a microscope;</p> <p>5. Observe the human blood smear with a microscope; draw a picture of the blood</p>
--	--	--	---	--	---

					<p>cells and other substances;</p> <p>6. Observe the surface of the leaf with a microscope and plot the structure of the stomata; and</p> <p>7. Conduct an experimental study of the function of the vascular bundle</p>
		2. Coordination and Constant	<p>Receiving Stimulation and Neuromodulation</p> <p>1. Recognise the sensory organs of the human body and their functions;</p> <p>2. Understand the human nervous system; and</p> <p>3. Recognise how the human body receives the stimulus and the response of the human body after receiving the stimulus</p>	<p>1. Be able to tell the sensory organs of the human body and their functions;</p> <p>2. Be able to tell the skin has a tactile, pressure, temperature and pain receptor;</p> <p>3. Be able to mark the structure of the skin, nasal cavity, ear and eye and tell the function of each structure;</p> <p>4. Be able to draw and mark the sensitive parts of the tongue for different tastes;</p> <p>5. Know that taste and smell are closely related;</p> <p>6. Know how to protect your ears;</p> <p>7. Know what noise is and how it affects your health;</p> <p>8. Be able to explain the cause of the hearing defect;</p> <p>9. Know the binaural effect;</p> <p>10. Be able to explain the visual</p>	<p>1. Collect, discuss and report through the Internet, educational software, books, videos or models:</p> <p>a) the structure and tactile function of the skin;</p> <p>b) the structure and olfactory function of the nose;</p> <p>c) the structure and taste function of the tongue;</p> <p>d) the structure and auditory function of the ear;</p> <p>e) the structure and visual function of the eye;</p> <p>f) the nervous system of the human body, including the main parts and functions of the human brain;</p> <p>g) stimulation and response; and</p> <p>h) the effects of drugs and alcohol on human health</p> <p>2. Conduct the following</p>

				<p>principle of the eye;</p> <p>11. Know the causes and corrections for myopia, hyperopia, astigmatism;</p> <p>12. Know the cause of colour blindness;</p> <p>13. Be able to tell the composition of the human nervous system;</p> <p>14. Be able to give examples of human reflections;</p> <p>15. Be able to tell the composition of the reflex arc; and</p> <p>16. Understand the impact of drugs and alcohol on human health</p>	<p>experiment:</p> <p>a) study the sensitivity of the skin to different stimuli in different parts of the body;</p> <p>b) find the parts of the tongue that are sensitive to different tastes;</p> <p>c) study the relationship between taste and olfaction;</p> <p>d) study the relationship between vision and balance;</p> <p>e) detect the frequency range of human hearing;</p> <p>f) find the range of auditory frequencies of different animals;</p> <p>g) Prove that the direction of the sound source requires stereo hearing, i.e. binaural effect;</p> <p>h) Experiments demonstrating eye vision imaging, myopia and hyperopia, and their correction methods;</p> <p>i) Perform reflexion experiments such as knee reflex and light pupil;</p> <p>3. Dissect an animal's eyeball, identify its parts and draw a picture of its basic</p>
--	--	--	--	--	--

					structure; 4. Perform colour blind detection; and 5. Perform a physiological blind spot test
			Endocrine Regulation 1. Recognise the endocrine system and its function; 2. Know the relationship between the nervous system and endocrine; 3. Know the function of hormones and hormones; and 4. Recognise the constant adjustment of the internal environment	1. Know that the physiological activities of the human body are controlled and coordinated by the nervous system and the endocrine system; 2. Know what the functions of hormones and hormones are; 3. Recognise the adrenal glands, pituitary glands, thyroid gland, islets, and gonads and their locations; and 4. Recognise the importance of maintaining a constant environment in the living body	1. Collect, discuss and report through the Internet, educational software, books, videos or models: a) the endocrine system of the human body; b) the endocrine glands of the human body; c) the function of various hormones; and d) The effects of a certain hormone deficiency or excessive secretion
			Excretion 1. Recognise the excretion of the human body; 2. Recognise the excretion of plants; and 3. Understand the	1. Recognise the body's excretory system and its role; 2. Be able to explain what excretion is; 3. Be able to tell the shape and structure of the kidney; 4. Be able to explain the function of the kidney;	1. Collect, discuss and report through the Internet, educational software, books, models or videos: a) the body's excretory system; b) excretory organs of the human body: excretion

			urinary system of the human body	<p>5. Be able to tell the excretion of each excretory organ;</p> <p>6. Be able to tell the ingredients of the exhaled gas, urine and sweat;</p> <p>7. Be able to explain the importance of excretion;</p> <p>8. Be able to explain how plants excrete waste;</p> <p>9. Know what the excrement of the plant is;</p> <p>10. Mark the location of the kidney and other urinary organs;</p> <p>11. Be able to explain the urination process of the human body; and</p> <p>12. Be able to explain the importance of protecting kidney health</p>	<p>function of skin, lungs and kidneys;</p> <p>c) the urinary system of the human body;</p> <p>d) other functions of the kidney and kidney disease;</p> <p>e) Excreta of each excretory organ: water, carbon dioxide and urea;</p> <p>f) the importance of excretion;</p> <p>g) how plants excrete; and</p> <p>h) Plant excreta: carbon dioxide, water and complex waste;</p> <p>2. Dissect and observe the kidney of an animal, or observe the kidney specimen of the animal; find the cortex, medulla and renal pelvis of the kidney;</p> <p>3. Discussion: The importance of the kidneys;;How to live with kidney failure, including “dialysis”; report the main points of the discussion</p>
			<p>Organism Support and Movement</p> <p>1. Know the support system of</p>	<p>1. Recognise the support systems of various animals;</p> <p>2. Can give examples of support systems for woody, herbaceous</p>	<p>1. Collect, discuss and report through the Internet, educational software, books, models or videos:</p>

			<p>animals;</p> <p>2. Know the support system of plants;</p> <p>3. Know the importance of the biological support system;</p> <p>4. Know the movement of living things; and</p> <p>5. Understand the relationship between the nervous system and exercise</p>	<p>and aquatic plants;</p> <p>3. Know the importance of the support system to living things;</p> <p>4. Know that animals and plants have movement;</p> <p>5. Be able to explain the plant's tropic movement and nastic movement;</p> <p>6. Know the composition of the body's motor system (bones, joints, and muscles); and</p> <p>7. Be able to explain the relationship between the nervous system and exercise</p>	<p>a) the supporting structure of different organisms;</p> <p>b) The components of the support structure and their functions;</p> <p>2. Study the support systems of various plants through field observations;</p> <p>3. Classify plants according to the support system;</p> <p>4. Discuss and report discussion results:</p> <p>a) Why are whales rushing to the coast unable to swim back to the sea?</p> <p>b) Why do some people use crutches?</p> <p>5. Collect, discuss and report through the Internet, educational software, books, models or videos:</p> <p>a) movement of people, animals and plants;</p> <p>b) the composition of the human motion system; and</p> <p>c) Characteristics of human movement; and</p> <p>6. Perform experiments to observe plant tropic movement and nastic movement ; report relevant</p>
--	--	--	--	--	---

					experimental results
		3. Reproduction and Development	<p>Sexual Reproduction and Asexual Reproduction</p> <p>1. Recognise the importance of reproduction; 2. Recognise the reproduction of living things; 3. Recognise sexual and asexual reproduction; and 4. Recognise the vegetative reproduction of flowering plants</p>	<p>1. Be able to tell the meaning of reproduction and the way of reproduction; 2. Know the concepts of asexuality and sexual reproduction; 3. Be able to list some ways of asexual reproduction; 4. Be able to explain the difference between asexual reproduction and sexual reproduction; 5. Be able to explain what fertilisation is; 6. Be able to explain what is in vivo fertilization and in vitro fertilisation; 7. Be able to give an example of what vegetative reproduction is; 8. Be able to tell the organs that plants can be used for vegetative reproduction; 9. Clasify the flowering plants according to the organs that can be used for vegetative reproduction; and 10. Know the application of vegetative reproduction research in agriculture</p>	<p>1. Collect, discuss and report through the Internet, educational software, books, models or videos: a) the reproductive patterns of various plants and animals; b) sexual reproduction; c) asexual reproduction; d) differences in sexual reproduction and asexual reproduction; and e) vegetative reproduction 2. Visit the nursery and learn about the various vegetative reproduction methods used; 3. Discuss what vegetative reproduction is; and 4. Discuss the application of vegetative reproduction research in agriculture</p>
			Human	1. Identify the structure that	1. Collect, discuss and report

			<p>Reproduction</p> <ol style="list-style-type: none"> 1. Recognize the male reproductive system 2. Recognize the female reproductive system 3. Know the menstruation and menstrual cycle 4. Know fertilization and pregnancy 5. Know the importance of prenatal care 	<p>makes up the male reproductive system and talk about its function;</p> <ol style="list-style-type: none"> 2. Be able to explain the role of sperm in reproduction; 3. Identify the structure of the female reproductive system and tell about its function; 4. Be able to explain the role of the egg in reproduction; 5. Know the difference in size, quantity, and mobility of male and female gametes; 6. Know the formation of menstruation and the menstrual cycle; 7. Know the changes in the endometrium during the menstrual cycle; 8. Know the relationship between ovulation and fertilisation during the menstrual cycle; 9. Be able to explain the importance of menstrual hygiene; 10. Know the formation of human fertilized eggs, pregnancy and childbirth; 11. Know the importance of nutrition to the health of the 	<p>through the Internet, educational software, books, models or videos:</p> <ol style="list-style-type: none"> a) the composition of the male reproductive system; b) Structure and reproduction of sperm; <p>2. Collect, discuss and report through the Internet, educational software, books, models or videos:</p> <ol style="list-style-type: none"> a) the composition of the female reproductive system; b) the structure and reproductive function of the egg; c) Ovulation and menstruation; <p>3 Discussion:</p> <ol style="list-style-type: none"> a) the relationship between the ovulation period of the menstrual cycle and fertilisation; b) The importance of menstrual hygiene; <p>4. Collect, discuss and report through the Internet, educational software, books, models or videos:</p> <ol style="list-style-type: none"> a) What fertilisation is; b) The process of egg
--	--	--	--	---	--

				<p>mother and the fetus during pregnancy; and</p> <p>12. Know the effects of harmful foods on the fetus</p>	<p>fertilisation and implantation;</p> <p>c) the process by which the fertilised egg develops into an embryo;</p> <p>d) the location of the embryo implantation;</p> <p>5. Hold an exhibition or seminar to explain:</p> <p>a) It is important to eat nutritious food during pregnancy; and</p> <p>b) The effects of smoking, taking drugs, taking certain toxic drugs and drinking alcohol on the embryo and the fetus</p>
			<p>Plant Reproduction</p> <p>1. Recognise sexual reproduction of flowering plants;</p> <p>2. Know the role of pollination and fertilisation; and</p> <p>3. Know the development and formation of fruits and seeds</p>	<p>1. Know that flowers are the reproductive organs of plants;</p> <p>2. Recognise the structure of the flower;</p> <p>3. Be able to recognise the stamen and pistil of the flower;</p> <p>4. Be able to explain the function of stamens and pistils;</p> <p>5. Know the pollination and fertilisation of plants;</p> <p>6. Be able to tell a variety of pollinators;</p> <p>7. Link the characteristics of flowers to their pollinators;</p>	<p>1. Collect, discuss and report through the Internet, educational software, books, models or videos:</p> <p>a) sexual reproduction of plants;</p> <p>b) the reproductive organs of plants;</p> <p>c) pollination and fertilization;</p> <p>d) the formation of fruits and seeds;</p> <p>e) The way fruit and seeds are transmitted;</p>

				<p>8. Know the advantages of cross-pollination;</p> <p>9. Be able to give an example of how to carry out cross-pollination in agriculture;</p> <p>10. Know where the fertilisation occurs in the flower;</p> <p>11. Be able to tell the fertilisation process of the plant;</p> <p>12. Be able to tell the formation and dissemination of plant fruits and seeds;</p> <p>13. Know the importance of science and technology in agriculture and economic development; and</p> <p>14. Know the impact of science and technology on agricultural development and human life</p>	<p>2. Carry out an experiment to observe the reproductive organs of the plant – flowers;</p> <p>Identification:</p> <p>a) petals and sepals;</p> <p>b) stamens: filaments and anthers;</p> <p>c) Pistil: style, stigma and ovary;</p> <p>3. Observe with a microscope or a magnifying glass:</p> <p>a) longitudinal and transverse sections of the style, identifying the ovary;</p> <p>b) Observe the pollen;</p> <p>4. Observe the way and report observations of different plants on the campus;</p> <p>5. Discussion:</p> <p>a) the similarities and differences between self-pollination and cross-pollination;</p> <p>b) the advantages of cross-pollination;</p> <p>c) the application of cross-pollination in agriculture;</p> <p>d) Artificial pollination;</p> <p>6. Observe the structure of</p>
--	--	--	--	---	---

					<p>different flowers and infer their pollinators;</p> <p>7. Observe the growth of the pollen tube in different concentrations of sugar solution (5%-10%) with a microscope;</p> <p>8. Use the diagram to indicate:</p> <p>a) the fertilisation process of the plant;</p> <p>b) The formation of fruits and seeds;</p> <p>9. Discussion:</p> <p>a) the part of the flower where fertilisation occurs;</p> <p>b) fertilisation of plants;</p> <p>c) The formation of fruits and seeds; and</p> <p>10. Classify plants by reproductive means</p>
			<p>Growth and Development</p> <p>1. Recognise the growth and development of the human body;</p> <p>2. Recognise the growth and development of plants</p>	<p>1. Explain what growth and development is;</p> <p>2. Be able to explain the changes that men have made during adolescence;</p> <p>3. Be able to explain the changes that women have made during adolescence;</p> <p>4. Understand the importance of hygiene and health care during</p>	<p>1. Collect, discuss and report through the Internet, educational software, books, models or videos:</p> <p>a) definition of growth and development;</p> <p>b) the growth and development of humans;</p> <p>c) changes in the body, physiology and mood of men</p>

				<p>adolescence;</p> <p>5. Know that the growth curves of men and women are different;</p> <p>6. Know the developmental characteristics of men and women;</p> <p>7. Be able to explain how nutrition affects human growth;</p> <p>8. Know the structure of the seed;</p> <p>9. Know the conditions for seed germination;</p> <p>10. Be able to explain the function of each part of the seed;</p> <p>11. Be able to explore the conditions of seed germination;</p> <p>12. Be able to tell the pattern of seed germination; and</p> <p>13. Know the growth and development of plant root tips and shoot tips</p>	<p>during puberty;</p> <p>d) changes in the physical, physiological and emotional aspects of women during adolescence;</p> <p>e) seed structure, germination and growth; and</p> <p>f) splitting activity of leaf tip and shoot tip cells;</p> <p>2. Perform experiments to observe the germination process of the seeds;</p> <p>3. Collect information about plant growth curves;</p> <p>4. Design and conduct an experiment to measure plant growth curves;</p> <p>5. Discussion:</p> <p>a) Measure the characteristics used for growth, such as height and weight;</p> <p>b) The meaning of growth;</p> <p>c) The effects of nutrition on the physical and intellectual growth of children;</p> <p>6. Explain the growth curve of men and women from infancy to adult;</p> <p>7. Observe the slice of the seed with a microscope or</p>
--	--	--	--	---	--

					<p>magnifying glass to identify the structure of the seed;</p> <p>8. Collect information and explanations:</p> <p>a) The function of each part of the seed, namely embryo (radial root, hypocotyl, germ, cotyledon) and seed coat;</p> <p>b) Changes in radicle, germ and cotyledon at germination;</p> <p>9. Divided trainees into several group to do discussion:</p> <p>a) identify variables related to seed germination;</p> <p>b) Make assumptions about the conditions under which seeds are germinated; and</p> <p>10. Design and perform experiments to determine seed germination conditions</p>
		4. Genetics and Evolution	<p>Biological Inheritance</p> <p>1. Recognise the genetic material of the organism and its function;</p> <p>2. Know the meaning of cell division; and</p>	<p>1. Understand the relationship between traits and heredity;</p> <p>2. Know the expression of genetic control traits;</p> <p>3. Know that DNA is a genetic material and know its relationship to genes and chromosomes;</p> <p>4. Know the meaning of mitosis</p>	<p>1. Collect, discuss and report through the Internet, educational software, books, models or videos:</p> <p>a) hereditary traits;</p> <p>b) the role of genes and DNA in heredity;</p> <p>c) cell division: the number of chromosomes in mitosis</p>

			3. Know the causes and consequences of genetic mutations	and meiosis; 5. Know how human gender is determined; 6. Know the causes and consequences of genetic mutations; and 7. Know the pros and cons of genetic engineering applications	and meiosis; d) factors determining human gender; e) cell division and heredity; f) genetic mutations; g) the causes and consequences of the mutation; and h) genetic diseases 2. Discussion: The pros and cons of genetic engineering
			Understanding Biological Evolution	1. Understand the concept of biological evolution; 2. Know Darwin's natural choices; and 3. Know that fossils are evidence of evolution	1. Collect, discuss and report through the Internet, educational software, books, models or videos: a) What evolution is; b) the main points of the evolution; c) the basis for the interpretation of the evolution; d) Darwin's natural selection; e) What artificial selection is; and f) Fossils and fossils
	4. Living Things and the Environment	Ecosystem	1. Know what an ecosystem is; 2. Know the relationship between living	1. Know what a population, community, and ecosystem are; 2. Know that there are many different ecosystems on Earth; 3. Recognise that the interaction	1. Collect, discuss and report through the Internet, educational software, books, models or videos: a) What is an ecosystem;

			<p>things and the environment; 3. Understand the relationship between living things; 4. Know the energy flow in the ecosystem; 5. Know the material cycle in ecosystem; and 6. Know the importance of ecological balance</p>	<p>of living things with the environment is important to the environment; 4. Be able to tell the relationship between living things; 5. Know the concept of the food chain in the ecosystem and the flow of energy in the food chain; 6. Be able to explain what producer, consumer and decomposer are; 7. Know the food chain and the food web and tell the relationship between the two; 8. Know the main pathways for oxygen, carbon and nitrogen cycling; 9. Know the importance of maintaining ecosystem balance and stability; and 10. Know the meaning of sustainable development</p>	<p>b) definition of population and community; c) What the food chain and food web are; d) the relationship between living things and living things in an ecosystem; e) energy flow; f) Abiotic factors affecting the ecological environment; 2. Observe the campus's habitat and draw a map of the food chain and energy flow of the habitat; 3. Collect and explain the types of interactions between: prey and predators; symbiosis and competition; 4. Discuss and report on the advantages of using biological control pests in certain areas; 5. Combine several food chains into one food web; 6. Discuss and report on the cycle of matter in an ecosystem – the cycle of oxygen, carbon and nitrogen; 7. Discuss the relationship between animals and plants and people;</p>
--	--	--	--	---	--

					8. Discuss and report on what happens to ecosystem imbalances; 9. Discuss and report on ways to maintain ecosystem balance and stability; and 10. Design a green campus environmental program
			Recognise the role of human beings in maintaining ecological balance	1. Be able to tell the impact of human activities on ecological balance; 2. Recognize that humans need a stable and productive ecosystem to maintain a harmonious life; 3. Be able to focus on ways to protect the environment; and 4. Understand that humans have a responsibility to maintain ecological balance and know how individuals can protect ecosystems	1. Discuss how human activities affect the balance of ecology; 2. Discuss environmental issues affecting ecological balance and their solutions; and 3. Discuss the ecological environment needed for a harmonious life of mankind and report the main points of the discussion
	5. Biological Diversity		Understanding the diversity of living things	1. Know that living thing is diverse and the ecological crisis it faces; 2. Can infer the possible consequences of a bio-extinction in an ecosystem; 3. Explain the importance of protecting biodiversity and propose protective measures;	1. Collect, discuss and report through the Internet, educational software, books, models or videos: a) Biological diversity; b) The type and quantity of the organism; c) Ecological crisis of biodiversity;

				<p>and</p> <p>4. Support the activities of biodiversity conservation organised by various environmental groups</p>	<p>2. Discuss and report on why you want to protect the diversity of living things;</p> <p>3. Discuss and report on how to protect the diversity of living things;</p> <p>4. Discuss the consequences of a biological extinction in an ecosystem;</p> <p>5. Visit the Bio Conservation Center;</p> <p>6. Discuss how technology can help with conservation and then report on the focus of the discussion; and</p> <p>7. Organise activities to promote the conservation of biodiversity</p>
			Understanding biological classification methods and classification systems	<p>1. Be able to tell the method and meaning of classification;</p> <p>2. Be able to classify common features of animals;</p> <p>3. Be able to classify common features of plants;</p> <p>4. Master the application of the dichotomous key;</p> <p>5. Recognise the main features of the five kingdom taxonomic classification and organisms;</p> <p>6. Know the diseases caused by common bacteria and fungi;</p>	<p>1. Collect, discuss and report through the Internet, educational software, books, models or videos:</p> <p>a) Various taxonomic systems;</p> <p>b) The historical development process of various classification systems;</p> <p>c) The classification system currently in use;</p> <p>2. Collect images of animals</p>

				<p>7. Understand and accept the evolving nature of scientific knowledge;</p> <p>8. Recognise the history of taxonomic systems and know that organisms may be reclassified and named as new evidence emerges; and</p> <p>9. Know that the name of a creature has a common name and a scientific name</p>	<p>and plants and classify them according to their common characteristics;</p> <p>3. Make a dichotomous key;</p> <p>4. Practice using a dichotomous key;</p> <p>5. Collect information and discuss taxonomic systems;</p> <p>6. Review and report on biological naming; and</p> <p>7. Find the scientific names of several common animals and plants</p>
Physical Science	1. Objects and Matter		Understanding matter	<p>1. Be able to tell the term matter refers to anything that occupies space and has mass; and</p> <p>2. Be able to carry out activities to verify the mass and space of water, air, soil and living things</p>	<p>1. Introduce the concept of matter that any substance has mass and takes up space as physical properties by observing some of the things around you;</p> <p>2. Discuss what a matter is; and</p> <p>3. List examples of substances</p>
			Matter is made up of particles 1. Recognise the three states of matter; and 2. Know Brownian motion	<p>1. Know that matter is made up of particles;</p> <p>2. Recognise the characteristics of the three states of matter;</p> <p>3. Know the relationship between the arrangement of particles in solid, liquid, and gaseous materials and the state</p>	<p>1. Perform an experiment in which the matter is composed of particles;</p> <p>2. Observe the Brownian motion of the particles;</p> <p>3. Carry out the experiment: the distance between the particles in the three state of</p>

				<p>of motion;</p> <p>4. Through Brownian motion experiment, understand that particles are constantly moving; and</p> <p>5. Know that the energy state of a particle determines the three-state change of a substance</p>	<p>the matter;</p> <p>4. Use the particle motion simulator to demonstrate the motion of the particles in the three states of matter;</p> <p>5. Collect data on the distribution and arrangement of particles in the three states of matter;</p> <p>6. Compare the distribution and arrangement of particles in the three states of matter;</p> <p>7. Collect data on the motion of the particles in the three states of matter;</p> <p>8. Compare the motion of the particles in the three states of matter;</p> <p>9. Simulate the distribution, alignment, and motion of particles in the three states of matter; and</p> <p>10. Observe the phenomenon of diffusion and penetration</p>
			Know the physical properties of matter	<p>1. Be able to tell the general properties of matter: colour, conductivity, melting point, thermal conductivity, elasticity, boiling point and density</p>	<p>1. Observe the physical properties of the surrounding objects;</p> <p>2. Compare the physical properties of some common objects with a chart; and</p> <p>3. Conduct experiments to</p>

					investigate the conductivity and thermal conductivity of the material
			Understanding the density of matter	1. Know that the mass of different objects with the same volume differ from each other; 2. Be able to understand the concept of density; 3. Compare the density of some common solids, liquids, and gases; 4. Compare the density of water with general matter and introduce the concept of 'floating and sinking' of matter in water; 5. Be able to explain why objects and liquids float on water; 6. The basic method of determining the density of an object; 7. The formula $\rho = m/v$ can be used to calculate the density of the object; 8. Know the unit of density: kg/m^3 ; and 9. Be able to illustrate the application of density in everyday life	1. Measure and compare the mass of different objects with the same volume to introduce the concept of density; 2. List the tables to compare the density of some common solids, liquids, and gases; 3. Experiment with objects floating in water; 4. Undergo experiment to show that the float of the object is related to its density; 5. Discuss the relationship between the density of objects and their floating in water; 6. Determine the density of the following substances: a) a regular solid; b) no regular solids; c) various liquids 7. Perform calculations on density
			Use of Substance	1. Be able to tell how people	1. Collect and discuss how

			<p>1. Know the nature of some common substances; and</p> <p>2. Know the relationship between the nature of the substance and its use</p>	<p>use different forms of matter in their daily lives;</p> <p>2. Know that substances of different nature have different uses;</p> <p>3. Be able to list the properties of the following substances:</p> <p>a) generally common metals;</p> <p>b) plastic;</p> <p>c) glass;</p> <p>d) ceramics; and</p> <p>e) Fiber</p> <p>4. Be able to tell the relationship between the manufacture of some items and the nature of their raw materials</p>	<p>people store and transport gases and liquids based on knowledge of the shape of the object;</p> <p>2. Collect information on the nature and use of general metals, plastics, glass, ceramics and fibers; and</p> <p>3. List the tables to illustrate the relationship between the manufacture of some items and their raw materials</p>
			<p>Element</p> <p>1. Understand elements;</p> <p>2. Know the names and symbols of common elements;</p> <p>3. Know metal and non-metal; and</p> <p>4. Understand the periodic table of elements</p>	<p>1. Be able to explain what an element is;</p> <p>2. Know that nature's matter is made up of more than 100 elements;</p> <p>3. Be able to tell the main elements that make up the human body and the earth;</p> <p>4. Know the effective elements of fertiliser;</p> <p>5. Know the names and symbols of about 21-23 common elements;</p> <p>6. Review the element symbols;</p> <p>7. Be able to illustrate the</p>	<p>1. Review the main elements that make up the human body and their percentages, and draw a schematic diagram;</p> <p>2. Review the main elements that make up the Earth and their respective percentages, and draw a schematic diagram;</p> <p>3. Investigate the main elements of common fertiliser ingredients and list the functions of each element on plants;</p>

				<p>difference between metal and non-metal;</p> <p>8. Be able to classify metals and non-metals based on the nature of the elements;</p> <p>9. Learn actively to use the periodic table of elements to know the distribution of metallic and non-metallic elements in the periodic table; and</p> <p>10. Recognise the importance of the Periodic Table of the Elements and the role of scientists' creative thinking</p>	<p>4. Investigate the main elements and trace elements of any health supplement;</p> <p>5. Collect data on trace elements necessary for human metabolism;</p> <p>6. Conduct an inquiry activity showing the similarities and differences between metals and non-metals;</p> <p>7. Recognise the periodic table of elements; and</p> <p>8. Read the information on the periodic table of findings and the typical historical facts of the application</p>
			<p>Atoms and Molecules</p> <p>1. Understand atomic theory;</p> <p>2. Understand the structure of the atom; and</p> <p>3. Understand the formation of ions</p>	<p>1. Know that a substance is made up of molecules, atoms or ions;</p> <p>2. Know that atoms are made up of nucleuses and electrons. The nucleus is made up of protons and neutrons;</p> <p>3. Know that atoms are the smallest unit of an element; and</p> <p>4. Recognise the formation of positive and negative ions</p>	<p>1. Make an atomic structure model;</p> <p>2. Collect, discuss and report through the Internet, educational software, books, models or videos:</p> <p>a) atomic theory;</p> <p>b) atomic structure; and</p> <p>c) formation of ions</p>
			<p>Chemical Formula</p> <p>1. Recognise valence, ion groups</p>	<p>1. Recognise the names and chemical formulas of common elements and compounds;</p>	<p>1. Collect information on the names and chemical formulas of elements, free</p>

			and chemical formulas	2. Know the valence of the element; 3. Know what an ion group is; and 4. Can use the valence to write a simple chemical formula	elements and compounds
			Understand how substances are classified	1. Be able to explain what pure substance and mixture are; 2. Be able to give examples to distinguish between pure substance and mixture; 3. Be able to explain what free element and compound are; 4. Be able to give examples to distinguish between free element and compounds; 5. Be able to give examples to distinguish between organic and inorganic substances; 6. Know that the organics are important to life activities; 7. Know that organic synthetic materials have a major impact on economic life and the environment; 8. Know that they can be classified according to the characteristics of the substance; and 9. Learn the separation techniques (filtration,	1. Collect and discuss information on the characteristics of pure substances (free elements and compounds) and mixtures; 2. Collect and discuss information on the characteristics of metallic and non-metallic elements; 3. Observe and compare the properties of metallic and non-metallic elements: appearance, hardness, electrical conductivity and thermal conductivity; 4. Collect and discuss information on the characteristics of organic and inorganic compounds; 5. Investigate the application of organic matter in daily life; 6. Collect and discuss information on the formation

				<p>evaporation, crystallisation, etc.) of the mixture</p>	<p>of fossil energy;</p> <p>7. Investigate the use of natural gas, oil and coal in daily life;</p> <p>8. Compare the relationship between burning natural gas, oil and coal and environmental pollution;</p> <p>9. Investigate the use of plastics, rubber and chemical fiber in daily life;</p> <p>10. Identify common organic materials (such as polyethylene and polyvinyl chloride, cotton, wool, and acrylic);</p> <p>11. Collect information on white pollution (white pollution) and discuss;</p> <p>12. Perform an experiment to separate the following mixtures:</p> <p>a) iron filings and sulfur powder; and</p> <p>b) sand and salt</p>
			Know the changes in matter	<p>1. Know the basic concepts of physical change;</p> <p>2. Be able to give examples of physical changes in daily life;</p> <p>3. Know the basic concepts of chemical change;</p>	<p>1. Collect and discuss information about physical changes;</p> <p>2. Observe and analyse physical changes in everyday life;</p>

				<p>4. Give examples of chemical changes in everyday life; and</p> <p>5. Be able to distinguish between physical and chemical changes in matter</p>	<p>3. Conduct experiments on physical changes;</p> <p>4. Collect and discuss information on chemical changes;</p> <p>5. Observe the chemical changes in daily life and analyse them;</p> <p>6. Conduct experiments on chemical changes; and</p> <p>7. Compare physical and chemical changes from chart</p>
			<p>Chemical Reaction</p> <p>1. Understand chemical reactions;</p> <p>2. Understand the endothermic and exothermic reactions;</p> <p>3. Understand the basic types of chemical reactions;</p> <p>4. Understand the chemical equation;</p> <p>5. Know the relative atomic weight; and</p> <p>6. Know the relative molecular weight</p>	<p>1. Know what a chemical reaction is;</p> <p>2. Be able to distinguish between exothermic and endothermic reactions;</p> <p>3. Know the energy conversion in the endothermic and exothermic reactions;</p> <p>4. Be able to master the basic types of chemical reactions and their characteristics;</p> <p>5. Know what a chemical equation is;</p> <p>6. Be able to interpret chemical equations;</p> <p>7. Know that the product can be inferred from the reactants;</p> <p>8. Be able to balance the chemical equation;</p>	<p>1. Collect information on exothermic and endothermic reactions and discuss energy conversion during the reaction;</p> <p>2. Perform an experiment showing an endothermic reaction and an exothermic reaction;</p> <p>3. Collect information on the following types of chemical reactions and discuss their characteristics:</p> <p>a) combination reaction;</p> <p>b) decomposition reaction;</p> <p>c) displacement reaction; and</p> <p>d) neutralization reaction</p>

				9. Know the relative atomic weight; 10. Know that the relative molecular weight of a substance can be calculated according to the chemical formula; and 11. Know that the calculation between the product and the reactant can be performed according to the chemical equation	
	2. The Law of Conservation of Mass		Understand the law of conservation of mass	1. Understand the meaning of the Law of Conservation of Mass; and 2. Understand the Law of Conservation of Mass through experimentation and use it to explain some common phenomena	1. Collect and analyse and discuss data on the Law of Conservation of Mass; 2. Perform an experiment to verify the Law of Conservation of Mass; 3. Explore the Law of the Conservation of Mass in chemical reactions
	3. Energy	1. Energy Resources and Energy	1. Know the type of energy and energy resources; 2. Recognise the transformation of energy; and 3. Know the conservation of energy	1. Be able to enumerate various forms of energy; 2. Be able to list various energy sources; 3. Be able to distinguish the conversion of energy; 4. Know that the sun is the main source of energy; 5. Be able to conduct activities to explore the transition between potential energy and	1. Collect information about the form of energy, the conversion of energy resources and energy; 2. Discuss issues on the sun as the main source of energy; 3. Conduct activities to observe the transition between potential energy and kinetic energy; and 4. Discuss the meaning of

				kinetic energy; and 6. Know the meaning of the conservation of energy	conservation of energy
		2. Renewable and Non-renewable Energy	Recognise renewable and non-renewable energy	1. Be able to distinguish between renewable energy and non-renewable energy; 2. Be able to classify energy as renewable energy and non-renewable energy; 3. Be able to give examples of alternative energy sources; 4. Know the significance of implementing sustainable development; 5. Apply creative thinking strategies or use new methods to protect and conserve energy; and 6. Be able to tell the pros and cons of technology applications	1. Collect information about renewable and non-renewable energy sources; 2. Discuss topics related to renewable and non-renewable energy sources and extend their meaning; 3. Conduct inquiry activities on the following topics: a) renewable and non-renewable energy sources; b) the application of solar energy; c) improve the efficient use of energy; and d) Alternative energy sources.
		3. Protection and Energy Conservation	Understand the importance and methods of protection and energy	1. Be able to describe the importance of protection and energy conservation; 2. Explain how to effectively apply and process energy;	1. Discuss topics related to the importance of conservation and energy conservation; and 2. Discuss topics related to

			Conservation	3. Know the significance of implementing sustainable development; 4. Apply creative thinking strategies or use new methods to protect and conserve energy; and 5. Know the importance of technology in protecting and conserving energy	the way to apply and process energy
		4. Heat	Heat Energy 1. Know the heat source; 2. Know the use of heat; and 3. Know the concept of temperature and thermometer	1. Know that the sun emits heat; 2. Be able to name other heat sources; 3. Know that heat is an energy; 4. Know the unit of heat; 5. Be able to give an example of the use of heat energy; 6. Know the basic concept of temperature; and 7. Know the basic concepts of the thermometer design principle	1. Conduct the following inquiry activities to show that: a) the sun releases heat; b) various heat sources; and c) Various methods of generating thermal energy 2. Discuss the following topics: a) What is energy; b) heat is an energy; c) the daily use of thermal energy; d) What temperature is; 3. Observe the thermometer to understand its structure and the function of each part; and 4. Perform an experiment that illustrates the difference between heat temperature

			<p>Effects of Heat and its Transmission</p> <ol style="list-style-type: none"> 1. Understand the thermal expansion and contraction of substances; 2. Recognise the transmission of heat; 3. Recognise good conductors, poor conductors and insulators; and 4. Know the structure of the thermos and the function of each component 	<ol style="list-style-type: none"> 1. Be able to illustrate the thermal expansion and contraction of solids, liquids and gases in daily life; 2. Be able to tell the heat to expand or contract solids, liquids and gases; 3. Know the random motion and thermal motion of molecules; 4. Know the relationship between temperature and molecular motion and the thermal expansion and contraction caused by it; 5. Can explain the thermal expansion and contraction of solids; <p>Expansion and Contraction</p> <ol style="list-style-type: none"> 6. Be able to describe the application of thermal expansion and contraction of solids, liquids and gases and how to prevent hazards; 7. Thermal energy can be transferred by conduction, convection and radiation; 8. Heat is transferred from high temperature to low temperature; 9. Be able to illustrate the natural phenomenon of heat 	<ol style="list-style-type: none"> 1. Conduct experiments to investigate the thermal expansion and contraction of solids, liquids, and gases; 2. Collect information on the relationship between temperature and molecular motion and the resulting thermal expansion and contraction; 3. Collect and discuss the phenomenon of thermal expansion and contraction in daily life; 4. Conduct experiments to explore heat transfer, heat convection, and heat radiation; 5. Collect and discuss information on heat transfer, thermal convection and heat radiation, application and control; 6. Conduct an inquiry activity on the application of the insulator; 7. Discuss the following topics: <ol style="list-style-type: none"> a) the formation of wind; b) Greenhouse effect; 8. Discuss the following
--	--	--	--	--	---

				<p>transfer;</p> <p>10. Be able to illustrate the phenomenon of heat transfer in daily life;</p> <p>11. Be able to explain heat conduction and convection from the perspective of molecular motion;</p> <p>12. Be able to tell what is a good conductor of heat, a poor conductor and an insulator;</p> <p>13. Be able to distinguish good conductors, poor conductors and insulators of heat;</p> <p>14. Be able to give examples of the daily use of thermal conductors and insulators;</p> <p>15. Be able to relate the relationship between the surface condition of the object and the heat radiation;</p> <p>16. Be able to tell the daily application of heat radiation and the prevention methods; and</p> <p>17. Know the structure of the thermos and the function of each component</p>	<p>topics:</p> <p>a) common heat transfer phenomena in life;</p> <p>b) thermal conduction and particle theory;</p> <p>c) good conductors of heat, poor conductors and insulators and their applications;</p> <p>d) Examples of applications and prevention of heat transfer in life;</p> <p>9. Discuss the following topics:</p> <p>a) the phenomenon of heat convection that is common in life;</p> <p>b) thermal convection and particle theory;</p> <p>c) Examples of applications of convection in heat in life;</p> <p>10. Discuss the following topics:</p> <p>a) the phenomenon of heat radiation that is common in life;</p> <p>b) the relationship between radiation and the surface of the object;</p> <p>c) Application and preventive measures for heat</p>
--	--	--	--	--	---

					<p>radiation that are common in life;</p> <p>11. Observe the construction of the thermos and identify the functions of the various components; and</p> <p>12. Make recommendations on how to apply knowledge of heat transfer to improve the quality of life</p>
		5. Sound	<p>Wave</p> <p>1. Know the spread of waves;</p> <p>2. Know the nature of the wave; and</p> <p>3. Recognise the waveform graph</p>	<p>1. Be able to describe the way the wave propagates;</p> <p>2. Know the nature of wave;</p> <p>3. Know what wavelength, frequency and wave speed are; and</p> <p>4. Recognise the waveform graph</p>	<p>1. Observe the wave phenomena that are common in life; and</p> <p>2. Draw a waveform graph</p>
			<p>Know the generation of sound waves</p>	<p>1. Know that sound is a kind of energy;</p> <p>2. Know that sound is a longitudinal wave; and</p> <p>3. Be able to describe sound is caused by vibration</p>	<p>1. Collect and discuss the sound information; and</p> <p>2. Conduct an experiment to explore the vibrations that produce sound</p>
			<p>Understand the spread of sound waves</p>	<p>1. Be able to describe the propagation of sound waves;</p> <p>2. Be able to compare the speed of sound waves in various media; and</p> <p>3. Know the role of ultrasound and infrasound in life</p>	<p>1. Conduct experiments to explore the propagation of sound waves and know that it requires media;</p> <p>2. Conduct experiments to explore the propagation of sound waves in solids,</p>

					liquids and gases; 3. Explain the microscopic interpretation of the process by which sound waves propagate through a medium in molecular kinematics; and 4. Investigate and communicate the application of ultrasound and infrasound waves in life
			Know the reflection and absorption of sound waves	1. Know the nature of sound waves that are reflected and absorbed; 2. Know the cause of the echo; and 3. Be able to describe the application and prevention methods of echo	1. Collect data on the reflection and absorption of sound waves and their applications; 2. Conduct experiment to explore the reflection and absorption of sound waves; and 3. Discuss the causes and applications of echoes
			Know the electromagnetic wave	1. Know that radio waves, microwaves, infrared rays, visible light, ultraviolet rays, and X-rays are all electromagnetic waves; and 2. Know the acquisition, storage, presentation and delivery of information	1. Investigate and exchange microwave, infrared, ultraviolet, X-ray and other applications in life and production; and 2. Investigate the application of electromagnetic waves in the transmission of information and the development of modern communication technologies

					(such as television, mobile phones, synchronous satellite communications, laser communications, networks, etc.)
			Know what music and noise are	1. Know the three elements of music: pitch, loudness and tone; 2. Be able to distinguish between noise and music; 3. Be able to tell the source of noise, hazards and prevention methods; and 4. Know what decibels are	1. Collect and discuss the three elements of tone; 2. Discuss the relationship between pitch, loudness, and tone; 3. Collect and discuss sources of noise, hazards and prevention; 4. Discuss how to prevent noise on campus; and 5. Be willing to participate in noise prevention activities
		6. Light and Colour	Know the spread of light	1. Know that light is an energy; 2. Know that light travels along a straight line; 3. Be able to express the effect of light traveling along a straight line; and 4. Know what the speed of light is	1. Observe the phenomenon of light traveling along a straight line in daily life; 2. Collect and discuss information on the formation of shadows, eclipses and eclipses; and 3. Make a pinhole camera and explore its imaging principles
			Reflection of Light	1. Know the reflection of light;	1. Conduct experiment with the reflection of light to explore the law of reflection of light;
			1. Know the law of reflection of light; and	2. Be able to tell the law of reflection of light; 3. Know the effect of smooth	

			<p>2. Recognition of the characteristics of plane mirror, concave mirror and convex mirror imaging and its application</p>	<p>and rough surfaces on light reflection; 4. Understand the principle of plane mirror imaging; 5. Be able to draw the light path diagram of plane mirror imaging; 6. Know the application of plane mirrors in daily life; 7. Understand the principle of concave mirror imaging; 8. Know the application of concave mirrors in daily life; 9. Understand the principles of convex mirror imaging; and 10. Know the application of convex mirrors in everyday life</p>	<p>2. Collect information on specular and diffuse reflections; 3. Draw a light path diagram for plane mirror imaging; 4. Collect information on the application of plane mirrors in daily life; 5. Make a periscope; 6. Collect information on the application of concave mirrors in everyday life; and 7. Collect information on the application of convex mirrors in everyday life</p>
			<p>Refraction of Light 1. Recognise the refraction of light; 2. Recognise the characteristics of lens imaging and its application; and 3. Know the total reflection of light</p>	<p>1. Know the refraction of light; 2. Be able to explain the refraction of light in various media; 3. Be able to tell the phenomenon of refraction of light in nature; 4. Understand the principle of concave lens imaging; 5. Know the effect of the concave lens on light; 6. Know the application of concave lenses in daily life; 7. Understand the principle of</p>	<p>1. Conduct experiments on the refraction of light between media of different densities; 2. Conduct an experiment to observe the refraction of light as it passes through the following instruments: a) glass bricks; b) a convex lens; c) Concave lens; 3. Collect information on the application of concave lenses in everyday life; and</p>

				convex lens imaging; 8. Know the effect of the convex lens on light; 9. Know the application of convex lenses in everyday life; and 10. Know the total reflection of light	4. Collect information on the application of convex lenses in everyday life
			Understand the dispersion phenomenon of light and know its principle	1. Know the dispersion of light; 2. Be able to tell the spectrum in white light; 3. Know what primary colour is; 4. Be able to tell the colour light produced by the mixing of primary colours; 5. Be able to explain the cause of the colour of transparent and opaque objects; and 6. Know visible and invisible light	1. Conduct experiment with the dispersion of light to explore the spectrum in white light; 2. Collect information on the formation of rainbows and secondary rainbow; 3. Collect information about the primary colour light; 4. Conduct experiment with mixed primary colors; 5. Conduct experiments on the reflection and absorption of coloured light by opaque objects; and 6. Conduct experiments on the reflection and absorption of coloured light by transparent objects
		7. Electricity and Magnetic	Know static electricity	1. Know what static electricity is; 2. Be able to explain the natural phenomenon of static	1. Collect and discuss static electricity; 2. Perform experiments on charging by friction;

				<p>electricity;</p> <p>3. Know the charge and its properties in static electricity;</p> <p>4. Be able to explain the cause of frictional electricity generation;</p> <p>5. Be able to tell the object of frictional electricity generation; and</p> <p>6. Know the prevention and application of static electricity</p>	<p>3. Conduct experiments on the interaction between charges;</p> <p>4. Perform an experiment to verify the charge;</p> <p>5. Observe the basic concept of the operation of the van der Graff electrostatic generator and the generation of a charge process to introduce a charge flow to form a current; and</p> <p>6. Collect and discuss information on the prevention and application of static electricity</p>
			<p>Current</p> <p>1. Recognise the Generation of Current; and</p> <p>2. Recognise simple circuits</p>	<p>1. Be able to explain the cause of current generation;</p> <p>2. Know the directional flow of electrons in the circuit;</p> <p>3. Be able to tell the components of a simple circuit;</p> <p>4. Be able to interpret simple circuit diagrams;</p> <p>5. Be able to draw a simple circuit diagram;</p> <p>6. Be able to compare and distinguish between series and parallel circuits; and</p> <p>7. Know that the power supply is providing voltage in the</p>	<p>1. Watch video on the generation of current;</p> <p>2. Conduct experiments on complete circuits;</p> <p>3. Collect information on the symbols of electrical components;</p> <p>4. Draw a simple circuit diagram; and</p> <p>5. Compare series and parallel circuits</p>

				circuit	
			<p>Current, Voltage and Resistance</p> <ol style="list-style-type: none"> 1. Know the unit of current, voltage and resistance; 2. Recognise the measurement of current, voltage and resistance; 3. Know the type of resistor; 4. Know the factors that affect the size of the resistor; and 5. Know the type of conductor and its application 	<ol style="list-style-type: none"> 1. Know the unit of current; 2. Be able to master the skills of operating an ammeter; 3. Know the basic concept of voltage; 4. Know the unit of voltage; 5. Be able to master the skills of operating a voltmeter; 6. Know the basic concept of resistance; 7. Know the unit of resistance; 8. Know the fixed value resistor and variable resistor; 9. Be able to tell the factors that determine the size of the conductor resistance; and 10. Know the good conductors of electricity, poor conductors, semiconductors and superconductors and their applications 	<ol style="list-style-type: none"> 1. Perform an experiment to measure current; 2. Perform an experiment to measure voltage; 3. Perform an experiment to measure resistance; 4. Conduct an experimental study of the effect of changes in resistance on current; 5. Observe the universal meter and understand its application; 6. Conduct an experiment to investigate the factors that determine the resistance of the conductor; 7. Observe the construction of the variable resistor and understand its operating principle; 8. Collect information about good conductors, poor conductors, semiconductors and superconductors, and their applications; 9. Determine the good conductor and poor conductor of electricity; and 10. Observe the use of good conductors, poor conductors,

					semiconductors and superconductors in life
			Know and understand the application of Ohm's Law	1. Understand Ohm's Law; 2. Can formulate the formula of Ohm's Law: $V=IR$ and perform simple calculations; and 3. Master the calculation of series and parallel connection of resistors	1. Collect and discuss information about Ohm's Law; 2. Conduct an experiment to study the effects of changes in the voltage, current, or resistance of the circuit; 3. Perform a simple calculation of $V=IR$; 4. Experiment with the relationship between voltage, current and resistance in parallel and series circuits; 5. Perform calculations for the relationship between voltage, current, and resistance in parallel and series circuits; 6. Perform a simple calculation of the formula $V = V_1 + V_2 + \dots$ in the circuit in which the battery is connected in series; 7. Perform a simple calculation of the formula $1/V = 1/V_1 + 1/V_2 + \dots$ in a circuit with the same battery in parallel; 8. Perform a simple

					<p>calculation of the formula $R = R_1 + R_2 + \dots$ in the circuit in series with the resistor; and</p> <p>9. Perform a simple calculation of the equation $1/R = 1/R_1 + 1/R_2 + \dots$ in the circuit in which the resistors are connected in parallel</p>
			<p>Magnetic</p> <p>1. Know the magnet and the pole;</p> <p>2. Know magnetisation and demagnetization; and</p> <p>3. Know the magnetic field and magnetic field lines</p>	<p>1. Know the magnet and the pole and its interaction between the poles;</p> <p>2. Know the methods of magnetisation and demagnetization;</p> <p>3. Know the phenomenon of magnetic induction;</p> <p>4. Be able to tell what a magnetic field is;</p> <p>5. Can draw the magnetic field of the strip magnet;</p> <p>6. Can draw the direction of the magnetic field;</p> <p>7. Know the magnetic field and magnetic field lines;</p> <p>8. Be able to relate the relationship between magnetic field lines and magnetic field strength;</p> <p>9. Be able to tell the function of magnetism in the compass; and</p>	<p>1. Observe the magnetic phenomena that are common in life;</p> <p>2. Measure the magnet and the magnetic pole;</p> <p>3. Conduct experiments on the properties of the magnetic;</p> <p>4. Collect and discuss the magnetisation and demagnetisation information;</p> <p>5. Perform experiments on magnetisation and demagnetization;</p> <p>6. Perform an experiment of magnetic induction;</p> <p>7. Observe the pattern of the magnetic field lines around the strip magnet;</p> <p>8. Draw the direction of the magnetic field of the strip magnet;</p>

				10. Know that the earth is a magnet	9. Discuss the relationship between magnetic field lines and magnetic field strength; 10. Collect information about the geomagnetic field and discuss; and 11. Observe the construction of the compass and understand its application
			Current Effect and Electromagnetic Induction 1. Know the thermal and magnetic effects of current; and 2. Know the electromagnetic induction	1. Know that current can produce thermal effects; 2. Know the factors affecting heat generated by current; 3. Know the magnetic effect of current; 4. Know the electromagnet and its application; 5. Know the electromagnetic induction; and 6. Know the difference between AC and DC	1. Collect and discuss the thermal effects of current generation; 2. Discuss factors affecting the amount of heat generated by the current; 3. Collect information on the magnetic effects of current and discuss; 4. Collect and discuss information on electromagnets and their applications; 5. Perform an electromagnetic induction experiment; and 6. Experiment with a demonstration of the difference between AC and DC
			Power Generation 1. Recognise the	1. Know the type of generator; 2. Know the operating	1. Browse webpages to gather information on

			<p>type of generator; 2. Know the principle of power generation; and 3. Know the transmission of transformers and electric energy</p>	<p>principles of DC and Alternator; 3. Be able to compare various generators; 4. Know the function and operating principle of the transformer; and 5. Know the process of transferring electrical energy</p>	<p>generator and explain; 2. Browse webpages to gather information on the generation of energy and explain; 3. Compare the operating principles of various types of generators; 4. Conduct activities related to the use of solar energy; 5. Collect information on the power generation principle of the alternator and discuss; 6. Collect and discuss information on AC and DC; 7. Discuss the utility and operating principles of transformer; 8. Perform a simple calculation of transformer; and 9. Collect information on the delivery of electrical energy and discuss</p>
			<p>Know the wiring and components of the home circuit</p>	<p>1. Know the wiring and components of your home circuit; 2. Be able to tell the voltage value of the main wiring in the home circuit; 3. Be able to name and identify</p>	<p>1. Gather information on wiring and components of the home circuit; 2. Observe and identify wiring and components in the home circuit system; and 3. Perform the activity of</p>

				<p>the type of household current;</p> <p>4. Be able to tell and identify the type of wiring;</p> <p>5. Know the components of the wiring system and their functions;</p> <p>6. Be able to tell the wiring method of the three-pin plug and the meaning of the international wire color code; and</p> <p>7. Be able to wire the three-pin plug</p>	wiring the three-pin plug
			Electrical work and electric power	<p>1. Know the meaning of electrical work and electric power;</p> <p>2. Be able to tell the electrical power and operating voltage of the household appliance;</p> <p>3. Be able to calculate the power consumption of household appliances;</p> <p>4. Use the formula to calculate the electric power; and</p> <p>5. Be able to master the calculation questions on power consumption</p>	<p>1. Verify the electrical power, operating voltage and power consumption of the household appliance;</p> <p>2. Calculate the power consumption of the household appliance;</p> <p>3. Discuss topics related to electrical work and electrical power; and</p> <p>4. Calculate the electricity bill</p>
			Know the ground wire and fuse	<p>1. Be able to identify the type of fuse;</p> <p>2. Be able to tell the specifications of the fuse;</p>	<p>1. Discuss the following:</p> <p>a) the type of fuse;</p> <p>b) the specifications of fuse;</p> <p>c) the function of fuse in the</p>

				<p>3. Know the function of the fuse in the circuit system;</p> <p>4. Be able to make a decision on the appropriateness of the electrical fuse specifications; and</p> <p>5. Can tell the function and operation principle of the ground wire in the circuit system</p>	<p>circuit system;</p> <p>d) The function and operation principle of the ground wire in the circuit system;</p> <p>2. Inquire on short circuits; and</p> <p>3. Conduct an activity to determine the appropriateness of the electrical fuse specifications</p>
			Know how to use electricity safely	<p>1. Be able to speak out the measures for safe use of electricity and practice;</p> <p>2. Be able to tell what to do in the event of an accident;</p> <p>3. Know the safety equipment in the home circuit; and</p> <p>4. Observe the safe use of electricity and focus on active prevention</p>	<p>1. Collect the following information on electricity use and discuss:</p> <p>a) the cause of the accident;</p> <p>b) the measures to be taken in an accident;</p> <p>c) Know the prevention measures for family accidents;</p> <p>2. Identify the safety devices in the home circuit and discuss their operating principles; and</p> <p>3. Discuss why it is necessary to take measures to safely use electricity</p>
			Know how to save electricity	<p>1. Know what a waste of energy is;</p> <p>2. Be able to know the measures to save electricity and practice;</p>	<p>1. Collect and discuss information on activities that waste energy;</p> <p>2. Design a special study on</p>

	4. Force and Movement			<p>3. Be able to predict the problems that the country will face in the event of a power shortage; and</p> <p>4. Understand the meaning of saving electricity</p>	<p>energy efficiency;</p> <p>3. Discuss measures to save electricity and practice; and</p> <p>4. Brainstorm on the “Difficulties that a country will face in the event of a power shortage”</p>
			<p>Force</p> <p>1. Know the common forces;</p> <p>2. Know the effect of force;</p> <p>3. Know the measurement of force;</p> <p>4. Recognise friction;</p> <p>5. Know gravity; and</p> <p>6. Understand the difference between weight and quality</p>	<p>1. Be able to tell common forces;</p> <p>2. Can express the effect of strength;</p> <p>3. Know the principle that spring scales can be used to measure force;</p> <p>4. Know the definition of Hooke’s Law;</p> <p>5. Know the unit of force;</p> <p>6. Be able to master the ability to measure force;</p> <p>7. Be able to explain the friction phenomenon that is common in life;</p> <p>8. Know the characteristics of friction;</p> <p>9. Know the factors that affect the amount of friction;</p> <p>10. Be able to illustrate the beneficial friction and harmful friction that are common in life;</p> <p>11. Be able to describe the ways to increase beneficial friction</p>	<p>1. Observe and experience the various forces encountered in daily life;</p> <p>2. Perform the effect of the experimental observation force;</p> <p>3. Perform an experiment to measure force with a spring balance;</p> <p>4. Make a simple spring balance to understand how it works;</p> <p>5. Observe the friction that is often encountered in life;</p> <p>6. Conduct experiments on factors affecting the magnitude of friction;</p> <p>7. Collect and discuss information on beneficial and harmful friction;</p> <p>8. Collect and discuss information on ways to increase and decrease friction;</p>

				<p>and reduce harmful friction; 12. Recognise gravity and gravity force; and 13. Be able to compare and distinguish weight and quality</p>	<p>9. Observe the gravity phenomena that are common in life; 10. Collect information on gravity; 11. Discuss the 'g' value; 12. Discuss the difference between weight and quality; 13. Identify the relationship between quality and weight; and 14. Compare the weight of the same object on the moon and the earth</p>
			<p>Motion 1. Know the reference object; 2. Know the classification of sports; and 3. Know the speed</p>	<p>1. Know that the description of the motion of the object is related to the selected reference object; 2. Know the classification of the movement; 3. Understand the meaning of speed; and 4. Know the unit of speed</p>	<p>1. Observe the motion of surrounding objects; and 2. Compare and record the speed of movement of different objects</p>
			<p>Work 1. Recognise work and power</p>	<p>1. Be able to define work; 2. Know the unit of work; 3. Be able to apply formula calculations; 4. Be able to define power; 5. Know the unit of power; 6. know that the formula can be used to calculate power; and</p>	<p>1. Discuss the meaning of work; 2. Perform calculations on work; 3. Discuss the meaning of power; 4. Perform calculations on power; and</p>

				7. Know the relationship between work and energy	5. Collect information on the relationship between work and energy and discuss
			Simple Machine 1. Know the common simple machinery; 2. Understand the operating principle, type and application of leverage; 3. Understand the balance of leverage; 4. Know the operating principle, type and application of the pulley; 5. Know the meaning of the mechanical benefits of the lever and pulley	1. Know what machinery is; 2. Be able to give examples of common simple machines; 3. Be able to tell the operating principle, type and application of the lever; 4. Be able to list all types of leverage; 5. Know the balance of the leverage; 6. Be able to calculate the balance of the lever; 7. Know the meaning of the mechanical benefits of leverage; 8. Know that the relevant calculations can be made for the mechanical benefits of the leverage; 9. Be able to list the application of the pulley; 10. Be able to tell the operating principle, type and application of the pulley; 11. Know the application of fixed pulleys and moving pulleys; 12. Know the application of the pulley block;	1. Collect information on simple machinery and discuss; 2. Observe the various operating principles of the lever principle, understand its operating principles and classify them; 3. Determine the law of leverage; 4. Compare each type of lever with graphical method; 5. Perform a calculation of the balance of the leverage; 6. Perform calculations on the mechanical benefits of the leverage; 7. Observe the application of pulleys and pulley blocks in daily life; 8. Conduct experiment to understand how the pulleys and pulley blocks operate; 9. Compare the principle of operation of the pulley and lever; 10. Calculate the mechanical benefits of the pulley; and

				<p>13. Know the meaning of the mechanical benefits of the pulley; and</p> <p>14. Know other simple machines</p>	<p>11. Collect information on the following simple machines and discuss:</p> <p>a) axle;</p> <p>b) bevel; and</p> <p>c) a spiral</p>
			Recognise the center of gravity, balance and stability of objects	<p>1. Know what the center of gravity of the object is;</p> <p>2. Be able to tell the position of the center of gravity of the shape rule and the irregular object;</p> <p>3. Know the meaning of balance;</p> <p>4. Give an example of the conditions for the balance of the two forces;</p> <p>5. Recognise the three equilibrium states of the object;</p> <p>6. Be able to recognise the balance state of the object;</p> <p>7. Know the meaning of stability;</p> <p>8. Be able to explain the relationship between the stability of the object and the position of the center of gravity and the size of the bottom area;</p> <p>9. Give an example of the application of the principle of stability in everyday life</p>	<p>1. Determine the position of the center of gravity of regular and irregular objects and discuss;</p> <p>2. Collect and discuss the three equilibrium states of the object;</p> <p>3. Determine the factors affecting the stability of the object;</p> <p>4. Observe, measure, and analyse the stability of some common objects in life; and</p> <p>5. Make recommendations for increasing the stability of the object</p>

Earth, Universe and Space Science	1. Earth Movement and Effects		1. Know the movement of the earth; 2. Know the causes of staying up late and the four seasons; 3. Know the movement of the moon; 4. Know the moon phase; and 5. Know the causes of the tides	1. Know the rotation and revolution of the earth; 2. Know the way and orbit of the Earth's movements; 3. Be able to tell the geographical effects of Earth's movement; 4. Be able to explain the causes of staying up late; 5. Tell the relationship between the Gregorian calendar and the Earth's revolution; 6. Be able to tell the characteristics of the moon; 7. Know the way and track of the moon movement; 8. Be able to tell the geographical effects of the moon movement; 9. Be able to explain the process of changing the moon phase; and 10. Be able to explain the causes of the tides	1. Collect the following information online and discuss: a) Copernicus; b) the way and orbit of the Earth and the Moon; c) the geographical effects of the Earth and the Moon; d) the characteristics of the moon; e) the process of changing the moon phase; and f) causes of tides; and 2. watch a video of the Earth and the Moon and their effects.
	2. Overview of the Earth		1. Know the earth's surface and interior structure; 2. Know the circle of the earth; and 3. Recognise the nature and	11. Be able to describe the general condition of its surface; 2. Know the layers of the Earth's internal structure: the crust, the mantle, and the core; 3. Be able to tell the various resources of the earth;	1. Collect and discuss information on the surface; 2. Watch video on its surface; 3. Collect information on the internal structure of the Earth and discuss;

			importance of each layer	4. Know the importance of Earth's resources for human existence; 5. Know how the Earth provides the basic needs to its organisms; 6. Know that the Earth is a biosphere; 7. Be able to tell the distribution of water on the surface; 8. Be able to explain the water cycle; 9. Be able to tell the importance of the water cycle; 10. Be able to feel the presence of the atmosphere; 11. Know the importance of the atmosphere; 12. Know that the atmosphere can be divided into troposphere, stratosphere, intermediate layer and thermal layer; and 13. Can make a basic description of each atmosphere	4. Watch video of the internal structure of the Earth; 5. Collect information on Earth resources and discuss; 6. Discuss the importance of earth resources for human survival; 7. Discuss how the Earth provides the basic needs to the organisms; 8. Collect information on the Earth as a biosphere and discuss; 9. Watch a video of the Earth's biosphere; 10. Watch a video on the water cycle; 11. Discuss the importance of the water cycle; 12. Collect information on the atmosphere and discuss; and 13. Watch a video on the atmosphere
	3. Earth Resources	1. Soil	1. Understand the soil; 2. Know that human activities have an impact on the soil;	1. Be able to tell the formation process of the soil; 2. Be able to list the components of the soil: a) sand particles; b) humus;	1. Collect soil from all parts of the campus and list its components; 2. Collect soil from all parts of the campus and compare its components;

				c) minerals; d) water; e) air; and f) Microorganisms 3. Be able to tell the importance of the various components of the soil; 4. Be able to tell the type of soil and its characteristics; 5. Know the use of the soil; 6. Be able to tell the impact of soil on plant growth; and 7. Focus and reflect on the impact of human activities on the soil and describe ways to protect the soil	3. Discuss the nature of the components of the soil; 4. Discuss the importance of the various components of the soil; 5. Collect information on the organisms in the soil and discuss their importance; 6. Collect and discuss information on the effects of soil on plant growth; 7. Collect information on the type of soil and its characteristics; 8. Discuss the important relationship between soil and human life; and 9. Collect information on soil protection and discuss ways to protect the soil
		2. Rock	1. Know the rock	1. Be able to tell what rock is; 2. Be able to tell the distribution of rocks; and 3. Know the various types of rocks and their uses	1. Collect information on the distribution of rocks and discuss; 2. View the rock sample and compare its colour, particle size, shape, and texture; 3. Collect and discuss information on the major minerals contained in various types of rocks; and 4. Enjoy a video of the

					natural rocky landscape
		3. Mineral	<p>The main mineral resources, characteristics of the earth and its relationship with human life</p> <ol style="list-style-type: none"> 1. Understand the main properties of metals and non-metals; 2. Recognise metal active order; 3. Know the chemical reaction between metal and non-metal; 4. Know the silicon compound; 5. Know calcium carbonate; 6. Know the natural fuel resources and their development, processing and utilisation; 7. Recognise the impact of the development and use of mineral resources on human 	<ol style="list-style-type: none"> 1. Be able to tell the main mineral resources of the earth; 2. Know what minerals are; 3. Be able to tell the form in which minerals are present in the earth's crust; 4. Recognise the main properties of common metals and non-metals; 5. Recognise the active order of metal; 6. Can tell the chemical reaction between metal and non-metal; 7. Can tell a variety of different forms of silicon compounds; 8. Know the stability of silicon compounds; 9. Be able to tell the daily use of silicon compounds; 10. Be able to tell the composition of calcium carbonate; 11. Know the different forms of calcium carbonate; 12. Be able to tell the nature of calcium carbonate; 13. Know the chemical reactions related to calcium carbonate; 14. Know the formation of 	<ol style="list-style-type: none"> 1. Discuss what minerals are; 2. Collect and explain information on the different forms of resources in the earth's crust: <ol style="list-style-type: none"> a) Natural elements such as gold and silver; b) Natural compounds such as oxides, carbonates, sulfides and silicides; 3. Discuss and identify elements in natural compounds; 4. Conduct an experiment to explore: <ol style="list-style-type: none"> a) the hardness of the mineral; b) the solubility of minerals; c) reactions when oxides, carbonates and sulfides are heated; 5. Brainstorm activities on the following topics: <ol style="list-style-type: none"> a) metal; and b) Non-metallic 6. Collect information about common metals; 7. Interpret the lively order of metal; 8. Conduct experiment to

			<p>life and the environment</p>	<p>calcium oxide and calcium hydroxide; 15. Know the nature of calcium compounds and their uses; 16. Be able to list a variety of natural fuel resources; 17. Be able to tell the formation process of fossil fuels; 18. Know the stratified distillation process of crude oil, the use of fractions and fractions; 19. Be able to express the contribution of the oil and gas industry towards China's economic development; 20. New concepts can be proposed for the effective application of natural fuel resources; 21. Recognise the importance of the Earth's various mineral resources to humanity; 22. The concept of material conservation, reuse and recycling can be practiced and implemented; and 23. Know the urgency of protecting mineral resources and be willing to participate in activities to protect mineral</p>	<p>explore the chemical reactions of some metals such as magnesium, aluminum, zinc and iron with oxygen and sulfur; 9. Collect and describe information on the resources of silica and silicates in the earth's crust; 10. Conduct experiments to explore the following properties related to silica and silicate: a) water solubility; b) chemical reaction with hydrochloric acid; and c) Heating effect 11. Visit a factory, or watch a video, or find the following items by looking for information on: a) glass; b) ceramics; c) electronic chip; and d) Optical fiber 12. Discuss the daily use of silicon compounds; 13. Collect and explain information on calcium carbonate; 14. Conduct an experiment</p>
--	--	--	---------------------------------	---	---

				resources	<p>to explore the nature of calcium carbonate;</p> <p>15. Conduct experiment to investigate the formation of calcium oxide and calcium hydroxide;</p> <p>16. Discuss the use of calcium compounds;</p> <p>17. Contact the nature of the calcium compound and its use;</p> <p>18. Collect information on the types and processes of fossil fuels;</p> <p>19. Browse online to collect information on China's natural fuel resources;</p> <p>20. Conduct experiment to investigate the stratified distillation of crude oil;</p> <p>21. Watch a video of the fractionation process of crude oil, the fractions and the use of each fraction;</p> <p>22. Discuss the characteristics and uses of each fraction;</p> <p>23. Discuss the contribution of the oil and gas industry to the economic development of our country;</p>
--	--	--	--	-----------	--

					<p>24. Discuss how to effectively apply oil and other natural fuel resources;</p> <p>25. Discuss the importance of mineral resources to humans;</p> <p>26. Draw a conceptual map to represent the relationship between mineral resources and the basic needs of human survival; and</p> <p>27. Conduct activities related to the protection of mineral resources</p>
		4. Water	<p>1. Understand the physical properties of water; and</p> <p>2. Know the method of testing water</p>	<p>1. Be able to describe the physical properties of water;</p> <p>2. Be able to understand the density of water;</p> <p>3. Be able to explain the meaning of the freezing point and boiling point of water;</p> <p>4. Know that the effect of impurities in water on the physical properties of water can be illustrated by an example; and</p> <p>5. Know the method of testing water</p>	<p>1. Conduct an experiment to determine:</p> <p>a) the freezing point of water; and</p> <p>b) the boiling point of water</p> <p>2. Conduct experiment to observe the effect of impurities on the physical properties of water; and</p> <p>3. Perform an experiment to test water</p>
			<p>Composition of Water</p> <p>1. Recognise the</p>	<p>1. Recognise the composition of water;</p> <p>2. Be able to test oxygen and</p>	<p>1. Electrolyse water to determine the ratio of oxygen to hydrogen in water;</p>

			<p>composition of water; and</p> <p>2. Know the preparation method of hydrogen and and the use of hydrogen</p>	<p>hydrogen;</p> <p>3. Be able to tell the nature of hydrogen;</p> <p>4. Know that hydrogen can be identified by nature;</p> <p>5. Know a laboratory method to produce hydrogen;</p> <p>6. Be able to tell the industrial production method of hydrogen; and</p> <p>7. Know the use of hydrogen</p>	<p>2. Collect information on the nature of hydrogen;</p> <p>3. Prepare hydrogen in the laboratory;</p> <p>4. Perform the following experiments on the properties of hydrogen:</p> <p>a) solubility;</p> <p>b) specific gravity with air.</p> <p>5. conduct experiment to observe the effects of the following substances with hydrogen:</p> <p>a) burning wood branches;</p> <p>b) wooden branches with embers;</p> <p>c) litmus paper; and</p> <p>d) Lime water</p>
			<p>Evaporation and Boiling</p> <p>1. Understanding evaporation and boiling; and</p> <p>2. Know sublimation and desublimation</p>	<p>1. Be able to explain what evaporation is;</p> <p>2. Be able to explain the factors affecting the evaporation rate through experiments;</p> <p>3. Be able to explain the process of evaporation using molecular kinematics;</p> <p>4. Be able to compare the similarities and differences between evaporation and boiling;</p> <p>5. Be able to describe the</p>	<p>1. Conduct an experiment to explore the factors affecting the rate of evaporation;</p> <p>2. Discuss the process of evaporation using molecular kinematics;</p> <p>3. Discuss the similarities and differences between evaporation and boiling;</p> <p>4. Collect information on evaporation and its application in life; and</p> <p>5. Collect information on</p>

				evaporation phenomenon in life; 6. Be able to tell the application of evaporation in life; 7. Be able to know what is sublimation and condensing; and 8. Be able to give examples of substances that can sublime and dehydrate	sublimation and condensing
			Solution 1. Recognise solvents, solutes and solutions; 2. Understand solubility; 3. Know the surface tension and capillary phenomenon of liquid; and 4. Know crystals and amorphous	1. Be able to explain what solvents, solutes and solutions are; 2. Be able to compare the similarities and differences between dilute solution and concentrated solution; 3. Be able to explain what suspension, emulsion and colloidal solution are; 4. Be able to explain what solubility is; 5. Be able to read the solubility curve table; 6. Be able to explain the factors affecting the dissolution of the substance; 7. Know what a saturated solution and an unsaturated solution are; 8. Know the surface tension and	1. Discuss the similarities and differences between solvents, solutes and solutions; 2. Conduct an experiment to explore: a) a dilute solution; b) a concentrated solution; and c) saturated solution 3. Discuss the similarities and differences between dilute solution, concentrated solution and saturated solution; 4. Conduct experiment to distinguish between suspensions and solutions; 5. Conduct an experiment to identify the solubility of the material and plot the

				<p>capillary phenomenon of the liquid;</p> <p>9. Know that water is the universal solvent in life;</p> <p>10. Be able to give an example of the application of organic solvents in daily life;</p> <p>11. Be able to identify crystals and amorphous;</p> <p>12. Be able to calculate a simple mass percentage concentration; and</p> <p>13. Be able to calculate the concentration percentage of the solution after a simple dilution and concentration</p>	<p>solubility curve;</p> <p>6. Conduct an experiment to identify factors that affect the solubility of the solute in the solvent:</p> <p>a) the nature of the solute;</p> <p>b) the nature of the solvent; and</p> <p>c) temperature</p> <p>7. Conduct an experiment to determine the factors that affect the rate of dissolution:</p> <p>a) the temperature of the solvent;</p> <p>b) the speed of the agitation;</p> <p>c) The size of the solute;</p> <p>8. Discuss the importance of water as a universal solvent in life;</p> <p>9. Collect and discuss information on the use of organic solvents in everyday life;</p> <p>10. Collect information on crystals and discuss;</p> <p>11. Collect and observe the crystals that are common in everyday life; and</p> <p>12. Perform an experiment to precipitate crystals</p>
			Acid and Alkali	1. Know the nature of acids and	1. Conduct an experiment to

			<ol style="list-style-type: none"> 1. Know acid and alkali; 2. Know the pH value; 3. Recognise the neutralisation reaction; and 4. Know common salts and their uses 	<ol style="list-style-type: none"> bases; 2. Be able to tell the role of water in acids and alkalis; 3. Know that the definition of acid and base can be explained by way of example; 4. Be able to identify acidic and alkaline substances that are common in daily life; 5. Be able to tell the daily use of acids and bases; 6. Know the meaning of pH; 7. Know what an acid-base indicator is; 8. Know the types of common acid-base indicators and their applications; 9. Know the test method for acid and alkali; 10. Be able to explain the meaning of the neutralisation reaction; 11. Write the equation of the word for the neutralisation reaction; 12. The application of neutralisation in daily life can be illustrated by examples; 13. Know that salt is common in everyday life and know its nature and use; and 	<ol style="list-style-type: none"> explore the nature of acid; 2. Conduct an experiment to determine the role of water in acids and bases; 3. Discuss and define acids and bases; 4. Conduct experiments to identify the acidity and alkalinity of some commonly used materials; 5. Collect information on the use of acids and bases and discuss; 6. Collect and discuss information on the use of acids and bases in everyday life; 7. Collect and discuss information on the use of acids and bases in industry and agriculture; 8. Discuss the meaning of the neutralisation reaction; 9. Perform a neutralization reaction experiment; 10. Collect and discuss information on the application of neutralisation reactions in daily life, industry and agriculture; 11. Collect information on
--	--	--	---	---	---

				14. Be able to tell the nature and daily use of salt	salts that are common in everyday life; and 12. Collect and discuss information on the nature and daily use of salt
			<p>Water Purification and Water Supply</p> <p>1. Know the resources of various natural waters;</p> <p>2. Know the water purification; and</p> <p>3. Know hard and soft water</p>	<p>1. Be able to tell a variety of natural water resources;</p> <p>2. Be able to tell the impurities contained in natural water;</p> <p>3. Be able to tell the reason for purifying natural water;</p> <p>4. Know how to purify natural water;</p> <p>5. Be able to compare the advantages and disadvantages of various natural water purification methods;</p> <p>6. Know the process of making tap water;</p> <p>7. Know hard and soft water;</p> <p>8. Know the application of hard and soft water in daily life;</p> <p>9. Know how to soften hard water; and</p> <p>10. Be able to talk about ways to save water and practice</p>	<p>1. Brainstorm the following topics:</p> <p>a) natural water resources; and</p> <p>b) reasons for purifying natural water;</p> <p>2. Discuss various ways to purify natural water;</p> <p>3. Discuss the advantages and disadvantages of various methods for purifying natural water;</p> <p>4. Carry out activities to purify natural water;</p> <p>5. Discuss the advantages and disadvantages of various methods for purifying natural water and present the discussion;</p> <p>6. Collect information on reverse osmosis water;</p> <p>7. Visit the natural water purification plant;</p> <p>8. Collect and discuss the water treatment process;</p> <p>9. Collect and discuss</p>

					<p>information on hard and soft water;</p> <p>10. Observe household water use and suggest ways to save water use; and</p> <p>11. Collect information on the application of water</p>
			Understand sewage and sewage treatment	<p>1. Be able to tell the cause of water pollution and related pollutants;</p> <p>2. Be able to explain the impact of water pollution on humans and aquatic organisms;</p> <p>3. Be able to propose and explain measures to prevent water pollution; and</p> <p>4. Be able to propose and explain measures to protect water quality</p>	<p>1. Watch video on water pollution;</p> <p>2. Collect information on the causes of water pollution and related pollutants;</p> <p>3. Discuss the impact of water pollution on humans and aquatic life;</p> <p>4. Present opinions and ideas on the prevention and control of water pollution, water quality protection and water conservation;</p> <p>5. Collect and discuss information on water pollution prevention;</p> <p>6. Collect and discuss information on water quality protection; and</p> <p>7. Gather information on waste water treatment in local communities</p>
		5. Atmosphere	Know the composition of the	1. Be able to tell the main components of air;	1. Collect information on the composition of the air;

			air	<p>2. Know that air is a mixture; and</p> <p>3. Be able to tell the percentage of oxygen, carbon dioxide, nitrogen and water in the air</p>	<p>2. Collect percentages of the composition of oxygen, carbon dioxide and nitrogen in the air; and</p> <p>3. Conduct experiments that show water vapor, microbes, and dust in the air</p>
			<p>1. Understand oxygen, carbon dioxide and their laboratory preparation method;</p> <p>2. Recognise the role of the catalyst;</p> <p>3. Know nitrogen; and</p> <p>4. Know rare gases</p>	<p>1. Be able to tell the nature of oxygen and carbon dioxide;</p> <p>2. Know that they can be identified based on the nature of oxygen and carbon dioxide;</p> <p>3. be able to identify oxygen and carbon dioxide;</p> <p>4. Know a laboratory method for expressing oxygen and carbon dioxide;</p> <p>5. Describe the role of the catalyst in the chemical reaction;</p> <p>6. Know the use of oxygen and carbon dioxide;</p> <p>7. Know the nature of nitrogen;</p> <p>8. Be able to tell the role of nitrogen in the air;</p> <p>9. Know the use of nitrogen;</p> <p>10. Know the role of nitrogen in living organisms;</p> <p>11. Know the nature of rare gases; and</p> <p>12. Be able to tell the use of</p>	<p>1. Collect and discuss information on the nature of oxygen and carbon dioxide;</p> <p>2. Prepare oxygen and carbon dioxide in the laboratory;</p> <p>3. Carry out the following experiments on the properties of oxygen and carbon dioxide:</p> <p>a) solubility;</p> <p>b) chemical reaction with sodium hydroxide solution;</p> <p>4. Conduct experiment to observe the effects of the following substances with oxygen and carbon dioxide:</p> <p>a) burning wood branches;</p> <p>b) wooden branches with embers;</p> <p>c) litmus paper;</p> <p>d) lime water; and</p> <p>e) acid-base indicator</p> <p>5. Collect and discuss</p>

				rare gases	information on the use of oxygen and carbon dioxide; 6. Conduct an experiment to identify the nature of nitrogen; 7. Collect information on the use of nitrogen and discuss; and 8. Collect and discuss information on the nature and use of rare gases
			Combustion 1. Know what burning is; 2. Know the type and application of fire extinguishers; and 3. Understand oxidation	1. Know what to burn means; 2. Be able to tell the conditions of combustion; 3. Know the type and application of the fire extinguisher; 4. Know the importance of burning in everyday life; 5. Know oxidation; 6. Know what it means to be spontaneous; and 7. Know what an explosion is	1. Collect information on combustion and discuss; 2. Collect and discuss the types of fire extinguishers and application methods; 3. Discuss the importance of burning in everyday life; and 4. Explore the effects of oxidation in everyday life: a) rancid; b) aging; c) rusting; and d) respiration
			Pressure and Pressure 1. Know what pressure is; 2. Know what pressure is; 3. Know the unit of	1. Know the meaning of pressure; 2. Be able to tell the way to increase and decrease the pressure in daily life; 3. Be able to describe the characteristics of liquid	1. Feel the presence of fluid pressure; 2. Explore information on the existence and causes of atmospheric pressure; 3. Conduct experiment to illustrate the presence of

			<p>barometer and air pressure; and</p> <p>4. Know the application of air pressure in daily life</p>	<p>pressure;</p> <p>4. Be able to feel the presence of atmospheric pressure;</p> <p>5. Know the cause of atmospheric pressure;</p> <p>6. Know the changes in atmospheric pressure and their impact on life;</p> <p>7. Know the construction and operating principles of mercury barometers and aneroid barometers;</p> <p>8. Know the unit of air pressure;</p> <p>9. Be able to tell the relationship between atmospheric pressure and altitude;</p> <p>10. Know how to explain the cause of air pressure from the perspective of the particle;</p> <p>11. Be able to explain the factors affecting air pressure;</p> <p>12. Be able to give examples of the application of air pressure in daily life;</p> <p>13. Propose a solution from the concept of applying air pressure to solve some problems in daily life;</p> <p>14. Know the application of barometric knowledge in</p>	<p>atmospheric pressure;</p> <p>4. Gather information on changes in atmospheric pressure and their impact on life;</p> <p>5. Collect information on the construction and operating principles of mercury and airless barometers;</p> <p>6. Collect and discuss information on atmospheric pressure applications;</p> <p>7. Perform a simple calculation of pressure and height;</p> <p>8. Conduct experiment to inquire the relationship between gas pressure, gas volume and temperature;</p> <p>9. Collect and discuss the use of atmospheric pressure to solve problems and discuss;</p> <p>10. Collect information on the operating principle of the gas barrel; and</p> <p>11. Discuss how to safely apply barreled gas</p>
--	--	--	---	---	--

				modern life and technology; and 15. Know the safety measures for the application of barreled gas	
			Air Pollution 1. Know the source of air pollution and its impact; 2. Know the ozone layer; and 3. Understand the greenhouse effect	1. Know what air pollution is; 2. Give examples of air pollution: a) acid rain; and b) smog 3. Be able to list the source of air pollutants; 4. Be able to describe the impact of air pollution; 5. Be able to tell the method of preventing air pollution; 6. Know the main content of the Air Quality Index; 7. Be able to describe the role of the ozone layer in the atmosphere; 8. Be able to describe the damage caused by the destruction of the near-Earth ozone layer; and 9. Recognise the causes of the greenhouse effect and the impact of the greenhouse effect	1. Collect the following information and discuss related topics: a) What air pollution is; b) examples of air pollution; c) the impact of air pollution; d) methods for controlling gas pollution; e) air quality index; f) the role of the ozone layer in the atmosphere; g) the damage caused by the destruction of the near-Earth ozone layer; h) the ways to prevent the destruction of the ozone layer; i) the cause of the greenhouse effect; and j) the impact of the greenhouse effect 2. Conduct a special study on campus air pollution
		6.Living Things	1. Know biological resources; and 2. Recognise the	1. Be able to tell the definition of biological resources; 2. Be able to tell the type of	1. Collect, discuss and report through the Internet, educational software, books,

			meaning and methods of protecting biological resources	biological resources; 3. Be able to explain the significance of protecting biological resources; 4. Propose a method of protecting biological resources; and 5. Identify measures to protect biological resources	models and videos: a) the definition of biological resources; b) the characteristics of biological resources; c) the type of biological resources; d) the significance of protecting biological resources; e) the role of human beings in protecting biological resources; and f) methods of protecting biological resources
	4. Solar System, the Milky Way and the Universe	1. Solar System	1. Know the solar system; 2. Know the sun; 3. Know the structure of the solar atmosphere; 4. Know the phenomenon of the sun's surface; 5. Know how the sun produces energy; and 6. Know the planet	1. Know what the solar system is; 2. Be able to tell the characteristics of the sun: a) size; b) quality; c) the density ratio to the Earth; and d) temperature 3. Be able to tell the structure of the sun; 4. Be able to describe the structure of the solar atmosphere: a) sundial; b) chromosphere layer; and	1. Collect the following materials and discuss: a) the solar system; b) the characteristics of the sun; c) the structure of the solar atmosphere; d) the phenomenon of the surface of the sun and its effects on the earth; e) how the sun produces energy; and 2. Watch a video of the sun and the solar system and make a brief report

				c) photosphere layer 5. Know the phenomenon that occurs on the surface of the sun: a) sunspots; b) solar flares; and c) sundial 6. Know the effects of solar surface phenomena on the Earth; 7. Know how the sun produces energy; and 8. Know what a planet is	
		2. Stars and Galaxies	1. Know the star; 2. Know the nature of each star and the birth and death of the star; 3. Know the galaxy; 4. Know the Milky Way; and 5. Know the light years	1. Know what a star is; 2. Know that the sun is a star; 3. Know the brighter stars in the night sky; 4. Be able to compare the stars: a) temperature; b) color; c) brightness; and d) chemical composition 5. Know the birth process of the star; 6. Know the death process of the star; 7. Know what they are: a) red giant star; b) white dwarfs; c) black dwarfs; d) neutron star; e) supernova; and	1. Discuss the following: a) the definition of the star; b) whether the sun is a star; 2. Visit the Planetarium/Science Center or go online to collect and interpret the following information: a) a bright star; b) the sun is a star; c) comparing the characteristics of each star; d) the birth process of the star; e) the death process of the star; f) the type of galaxies; g) the Milky Way; and h) the universe

				f) black hole 8. Know what a galaxy is; 9. Be able to tell the type of galaxies; 10. Know what the Milky Way is; 11. Know what the universe is; 12. Be able to tell where the solar system is in the universe; and 13. Know what light year is	3. Participate in stargazing activities and make relevant reports; and 4. Watch the relevant video or computer software and collect relevant information, then make a brief report
		3. Universe	Know the universe	1. Be able to appreciate the unique, orderly, beautiful and harmonious display of the universe; 2. Know the expansion of the universe; 3. Know that everything in the universe is not eternal; and 4. Know the importance of the sun and the moon towards the survival of the Earth's life	1. Discuss the following: a) the expansion of the universe and the earth; b) everything in the universe is not eternal; c) the importance of the sun and the moon for the survival of the Earth's life; and 2. Write a poem that praises the unique, orderly, beautiful, and harmonious universe
		4. The Development of Astronomy and Space Exploration	Know the history and development of astronomy and space exploration	1. Be able to tell the history of the development of astronomy; 2. Be able to tell the development of space exploration; 3. Be able to give an example of the application of technology in space exploration and	1. Visit the Planetarium/Science Center or go online to collect the following information and report: a) the development of astronomy; b) the application of

				<p>astronomical research;</p> <p>4. Be able to tell the reasons for continuing space exploration; and</p> <p>5. Understand that human knowledge of astronomy and space is constantly evolving</p>	<p>technology in space exploration and astronomical research, such as remote controls;</p> <p>c) The development of space exploration, such as rocket launches, satellites, space probes, human landing on the moon, etc.;</p> <p>2. Debate whether humans should continue their space exploration; and</p> <p>3. Hold a multimedia presentation on the development of astronomy and space exploration</p>
--	--	--	--	---	--

Part IV Implementation Recommendations

1. Teaching Advice

(1) Based on Inquiry Teaching

The junior high school science curriculum emphasises the development of students' scientific inquiry ability and understanding of scientific inquiry, and through these processes to improve students' scientific literacy. Therefore, in the teaching process, we should provide more opportunities for scientific inquiry, and link the practical experience with the acquisition of scientific knowledge to cultivate and improve students' practical ability and innovative spirit.

The design of the inquiry activity should be in line with the psychological characteristics of the students, try to cut in from the familiar things of the students, design the activities that the students love, and make the students happy to participate. Self-made teaching aids and low-cost experiments can be used for inquiry activities, focusing on combining in-class and co-curricular, intra- and out-of-school inquiry activities.

Scientific inquiry activities can be whole-process or partial. For example, some classes focus on asking questions, conducting training on conjectures, assumptions, and predictions while other classes focus on training in planning and gathering information. It is not necessary to be constrained that each activity must follow the entire process of scientific inquiry step by step and from the beginning to the end or must be flexible according to the content of the teaching.

Although the junior high school science curriculum emphasises the significance of scientific inquiry to student development, it should also be recognised that inquiry is not the only way to learn. In science teaching, various teaching methods and strategies are required to form an optimised teaching mode.

(2) Using Teaching Materials Flexibly

Textbooks are an important resource for scientific learning, but they are not the only curriculum resources. The teaching materials cannot be fully applied to every region, every school and every student. Teachers should flexibly handle the content according to the actual situation, and continuously expand, supplement and innovate. The curriculum implementation should be the way to better use the textbooks rather than simply “teaching textbooks”.

In order to use the teaching materials effectively and to correctly understand and accurately grasp the teaching materials, it is necessary to thoroughly analyse the learning characteristics of students and understand their real situation. No matter how good the teaching materials are, they usually only provide a way of thinking and a design scheme for teaching and learning according to the general situation. Therefore, the teacher cannot stay in the knowledge framework presented by the textbook itself, and is not subject to the design of the textbook, but can make flexible adjustments according to the specific situation of the students.

(3) Combining Classroom Teaching with Cocurricular Activities

Cocurricular activities here mainly refer to activities that are organised by the school in addition to classroom teaching, to supplement classroom teaching and to achieve an educational activity required by the educational policy.

Combining cocurricular activities with classroom teaching can deepen students’ understanding of knowledge, enable them to learn and use what they have learned, and achieve the purpose of associating theory with practice. Through cocurricular activities, students can also enrich their experience, broaden their horizons, and give full play to their respective strengths, including foster innovative spirit and improve their practical ability.

Teachers should carry out various cocurricular activities according to the teaching, students and the actual situation inside and outside the school, and closely combine classroom teaching with cocurricular activities. For example, conducting research group activities and visiting museums, science museums, zoology and botanical gardens, farms, factories, garbage disposal sites, etc.

(4) Learning by Doing

In the teaching of science courses, we must create a variety of opportunities for students to conduct scientific inquiry. In the process of personal participation in scientific activities, students will discover problems, feel scientific processes, obtain factual evidence, test their own ideas and scientific theories, and gradually form scientific attitude, emotions and values.

In science teaching, we should focus on guiding students to think about the relationship between factual evidence and scientific conclusions, help students establish scientific models, and thus cultivate students' analytical, general and logical thinking abilities, and gradually form a scientific thinking habit of questioning and reflection.

Teachers should arrange students to do experiments for different course contents to improve their practical ability in this way.

(5) Focus on Student Participation

Students should be encouraged to participate actively in the teaching process, so that they can truly understand and master basic scientific knowledge and skills, scientific attitudes and methods, and gain extensive experience in scientific activities through their own hand-on experience.

Teachers should respect students' diverse insights, skills and experiences, protect students' creativity and curiosity, provide students with multiple opportunities to express their ideas, and allow students to come up with different perspectives, including ideas that may be wrong.

Teachers should help and guide students who have difficulty in learning science and ensure that every step of their progress will be given prompt encouragement so as to build their confidence in learning science.

(6) Encouragement on Exchanges and Cooperation

Teachers should create various conditions and forms according to different teaching contents, and carry out exchanges between students. Students should form mutual respect and trust in the process of interactions. These interactions aim to foster students' ability to present arguments and answer questions. In addition, teachers should encourage students to conduct open discussions and critic and question one another's scientific explanations. They will be guided to discard incorrect views and accept a more reasonable scientific explanation.

Teachers should encourage students to cooperate and learn, use collaborative group forms to conduct inquiry activities, so that everyone can participate in group work to cultivate their cooperative spirit.

(7) Flexible Arrangement of Teaching

Teachers should be flexible in their teaching according to the actual needs of the students. The formation of some important scientific concepts is a complicated process. Teachers should give students sufficient time to observe, experiment, analyse and discuss. Scientific inquiry is an activity that takes more time to be carried out. If a student is

particularly interested in an inquiry activity, or if the student discovers a new problem during the inquiry and needs further inquiry, he or she should be given time allowance to fully explore and discuss. At time when students have difficulties in understanding a certain concept or principle, teachers can increase related activities to help students understand.

(8) Make Full Use of Modern Educational Technology

Today's society has entered the era of high-speed informatisation, and all disciplines in primary and secondary schools are actively using modern educational technology to optimise classroom teaching and improve teaching effectiveness. Modern educational technology integrates sound, image, text, animation and other information into one image. The image is rich and intuitive, which makes students feel intimate and impressed.

The use of modern educational technology can also adjust the teaching progress according to the differences in students' learning ability, improve the learning efficiency; it also can cultivate students' self-learning ability and lay the foundation for lifelong learning.

2. Evaluation Recommendations

(1) Purpose of Evaluation

Evaluation is an indispensable part of teaching activities. It plays a multi-faceted role in the teaching process, and regulates and controls the teaching activities as a whole to ensure that the teaching activities can achieve the set goals.

The main purpose of the evaluation is to understand students' learning status as a reference for refining teaching and promoting learning. Therefore, the evaluation should reflect the true situation of the teaching in a comprehensive and objective manner and provide a real and reliable basis for improving the teaching.

(2) Evaluation Content

The content of the evaluation should be considered based on whether the course objectives are achieved. Teaching evaluation should be carried out abreast teaching activities, and its content should be consistent with the teaching objectives, viz., covering all aspects of the course objectives. It is necessary to examine the basic knowledge and basic skills of students, as well as to examine students' scientific attitudes, emotions and values, including the processes, methods and abilities of scientific inquiry, and the understanding of science, technology and social relations. Moreover, teachers should pay

attention to the results of learning as well as the changes and development of students in the learning process.

(3) Evaluation Method

Diverse evaluation methods are recommended. Teachers should use a variety of evaluation methods throughout the teaching process to assess the level of achievement of students in different learning objectives. It is necessary to select a variety of evaluation methods that match the evaluation content in addition to the written test and give equal attention to the formative and summative evaluation.

1. Formative Evaluation

Formative evaluation mainly refers to the measurement of students' learning process and results in order to improve and maximise teaching activities during the teaching process. Formative evaluation focuses on the testing of the learning process and the use of measurement results to improve teaching, so that the teaching can be improved in the process of continuous evaluation, feedback, correction or improvement, rather than emphasising students' results. Since formative evaluation is the main purpose of obtaining feedback and improving teaching, the number of such tests is relatively frequent. Generally, formative assessment is conducted after the initial teaching of any one unit or new concepts and new skills has been completed. As such, the scope of each test is comparatively small in scale.

2. Summative Evaluation

Summative evaluation generally refers to the assessment of student learning outcomes after the end of a course or a teaching phase. The main purpose of this type of evaluation is to assess the student's academic performance, determine the extent to which the student achieves the learning objectives, and determine the basis for the student's learning in the follow-up tutorial and the development of new learning objectives. The generalisation level of summative evaluation is generally high, and the scope of content included in the examination or test is also broad, and the number of evaluations is as many, usually two or three times a semester or one academic year. The mid-term exams, final exams, and graduation exams in the school are all such evaluations.

The evaluation should be based on daily teaching and make full use of all normal classroom teaching activities and cocurricular practice activities to fully reflect the actual learning and development of students. The main evaluation methods available are:

1. Written Test

The written test is the most common evaluation method. It should avoid test on knowledge and memory. It should pay attention to the understanding of knowledge and

the ability to solve problems and the ability to think at a higher order. The test is conducted aiming to strengthen comprehensiveness, inquiry and openness.

2. Experimental Examination

Teachers can use appropriate guidelines to examine students' understanding and application of scientific concepts and principles, including their ability to design experiments, apply experimental techniques, process and interpret data obtained, communicate and express, cooperate, innovate, and possess safety consciousness, etc. The experimental examination evaluates the performance and results of students during the experiments (such as the experimental report).

3. Teacher Observation

When students are completing learning activities, teachers can observe their interest and motivation to examine their learning attitudes (such as initiative, cooperation, creativity, etc.) and see how they solve problems and interact with others. Through a long-term, systematic observation of students' performance in daily learning and recording, a more comprehensive evaluation of students' learning outcomes can be obtained.

4. Verbal Questions

By asking questions verbally, teachers can understand how students think in certain situations. Students' responses can reflect their strengths, weaknesses, fallacies, understanding, attitudes and abilities. Teachers should use different types of questions to stimulate students' thinking, such as asking students to provide facts, setting questions, finding evidence, and answering open questions that promote higher order thinking.

5. Personal Growth Record

Establishing a growth record is an important way for students to conduct self-evaluation. It can reflect the development and progress of students, and it also allows students to cultivate the habit of reflection and self-review. Students can record the growth experience of their scientific learning activities, including the learning content, academic performance, scientific observation diary, scientific and technological works, the process of participating in scientific practice activities inside and outside the school, experience, achievements and so forth.

6. Feature Report

The special report provides an opportunity for students to apply what they have learned. Teachers can use appropriate evaluation criteria to evaluate students' creativity, communication and presentation skills, problem-solving skills, and the ability to collect and process data.

The results of the evaluation should be presented in a combination of qualitative and quantitative methods. Quantitative evaluation can adopt the level system, percentage, etc.; qualitative evaluation can be conducted in the form of comments, filling activity records, etc. Teachers should pay more attention to what students have mastered, what progress they have gained, and what capabilities they have, so that the evaluation results are conducive to building students' self-confidence in learning science, improving their interest in learning science, and promoting their development.

3. The Development and Utilisation of Curriculum Resources

Science teachers should have the awareness of developing and utilising curriculum resources, and develop and utilise various scientific curriculum resources based on local conditions.

The curriculum resources for science education are everywhere, and exist anytime. It can be divided into three categories: school resources, family resources and community resources. In essence, it includes three major resources: people, things and environment. In order to improve students' scientific literacy, teachers can develop and utilise curriculum resources in various ways relevant to the environment in which the school is located.

1. Development and Utilisation of School Curriculum Resources

The school curriculum resources can be divided into two categories in the classroom and outside the classroom. Those inside classrooms are mainly laboratories, science rooms, libraries, reading rooms, computer rooms, etc. The main areas outside the school are the school buildings, the environment of the corridors, flowers and trees, biological corners, and scientific and technological attractions.

The ways to develop and utilise school curriculum resources are to:

1. Familiarise books in school library, enrich scientific collections and update science education equipment;
2. Make full use of the land in the school and open up science and technology education parks, such as herbal garden, weather station, small zoo, etc.;
3. Design and establish scientific and technological attractions such as solar clocks, wind turbines, and scientific sculptures on campus; and
4. Mobilise teachers with special skills in science and technology and actively develop school-based curriculum.

(3) Development and Utilisation of Family Resources

Every family has a wealth of scientific and educational resources, such as the professional background of the parents, the animals, the plants, the family science books and the like.

The methods of using the family curriculum resources are to:

1. Encourage students to conduct scientific inquiry activities on domesticated animals and planted plants; and
2. Encourage parents to bring their children to nature, encounter the society, and conduct social practice.

4. Development and Utilisation of Community Resources

The community curriculum resources mainly include professionals, factories, farms, orchards, botanical gardens, zoos, libraries, science museums, museums, natural parks, universities, and scientific research institutes.

The use of community curriculum resources is to:

1. Carry out activities to improve the community environment;
2. Visit community research units for on-site teaching; and
3. Invite professionals with specialisations to guide students in scientific activities or give scientific lectures.

4. Textbook Writing Recommendations

The textbook provides basic clues for students' learning activities, and is an important resource for achieving the objectives of the curriculum and implementing teaching. The preparation of junior high school science textbooks should be based on the "curriculum standard". Therefore, textbook writers need to fully understand and master the basic ideas and contents of the "curriculum standard" and reflect them in the textbook as a whole.

The selection, organisation and presentation of the content of the textbook are important issues to be considered in the preparation of the textbook. In this regard, the "curriculum standard" proposes the following principles and recommendations:

(1) Selection of Teaching Materials

1. In addition to considering the systemic nature of the subject, the selection of the contents of the textbook should also consider the development of the students and the needs of the society.
2. The content of the textbook should include the basic knowledge and skills of science, highlight the most basic scientific concepts and principles, and reflect the basic characteristics of scientific inquiry. It is designed to combine scientific inquiry with the acquisition of scientific knowledge, skills, and the formation of scientific attitudes, emotions, and values.
3. The choice of textbook content should reflect the needs of social, economic and technological development. Science, technology and society should be integrated to fully reflect the interaction between them, reflecting the development of science and its impact on social development and personal life.
4. The selection of the content of the teaching materials should reflect the connection and integration between the contents of each subject, and fully consider the combination of knowledge and skills beforehand and afterwards. Furthermore, familiar things and practical problems in the daily life of the students should be selected and engaged as the content of the teaching materials.
5. The content of the textbook should be based on student activities as an important part. The textbooks should arrange a variety of learning activities, so that students can develop their knowledge, abilities, emotions, attitudes and values through activities.
6. The selection of the content of the teaching materials should fully consider the existing knowledge and experience of the students. Teachers should pay attention to the connection within the relevant courses, and the level of difficulty should be moderated, so as to avoid excessive burden of learning for the students.

(2) Organisation of Textbook Content

The content standard of this “Curriculum Standard” is expressed and presented in four aspects. It does not represent the order of teaching content and the organisational structure of the teaching materials. It needs to be re-created and integrated when writing teaching materials.

The integration of scientific textbooks does not require the complete breaking of the boundaries of the branch field, but the content should focus on the comprehensive connection and mutual penetration of knowledge and skills in different subject areas in order to cultivate students’ awareness and ability to use knowledge comprehensively.

The integration of scientific textbooks should have a certain logical structure, but the form of logical structure can be diverse.

The following checklist describes several different forms that can be used as a reference when writing a textbook.

1. Scientific textbooks based on the development of inquiry ability

This kind of teaching materials is mainly based on scientific inquiry. The purpose is to develop students' inquiry ability and emphasise the continuity of inquiry activities.

2. Scientific textbooks based on the development of student life experience

This kind of teaching materials organises materials from the perspective of students, and gradually expands the teaching content according to the continuous expansion of their life experiences including the enhancement of students' understanding and recognition of science.

3. Scientific textbooks based on students' knowledge background and cognitive development

This kind of teaching material is used to find the learning materials corresponding to the students' knowledge background and cognitive characteristics in life science, material science and earth, universe and space science content. These materials are arranged in order from basic to advanced, from simple to complex, and finally form a certain knowledge system.

4. Scientific textbook based on scientific concept system

This kind of teaching materials is used to introduce from the basic concepts of a certain scientific field to derive theorems, principles, rules, laws and so on according to the logical concept as the main clues to compose the content of the textbook.

5. Scientific textbook with unified concept and process

Such textbooks are organised with a number of basic, scientific, and unified concepts and processes, such as the transformation of materials and energy, systems, conservation, structure and function, and evolution, aiming to promote and strengthen the study of scientific concepts and principles.

(3) How the content of the textbook is presented

1. Science textbooks should match the age characteristics and cognitive rules of students, apply interesting things to stimulate students' interest and learning motivation, and pay attention to the relevancy of students' daily life.
2. Scientific textbooks should reflect the core of the subject, viz., inquiry, carefully arrange learning activities, create a situation and conditions conducive to students' independent inquiry and study, and guide students to draw conclusions through inquiry.
3. Science textbooks should be open, and guide students to broaden their horizons of knowledge through various channels as well as to guide students to pay attention to and participate in discussions about scientific issues and express their own opinions.
4. The presentation of teaching materials should be lively and diverse, and the text should be popular and fluent.
5. The content of the textbook should be arranged from easy to difficult, and the abstract content can be arranged later in the book.

5. Teacher Training Recommendation

Since the comprehensive science curriculum bears the heavy responsibility of cultivating students' scientific literacy, it is critical to improve the literacy and knowledge level of science teachers. Put simply, it is necessary to gradually build up a professional team of science teachers.

To set up a special training programme for teachers, the training courses shall be designed in accordance with the scientific literacy required by the "curriculum standard", and the training shall be conducted in stages and in batches. The training content should pay equal attention to subject areas and teaching areas to strengthen the use of information technology, including information acquisition, information processing and information processing training.

As such, teacher training courses should include the following three aspects:

1. Training courses include knowledge, methods, and experimental skills in Physics, Chemistry, Biology, Geography and their extension and application; the connection and integration between disciplines, such as the introduction to science, the history of science, or the general methodology of science.
- 2 Training courses should be based on the basic theory of education and teaching, including the theory and methods of comprehensive science curriculum theory, teaching method, teaching design and teaching evaluation.

3. Practical courses, including basic techniques and methods of comprehensive science education practice and modern educational technology.

Final version: March 2011

First revision: June 2011

Second revision: June 2012