Science

Matthayom 1-3 (EP)

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I. Introduction

The Importance of Science

Science plays a vital role in the development of our present and future world. Science, with the help of technology and devices, has shaped the lives of people by facilitating easier life and work. It also helps to explain natural phenomena, and promotes thinking by using reason and evidence. It fosters critical thinking and creativity. All the benefits and advantages we have in today's modern world come from our scientific knowledge. It enables us to develop skills for planning and conducting investigations, teamwork and evaluating results based on data and information gathered. Science is important to the development and growth of a modern knowledgeable society. Most importantly, all of us must be aware of scientific knowledge in order to gain an understanding of the world around us.

The Andrew Biggs Academy English Program Science Curriculum for Matthayom 1 to Matthayom 3 (Grades/Years 7 – 9) provides the framework to meet these objectives. Learning science equips students with a concise and powerful means of scientific knowledge.

Through practical and relevant activities, students will acquire skills for seeking knowledge, the ability to solve problems, and decision-making skills that can be applied in their daily lives.

Principles Underlying Andrew Biggs Academy Science Program

Andrew Biggs Academy Curriculum is based on the Thai Ministry of Education (The Basic Education Core Curriculum 2008). This curriculum recognizes the diversity that exists among students who study science in the English Program. It is based on the belief that all students can learn science and deserve the opportunity to do so.

This curriculum is designed to help students build a solid foundation in science that will enable them to apply their knowledge and further their learning successfully. Andrew Biggs Academy believes that students are learning most effectively when they are given the chance to investigate ideas and solve problems and then guided carefully into an understanding of the basic principles in science.

It is also part of this philosophy that students must be enjoying themselves, or at the very least interested, in learning the subject. For this reason, many of the activities have an amusing aspect to them in order to maintain interest in this sometimes-difficult subject. For more than 10 years, Andrew Biggs Academy has been developing curricula in the field of English. The Science curriculum is a relatively-new one based on the textbook and the philosophy of Andrew Biggs Academy towards learning.

The Basic Education Core Curriculum aims to instill the following five key competencies among students: communication skills, thinking skills, problem solving skills, life skills, and technological application skills.

Curriculum Overview

The Andrew Biggs Academy Curriculum, Matthayom 1 to Matthayom 3 in Science identifies the goals and objectives for each level and illustrates the knowledge and skills that students are expected to acquire, learn, demonstrate and apply in their class work. It also includes examinations and various activities to assess their achievements. The overall expectations describe the general knowledge and skills that students are expected to achieve at the end of each level. The specific expectations describe the detailed knowledge and skills that students are expected to demonstrate at the end of each chapter.

Overall and specific expectations in science are organized into eight (8) strands, which are the eight major areas of knowledge and skills in the mathematics curriculum of Basic Core Curriculum (B.E. 2551) from the Thai Ministry of Education.

The program in Matthayom 1 to Matthayom 3 is specifically designed to ensure that students build a solid foundation in science. To support this learning process, teachers will, whenever possible integrate concepts form the eight strands and apply them to real life situations.

The learning strands in the study of science emphasize the linking of knowledge to science processes, acquiring of investigative skills, accumulation of knowledge through investigative processes, and problem solving. The strands are:

Strand 1: Living Things and Life Processes

Living things; basic units of living things; structures and functions of various systems of living things and life processes; biodiversity; genetic transmission; functioning of various systems of living things, evolution and diversity of living things and biotechnology.

Strand 2: Life and the Environment

Diverse living things in the environment; relationship between living things and the environment; relationships among living things in the ecosystem; importance of natural resources, and utilization and management of natural resources at local, national and global levels; factors affecting survival of living things in various environments.

Strand 3: Substances and Properties of Substances

Properties of materials and substances; binding forces between particles; changes in the state of substances; solution formation and chemical reaction of substances, chemical equations and separation of substances.

Strand 4: Forces and Motion

Nature of electromagnetic, gravitational and nuclear forces; forces acting on objects; motion of objects; frictional forces; moment of variety of motions in daily life.

Strand 5: Energy

Energy and life; energy transformation; properties and phenomena of light, sound, electrical circuits, electromagnet, radioactivity and nuclear reactions; interrelationship between substances and energy; energy conservation; effects of utilization of energy on life and the environment

Strand 6: Change Processes of the Earth

Structure and components of the Earth; geological resources; physical properties of soil, rock, water and air; properties of the Earth's surface and atmosphere; change processes of the Earth's crust; geological phenomena; factors affecting atmospheric change.

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Strand 7: Astronomy and Space

Evolution of the solar system; galaxies; the universe; interrelationship and effects on living things on Earth; relationship between the sun, the moon and Earth; importance of space technology.

Strand 8: Nature of Science and Technology

Scientific processes; investigation for seeking knowledge, problem solving, and understanding that science, technology, society and environment are interrelated.

For common understanding and to establish clarity with regards to Andrew Biggs Curriculum, various codes have been used for Learning Standards and Grade Level Indicators. Below are the codes used for this curriculum:

SC1.1, GLI M1/1	
SC	Subject Area of Science
1.1	Standard 1, Learning Area 1
GLI	Grade Level Indicators
M1	Year (Matthayom 1)
1	Indicator Number

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M1

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Core Curriculum for Science, M1

Strands, Learning Standards, and Grade Level Indicators

Strand	Learning Standards		Grade Level Indicators (GLI)
1. Living Things and Life Processes	**SC1.1**	Understanding basic units of living things; relationship between structures an functions of living things which are interlinked; investigative process for seeking knowledge; ability to communicate acquired knowledge that could be applied to one's life and care for living things	1. Observe and explain forms and characteristics of cells of unicellular and multicellular organisms. 2. Observe and compare essential components of plant and animal cells. 3. Experiment and explain functions of essential components of plant and animal cells. 4. Experiment and explain processes of passing substances through cells by diffusion and osmosis. 5. Experiment to find some factors essential for photosynthesis of plants, and explain that light, chlorophyll carbon dioxide and water are essential for photosynthesis. 6. Experiment and explain results obtained concerning photosynthesis by plants. 7. Explain importance of the photosynthesis process of plants on living things and the environment. 8. Experiment and explain groups of cells involved in transportation of water in plants. 9. Observe and explain structures of the systems for transportation of water and nutrients in plants. 10. Experiment and explain floral structures involved in plant reproduction. 11. Explain sexual reproduction processes of angiosperms and plant asexual reproduction processes by referring to various parts for propagation. 12. Experiment and explain responses of plants to light, water and touch. 13. Explain principles and effects of biotechnological application for propagation, improved breeding and increased productivity of plants, and apply acquired knowledge for useful purposes.
	SC1.2	**Not applicable for M1**	
2. Life and the Environment	**SC2.1** **SC2.2**	**Not applicable for M1** **Not applicable for M1**	

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Strand	Learning Standards		Grade Level Indicators (GLI)
3. Substances and Properties of Substances	**SC3.1**	Understanding of properties of substances; relationship between properties of substances and structures and binding forces between particles; investigative process for seeking knowledge and scientific mind; and communicating acquired knowledge for useful purposes.	1. Experiment and classify substances into groups by using their texture or particle size as criteria and explain properties of each group of substances. 2. Explain properties and transition of substances by using particle arrangement models. 3. Experiment and explain acid-base properties of solutions. 4. Verify pH value of solutions, and apply the knowledge gained for useful purposes.
	SC3.2	Understanding of principles and nature of change in the state of substances; solution formation; reaction; investigative process for seeking knowledge and scientific mind; and communication of acquired knowledge that could be applied for useful purposes.	1. Experiment and explain methods of preparing solutions with density in percentage, and discuss application of knowledge about solutions for useful Purposes. 2. Experiment and explain change of properties, mass and energy of substances when they change state and dissolve. 3. Experiment and explain factors affecting changes in the state and dissolution of substances.
4. Forces and Motion	**SC4.1**	Understanding of the nature of electromagnetic, gravitational and nuclear forces; investigative process of seeking knowledge and applying acquired knowledge for useful and ethical purposes.	1. Search for data and explain scalar and vector quantities. 2. Experiment and explain distance, speed, displacement and velocity of motion of objects.
	SC4.2	Not applicable for M1	
5. Energy	**SC5.1**	Understanding of relationship between energy and life; energy transformation; interrelationship between substances and energy; effects of energy utilization on life and the environment; investigative process for seeking knowledge; and communication of acquired knowledge that could be applied for useful purposes	1. Experiment and explain temperature and its measurement. 2. Observe and explain heat transmission, and apply the knowledge gained for useful purposes. 3. Explain heat adsorption and emission through radiation, and apply the knowledge gained for useful purposes. 4. Explain thermal equilibrium and effects of heat on expansion of substances, and apply the knowledge gained in daily life.

Strand	Learning Standards		Grade Level Indicators (GLI)
6. Change Processes of the Earth	**SC6.1**	Understanding of various processes on the Earth's surface and inside the Earth; relationship between various processes causing changes in climate, topography and form of the Earth; investigative process for seeking knowledge and scientific mind; and communication of acquired knowledge that could be applied for useful purposes.	1. Search for relevant information and explain components and division of atmospheric layers covering the Earth's surface. 2. Experiment and explain relationship between temperature, humidity and air pressure and climate affecting phenomena. 3. Observe, analyse and discuss formation of climate phenomena affecting human beings. 4. Search for relevant information, analyse and interpret meanings of data from weather forecasts. 5. Search for, analyse and explain effects of climate on the lives of living things and the environment. 6. Search for relevant information, analyse and explain natural factors and man-mode actions affecting changes of the Earth's temperature, ozone holes and acid rain. 7. Search for relevant information, analyse and explain effects of global warming, ozone holes and acid rain on living things and the environment.
7. Astronomy and Space	**SC7.1**	Not applicable to M1	
	SC7.2	Not applicable to M1	
8. Nature Science and Technology	**SC8.1**	Application of scientific process and scientific mind in investigation for seeking knowledge and problem-solving; knowing that most natural phenomena assume definite patterns that are explainable and verifiable within limitations of data and instruments available during particular periods of time; and understanding that science, technology, society and the environment are interrelated.	1. Pose questions prescribing the issues or important variables for exploration and verification or conduct comprehensive and reliable study and research on matters of their interest. 2. Make verifiable hypotheses and plan several methods for exploration and verification. 3. Select techniques and methods for quantitative and qualitative exploration and verification yielding accurate and safe results by using appropriate materials and equipment. 4. Collect data and process it quantitatively and qualitatively. 5. Analyse and evaluate conformity of eyewitnesses with the conclusions both supporting and contradicting the hypotheses and data abnormality from exploration and verification. 6. Create models or formats explaining or showing results of exploration and verification.

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Strand	Learning Standards		Grade Level Indicators (GLI)
			7. Pose questions leading to exploration and verification of relevant matters, and apply the knowledge gained in new situations or to explain the concepts, processes and results of the project or task for others to understand. 8. Make a record and explain results of additional observation, exploration, verification and research from various sources of knowledge in order to obtain reliable data, and accept changes in the knowledge discovered when presented with new and additional data, eye-witnesses or contradictory data. 9. Display their work, write reports and/or explain the concepts, processes and results of the project or task so that others can understand.

Course Description: Science M1, Semester 1

Subject: Core Science	**Course Number:** SC21101	**Level:** M1
Period: 60 hours/semester	**Academic Credit:** 1.5	**Semester:** 1st

This course develops students' thinking skills in various aspects such as logical, analytical and critical thinking. This course will also help them develop their investigative skills that are essential for acquiring knowledge, making decisions and solving problems to the following topics:

Introduction to Science

What is science?, science laboratory, steps in scientific investigation, physical quantities and their units, the concepts of mass, measuring tools and the importance of standard units;

Cell as a Unit of Life

Understanding cells, unicellular and multicellular organisms and diffusion and osmosis in cells;

Plants

Photosynthesis, transport system in plants, sexual reproductive system of flowering plants, pollination, development of fruits and seeds in plants, germination of seeds, application of vegetative reproduction in flowering plants, stimuli and response in plants and biotechnology;

Matter

Classifying matter, states of matter, changes of states.

This course will help students to learn and ask questions in relation to real situations and their scientific experiences in daily life. As well, it will develop a range of approaches, including the use of technology to explore and solve problems. Students should be able to represent and communicate science ideas and give reasons to support their conclusions. Moreover, students must be able to use the scientific knowledge and understanding with the use of science in the real world.

Grade Level Indicators (GLI):

SC1.1, GLI M1/1	SC1.1, GLI M1/2	SC1.1, GLI M1/3	SC1.1, GLI M1/4	SC1.1, GLI M1/5
SC1.1, GLI M1/6	SC1.1, GLI M1/7	SC1.1, GLI M1/8	SC1.1, GLI M1/9	SC1.1, GLI M1/10
SC1.1, GLI M1/11	SC1.1, GLI M1/12	SC1.1, GLI M1/13		

Total up to 13 Grade Level Indicators

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Course Syllabus: Science M1, Semester 1

Level: Matthayom 1 Credit: 1.5 | **Period: 60 hours** | **Semester: 1st Semester** | **Instruction Time: 3 periods/week**

Focus Smart Science 1, Unit. 1: Introduction to Science (19 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
1	**Introduction to Science**	Students will be able to understand a fundamental definition of science and what it comprises.	■ Teach what natural phenomena are, SB p. 2. ■ Teach what science is. What is scientific knowledge and what is technology, SB p. 2 – 3. ■ Lead a discussion about life without mobile phones, computers and televisions. ■ Have a group discussion on the advantages and disadvantages of modern technology. ■ Teach students the importance of science in transportation, medicine and agriculture. Classroom work: ■ Asking questions; monitoring; assessing projects, tasks and assignments, other in-class projects	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	Not Applicable
2	**Introduction to Science (Continued)**	Students will be able to understand the importance of science and technology.	■ Elicit and discuss careers that involve scientific knowledge. ■ Assign exercises 2 and 3 of Workbook page. Lead a discussion about the results. ■ Homework: Answer Test Yourself 1.1, SB p. 4.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
3	**Science Laboratory**	Students learn rules and safety precautions when inside a laboratory.	■ Tour the science laboratory. ■ Demonstrate how we use a laboratory to carry out experiments, SB p. 5. ■ Introduce students to safety precautions when inside the laboratory. ■ Answer exercise 1 of workbook p. 4.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	Not Applicable
4	**Science Laboratory (Continued)**	Students will be able to know different science laboratories and their uses.	■ Show students different apparatus in the laboratory and explain their uses, SB p. 5. ■ Discuss the parts and usage of a Bunsen burner, SB p. 7. ■ Discuss how to avoid accidents when using a Bunsen burner. ■ Teach when to use a yellow flame and a blue flame.		
5	**Science Laboratory (Continued)**	Students will be able to understand some hazard warnings.	■ Show students some chemical bottles with hazard warning symbols, SB p. 8. ■ Teach the danger of each substance and symbol. ■ Demonstrate how to handle dangerous substances. ■ Answer Test Yourself 1.1, SB p. 4.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
6	**Steps in Scientific Investigation**	Students will be able to carry out a scientific investigation.	■ Teach the steps in carrying out a scientific investigation, SB p. 9. ■ Homework: Workbook exercise 1, p. 5.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	Not Applicable
7	**Steps in Scientific Investigation (Continued 1)**	Students will be able to understand the importance of a science report.	■ Use the example of a science report, SB p. 11. ■ Explain to students the importance of a science report. ■ Homework: Answer Test Yourself question 1-2, SB p. 12.		
8	**Steps in Scientific Investigation (Continued 2)**	Students will be able to understand some hazard warnings.	■ Answer workbook p. 5. ■ Discuss the answers with students. ■ Homework: Answer Test Yourself 1.3 question 3, SB p. 12.		
9	**Physical Quantities and their Units**	Students will be able to understand the physical quantities and their units.	■ Teach what a physical quantity is, SB p. 12. ■ Explain examples of physical quantity: length, mass, time, temperature and electric current. ■ Teach the meaning of SI Units. ■ Use the SI Table on page 13 of SB and explain to students to know the units and the measuring tools for each physical quantity. ■ Homework: Answer workbook exercises 1 – 2 p. 6.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
10	**Physical Quantities and their Units (Continued)**	Students will be able to identify kilobytes, megabytes, and gigabytes.	■ Teach the meaning of gig-, mega-, kilo- and other prefixes used to state large values, SB p. 13. ■ Guide students to write quantities in the prefixed and standard forms, SB p. 14. ■ Answer workbook exercise 3 p. 7. ■ Homework: Answer Test Yourself 1.4 of p. 14.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	Not Applicable
11	**The Concept of Mass**	Students will be able to identify the difference between a mass and a weight.	■ Explain the difference between mass and weight, SB p. 15. ■ Emphasize that the units and measurement tools are different for both weight and mass, SB p. 16. ■ Answer workbook exercises 1-2 p. 7-8. ■ Homework: Answer Test Yourself 1.5, SB p. 16.		
12	**Measuring Tools**	Students will be able to use measuring tools.	■ Elicit some units of length, SB p. 17. ■ Elicit the measurement tools for measuring a straight line and have them demonstrate on the board. ■ Answer question 1 of workbook p. 8.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
13	**A. Measuring the Length of Curved Lines** **B. Measuring the Diameter of Objects**	A. Students will be able to measure the length of curved lines using an opisometer. B. Students will be able to know how to measure the diameter of objects.	■ Draw a curved line on the board, SB p. 18. ■ Introduce ways to measure the length of a curved line. ■ Invite volunteers to measure the length of a curved line. ■ Show students an opisometer – a device to measure curved lines. ■ Teach what diameter is, SB p. 18 ■ Get a cylinder and teach students that there are two diameters for the cylinder. ■ Ask the students how to measure the external and internal diameters. ■ Answer workbook exercise p. 8.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	Not Applicable
14	**Measuring Area**	Students will be able to measure area.	■ Discuss the definition of an area, SB p. 19 ■ Ask students to measure the area of the table and other surfaces with a ruler or meter stick. ■ Show students a leaf and ask them to figure out how to measure the area of a leaf. Give them graph paper and guide them to measure the areas of a leaf, SB p. 19. ■ Answer workbook question 3 p. 9.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
15	**Measuring Volume**	Students will be able to measure the volume of liquids.	■ Teach how to measure volumes of liquids, SB p. 20. ■ Show beakers, measuring cylinders, volumetric flasks, burettes and pipettes to measure volumes of liquids. ■ Answer workbook exercise 4 p. 9.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	Not Applicable
16	**Ways to Measure Volumes**	Students will be able to measure volumes using different apparatus.	■ Explain what meniscus is, SB p. 20. ■ Teach students how to measure the volume of a liquid using a pipette and a burette. ■ Teach students how to use eureka tin. ■ Answer workbook question 5- 6 p. 9 – 10. ■ Homework: Answer Test Yourself 1.6, SB p. 23.		
17	**The Importance of Standard Units**	Students will be able to understand the importance of standard units.	■ Explain the importance of standard units, SB p. 24. ■ Ask students to think of the disadvantages and advantages if the SI units are not used worldwide. ■ Answer Test Yourself 1.7, SB p. 25. ■ Homework: Answer workbook exercises 1 -2 p. 10.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
18	**Conclusion**	Students will be able to conceptualize what have they learned in these lessons.	■ Use conceptual map, SB p.25 to help student to understand the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall p. 26.		Not Applicable
19	**UNIT TEST**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 27 – 32 of Student's Book and Enrichment Exercises of Workbook pages 12 – 15.			

Focus Smart Science 1, Unit. 2: Cell as a Unit of Life (12 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
20	**Understanding Cells**	Students will be able to understand the basic structure of cells and the essential components in them.	■ Explain the meaning of cells, SB p. 34 ■ Explain what living things are made of ■ Introduce the microscope and describe its function and parts, SB p. 35. ■ Get a slide and let the students get a feel of using the microscope. Classroom work: ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1, GLI M1/1** **SC1, GLI M1/2** **SC1, GLI M1/3** **SC1, GLI M1/4**

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
21	**Parts of a Microscope**	Students will be able to identify parts of microscope.	■ Answer workbook exercises 1-2 p. 17 – 18. ■ Discuss the answer with the students. ■ Discuss the general structure of a cell, SB p. 36 – 38. ■ Prepare a slide of human cheek cells and do activity 37 in SB p. 37 and discuss with students.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1, GLI M1/1** **SC1, GLI M1/2** **SC1, GLI M1/3** **SC1, GLI M1/4**
22	**Parts of a Microscope Continued**	Students will be able to carry out experiment with the use of a microscope.	■ Prepare a slide of onion cells and carry out the activity in SB p. 38. ■ Discuss the structure of animals cells. ■ Discuss the structure of plant cells. ■ Homework: Answer workbook exercises 3-4 p. 18.		
23	**Functions of Cell Structures**	Students will be able to compare between animal and plant cells.	■ Teach the functions of cell structures on SB p. 41 and discuss with students. ■ Ask students to compare between animals cells and plant cells. ■ Homework: Answer exercises 5-6 p. 19		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
24	**Functions of Cell Structures**	Students will be able to compare animal and plant cells.	■ Check homework. ■ Answer Test Yourself 2.1, SB p. 43.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1, GLI M1/1** **SC1, GLI M1/2** **SC1, GLI M1/3** **SC1, GLI M1/4**
25	**Unicellular and Multicellular Organisms**	Students will be able to explain what unicellular and multicellular organisms are.	■ Teach unicellular and multicellular organisms, SB p. 43. ■ Proceed to activity on SB p. 44. ■ Homework: Answer workbook exercises 1-4 p. 19.		
26	**Unicellular and Multicellular Organisms (Continued)**	Students will be able to observe and explain the different characteristics of unicellular and multicellular organisms.	■ Check and discuss students answer from the homework given. ■ Answer Test Yourself 2.2, SB p. 45		
27	**Diffusion and Osmosis in Cells**	Students will be able to understand the diffusion and osmosis processes in cells.	■ Teach diffusion and osmosis in cells, SB p. 45. ■ Show examples of where these processes take place. ■ Carry out activity on SB p. 46 – 47.		
28	**Osmosis in Living Animal Tissues**	Students will be able to carry out an experiment to explain the effects of plant and animal cells.	■ Teach the effects of plant cells and animal cells in three different solutions made due to osmosis. ■ Homework: Answer workbook exercises 1-4 p. 21-22.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
29	**Osmosis in Living Animal Tissues (Continued)**	Students will be able to understand the diffusion and osmosis processes in cells.	■ Check homework. ■ Answer Test Yourself 2.3, SB p. 48.		
30	**Conclusion**	Students will be able to conceptualize what they have learned in these lessons.	■ Use conceptual map, SB p. 48 to help student to understand the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall p. 49.		
31	**UNIT TEST**	Unit test will be given at the end of every unit. Questions will come from the Mastery Practice pages 49 - 53 of Student's Book and Enrichment Exercises of Workbook pages 23 – 26			

Focus Smart Science 1, Unit 3: Cell as a Unit of Life (29 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
32	**Photosynthesis**	Students will be able to understand what photosynthesis is.	■ Teach photosynthesis and chlorophyll, SB p. 55. ■ Explain the process of photosynthesis, SB p. 55.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1, GLI M1/5** **SC1, GLI M1/6** **SC1, GLI M1/7** **SC1, GLI M1/8** **SC1, GLI M1/9** **SC1, GLI M1/10** **SC1, GLI M1/11** **SC1, GLI M1/12** **SC1, GLI M1/12**

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
33	**Requirements of Photosynthesis**	Students will be able to identify the requirements of photosynthesis.	■ Emphasize the equation to represent photosynthesis and the factors for photosynthesis, SB p. 55. ■ Carry out the steps in SB page 56 to test the presence of starch in leaves	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1, GLI M1/5** **SC1, GLI M1/6** **SC1, GLI M1/7** **SC1, GLI M1/8** **SC1, GLI M1/9** **SC1, GLI M1/10** **SC1, GLI M1/11** **SC1, GLI M1/12** **SC1, GLI M1/12**
34	**Factors required for Photosynthesis**	Students will be able to investigate the factors required for photosynthesis.	■ Carry out the activity, SB p.57– 59, on how to investigate the factors required for photosynthesis. ■ Teach and discuss the outcome of the observation.		
35	**Importance of Photosynthesis**	Students will be able to explain and discuss photosynthesis.	■ Teach the importance of photosynthesis using the chart, SB p. 60. ■ Answer Test Yourself 3.1 questions 1-4, SB p. 61.		
36	**Photosynthesis**	Students will be able to understand photosynthesis.	■ Assign Workbook exercise 1 – 3 p. 30 – 31. ■ Discuss the answer in class.		
37	**Transport System in Plants**	Students will be able to analyse transport system in plants.	■ Elicit ideas about what will happen if we don't water an indoor potted plant for a week. ■ Teach the difference between wilting and transpiration, SB p. 61 – 62. ■ Answer workbook exercises 1-2 of the workbook on p. 31 – 32.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
38	**Stomata**	Students will be able to understand what stomata are.	■ Define stomata, SB p. 62. ■ Lead an observation of the stomata of a leaf using a magnifying glass. ■ Answer workbook exercise 3 p. 32 – 33.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1, GLI M1/5** **SC1, GLI M1/6** **SC1, GLI M1/7** **SC1, GLI M1/8** **SC1, GLI M1/9** **SC1, GLI M1/10** **SC1, GLI M1/11** **SC1, GLI M1/12** **SC1, GLI M1/12**
39	**Factors that Affect the Rate of Transportation**	Students will be able to identify factors that affect the rate of transportation.	■ Discuss the factors that affects the rate of transportation, SB p. 63. ■ Teach the roles of transportation, SB page 63.		
40	**Vascular Tissue of Plants**	Students will be able to explain what phloem and xylem means.	■ Use SB p. 63 to define xylem and phloem. ■ Discuss what the xylem consists of. ■ Discuss what phloem consists of. ■ Carry out the activity, SB p. 66 to study the transport of synthesized food and substances via phloem and discuss with students.		
41	**Vascular Tissue of Plants (Continued)**	Students will be able to explain what phloem and xylem means.	■ Carry out activity, SB p. 67 to identify the locations of xylem and phloem and discuss with students. ■ Answer Test Yourself 3.2 questions 1-4, SB p. 68.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
42	**Sexual Reproductive System of Flowering Plants**	Students will be able to analyse the sexual reproductive system of flowering plants.	■ Get a fresh hibiscus flower and review the parts of the flower and their functions. ■ Discuss the structure of a flower, SB p. 68.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	SC1, GLI M1/5 SC1, GLI M1/6 SC1, GLI M1/7 SC1, GLI M1/8 SC1, GLI M1/9 SC1, GLI M1/10 SC1, GLI M1/11 SC1, GLI M1/12 SC1, GLI M1/12
43	**Types of Flowers**	Students will be able to identify types of flowers.	■ Get a male and a female papaya flower and have students identify them. ■ Review the parts of a male flower and a female flower, SB p. 69. ■ Teach the meaning of pollen grains and ovules. ■ Homework: Answer workbook exercises 1-3 p. 33.		
44	**Types of Flowers (Continued)**	Students will be able to identify types of flowers.	■ Check homework. ■ Discuss the table on SB page 70. ■ Explain part of flower and its function. ■ Assign Test Yourself 3.3 page 71 of SB individually and discuss the answer in class.		
45	**Pollination**	Students will be able to analyse pollination.	■ Teach pollination, SB page 71. ■ Teach the features of an insect-pollinated flower and a wind-pollinated flower, and have students compare the features, SB page 72. ■ Tech the difference between a self-pollination and a cross-pollination, SB page 73.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
46	**Pollination (Continued)**	Students will know the difference between a self-pollination and cross-pollination	■ Teach the advantages of self-pollination and cross-pollination, SB page 73. ■ Assign questions 1 – 3 of the workbook pages 35 – 36 individually in class. ■ Homework: Test Yourself 3.4 page 74 of SB.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1, GLI M1/5** **SC1, GLI M1/6** **SC1, GLI M1/7** **SC1, GLI M1/8** **SC1, GLI M1/9** **SC1, GLI M1/10** **SC1, GLI M1/11** **SC1, GLI M1/12** **SC1, GLI M1/12**
47	**Development of Fruits and Seeds in Plants**	Students will be able to understand the development of fruits and seeds in plants.	■ Teach how fertilization occurs in flowers, SB page 75. ■ Teach the process of fertilization. ■ Do the activity on page 76 to observe the development of pollen tubes and different percentages of sugar solutions.		
48	**Formation of Fruits and Seeds**	Students will be able to understand the development of fruits and seeds.	■ Teach how fruits and seeds develop after a successful fertilization, SB page 77. ■ Assign question 1 – 3 of the Workbook pages 36 – 37 and discuss. ■ Homework: Test Yourself 3.5 page 78 of SB.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
49	**Germination of Seeds**	Students will be able to understand the concept of germination of seeds.	■ Teach what germination is, SB page 78. ■ Show students a mung bean and a maize bean grain. Lead a discussion about the structures of both beans. ■ Explain the physical changes of seedlings during the germination, SB page 79. ■ Do the activity on page 80 of SB to determine the condition necessary for the germination of seeds.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1, GLI M1/5** **SC1, GLI M1/6** **SC1, GLI M1/7** **SC1, GLI M1/8** **SC1, GLI M1/9** **SC1, GLI M1/10** **SC1, GLI M1/11** **SC1, GLI M1/12** **SC1, GLI M1/12**
50	**Physical Changes of Seedlings during Germination**	Students will be able to identify physical changes of seedlings during germination	■ Discuss the difference between an apogeal germination and a hypogeal germination. ■ Assign questions 1 – 4 of the workbook pages 37 - 39 and discuss the answer with students. ■ Homework: Test Yourself 3.6 page 82 of SB.		
51	**Application of Vegetative Reproduction in Flowering Plants**	Students will be able to apply vegetative reproduction in plants.	■ Ask students to name flowering plants that can reproduce, SB page 82. ■ Teach the advantages of vegetative reproduction. ■ Assign questions 1 – 3 of the workbook pages 39 - 40 and discuss. ■ Homework: Test Yourself 3.7 page 78 of SB.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
52	**Stimuli and Responses in Plants**	Students will be able to understand stimuli and responses in plants.	■ Review the meaning of stimuli and responses, SB pages 83 and elicit examples. ■ Teach and give examples of tropisms, phototropism, geotropism, hydrotropism and thigmotropism, SB pages 84 – 86.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1, GLI M1/5** **SC1, GLI M1/6** **SC1, GLI M1/7** **SC1, GLI M1/8** **SC1, GLI M1/9** **SC1, GLI M1/10** **SC1, GLI M1/11** **SC1, GLI M1/12** **SC1, GLI M1/12**
53	**Investigating and Identifying (a) stimuli detected by plants and (b) the parts of plants that are sensitive to stimuli.**	Students will be able to investigate and identify stimuli.	■ Carry out the activity about phototropism, SB pages 86 – 87 and discuss with students. ■ Carry out the activity about geotropism, SB page 87 – 88 and discuss with students.		
54	**Investigating and Identifying (a) stimuli detected by plants and (b) the parts of plants that are sensitive to stimuli (Continued)**	Students will be able to investigate and identify stimuli.	■ Carry out the activity about hydrotropism, SB page 89 and discuss with students.		
55	**Nastic Movements**	Students will be able to understand what nastic movements re	■ Teach nastic movements. ■ Compare nastic movements with tropism. ■ Assign questions 1 to 3 on pages 40 and 42 of the workbook.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
56	**Nastic Movements (Continued)**	Students will be able to understand what nastic movements re	■ Assign Test Yourself 3.8 page 90	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1, GLI M1/5** **SC1, GLI M1/6** **SC1, GLI M1/7** **SC1, GLI M1/8** **SC1, GLI M1/9** **SC1, GLI M1/10** **SC1, GLI M1/11** **SC1, GLI M1/12** **SC1, GLI M1/12**
57	**Biotechnology**	Students will be able to understand what biotechnology is.	■ Teach the meaning of biotechnology, SB page 91. ■ Describe the application of biotechnology in agriculture, industry food and medicine, SB pages 91 – 93. ■ Homework: have students to find more information on genetically modified food and discuss in class.		
58	**Biotechnology (Continued)**	Students will be able to realize the importance of biotechnology.	■ Assign exercises 1 to 3 of the workbook pages 42 and 43. ■ Assign Test Yourself 3.8 and discuss the answers with them.		
59	**Conclusion**	Students will be able to conceptualize what have they learned in these lessons.	■ Use conceptual map on page 94 to help student to understand the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall Page 95.		
60	**UNIT TEST**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 98 - 101 of Student's Book and Enrichment Exercises of Workbook pages 44– 48			

MID-TERM EXAMINATION

Course Description: Science M1, Semester 2

Subject: Core Science	**Course Number:** SC21102	**Level:** M1
Period: 60 hours/semester	**Academic Credit:** 1.5	**Semester:** 2nd

This course develops students' skills in various aspects such as logical, analytical and critical thinking. This course will also help to develop investigative skills that are essential for acquiring knowledge, making decisions and solving problems on the following topics:

Matter

Classifying matter, states of matter, changes of states.

Solutions

Solutions, dissolution, acids and alkalis and ph indicators.

Heat

Heat as form of energy, heat flow, benefits of heat flow, thermal equilibrium and effects of heat on matter and absorption and radiation of heat.

Atmosphere and Weather

Layers of Earth, what is weather, factors of weather, monsoons, tropical cyclones and thunderstorms, how to avoid danger during severe weather, interpreting weather forecasts and their importance; Global Issues — global warming, ozone depletion and acid rain.

This course will help students to learn to ask questions in relation to real situations and their scientific experiences in daily life; develop a range of approaches, including the use of technology to explore and solve problems. Students should be able to represent and communicate science ideas and give reasons to support their conclusions. Moreover, students must be able to use the scientific knowledge and understanding with the use of science in the real world.

Grade Level Indicators (GLI):

SC3.1, GLI M1/1	**SC3.1, GLI M1/2**	**SC3.1, GLI M1/3**	**SC3.1, GLI M1/4**	**SC3.2, GLI M1/1**
SC3.2, GLI M1/2	**SC3.2, GLI M1/3**	**SC4.1, GLI M1/1**	**SC4.1, GLI M1/2**	**SC5.1, GLI M1/1**
SC5.1, GLI M1/2	**SC5.1, GLI M1/3**	**SC5.1, GLI M1/4**	**SC6.1, GLI M1/1**	**SC6.1, GLI M1/2**
SC6.1, GLI M1/3	**SC6.1, GLI M1/4**	**SC6.1, GLI M1/5**	**SC6.1, GLI M1/6**	**SC6.1, GLI M1/7**

Total up to 20 Grade Level Indicators

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Course Syllabus: Science M1, Semester 2

Level: Matthayom 1 Credit: 1.5 | **Period: 60 hours** | **Semester: 2nd Semester** | **Instruction Time: 3 periods/week**

Focus Smart Science 1, Unit 4: Matter (10 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
1	**Matter**	Students will be able to identify matter.	■ Introduce matter, SB p. 103. ■ Elicit examples of matter. ■ Teach that matter can be divided into three groups based on the way particles are assembled, SB p. 103. ■ Teach what consists of elements, compounds and mixtures. Classroom work: ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC3.1, GLI M1/1** **SC3.1, GLI M1/3**
2	**Matter (Continued)**	Students will be able to compare/ contrast between elements, compounds and mixtures.	■ Teach that mixtures can be divided into three groups – solutions, colloids and suspensions, SB p. 104. ■ Teach that elements can also be divided in to three groups — metals and non-metals and metalloids, SB p. 105. ■ Explain that matter can also be classified by their states – solid, liquid and gas, SB p. 105.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
3	**Matter (Continued)**	Students will be able to compare/ contrast between elements, compounds and mixtures.	■ Assign questions 1 and 2 on page 50 of the Workbook in class and discuss the answers. ■ Assign Test Yourself 4.1 of SB p. 106	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC3.1, GLI M1/1** **SC3.1, GLI M1/3**
4	**States of Matter**	Students will be able to understand what comprises matter.	■ Teach what matter is made of, SB p.106. ■ Perform the activity on SB p. 106 – 107 to show students that matter is made up of small particles. ■ Lead a discussion on the results of the activity.		
5	**Three States of Matter**	Students will be able to identify the three different states of matter.	■ Teach the three states of matter, SB p. 107. ■ Explain the table on SB p. 108 to show the physical properties of each state of matter. ■ Discuss their properties. ■ Compare and contrast the arrangement of particles in solid, liquid or gas, SB p. 109.		
6	**Arrangement and Movement of Particles in Matter**	Students will be able to compare and contrast the arrangement and movement of particles in matter.	■ Carry out the activity on SB p. 110 to show the arrangement of particles in the three states of matter. ■ Lead a discussion on the results. ■ Homework: questions 1 – 3 of pages 51 and 52 of the Workbook as their homework. ■ Assign Test Yourself 4.2 of SB p. 112.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
7	**Changes of States**	Students will be able to describe the changes of states of matter.	■ Teach what happens to the states of matter when the matter is heated or cooled. SB p. 114. ■ Describe the table on SB p. 114 to summarise the changes of state of matter. ■ Check for understanding of the changes that take place.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC3.1, GLI M1/1** **SC3.1, GLI M1/3**
8	**Changes of States (Continued)**	Students will be able to describe the changes of states of matter.	■ Assign Workbook questions 1 – 2 on p. 52 – 54 in class. ■ Homework: Test Yourself 4.3 of SB p. 112.		
9	**Conclusion**	Students will be able to conceptualize what have they learned in these lessons.	■ Use conceptual map on page 114 to teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall p.115		
10	**UNIT TEST**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 116- 119 of Student's Book and Enrichment Exercises of Workbook pages 55			

Focus Smart Science 1, Unit. 5: Solutions (10 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
11	**Solutions**	Students will be able to understand and identify solutions.	■ Teach what solutions are, SB p. 121 ■ Teach the meaning of the following words: solution, solute, solvent, dilute solution, concentrated solution and saturated solution, SB p. 121 – 122. ■ Use the table on page 122 to teach the difference between dilute solution, concentrated solution and saturated solutions. ■ Homework: exercise 1 and 2 p. 61 of the workbook as their homework	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC3.1, GLI M1/3** **SC3.1, GLI M1/4** **SC3.2, GLI M1/1** **SC3.2, GLI M1/2** **SC3.2, GLI M1/3**
12	**Concentration of Solutions**	Students will be able to understand concentration of solutions.	■ Teach the metric units for concentration of solutions. ■ Demonstrate how to prepare solution by using the serial dilution method and successive serial dilution method. ■ Assign Test Yourself 5.1 page 123 to check their understanding with the lesson. ■ Assign exercise 3 - 5 on pages 61 – 62.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
13	**Dissolution**	Students will be able to identify dissolution.	■ Teach the meaning of solubility, SB page 124. ■ Give examples to further explain solubility. ■ Describe the factors such as nature of solvent, nature of the solute, temperature and pressure, SB p. 124 - 125	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC3.1, GLI M1/3** **SC3.1, GLI M1/4** **SC3.2, GLI M1/1** **SC3.2, GLI M1/2** **SC3.2, GLI M1/3**
14	**Rate of Dissolution**	Students will be able to describe factors involved in the rate of dissolution.	■ Describe the factors such as temperature of the solvent, rate of stirring, size of the solute particles, SB page 125. ■ Perform the activity on SB pages 126 – 128 to determine the factors affecting the rate of dissolution.		
15	**Rate of Dissolution (Continued)**	Students will be able to describe factors involved in the rate of dissolution.	■ Continue the discussion with the previous activity. ■ Teach the physical and chemical changes that may take place during dissolution, SB page 128. ■ Test Yourself 5.2 page 128 and discuss the answers with students. ■ Assign exercise 1 – 4 of the workbook pages 63 – 64.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
16	**Acids**	Students will be able to understand the properties of acids.	■ Teach acids and alkalis, SB page 129. ■ Class activity: taste oranges and lemons. Lead a discussion about what gives them their taste. ■ Discuss the types of acids in fruits, food and surroundings, SB page 129. ■ Carry out the activity on SB page 130 – 131 to identify properties of acids.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC3.1, GLI M1/3** **SC3.1, GLI M1/4** **SC3.2, GLI M1/1** **SC3.2, GLI M1/2** **SC3.2, GLI M1/3**
17	**Alkali**	Students will be able to identify the properties of alkalis.	■ Teach what alkali is, SB page 132. ■ Perform the activity on SB page 132 to discuss the properties of alkalis. ■ Teach the role of water in acids and alkalis ■ Assign Test Yourself 5.3 on page 133 and discuss the answers with students. ■ Homework: exercise 1 – 3 of the workbook pages 64 – 65.		
18	**pH Indicators**	Students will be able to know what are pH scales and pH indicators.	■ Explain pH scales and pH indicators, SB page 134. ■ Inform the color changes of some common pH indicators. ■ Discuss the use of acids and alkalis in our daily life. ■ Assign: Test Yourself 5.4 on page 136. ■ Homework: Workbook page 66 as their homework.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
19	**Conclusion**	Students will be able to conceptualize what have they learned in these lessons	■ Use conceptual map on page 137 to help students to understand the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall pages 137 – 138.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC3.1, GLI M1/3** **SC3.1, GLI M1/4** **SC3.2, GLI M1/1** **SC3.2, GLI M1/2** **SC3.2, GLI M1/3**
20	**UNIT TEST**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 138 - 141 of Student's Book and Enrichment Exercises of Workbook pages 67 – 70.			

Focus Smart Science 1, Unit. 6: Motion (6 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
21	**Scalar and Vector Quantities**	Students will be able to understand what motion is.	■ Teach what physical quantities are, SB page 143. ■ Discuss with students that physical quantities are divided into two groups. ■ Discuss the difference between scalar quantities and vector quantities.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC4.1, GLI M1/1** **SC4.1, GLI M1/2**

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
22	**Scalar and Vector Quantities**	Students will be able to identify the difference between scalar and vector quantities.	■ Use examples 1 and 2 of SB pages 144 to 125 to explain further ■ Assign: Test Yourself 6.1 on page 145 and discuss the answers with students. ■ Homework: exercise 1 – 3 of the Workbook pages 72 – 73.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC4.1, GLI M1/1** **SC4.1, GLI M1/2**
23	**Distance and Displacement**	Students will be able to describe distance and displacement.	■ Teach the difference in meaning the term between distance and displacement, SB page 146 ■ Use example 3 for further explanation. ■ Assign: Test Yourself 6.2 on page 147 and discuss the answers with students. ■ Homework: exercise 1 – 3 of the workbook pages 73 – 74.		
24	**Speed and Velocity**	Students will be able to describe and identify speed and velocity.	■ Explain the difference between a speed and a velocity, SB page 148. ■ Discuss example 4 for further explanation. ■ Explain the table on page 149 to summarise the difference between physical quantities of distance, displacement, speed and velocity.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
25	**Conclusion**	Students will be able to conceptualize what have they learned in this lesson	■ Use conceptual map on page 150 to help student to understand the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall page 151.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC4.1, GLI M1/1** **SC4.1, GLI M1/2**
26	**UNIT TEST**	Unit test will be given every end of the unit. Questions will come from the Mastery Practice pages 151 - 153 of Student's Book and Enrichment Exercises of Workbook pages 76 – 78.			

Focus Smart Science 1, Unit 7: Heat (16 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
27	**Heat as a Form of Energy**	Students will be able to understand heat as a form of energy.	■ Discuss what is heat in the form of energy, SB page 155. ■ Perform the activity of SB page 155 to show that the sun gives us heat. ■ Discuss what other sources of heat, SB page 156. ■ Explain what other sources of heat, SB page 157. ■ Discuss the uses of heat, SB page 157. Classroom work: ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects	**Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC5.1, GLI M1/1** **SC5.1, GLI M1/2** **SC5.1, GLI M1/3** **SC5.1, GLI M1/4**

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
28	**Heat and Temperature**	Students will be able to compare and contrast heat and temperature.	■ Discuss the difference between heat and temperature, SB page 157. ■ Complete the activity on page 158 to show the difference between heat and temperature. ■ Ask students to answer Test Yourself 7.1 on page 159 and discuss the answers with students. ■ Homework: Workbook pages 80-81.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC5.1, GLI M1/1** **SC5.1, GLI M1/2** **SC5.1, GLI M1/3** **SC5.1, GLI M1/4**
29	**Heat Flow**	Students will be able to explain and identify ways to transfer heat.	■ Define heat flow, SB page 159. ■ Discuss and explain ways to transfer heat: conduction, convection, radiation. ■ Perform activity on SB page 160 to show the transfer of heat by conduction.		
30	**Convection Radiation**	Students will be able to know how to transfer heat by convection. Students will be able to understand the process whereby heat energy travels by radiation.	■ Continue the activity on SB page 161 and 162 to show the transfer of heat in liquids by convection. ■ Discuss the result of the activity. ■ Discuss radiation, SB page 162. ■ Carry out the activity on SB page 163 to show the transferring of heat through a vacuum by radiation. ■ Ask students to do question 1 on page 81 of the workbook for homework.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
31	**Heat Flow in Natural Phenomena**	Students will be able to explain heat in natural phenomena.	■ Teach the natural phenomena that occurs as the sun warms the earth, sea breezes and land breezes, SB page 163 – 164. ■ Lead a discussion about what keeps a house cool. ■ Elicit and teach the meaning of heat conductors and heat insulators.	**Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC5.1, GLI M1/1** **SC5.1, GLI M1/2** **SC5.1, GLI M1/3** **SC5.1, GLI M1/4**
32	**Investigating different materials as heat insulators**	Students will be able to identify materials as heat insulators.	■ Lead a discussion about how we use heat as conductors and as insulators, SB page 166. ■ Perform the activity on SB page 67 to investigate different materials as heat insulators and discuss the outcomes. ■ Assign Test Yourself 7.2 on page 168 and discuss the answers with students. ■ Homework: Workbook pages 81 – 82.		
33	**Benefits of Heat Flow**	Students will be able to identify the many uses of heat flow in our daily life.	■ Discuss the many uses of heat flow, SB page 168. ■ Assign questions 1 and 2 on pages 82 - 83 of the workbook in class. ■ Homework: Test Yourself 287.3 of SB page 170.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
34	**Thermal Equilibrium and Effects of Heat on Matter**	Students will be able to understand thermal equilibrium.	■ Teach thermal equilibrium, SB page 170. ■ Teach how the heat flows from a hot object to a cooler object. ■ Elicit examples of such phenomenon in our daily life. ■ Homework: questions 1 and 2 on pages 83 - 84 of the workbook.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC5.1, GLI M1/1** **SC5.1, GLI M1/2** **SC5.1, GLI M1/3** **SC5.1, GLI M1/4**
35	**Expansion and Contraction of Matter**	Students will be able to define expansion and contraction.	■ Discuss in class what expansion and contraction of solids are, SB page 171. ■ Discuss in class what expansion and contraction of liquids are. ■ Teach expansion and contraction of gases.		
36	**Expansion and Contraction of Matter (Continued)**	Students will be able to carry out an investigation of expansion and contraction of solids, liquids and gases.	■ Carry out an activity on SB page 172 – 174. ■ Observe the expansion and contraction of solids, liquids and gases on this activity.		
37	Application of Expansion and Contraction of Matter	Students will be able to apply expansion and contraction of matter.	■ Assign exercise 3 of the workbook, page 84. ■ Discuss how we apply expansion and contraction of matter in our daily life, SB page 174. ■ Use some examples to show the expansion and contraction of matter, SB page 175 – 176; mercury in thermometers, bimetallic strip as thermostats and bimetallic thermometers.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
38	**Solving Problems of Expansion and Contraction**	Students will be able to know and use the principle of expansion and contraction of matter to solve simple problems.	■ Teach the principles of expansion and contraction of matter to solve problems. ■ Assign: Exercise 4 of the workbook on page 84. ■ Homework: Test Yourself 7.4 page 180.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC5.1, GLI M1/1** **SC5.1, GLI M1/2** **SC5.1, GLI M1/3** **SC5.1, GLI M1/4**
39	**Absorption and Radiation of Heat**	Students will be able to describe types of surface that absorb and give out heat.	■ Teach absorption and radiation of heat, SB page 181. ■ Carry out the activity on SB pages 181 – 183 to identify the type and color of surfaces that can absorb and give out heat better.		
40	**Absorption and Radiation of Heat Continued**	Students will be able to understand the applications of absorption and release heat in daily life.	■ Elicit examples of how we apply this concept in our daily life. ■ Assign exercises 1 and 2 of the workbook on page 85 – 86. ■ Homework: Test Yourself 7.5 page 184.		
41	**Conclusion**	Students will be able to conceptualize what have they learned in these lessons	■ Use conceptual map on page 184 to help student to understand the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall page 186 – 191.		
42	**UNIT TEST**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 151 - 153 of Student's Book and Enrichment Exercises of Workbook pages 87 – 91.			

Focus Smart Science 1, Unit 8: Atmosphere and Weather (10 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
43	**Layers of the Earth's Atmosphere**	Students will be able to describe the layers in the Earth's atmosphere.	■ Teach atmosphere, SB page 193. ■ Teach the five atmospheric layers. ■ Lead a discussion about the exosphere, thermosphere, mesosphere, stratosphere and troposphere.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC6.1, GLI M1/1** **SC6.1, GLI M1/2** **SC6.1, GLI M1/3** **SC6.1, GLI M1/4** **SC6.1, GLI M1/5**
44	**Layers of the Earth's Atmosphere (Continued)**	Students will be able to describe and identify layers of atmosphere.	■ Assign exercises 1 to 3 of the workbook page 93 – 94 individually in class. ■ Homework: Test Yourself 8.1 page 194.		
45	**What is Weather?**	Students will be able to explain weather.	■ Teach weather, meteorology and weather forecasting, SB page 195. ■ Assign exercise 1 to 3 on page 94 of the workbook. ■ Homework: Test Yourself 8.2 on page 196.		
46	**Factors of Weather**	Students will be able to discuss factors that affect the weather.	■ Discuss the main factors that affect the weather, SB page 196. ■ Teach air pressure, humidity, relative humidity, and hygrometers. ■ Explain the graph found in SB page 197 that shows the maximum of water vapor in the air at various temperatures.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
47	**Monsoons, Tropical Cyclones and Thunderstorms**	Students will be able to define and identify what monsoons, tropical cyclones and thunderstorms are.	■ Teach how monsoons, tropical cyclones, thunderstorms occur, SB pages 197 – 200.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC6.1, GLI M1/1** **SC6.1, GLI M1/2** **SC6.1, GLI M1/3** **SC6.1, GLI M1/4** **SC6.1, GLI M1/5**
48	**Monsoons, Tropical Cyclones and Thunderstorms (Continued)**	Students will be able to define and identify what monsoons, tropical cyclones and thunderstorms are.	■ Assign exercises 1 and 2 on page 95 and 96 of the Workbook. ■ Assign Test Yourself 8.4 page 200 and discuss answers in class		
49	How to Avoid Danger during Severe Weather	Students will be able to protect themselves during severe weather.	■ Teach about the things we need to do to avoid danger during severe weather, SB page 201. ■ Assign exercise 1 on page 97 of the Workbook. ■ Homework: Test Yourself 8.5 page 201.		
50	**Interpreting the Weather Forecast and its Importance**	Students will be able to understand weather forecasting, a station model and a station map.	■ Teach weather forecasting, SB page 202. ■ Teach station model and a weather map. ■ Assign exercises 1 to 3 of the Workbook pages 97 – 98.		
51	**Conclusion**	Students will be able to conceptualize what have they learned in this lesson.	■ Use the conceptual map on page 204 to help student to understand the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall pages 204 and 205.		
52	**UNIT TEST**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 205 – 208 of Student's Book and Enrichment Exercises of Workbook pages 99 – 101.			

Focus Smart Science 1, Unit 9: Global Issues (8 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
53	**Global Warming**	Students will be able to define what global warming is.	■ Teach global warming, SB page 210. ■ Define greenhouse gas. ■ Teach the factors contributing to global warming and its effects, SB 212 – 213	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC6.1, GLI M1/6** **SC6.1, GLI M1/7**
54	**Global Warming (Continued)**	Students will be able to describe the cause and effects of global warming.	■ Ask students to answer exercises 1 – 4 on pages 103 and 104 of the workbook. ■ Assign Test Yourself 9.1 of SB page 213.		
55	**Ozone Depletion**	Students will able to understand what ozone depletion is.	■ Teach ozone depletion, SB page 213. ■ Lead a discussion about the factors contributing to ozone depletion.		
56	**Ozone Depletion (Continued)**	Students will be able to understand the function of ozone layer.	■ Assign exercises 1 – 4 on page 104 of the workbook. ■ Assign Test Yourself 9.2 of SB page 215.		
57	**Acid Rain**	Students will be able to define what acid rain is.	■ Teach acid rain, SB page 215 ■ Teach the factors contributing to acid rain and its effects. ■ Homework: Test Yourself 9.3 of SB page 216.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
58	**Acid Rain (Continued)**	Students will be able to define what acid rain is.	■ Check homework given. ■ Assign exercises 1 – 4 on page 105 of the workbook.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC6.1, GLI M1/6** **SC6.1, GLI M1/7**
59	**Conclusion**	Students will be able to conceptualize what have they learned in these lessons.	■ Use conceptual map on page 217 to help student to understand the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall page 217		
60	**UNIT TEST**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 218 - 219 of Student's Book and Enrichment Exercises of Workbook pages 99 - 101.			
FINAL EXAMINATION					

SCIENCE
M2

Core Curriculum for Science M2

Science Strands, Learning Standards and Grade Level Indicators

Strand	Learning Standards		Grade Level Indicators (GLI)
1. Living Things and Life Processes	**SC1.1**	Understanding basic units of living things; relationship between structures and functions of living things, which are interlinked; investigative process for seeking knowledge; ability to communicate acquired knowledge that can be applied to one's life and care for living things.	1. Explain structures and functions of digestive, circulatory, respiratory, excretory and reproductive systems of human beings and animals as well as nervous system of human beings. 2. Explain relationship of various systems of human beings and apply acquired knowledge for useful purposes. 3. Observe and explain behaviour of human beings and animals responding to internal and external stimuli. 4. Explain principles and effects of biotechnological application for propagation, improved breeding and increased productivity of animals, and apply acquired knowledge for useful purposes. 5. Experiment, analyse and explain nutrients in foods with energy quantity and proportion suitable to gender and age. 6. Discuss effects of addictive substances on various systems of the body, and guidelines for self-protection from addictive substances.
	SC1.2	Not applicable for M2	
2. Life and the Environment	**SC2.1** **SC2.2**	Not applicable for M2 Not applicable for M2	
3. Substances and Properties of Substances	**SC3.1**	Understanding of properties of substances; relationship between properties of substances and structures and binding forces between particles, having investigative process for seeking knowledge and scientific mind; and communicating acquired knowledge for useful purposes.	1. Explore and explain components and properties of elements and compounds. 2. Search for data and compare properties of metallic, non-metallic semi metallic and nuclear elements and apply the knowledge gained for useful purposes. 3. Experiment and explain principles of substance separation by applying methods of filtering, crystallisation, expunctions, distillation and chromatography, and apply the knowledge gained for useful purposes.

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Strand	Learning Standards		Grade Level Indicators (GLI)
	SC3.2	Understanding of principles and nature of change in the state of substances; solution formation; reaction; investigative process for seeking knowledge and scientific mind; and communication of acquired knowledge that could be applied for useful purposes.	1. Experiment and explain changes in properties, mass and energy when substances have chemical reactions as well as explain factors affecting the chemical reactions. 2. Experiment, explain and write chemical equations of reactions of various substances, and apply the knowledge gained for useful purposes. 3. Search for data and discuss effects of chemical substances and chemical reactions on living things and the environment. 4. Search for data and explain proper and safe application of chemical substances as well as methods of protection from and remedies for harm from use of chemical substances.
4. **Forces and Motion**	**SC4.1**	Understanding of the nature of electromagnetic, gravitational and nuclear forces; investigative process of seeking knowledge and applying acquired knowledge for useful and ethical purposes.	1. Experiment and explain finding resultant force of several forces on the same plane acting on objects. 2. Explain resultant forces acting on static objects or objects moving with constant velocity.
	SC4.2	Not applicable for M2	
5. Energy	**SC5.1**	Understanding of relationship between energy and life; energy transformation; interrelationship between substances and energy; effects of energy utilization on life and the environment; investigative process for seeking knowledge; and communication of acquired knowledge that could be applied for useful purposes.	1. Experiment and explain reflection and refraction of light, and apply the knowledge gained for useful purposes. 2. Explain effects of brightness on human beings and other living things. 3. Experiment and explain absorption of light, heat, seeing colours of objects, and apply the knowledge gained for useful purposes.
6. Change Processes of the Earth	**SC6.1**	Understanding of various processes on the Earth's surface and inside the Earth; relationship between various processes causing changes in climate, topography and form of the Earth; investigative process for seeking knowledge and scientific mind; and communication of acquired knowledge that could be applied for useful purposes.	1. Explore, experiment and explain soil profile, soil properties and the soil formation process. 2. Explore, analyse and explain utilization of soil and improvement of soil quality. 3. Experiment with geological process simulation models to explain the rock formation process and the characteristics of components of rocks. 4. Test and observe components and properties of rocks for their classification, and apply the knowledge gained for useful purposes.

Strand	Learning Standards		Grade Level Indicators (GLI)
			5. Verify and explain physical characteristics of minerals and their application for useful purposes. 6. Search for relevant information and explain formation process, characteristics and properties of petroleum, coal and oil shale, and their application for useful purposes. 7. Explore and explain characteristics of natural water sources, and utilization and conservation of local water sources for benefits. 8. Experiment with simulation models and explain formation process of ground water sources and underground water sources. 9. Experiment with simulation models and explain processes of weathering, erosion, sweeping away, piling up and crystallisation and the effects of these processes. 10. Search for relevant information, make a model and explain structure and components of the Earth.
7. Astronomy and Space	**SC7.1**	Not applicable for M2	
	SC7.2	Not applicable for M2	
8. Nature Science and Technology	**SC8.1**	Application of both scientific process and mind in investigation for seeking knowledge and problem-solving; knowing that most natural phenomena assume definite patterns that are explainable and verifiable within limitations of data and instruments available during particular periods of time; and understanding that science, technology, society and the environment are interrelated.	1. Pose questions prescribing the issues or important variables for exploration and verification or conduct comprehensive and reliable study and research on matters of their interest. 2. Make verifiable hypotheses and plan several methods for exploration and verification. 3. Select techniques and methods for quantitative and qualitative exploration and verification yielding accurate and safe results by using appropriate materials and equipment. 4. Collect data and process it quantitatively and qualitatively. 5. Analyse and evaluate conformity of eyewitnesses with the conclusions either supporting or contradicting the hypotheses and data abnormality from exploration and verification. 6. Create models or formats explaining or showing results of exploration and verification. 7. Pose questions leading to exploration and verification of relevant matters, and apply the knowledge gained in new situations or to explain the concepts, processes and results of the project or task for others to understand.

Strand	Learning Standards	Grade Level Indicators (GLI)
		8. Make a record and explain results of additional observation, exploration, verification and research from various sources of knowledge in order to obtain reliable data and accept changes in the knowledge discovered when presented with new and additional data, eye-witnesses or contradictory data. 9. Display their work, write reports and/or explain the concepts, processes and results of the project or task so that others can understand.

SCIENCE

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Course Description: Science M2, Semester 1

Subject: Core Science	Course Number: SC22101	Level: M2
Period: 60 hours/semester	Academic Credit: 1.5	Semester: 1st

This course develops thinking skills in areas such as logic, analysis and critical thinking. This course also helps students to develop their investigative skills essential for acquiring knowledge, making decisions and solving problems in the following topics:

Food and Addictive Substances
Classes of food, importance of a balanced diet, drugs, alcoholic drinks, smoking.

Systems in Humans and Animals
Digestive systems of humans and animals, circulatory systems of humans and animals, respiratory systems of humans and animals, excretory systems of humans and animals.

Reproduction
Sexual and asexual reproduction, the male reproductive system, the female reproductive system, menstrual cycle, fertilization and pregnancy, importance of pre-natal care, importance of research in human reproduction, biotechnology in animal reproduction.

Coordination and Responses
Stimuli and responses in humans and animals, the human nervous system.

This course will help students to learn and ask questions in relation to real situations and their scientific experiences in daily life. It will also help to develop a range of approaches, including the use of technology to explore and solve problems. Students should be able to represent and communicate scientific ideas and give reasons to support their conclusions. Moreover, students will be able to use scientific knowledge and understanding with science in the real world.

Grade Level Indicators (GLI):

SC1.1, GLI M2/1	SC1.1, GLI M2/2	SC1.1, GLI M2/3	SC1.1, GLI M2/5	SC1.1, GLI M2/6

Total up to 5 Grade Level Indicators

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Course Syllabus: Science M2, Semester 1

Level: Matthayom 2 Credit: 1.5	Period: 60 hours	Semester: 1st Semester	Instruction Time: 3 periods/week

Focus Smart Science 2, Unit. 1: Food and Additive Substance (12 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
1	**Classes of Food**	Students will be able to understand the various classes of food.	■ Ask students the reason why we eat food, SB p. 2. ■ Discuss in class what will happen if we do not eat food. ■ Elicit examples of food they eat.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1.1, GLI M2/5** **SC1.1, GLI M2/6**
2	**Classes of Food (Continued)**	Students will be able to identify different classes of food.	■ Teach the different classes of food: carbohydrates, proteins, fats, vitamins, minerals, water and fiber, and their functions and sources. ■ Homework: Answer workbook exercise1 – 3 p.3.		
3	**Testing for Glucose, Starch, Protein and Fats**	Students will be able to perform experiments to test the presence of glucose, starch, protein and fats.	■ Perform the activity with the students on SB p7 to test food for the presence of glucose, starch, protein and fats. ■ Assign Exercise 4 on page 4 of the workbook. ■ Homework: Answer Test Yourself 1.1 p.8.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
4	**Importance of a Balanced Diet**	Students will understand the importance of a balanced diet.	■ Teach students what a diet and balanced diet is, SB p. 9. ■ Explain the table on SB p10 and discuss the factors that affect the amount of energy needed by a person. ■ Describe the food pyramid. ■ Answer workbook exercise 1 p.4.		
5	**Calorific Value of Food**	Students will be able to identify the energy content of food.	■ Discuss calorific value of food, SB p. 11 – p. 12. ■ Teach that each food contain different amounts of energy. ■ Assign Workbook exercises 2 and 3, page 5. ■ Homework: Test Yourself 1.2.		
6	**Drugs**	Students will be able to identify different kinds of drugs.	■ Teach what drugs and drug abuse is, SB p. 13. ■ Use table shown, SB p. 14 to discuss types of drugs; stimulants, depressants, hallucinogens, opiates and inhalants and the harmful effects of drugs.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
7	**Drugs (Continued)**	Students will be able to identify the consequences and ways to avoid drugs.	■ Teach the consequences of drug abuse, SB p. 15. ■ Discuss ways to avoid drugs, SB p 15. ■ Assign Workbook exercises 1 – 4 on p. 6. ■ Homework: Test Yourself 1.3 on SB p. 16.		
8	**Alcoholic Drinks**	Students will be able to understand the harmful effects of alcoholic drinks.	■ Discuss what alcoholic drinks are and how they are produced, SB p. 16. ■ Discuss how alcohol affects our nervous system and health, SB p 16. ■ Explain the table in SB p. 17 and ask what would happened if we consume alcohol excessively everyday.		
9	**Alcohol Drinks (Continued)**	Students will be able to find ways to avoid alcohol.	■ Explain ways to avoid becoming addicted to alcohol, SB p. 19. ■ Assign Workbook exercises 1 and 2 on p. 6–7. ■ Homework: Test Yourself 1.4, SB p. 18.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
10	**Smoking**	Students will be able to:	■ Understand the harmful effects of smoking. ■ Find ways to avoid smoking. ■ Discuss the harmful substances in cigarette smoke, SB p.19. ■ Teach the illnesses caused by smoking, SB p. 19. ■ Discuss ways to avoid smoking, SB p. 20. ■ Assign Workbook exercises 1-4 p.7-8. ■ Homework: Test Yourself 1.4, SB p. 20.		
11	**Conclusion**	Students will be able to conceptualize what have they learned in these lessons.	■ Use conceptual map, SB p. 21 to help student to understand the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall, SB p. 21-22.		
12	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 22 - 24 of Student's Book and Enrichment Exercises of Workbook pages 9 - 11.			

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Focus Smart Science 2, Unit 2: Systems in Human Animals (21 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
13	**Digestive Systems in Humans**	Students will be able to understand the digestive system of humans.	■ Teach the functions of digestive system, SB p. 26. ■ List organs involved in our digestive system in the correct sequence. ■ Discuss three main types of digestive enzymes, SB p. 26.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1.1, GLI M2/1** **SC1.1, GLI M2/2**
14	**Process of Digestion**	Students will be able to know the process of digestion.	■ Discuss the process of digestion in each organs, SB p. 27. ■ Teach what enzymes are secreted and what their functions are. SB p. 27. ■ Summarize digestion, SB p. 29. ■ Homework: Answer workbook exercises 1-2 p. 15.		
15	**Showing the Action of Salivary Amylase on Starch.**	Students will be able to do experiment to show the action of salivary amylase on starch.	■ Assign activity, SB p. 30. ■ Discuss the results and conclusion of this experiment. ■ Homework: Answer workbook question 3 p. 16.		
16	**Absorption of Digested Food**	Students will be able to understand how digested food is absorbed.	■ Discuss how food is absorbed in the small intestine, SB p. 31. ■ Discuss how water is reabsorbed in the big large intestine, SB p. 31.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
17	**Review of Concepts Learned**	Students will be able to answer questions regarding digestive system.	■ Assign Test Yourself 2.1, SB p. 32. ■ Homework: Answer workbook exercises 4-5 p. 17.		
18	**Digestive Systems in Animals**	Students will be able to understand digestive systems in animals.	■ Discuss digestive system in animals, SB p. 32. ■ Describe different digestive system of animals (fish, cows, birds, frogs, crocodiles), SB p. 32-33. ■ Emphasize four compartments in the stomach, rumen, omasum and abomasums, to digest the tough fiber in food. ■ Emphasize that birds have crops to store food and gizzard to grind hard food.		
19	**Digestive Systems in Animals**	Students will be able to answer questions about animal digestive systems.	■ Assign Test Yourself 2.2, SB p. 34. ■ Homework: workbook exercises p. 17 – 18.		
20	**Circulatory System in Humans**	Students will be able to explain the functions of a circulatory system.	■ Teach the functions of a circulatory system, SB p. 34-35. ■ Explain the four basic characteristics of a circulatory system, SB p. 35.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
			■ Teach why our circulatory system is known as a double circulatory system.		
21	**Structure of the human heart**	Students will be able to identify and know the functions of the human heart.	■ Use the diagram of the heart, SB p. 36 to explain and discuss structures of the heart. ■ Explain to students the function of the human heart, SB p. 37.		
22	**Blood Vessels**	Students will be able to identify three kinds of blood vessels.	■ Discuss the three parts of a blood vessel – artery, capillary and vein. ■ Answer workbook exercise 1 p. 18.		
23	**Path of Blood Flow**	Students will be able to understand how blood flows in the body.	■ Teach students how blood flows using the diagram, SB p. 39. ■ Answer Test Yourself 2.3, SB p. 40. ■ Homework: Answer workbook exercise 2 p. 19.		
24	**Circulatory Systems in Animals**	Students will be able to understand the circulatory systems in animals	■ Teach students about the three types of circulatory systems, SB p. 41. ■ Homework: Test Yourself 2.4, SB p. 41. ■ Assign workbook p. 19.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
25	**Respiratory System in Humans**	Students will understand the structure of the human respiratory system.	■ Explain the functions of a respiratory system, SB p. 41. ■ Teach students the parts of human respiratory system using the diagram, SB p. 42.		
26	**Adaptation of the Alveoli for Efficient Gas Exchange**	Students will be able to discuss how alveoli are adapted for efficient gas exchange.	■ Teach how alveoli are adapted for efficient gas exchange, SB p. 42. ■ Have students breathe in while placing the palms on their chest. Elicit reactions. ■ Teach breathing mechanism, SB p. 43 -44.		
27	**Relationship Between the Air Pressure in the Thoracic Cavity and the Process of Inhalation and Exhalation**	Students will be able to understand the relationship between the air pressure in the thoracic cavity and the process of inhalation and exhalation.	■ Carry out the activity, SB p. 44. ■ Discuss the results and conclusion of this activity. ■ Answer workbook exercise 1 p. 20. ■ Compare and contrast the composition of inhaled air,, exhaled air and alveoli air, SB p. 45.		
28	**Transport of Oxygen and Blood**	Students will be able to understand how blood transports oxygen.	■ Teach how oxygen and carbon dioxide are absorbed ad released from the red blood cells, SB p. 45- 46.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
			■ Homework: Answer Test Yourself 2.5, SB p. 46. ■ Answer workbook exercise 2 p. 20 – 21.		
30	**Respiratory Systems in Animals**	Students will be able to understand how blood circulates in animals.	■ Discuss with students briefly how blood circulates in animals, SB p. 47. ■ Assign Workbook p. 21. ■ Homework: Answer Test Yourself 2.6, SB p. 48.		
31	Excretory System in Humans	Students will be able to understand the excretory system in humans.	■ Explain the function of excretory system in humans, SB p. 49. ■ List three organs that we use to excrete waste products, SB p. 49 – 50. ■ Explain the importance of secretion, SB p. 50. ■ Answer workbook p. 22. ■ Homework: Answer Test Yourself 2.7, SB p. 50		
23	**Excretory System in Animals**	Students will be able to understand the excretory systems in animals.	■ Teach students some excretory organs to remove carbon dioxide in animals, SB p. 50. ■ Discuss the table shown, SB p. 51. ■ Answer workbook exercise 1 p. 23.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
			■ Homework: Answer Test Yourself 2.8, SB p. 50.		
32	**Conclusion**	Students will be able to conceptualize what have they learned in these lessons.	■ Use conceptual map SB p. 21 to help student to understand the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall, SB p. 21-22.		
33	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 53 – 57 of Student's Book and Enrichment Exercises of Workbook pages 24 – 28.			

Focus Smart Science 2, Unit 3: Reproduction (16 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
34	**Asexual Reproduction**	Students will be able to understand the process of asexual reproduction	■ Discuss what reproduction is, SB p. 59. ■ Teach what asexual reproduction is, SB p. 59. ■ Explain the five major types of asexual reproduction, SB p. 59 – 60. ■ Explain the table in SB p. 60 - 61. ■ Teach rejuvenation.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1.1, GLI M2/1**

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
35	**Sexual Reproduction**	Students will be able to understand the process of sexual reproduction.	■ Teach sexual reproduction, SB p. 62. ■ Compare and contrast asexual and sexual reproduction. ■ Assign workbook p. 31. ■ Homework: Test Yourself 3.1, SB p. 63.		
36	Male Reproductive Organ	Students will be able to identify the male reproductive organ.	■ Explain the diagram, SB p. 64 – 65, identifying parts of the male reproductive organ. ■ Discuss the structure and function of the male reproductive organ, SB p. 65.		
36	**Male Reproductive Organ (Continued)**	Students will be able to know the structure and function of the male reproductive organ.	■ Discuss the role of sperm in reproduction, SB p, 66. ■ Discuss changes in males during puberty, SB p. 66. ■ Answer workbook exercises p. 32. ■ Homework: Test Yourself 3.2, SB p. 66.		
36	**Female Reproductive Organ**	Students will be able to identify the female reproductive organ.	■ Explain the diagram, SB p. 67, identifying parts of the female reproductive organ. ■ Discuss the structure and function of the female reproductive organ, SB p. 68.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
37	Female Reproductive Organ (Continued)	Students will be able to know the structure and function of the male reproductive organ.	■ Discuss the role of an ovum in reproduction, SB p, 68. ■ Discuss the changes in the female during puberty, SB p. 68. ■ Assign Workbook exercises p. 33. ■ Homework: Test Yourself 3.3. SB p. 69.		
38	**Menstrual Cycle**	Students will be able to understand the menstrual cycle.	■ Teach the purpose of the menstrual cycle, SB p. 69. ■ Explain that girls will experience menstruation when they reach puberty. ■ Discuss the menstrual cycle, SB p. 70. ■ Discuss the major events in menstrual cycle.		
39	**Menstrual Cycle (Continued)**	Students will be able to know the importance hygiene during menstruation.	■ Discuss why personal hygiene is important during menstruation, SB p. 71. ■ Assign workbook exercises p. 34-35. ■ Homework: Test Yourself 3.4. SB p. 71.		
40	**Fertilization and Pregnancy**	Students will be able to describe fertilization and pregnancy in humans.	■ Discuss fertilization and pregnancy, SB p. 72. ■ Discuss how fertilization occurs that leads to pregnancy.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
			■ Teach students the growth and development of a fetus in the uterus, SB p. 73.		
41	**Fertilization and Pregnancy (Continued)**	Students will be able to describe fertilization and pregnancy in humans.	■ Explain to students how the exchange of materials in the placenta happens, SB p. 73. ■ Assign Workbook exercises p. 35. ■ Homework: Test Yourself 3.5. SB p. 74.		
42	**Importance of Pre-natal Care**	Students will be able to know the importance of pre-natal care.	■ Discuss the importance of pre-natal care, SB p. 75. ■ Teach why a mother needs to have a good diet during pregnancy, SB p. 75. ■ Discuss what woman should avoid during pregnancy, SB p. 75. ■ Assign workbook exercises p. 36. ■ Homework: Test Yourself 3.6. SB p. 76.		
43	**Importance of Research in Human Reproduction**	Students will be able to understand the importance of research in human reproduction.	■ Teach the meaning of sterility or infertility, SB p. 76. ■ Discuss the reasons why females become sterile, SB p. 76. ■ Discuss ways to overcome sterility, SB p. 76.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
44	**Birth Control**	Students will understand methods of birth control.	■ Teach the purpose of birth control, SB p. 78. ■ Discuss some methods of birth control. ■ Ask students to debate the advantages and disadvantages of birth control. ■ Assign workbook exercises p. 36 - 37. ■ Homework: Test Yourself 3.7. SB p. 80.		
45	**Biotech-nology in Reproduction of Animals**	Students will be able to explain methods used to improve animal reproduction.	■ Teach what biotechnology in animal reproduction means, SB p. 81. ■ Explain the methods of biotechnology in reproduction of animals, SB p. 81. ■ Lead a discussion on cloning.		
46	**Biotechnology in Reproduction of Animals Continued**	Students will be able to understand what biotechnology in reproduction of animal is.	■ Assign workbook exercises p. 38. ■ Homework: Test Yourself 3.8 SB p. 82		
47	**Conclusion**	Students will be able to conceptualize what have they learned in these lessons.	■ Use conceptual map, SB p. 83 to demonstrate the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall p. 83-84.		
48	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 84 - 86 of Student's Book and Enrichment Exercises of Workbook pages 40- 42.			

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Focus Smart Science 2, Unit 4: Coordination and Responses (12 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
49	**Stimuli and Responses in Human and Animals**	Students will be able to understand stimuli and responses in human and animals.	■ Teach stimuli and responses, SB p. 88. ■ Discuss the types of stimuli – external and internal stimuli, SB p. 88. ■ Carry out the activity, SB p. 89 – to show how humans and animals respond to different stimuli.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1.1, GLI M2/1** **SC1.1, GLI M2/3**
50	**Stimuli and Responses in Human and Animals (Continued)**	Students will be able to know how humans and animals respond to different stimuli.	■ Discuss the results and conclusion of the activity on how humans and animals respond to different stimuli. ■ Assign workbook exercises 1-2 p. 45.		
51	**Components and Pathways Involved in Detecting and Responding to Stimuli**	Students will be able to know how to detect a stimulus.	■ Teach how human and animals detect external stimuli, SB p. 90. ■ Teach how the receptor will send out signals after detecting the stimuli, SB p. 91. ■ Assign workbook exercise 3 p. 45.		
52	**Components and Pathways Involved in Detecting and Responding to Stimuli**	Students will be able to know how to detect a stimulus.	■ Discuss condition responses using Ivan Pavlov's study, SB p. 91. ■ Assign workbook exercise 4 p.46. ■ Homework: Test Yourself 4.1 SB p. 92.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
53	**Human Nervous System**	Students will be able to understand the importance of our nervous system.	■ Teach the nervous system using the diagram, SB p. 93. ■ Teach the nervous system using the diagram, SB p. 93. ■ Teach the central nervous system, SB p. 93. ■ Teach students the functions of the components of the human brain. ■ Homework: workbook exercise 1 p. 46.		
54	**Neurons**	Students will be able to understand what a neuron is.	■ Check homework and discuss in class. ■ Teach the structure of a neuron, SB p. 95. ■ Explain the functions of different parts of a neuron, SB p. 95. ■ Compare and contrast three different kinds of neurons, SB p. 95.		
55	**Neurons (Continued)**	Students will be able to know the functions and different types of neurons.	■ Assign workbook exercises 2 – 3 p. 47. ■ Discuss the answers in class.		
56	**Pathway of Transmission of Information**	Students will be able to know the pathway involved in detecting and responding to stimuli.	■ Teach students how information is transmitted using the diagram, SB p. 96. ■ Explain how information is transmitted by using examples 1-2, SB p. 97 – 98. ■ Homework: workbook exercise 4 p. 48.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
57	**Nervous System**	Students will be able to understand what voluntary and i nvoluntary actions are.	■ Teach voluntary and involuntary actions, SB p. 99. ■ Teach the sympathetic nervous system and the parasympathetic nervous system, SB p. 100. ■ Compare and contrast voluntary and involuntary actions.		
58	**Reflex Action**	Students will be able to understand what reflex action is.	■ Conduct experiment and elicit responses. ■ Explain reflex action, SB p. 101 ■ Assign Workbook exercise 5 p. 48-49. ■ Homework: Test Yourself 4.2 SB p. 102		
59	**Conclusion**	Students will be able to conceptualize what have they learned in these lessons.	■ Use conceptual map, SB p. 102 to teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall p. 103		
60	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 104 - 106 of Student's Book and Enrichment Exercises of Workbook			
MID-TERM EXAMINATION					

SCIENCE

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Course Description: Science M2, Semester 2

Subject: Core Science	**Course Number: SC22102**	**Level: M2**
Period: 60 hours/semester	**Academic Credit: 1.5**	**Semester: 2nd**

This course develops students' thinking skills in various aspects such as logical, analytical and critical thinking. This course will also help students to develop their investigative skills that are essential for enquiring knowledge, making decision and solving problems to the following topics:

Elements, Compounds and Mixtures

Elements, compounds, mixtures, separation techniques, radioactive techniques.

Energy and Chemical Changes

Physical and chemical changes, chemical equations, energy and chemical reactions, factors affecting the rate of a reaction, chemical reactions and chemical substances in everyday life.

Forces and Motion

Understanding force, resultant forces on a same plane (net force), resultant forces on static objects and moving objects with constant velocity.

Light

Properties of light, reflection of light, refraction of light, light and colors, uses of light.

Soil

Soil, soil formation, soil uses and soil improvement

The Earth

Layers of the earth, rocks, minerals, fossil fuels, natural water.

This course will help students to learn and ask questions in relation to real situations and their scientific experiences in daily life. It also develops a range of approaches, including the use of technology to explore and solve problems. Students should be able to represent and communicate scientific ideas and give reasons to support their conclusions. Moreover, students must be able to use the scientific knowledge and understanding with the use of science in the real world.

Grade Level Indicators (GLI):

SC3.1, GLI M2/1	**SC3.1, GLI M2/2**	**SC3.1, GLI M2/3**		
SC3.2, GLI M2/1	**SC3.2, GLI M2/2**	**SC3.2, GLI M2/3**	**SC3.2, GLI M2/4**	
SC4.1, GLI M2/1	**SC4.1, GLI M2/2**			
SC5.1, GLI M2/1	**SC5.1, GLI M2/2**	**SC5.1, GLI M2/3**		
SC6.1, GLI M2/1	**SC6.1, GLI M2/2**	**SC6.1, GLI M2/3**	**SC6.1, GLI M2/4**	**SC6.1, GLI M2/5**
SC6.1, GLI M2/6	**SC6.1, GLI M2/7**	**SC6.1, GLI M2/8**	**SC6.1, GLI M2/9**	**SC6.1, GLI M2/10**

Total up to 5 Grade Level Indicators

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Course Syllabus: Science M2, Semester 2

Level: Matthayom 2 Credit: 1.5 | **Period: 60 hours** | **Semester: 2nd Semester** | **Instruction Time: 3 periods/week**

Focus Smart Science 2, Unit 5: Elements, Compounds and Mixtures (11 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
1	**Elements**	Students will be able to understand what elements are.	■ Teach what the elements are, SB p. 108. ■ Teach that elements are made up of different atoms. ■ Teach the three classifications of elements, SB p. 108 – 109.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	SC3.1, GLI M2/1 SC3.1, GLI M2/2 SC3.1, GLI M2/3
2	**Elements (Continued)**	Students will be able to compare properties of metals and non-metals.	■ Perform the activity, SB p. 110-111. ■ Discuss the results and conclusion of this activity in class.		
3	**Elements (Continued)**	Students will be able to answer questions about elements.	■ Assign Workbook exercises p. 55. ■ Homework: Test Yourself 5.1 SB p. 111.		
4	**Compounds**	Students will be able to identify different kinds of compounds.	■ Teach what a compound is and give examples, SB p. 112. ■ Assign Workbook exercises p. 56. ■ Homework: Test Yourself 5.2 SB p. 112.		
5	**Mixtures**	Students will identify different kinds of mixtures.	■ Teach what a mixtures is and give examples, SB p. 112. ■ Lead the activity, SB p. 113 to compare a compound and a mixture.		
6	**Compound/ Mixture**	Students will be able to tell the difference between a	■ Compare and contrast a compound and a mixture, SB p. 114.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
		compound and a mixture.	■ Assign Workbook exercises p. 55. ■ Homework: Test Yourself 5.3 SB p. 114.		
7	**Separation Techniques**	Students will be able to know to separate the components in a mixture.	■ Teach the different techniques to separate the components in a mixture, SB p. 115-119. ■ Explain each separation technique.		
8	**Separation Techniques (Continued)**	Students will be able to identify the different separation techniques.	■ Assign Workbook exercises p. 58-59. ■ Homework: Test Yourself 5.4 SB p. 119.		
9	**Radioactive Elements**	Students will be able to understand what radioactive elements are.	■ Teach students what radioactive elements are, SB p, 121. ■ Describe the uses of radioactive elements, SB p. 121. ■ Answer workbook exercises p 60. ■ Homework: Test Yourself 5.5 SB p. 120.		
10	**Conclusion**	Students will be able to conceptualize what have they learned in these lessons.	■ Use conceptual map, SB p. 121, to teach understanding of the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall p. 121-122.		
11	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 122-125 of Student's Book and Enrichment Exercises of Workbook pages 61-62.			

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Focus Smart Science 2, Unit 6: Energy and Chemical Changes (13 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
12	**Physical Change**	Students will be able to analyse physical changes.	■ Explain that changes occur every now and then, SB p. 127. ■ Teach students that changes can be divided in to two groups- physical and chemical changes, SB p 127. ■ Lead the activity, SB p. 127-128 to study physical changes. ■ Lead a discussion about the results and conclusion in class.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	SC3.2, GLI M2/1 SC3.2, GLI M2/2 SC3.2, GLI M2/3 SC3.2, GLI M2/4
13	**Chemical Changes**	Students will be bale to analyse chemical l changes.	■ Lead the activity, SB p. 128-129 to study chemical changes. ■ Compare and contrast physical and chemical changes, SB p. 130 ■ Answer Workbook exercises p 60. ■ Homework: Test Yourself 6.3 SB p. 130.		
14	**Chemical Equations**	Students will be able to know and explain chemical equation.	■ Teach chemical change and a chemical equation, SB p. 131 ■ Explain what makes up a chemical equation, chemical symbols and chemical formulas are, SB p. 131		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
			■ Answer Workbook exercise 1 p. 67.		
15	**Chemical Equations (Continued)**	Students will be able to write chemical equations steps by step.	■ Teach students to write chemical equations steps by step, SB p. 132-134.		
16	**Chemical Equations (Continued)**	Students will be able to answer questions about chemical equations.	■ Assign Test Yourself: 6.2, SB p. 134 ■ Homework: Workbook exercises 2-5 p. 67-68.		
16	**Chemical Equations (Continued)**	Students will be able to answer questions about chemical equations.	■ Assign Test Yourself: 6.2, SB p. 134 ■ Homework: Workbook exercises 2-5 p. 67-68.		
17	**Energy and Chemical Reaction**	Students will be able to understand that chemical reactions involve some heat change.	■ Teach that chemical reactions involve some heat change, SB p. 135. ■ Teach endothermic reactions, SB p. 135.		
18	Heat Change	Students will be able to understand heat change.	■ Perform the activity, SB p. 136 to study heat change. ■ Give examples of exothermic reactions and endothermic reactions that occur everyday. ■ Answer Test Yourself: 6.3, SB p. 137. ■ Homework: Workbook exercises p. 68-69.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
19	**Factors Affecting the Rate of a Reaction**	Students will be able to identify the factors that the rate of reaction.	■ Teach the factors that affect the rate of reaction – temperature, concentration, particle size, pressure and catalyst, SB p. 138 – 140. ■ Discuss how these factors affect the rate of reaction. ■ Give examples of how we apply this knowledge in our daily life.		
20	**Factors Affecting the Rate of a Reaction (Continued)**	Students will be able to identify the factors that affect the rate of reaction.	■ Answer Workbook exercises p. 70 - 71. ■ Homework: Test Yourself 6.4 SB p. 140.		
21	**Chemical Reactions in Everyday Life**	Students will be able to distinguish some chemical reactions that are happening around us every day.	■ Teach students some of the chemical reactions in our everyday life – combustion of fossil fuel, rusting of iron, photosynthesis and respiration, SB p. 141 – 142.		
22	**Chemical Substances**	Students will be able to distinguish some chemical substances that are happening around us every day.	■ Explain what chemical substances are, SB p. 143. ■ Teach some chemical substances that we use daily, SB 143-144. ■ Answer workbook exercises p. 71-72. ■ Homework: Answer Test Yourself 6.5 SB p. 144.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
23	Conclusion	Students will be able to conceptualize what have they learned in these lessons.	■ Use conceptual map, SB p. 145 to teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall p. 145-146.		
24	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 146 - 149 of Student's Book and Enrichment Exercises of Workbook pages 73-75.			

Focus Smart Science 2, Unit 6: Energy and Chemical Changes (13 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
25	**Understanding Force**	Students will be able to understand what a force is.	■ Teach what force is, SB p. 151. ■ Elicit examples of different types of forces. ■ Answer Workbook exercises p.79. ■ Homework: Test Yourself 7.1 SB p. 151.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	SC4.1, GLI M2/1 SC4.1, GLI M2/2
26	**Resultant Forces on a Same Plane: Net Force**	Students will be able to calculate resultant force for parallel force.	■ Teach what resultant force is, SB p. 152. ■ Teach students how to calculate resultant force for parallel force by using examples SB 152-153. ■ Homework: Workbook exercises 1 p.80.		
27	**Resultant Forces on a Same Plane: Net Force (Continued)**	Students will be able to calculate resultant force for non-parallel force.	■ Teach students how to calculate resultant force for non-parallel force by using examples SB p. 154-155.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
			■ Answer workbook exercise 2 p. 80 – 81. ■ Homework: Test Yourself 7.2 SB p. 155.		
28	**Resultant Forces on Static Objects and Moving Objects with Constant Velocity**	Students will be able to calculate resultant force when an object is at stationary.	■ Teach what will happen to the resultant force if the object is at rest or not moving, SB p. 156. ■ Explain the example, SB p. 3 which calculates the resultant force if the object is at rest. ■ Answer Workbook exercise 1- 2 p. 82.		
29	**Resultant Forces on Static Objects and Moving Objects with Constant Velocity (Continued)**	Students will be able to calculate resultant force when an object is moving at a constant velocity.	■ Teach what will happen to the resultant force if the object is moving at a constant velocity, SB p. 157-158. ■ Answer Workbook exercises 4-5 p. 83 – 84. ■ Homework: Test Yourself 7.3 SB p. 158.		
30	**Conclusion**	Students will be able to conceptualize what they have learned in these lessons.	■ Use conceptual map, SB p. 159 to teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall p. 159.		
31	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 160-162 of Student's Book and Enrichment Exercises of Workbook pages 84-85.			

Focus Smart Science 2, Unit 8: Light (10 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
32	**Properties of Light**	Students will be able to explain the properties of light.	■ Teach the properties of light, SB p. 164. ■ Answer Workbook exercise 1 p. 88. ■ Homework: Test Yourself 8.1 SB p. 164.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC5.1, GLI M2/1** **SC5.1, GLI M2/2** **SC5.1, GLI M2/3**
33	**Reflection of Light**	Students will be able to understand reflection of light.	■ Teach how we see things. ■ Explain what reflection means and explain why we can see ourselves in mirrors and smooth surfaces, SB p. 165. ■ Carry out the activity, SB p. 166 on the reflection of light.		
34	**Application of Reflection of Light in Daily Life.**	Students will be able to understand the application of reflection of light in daily life.	■ Ask students to describe their own image that they see in a mirror. ■ Explain the image that we see on a plane mirror, SB p. 167. ■ Answer Workbook exercise 2 p. 88. ■ Homework: Test Yourself 8.2 SB p. 168.		
35	**Refraction of Light**	Students will be able to describe the refraction of light.	■ Teach what refraction is, SB p. 169. ■ Do the activity, SB p. 170-171. ■ Explain how light refracts when passing through different media.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
36	**Refraction of Light (Continued)**	Students will be able to describe the refraction of light.	■ Describe some phenomena involving refraction. ■ Answer Workbook exercises 1-3 p. 89. ■ Homework: Test Yourself 8.3 SB p. 171.		
37	**Light and Colors**	Students will be able to describe white color and spectrum.	■ Teach what happens when a beam of white light passes through a prism, SB p. 171. ■ Explain what dispersion is and how it happens. ■ Lead the activity, SB p. 172, and showing light dispersion.		
38	**Light and Colors**	Students will be able to explain how we see the color of objects.	■ Explain how we see color of objects, SB p. 173. ■ Use the examples, SB p. 173-174 to explain how we see color of objects. ■ Answer Workbook exercise 1 p. 89-90. ■ Homework: Test Yourself 8.4 SB p. 174.		
39	**Uses of Light**	Students will be able to explain the uses of light.	■ Explain with examples how we use light, SB p. 174-175. ■ Answer Workbook exercise p. 91. ■ Homework: Test Yourself 8.5 SB p. 175.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
40	**Conclusion**	Students will be able to conceptualize what they have learned in these lessons.	■ Use conceptual map, SB p. 176 teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall p. 176.		
41	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 177-180 of Student's Book and Enrichment Exercises of Workbook pages 92-95.			

Focus Smart Science 2, Unit 9: Soil (6 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
42	**Soil**	Students will be able to identify components of soil.	■ Discuss to students the components of soil – inorganic materials, organic materials, air, water and soil organisms, SB p. 182. ■ Discuss types of soil, SB p. 182. ■ Discuss soil properties, SB p. 183-185.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1.1, GLI M2/1**
43	**Soil Profile**	Students will be able to identify soil profile and the layers in it.	■ Explain about the soil profile, SB p. 186. ■ Answer Workbook exercise p. 97. ■ Homework: Answer Test Yourself 9.1 SB p. 187.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
44	**Soil Formation**	Students will be able to know the factors that affect soil formation.	■ Teach the factors that affect soil formation, SB p. 187. ■ Explain how soil is formed using diagram, SB p. 188. ■ Answer workbook exercise p. 98. ■ Homework: Answer Test Yourself 9.2 SB p. 188.		
45	**Soil Uses and Soil Improvement**	Students will be able to understand soil uses and soil improvement.	■ Explain how we use soil. What are the valuable products in the soil? SB p. 188-189. ■ Explain how we improve soil, SB p. 189. ■ Answer Workbook exercise p. 98-99. ■ Homework: Test Yourself 9.3 SB p. 191.		
47	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 193-194 of Student's Book and Enrichment Exercises of Workbook pages 100-103.			

Focus Smart Science 2, Unit 10: The Earth (13 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
48	**Layers of the Earth**	Students will identify layers of the earth.	■ Teach the layers of the Earth — crust, mantle, core, SB p. 196. ■ Discuss what is found in each layer. ■ Discuss what the hottest layer is.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects	**SC6.1, GLI M2/3** **SC6.1, GLI M2/4** **SC6.1, GLI M2/5** **SC6.1, GLI M2/6** **SC6.1, GLI M2/7**

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
			■ Answer Workbook exercise p. 106. ■ Homework: Test Yourself 10.1 SB p. 196.	**Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC6.1, GLI M2/8** **SC6.1, GLI M2/9** **SC6.1, GLI M2/10**
49	**Rocks**	Students will identify different types of rocks.	■ Explain types of rocks – igneous rocks, sedimentary rocks and metamorphic rocks, SB p. 196. ■ Describe features of rocks. ■ Teach how rocks are formed.		
50	**Weathering and Erosion**	Students will be able to identify the difference between weathering and erosion.	■ Explain weathering, SB p. 199 – 200. ■ Homework: Workbook exercise p. 107.		
51	**Rock Cycle**	Students will be able to explain rock cycle.	■ Explain weath ■ Discuss rock cycle, SB p. 201. ■ Answer workbook exercise p. 107- 108. ■ Homework: Test Yourself 10.2 SB p. 202. ering, SB p. 199 – 200. ■ Homework: Workbook exercise p. 107.		
52	**Minerals**	Students will be able to identify minerals on earth	■ Discuss minerals, SB p. 202. ■ Teach the four basic characteristics of minerals. ■ Describe the physical properties that can be used to classify minerals, SB p. 203.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
53	**Minerals (Continued)**	Students will be able to know the uses of minerals.	■ Elicit the uses of minerals, SB p. 204. ■ Answer Workbook exercise p. 109-110. ■ Homework: Test Yourself 10.1 SB p. 205.		
54	**Fossil Fuels**	Students will understand the meaning of fossil fuels.	■ Discuss what fossil fuels are, SB p. 205. ■ Lead a discussion: How and where does coal form? How do we get coal? How do we use coal?		
55	**Petroleum**	Students will be able to understand how petroleum is formed	■ Discuss petroleum with students, SB p. 206. ■ Discuss where petroleum originates. How do we get petroleum? How do we use petroleum?		
56	**Oil Shale**	Students will be able to understand what oil shale is.	■ Discuss oil shale, SB p. 206. ■ Teach what oil shale is and how we use it. ■ Answer Workbook exercise p. 110-111. ■ Homework: Test Yourself 10.4 SB p. 207.		
57	**Natural Water**	Students will be able to understand the importance of natural water.	■ Discuss the availability of water on our earth, SB p. 207. ■ Elicit uses of water.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
			■ Discuss underground water, SB p. 208. Where does it come from? How do we get it? Is it safe for consumption?		
58	**Review of Lesson's Concepts**	Students will be able to answer questions about the earth.	■ Answer Workbook exercise p. 111. ■ Homework: Test Yourself 10.5 SB p. 209.		
59	**Conclusion**	Students will be able to conceptualize what they have learned in these lessons.	■ Use conceptual map, SB p. 209 to teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall p. 210.		
60	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 210-212 of Student's Book and Enrichment Exercises of Workbook 112-115.			
FINAL EXAMINATION					

SCIENCE
M3

Core Curriculum for Science, M3

Science Strands, Learning Standards and Grade Level Indicators

Strand	Learning Standards		Grade Level Indicators (GLI)
1. Living Things and Life Processes	**SC1.1**	**Not applicable for M3**	
	SC1.2	Understanding of the process and importance of genetic transmission; evolution of living things and biodiversity affecting humans and the environment; investigative process for seeking knowledge and scientific mind; communicating knowledge that could be applied for useful purposes.	1. Observe and explain characteristics of chromosomes with genetic units or genes in their nuclei. 2. Explain the importance of genetic material or DNA and the process of transmitting genetic characteristics. 3. Discuss genetic diseases resulting from abnormality of genes and chromosomes, and apply the knowledge gained for useful purposes. 4. Explore and explain biodiversity in the local area enabling living things to maintain equilibrium in their lives. 5. Explain effects of biodiversity on human beings animals, plants and the environment. 6. Explain effects of biotechnology on living of human beings and the environment.
2. Life and the Environment	**SC2.1**	Understanding of local environment; relationship between the environment and living things; relationship between living things in the ecosystem; investigative process for seeking knowledge and scientific mind; and communicating acquired knowledge that could be applied for useful purpose.	1. Explore various eco-systems in the local area and explain relationships of the components within the eco-systems. 2. Analyse and explain the relationship of energy transmission in living things in terms of the food chain and food web. 3. Explain water and carbon cycles and their importance to the eco-system. 4. Explain the factors affecting change in size of population in the eco-system.
	SC2.2	Appreciating the importance of natural resources; utilization of natural resources at local, national and global levels; and application of knowledge for management of natural resources and local environment on a sustainable basis.	1. Analyse the state of problems concerning the environment and natural resources in the local area, and propose guidelines for problem solving. 2. Explain guidelines for preserving the equilibrium of the eco-system. 3. Discuss sustainable utilization of natural resources. 4. Analyse and explain utilization of natural resources in terms of the Sufficiency Economy Philosophy. 5. Discuss environmental problems and propose relevant guidelines for problem solving. 6. Discuss and participle in providing care and preserving the local environment on a sustainable basis.

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Strand	Learning Standards		Grade Level Indicators (GLI)
3. Substances and Properties of Substances	**SC3.1**	**Not applicable for M3**	
	SC3.2	**Not applicable for M3**	
4. Forces and Motion	**SC4.1**	Understanding the nature of electromagnetic, gravitational and nuclear forces; investigative process of seeking knowledge and applying acquired knowledge for useful and ethical purposes.	1. Explain acceleration and effects of resultant forces acting on objects. 2. Experiment and explain actions and reactionary forces between objects, and apply the knowledge gained for useful purposes. 3. Experiment and explain buoyant forces acting on liquid.
	SC4.2	Understanding of characteristics and various types of motion of natural objects; investigative process for seeking knowledge and scientific mind; and communication of acquired knowledge for useful purposes.	1. Experiment and explain differences between static, friction and forces, and apply the knowledge gained for useful purposes. 2. Experiment and explain moment of forces, and apply the knowledge gained for useful purposes. 3. Observe and explain motions of objects in a straight line and in curves.
5. Energy	**SC5.1**	Understanding of the relationship between energy and life; energy transformation; interrelationship between substances and energy; effects of energy utilization on life and the environment; investigative process for seeking knowledge; and communication of acquired knowledge that could be applied for useful purposes.	1. Explain kinetic and gravitational potential energy, rules for conservation of energy and relationship between these quantities as well as apply the knowledge gained for useful purposes. 2. Experiment and explain the relationship between potential difference, electrical current and resistance, and apply the knowledge gained for useful purposes. 3. Calculate electrical energy of electric appliances, and apply the knowledge gained for useful purposes. 4. Observe and discuss correct, safe and economical connection of electrical circuits at home. 5. Explain the resistors, diodes, and transistors and experiment the basic electronic circuits with transistors.
6. Change Processes of the Earth	**SC6.1**	**Not applicable for M3**	
7. Astronomy and Space	**SC7.1**	Understanding of evolution of the solar system, galaxies and the universe; interrelationships within the solar system and their effects on living things on Earth; investigative process for seeking knowledge and	1. Search for relevant information and explain relationships between the sun, Earth, the moon and other planets, and the effects on the environment and living things on Earth.

Strand	Learning Standards		Grade Level Indicators (GLI)
		scientific mind; and communication of acquired knowledge for useful purposes.	2. Search for relevant information and explain components of the universe, galaxies and the solar system. 3. Specify position of constellations, and apply the knowledge gained for useful purposes.
	SC7.2	Understanding of importance of space technology utilized for space exploration and natural resources for agriculture and communication; investigative process for seeking knowledge and scientific mind; and communication of acquired knowledge that could be ethically applied to life and the environment.	1. Search for relevant information and discuss process of utilizing space technology for exploration of space, objects in the sky, weather conditions, natural resources for agriculture and communication.
8. Nature Science and Technology	**SC8.1**	Application of scientific process and scientific mind in investigation for seeking knowledge and problem-solving; knowing that most natural phenomena assume definite patterns that are explainable and verifiable within limitations of data and instruments available during particular periods of time; and understanding that science, technology, society and the environment are interrelated.	1. Pose questions prescribing the issues or important variables for exploration and verification or conduct comprehensive and reliable study and research on matters of their interest. 2. Make verifiable hypotheses and plan several methods for exploration and verification. 3. Select techniques and methods for quantitative and qualitative exploration and verification yielding accurate and safe results by using appropriate materials and equipment. 4. Collect data and process it quantitatively and qualitatively. 5. Analyse and evaluate conformity of eyewitnesses with the conclusions either supporting or contradicting the hypotheses and data abnormality from exploration and verification. 6. Create models or formats explaining or showing results of exploration and verification. 7. Pose questions leading to exploration and verification of relevant matters, and apply the knowledge gained in new situations or to explain the concepts, processes and results of the project or task for others to understand. 8. Make a record and explain results of additional observation, exploration, verification and research from various sources of knowledge in order to obtain reliable data and accept changes in the knowledge discovered when presented with new and additional data, eye-witnesses or contradictory data. 9. Display their work, write reports and/or explain the concepts, processes and results of the project or task so that others can understand.

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Course Description: Science M3, Semester 1

Subject: Core Science	**Course Number: SC23101**	**Level: M3**
Period: 60 hours/semester	**Academic Credit: 1.5**	**Semester: 1st**

This course develops students' thinking skills in various aspects such as logical, analytical and critical thinking. It will also help them develop their investigative skills that are essential for acquiring knowledge, making decisions and solving problems on the following topics:

Our Genes

Traits and heredity unit, chromosomes, DNA and genes, inheritance of traits, genetic disorders, application of the knowledge of heredity.

Interdependence among Living Organisms and the Environment

Interdependence among living organisms, interactions between living organisms, food web, nutrient cycles, limiting factors of population size, biodiversity.

Natural Resources and the Environment

Environmental issues, natural resources, ecosystem and balance.

Forces and Motion

Acceleration, action and reaction forces, buoyant forces and liquid, static friction and kinetic friction, moment of force, motions of objects.

This course will help students to learn and ask questions in relation to real situations and their scientific experiences in daily life. It will also help to develop a range of approaches, including the use of technology to explore and solve problems. Students should be able to represent and communicate science ideas and give reasons to support their conclusions. Moreover, students must be able to use the scientific knowledge and understanding with the use of science in the real world.

Grade Level Indicators (GLI):

SC1.2, GLI M3/1	**SC1.2, GLI M3/2**	**SC1.2, GLI M3/3**	**SC1.2, GLI M3/4**	**SC1.2, GLI M3/5**
SC1.2, GLI M3/6				
SC2.1, GLI M3/1	**SC2.1, GLI M3/2**	**SC2.1, GLI M3/3**	**SC2.1, GLI M3/4**	
SC2.2, GLI M3/1	**SC2.2, GLI M3/2**	**SC2.2, GLI M3/3**	**SC2.2, GLI M3/4**	**SC2.2, GLI M3/5**
SC2.2, GLI M3/6				
SC4.1, GLI M3/1	**SC4.1, GLI M3/2**	**SC4.1, GLI M3/3**		
SC4.2, GLI M3/1	**SC4.2, GLI M3/2**	**SC4.2, GLI M3/3**		

Total up to 22 Grade Level Indicators

Course Syllabus: Science M3, Semester 1

Level: Matthayom 3 Credit: 1.5 | **Period: 60 hours** | **Semester: 1st Semester** | **Instruction Time: 3 periods/week**

Focus Smart Science 3, Unit 1: Our Genes (14 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
1	**Traits and Heredity**	Students will be able to traits and heredity.	■ Lead discussion about how students resemble their parents. ■ Teach traits and heredity, SB p. 2. ■ Discuss the meaning of genetics. ■ Describe the work of Gregor Mendel, SB p. 2.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1.2, GLI M3/1** **SC1.2, GLI M3/2** **SC1.2, GLI M3/2**
2	**Traits and Heredity (continued)**	Students will be able to identify genes as units of inheritance.	■ Teach genes as units of inheritance.• Answer Workbook p. 4. ■ Homework: Test Yourself 1.1 p.3.		
3	**Chromosomes**	Students will be able to understand what chromosomes are.	■ Guide students to understand chromatin and chromosomes by using the diagram, SB p. 3. ■ Explain the table, SB p. 4. Discuss that each individual has the same number of chromosomes. ■ Explain homologous chromosomes and haploid number, SB p. 4-5.		
4	**Chromosomes (Continued)**	Students will learn that babies have the same chromosomes as their parents.	■ Teach the number of chromosomes in gametes and somatic cells, SB p. 5. ■ Answer Workbook exercises 1-3 pp. 4 -5. ■ Homework: Answer Test Yourself 1.2 p.5.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
5	**DNA and Genes**	Students will be able to understand what DNA and genes are.	■ Discuss what DNA and genes are, SB p. 6. ■ Explain Watson – Crick Model of DNA, SB p. 6-7. ■ Answer Workbook exercises 1-3 p. 4 -5. ■ Homework: Test Yourself 1.3 p.7.		
6	**Inheritance of Traits**	Students will be able to understand what alleles are.	■ Teach what alleles are, SB p. 7. ■ Discuss the diagram, SB p. 7 on gene locus. ■ Discuss what type of letter we use to represent the dominant allele and the recessive allele, SB p. 7. ■ Explain the diagram, SB p. 8 and discuss how alleles determine the trait in the offspring.		
7	**Inheritance of Traits (Continued)**	Students will be able to explain what genotype and phenotype are.	■ Teach genotype and phenotype, SB p. 9. ■ Carry out the activity, SB p. 9 – 10. ■ Discuss the observation and conclusion of this activity.		
8	**Inheritance of Traits (Continued)**	Students will be able to explain what genotype and phenotype are.	■ Answer Workbook exercises 1-3 p. 5 -6. ■ Homework: Answer Test Yourself 1.4 p.11.		
9	**Genetic Disorders**	Students will be able to understand what genetic disorder is.	■ Teach what genetic disorder is, SB p.11. ■ Discuss the four types of genetic disorders, SB p. 11-12.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
10	**Testing for Genetic Disorders**	Students will be able to know the test for genetic disorders in fetus.	■ Teach how we can test genetic disorder in fetus, SB p. 13. ■ Answer Workbook exercises 1-3 p. 7. ■ Homework: Answer Test Yourself 1.5 p.13.		
11	**Application of the Knowledge of Heredity**	Students will be able to use the knowledge of heredity to improve their lives.	■ Discuss how we use the knowledge of heredity to improve our lives, SB p. 13. ■ Teach some examples of the knowledge of heredity, SB p. 14-16.		
12	**Application of the Knowledge of Heredity (Continued)**	Students will be able to use the knowledge of heredity to improve their lives.	■ Assign Test Yourself 1.6, SB p. 17. ■ Discuss the answer with the students.		
13	**Conclusion**	Students will be able to conceptualize what have they learned in these lessons.	■ Use conceptual map, SB p.17 to teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall, SB p.18.		
14	**UNIT TEST**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 19-21 of Student's Book and Enrichment Exercises of Workbook pages 8-10.			

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SCIENCE

Focus Smart Science 3, Unit 2: Interdependence among Living Organisms and the Environment (17 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
15	**Interdependence among Living Organisms**	Students will be able to understand interdependence among living things	■ Teach different species on earth, SB p. 23. ■ Explain the terms species, population, community, habitat and ecosystem Community, SB p. 23.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC1.2, GLI M3/4** **SC1.2, GLI M3/5** **SC1.2, GLI M3/6** **SC2.1, GLI M3/1** **SC2.1, GLI M3/2** **SC2.1, GLI M3/3** **SC2.1, GLI M3/4**
16	**Interdependence among Living Organisms (Continued)**	Students will be able to know the relationship between species, population and community.	■ Discuss the diagram, SB p. 25 explaining the relationship between species, population and community in a paddy field ecosystem. ■ Explain the importance of interdependence among living things, SB p. 25 – 26. ■ Use the diagram, SB p. 26 to give example of the interdependence among living organisms in the ecosystem.		
17	**Interdependence among Living Organisms (Continued)**	Students will be able to explain about interdependence in living organisms.	■ Answer workbook p. 13 ■ Homework: Test Yourself 2.1, SB p. 27.		
18	Interactions between Living Organisms	Students will be able to understand the interaction between living organisms.	■ Discuss why interactions between living things are important, SB p. 27.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
			■ Teach the types of interactions between organisms, SB p. 27-29.		
19	**The Importance of Interaction between Living Organisms**	Students will be able to answer questions on the types of interactions between living organisms.	■ Discuss and answer Test Yourself 2.2, SB p. 33. ■ Homework: Workbook exercise 1 p. 14.		
20	**The Importance of Interaction between Living Organisms (Continued)**	Students will be able to understand the interaction between living organisms.	■ Discuss the importance of interaction between living organisms. ■ Do the activity, SB p. 30 – 31. ■ Discuss the observation and the conclusion of this activity.		
21	**The Importance of Interaction between Living Organisms (Continued)**	Students will continue their understanding of the interaction between living organisms.	■ Answer Workbook exercises 1-3 p.14 - 16. ■ Discuss the answer in class.		
22	**Food Web**	Students will be able to understand what food chains are.	■ Teach the causes of interaction between organisms, SB p. 33. ■ Discuss the three groups of living organisms according to their role in the ecosystem, SB p. 33. ■ Discuss the diagram, SB p. 34 to explain example of a food chain. ■ Homework: Have students to draw a food chain for the community.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
23	**Food Chain**	Students will be able to explain the relationship between a producer and consumers.	■ Discuss the diagram, SB p. 34 to explain and example of a food web. ■ Discuss the diagram, SB p. 34 to explain the relationship between organisms in a food chain. ■ Homework: Test Yourself 2.3, p. 37.		
24	**Food Chain (Continued)**	Students will be able to explain the shape of the pyramid of numbers.	■ Explain the diagram, SB p. 35 explaining how energy flows in a food web and pyramid of numbers. ■ Answer Workbook exercises 1-3, p. 16-18.		
25	**Nutrient Cycles**	Students will be able to identify the three important nutrient cycles.	■ Discuss the three important nutrient cycles, SB p. 37. ■ Use the diagram, SB p. 38 to explain the cycle of nitrogen. ■ Use the diagram, SB p. 38 to explain the cycle of water. ■ Answer Test Yourself 2.4, p. 39. ■ Homework: Workbook exercises 1-3, p. 18-19.		
26	**Limiting Factors of Population**	Students will be able to explain the factors that limit population size.	■ Teach how to have a balanced ecosystem, SB p. 40.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
			■ Discuss what limiting factors are, SB p. 40. ■ Teach why species have to compete for food, SB p. 40. ■ Explain the carrying capacity of an environment, SB p. 41.		
27	**Limiting Factors of Population (Continued)**	Students will be able to answer questions about the factors that limit the population in size.	■ Answer Test Yourself 2.5, SB p. 25. ■ Answer Workbook exercises 1-3, p. 20.		
28	**Biodiversity**	Students will be able to describe biodiversity.	■ Teach biodiversity, SB p. 42. ■ Discuss the importance of biodiversity, SB p. 42.		
29	**Biodiversity (Continued)**	Students will be able to know the importance of biodiversity.	■ Answer Test Yourself 2.6, SB p. 43 and discuss in class. ■ Answer Workbook exercises 1 - 2, p. 20.		
30	**Conclusion**	Students will be able to conceptualize what they have learned in these lessons.	■ Use conceptual map, SB .p 43 to teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall, SB p. 44.		
31	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 45 - 49 of Student's Book and Enrichment Exercises of Workbook pages 21 - 25.			

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Focus Smart Science 3, Unit 3: Natural Resources and the Environment (11 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
32	**Environmental Issues**	Students will be able to identify different environmental issues.	■ Explain some activities that have the immediate effect on the environment, SB p. 51. ■ Explain Air pollution, SB p. 51. ■ Use the diagram, SB p. 51 to explain the formation of acid rain and its effects.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC2.2, GLI M3/1** **SC2.2, GLI M3/2** **SC2.2, GLI M3/3** **SC2.2, GLI M3/4** **SC2.2, GLI M3/5** **SC2.2, GLI M3/6**
33	**Air Pollution**	Students will be able to explain global warming.	■ Discuss the functions of the ozone layer, SB p. 52. ■ Explain the diagram, SB p. 52 on absorption of UV radiation by ozone layer. ■ Lead a discussion on the cause and effect of global warming and possible resolutions. SB p. 52-53.		
34	**Land Pollution**	Students will be able to explain what land pollution is.	■ Discuss land pollution, SB p. 53. ■ Teach what happens to the solid waste left in dumps, SB p. 53-54.		
35	**Water Pollution**	Students will understand the causes of water pollution.	■ Discuss what happens of oil spill at an ocean, SB p. 54. ■ Answer Test Yourself 3.1, SB p. 55 and discuss in class. ■ Answer Workbook exercises 1 – 4, p. 27 – 29.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
36	**Natural Resources**	Students will be able to understand natural resources.	■ Teach what natural resources are, SB p. 55. ■ Teach the difference between renewable resources and non-renewable resources, SB p. 55. ■ Elicit examples of renewable resources and non-renewable resources.		
37	**Natural Resources (Continued)**	Students will be able understand how to use natural resources sustainably.	■ Discuss why we need to find a sustainable way to use our natural resources, SB p. 56 ■ Explain what we should do to sustain these natural resources, SB p. 56-57.		
38	**Natural Resources (Continued)**	Students will be able to answer questions about natural resources.	■ Answer Workbook exercises 1- 5 p. 29 – 30. ■ Homework: Test Yourself 3.2, SB p. 58.		
39	**Ecosystem and Balance**	Students will be able to understand the importance of the ecosystem.	■ Teach and discuss why we need to balance our ecosystem, SB p. 58. ■ Discuss the measures that can be taken to ensure a balanced ecosystem, SB p. 59 – 61.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
40	**Ecosystem and Balance (Continued)**	Students will be able to discuss ways to balance our ecosystem.	■ Answer workbook p. 31. ■ Homework: Test Yourself 3.3, SB p. 61.		
41	**Conclusion**	Students will be able to conceptualize what they have learned in these lessons.	■ Use conceptual map, SB p. 62 to teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall, SB p. 62 – 64.		
42	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 63 – 66 of Student's Book and Enrichment Exercises of Workbook pages 33 – 36.			

Focus Smart Science 3, Unit 4: Forces and Motion (18 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
43	**Acceleration**	Students will be able to analyse and calculate acceleration.	■ Teach acceleration, SB p. 68. ■ Teach the formula for acceleration, SB p. 68. ■ Explain the diagram, SB p. 68. ■ Use examples 1 – 2, SB p. 69 to explain how to solve acceleration problems.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC4.1, GLI M3/1** **SC4.1, GLI M3/2** **SC4.1, GLI M3/3** **SC4.2, GLI M3/1** **SC4.2, GLI M3/2** **SC4.2, GLI M3/3**

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
44	**Acceleration (Continued)**	Students will be able to solve problems involving acceleration.	■ Answer Workbook questions 1-2 p. 39. ■ Answer Test Yourself 4.1 questions 1 -3, SB p. 73.		
45	**Effect of Resultant Forces**	Students will be able to explain Newton's Second Law of Motion.	■ Discuss Newton's Second Law of Motion, SB p. 70. ■ Teach how to solve problems related to resultant force by using examples, SB p. 70 – 72. ■ Answer Workbook questions 3 - 5 p. 40 – 41. ■ Homework: Test Yourself questions 4 - 5, SB p. 73.		
46	**Weight and Mass**	Students will be able to explain weight and its relation to mass.	■ Teach weight and its relation with mass, SB p. 72. ■ Use example 5, SB p. 72 to solve problems involving weight and mass. ■ Answer Test Yourself 4.1, SB p. 73. ■ Homework: Workbook 6, p. 41.		
47	**Action and Reaction Forces**	Students will be able to explain Newton's Third Law of Motion.	■ Discuss Newton's Third Law of Motion, SB p. 73. ■ Discuss examples SB p. 74 – 75, explaining Newton's Third Law of Motion.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
48	**Action and Reaction Forces (Continued)**	Students will be able to answer questions about Newton's Third Law of Motion.	■ Answer workbook questions 1 - 2 p.41 – 42. ■ Homework: Test Yourself 4.2, questions 4 - 5, SB p. 73.		
50	**Buoyant Force (Continued)**	Students will be able to solve problems involving buoyant force.	■ Teach students how to solve problems involving buoyant force by using example 7, SB p. 77. ■ Provide students with additional worksheet to solve problems involving buoyancy.		
51	**Archimedes Principle**	Students will be able to understand Archimedes Principle.	■ Explain Archimedes Principle, SB p. 78. ■ Carry out the Activity, SB p. 78 – 79 to explain Archimedes Principle. ■ Homework: Answer Workbook exercises 1 – 3 p. 42 – 43.		
52	**Floating and Sinking**	Students will be able to understand why objects float and sink.	■ Explain the diagrams, SB p. 79 – 81 and teach how objects float and sink. ■ Answer Workbook exercises 4 – 5, p. 43 – 44. ■ Answer Test Yourself 4.3, SB p. 81.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
53	**Static Friction and Kinetic Friction**	Students will be able to understand friction.	■ Teach what friction is, SB p. 82. ■ Explain two kinds of friction, SB p. 82 – 83. ■ Homework: Test Yourself 4.4 questions 1 – 2 p.85.		
54	**Static Friction and Kinetic Friction (Continued)**	Students will be able to solve problems involving static and kinetic friction.	■ Explain example 8, SB p. 84 to solve problems involving static and kinetic friction. ■ Answer workbook exercises 1 – 3, p. 44 – 45. ■ Homework: Answer Test Yourself 4.4 question 3, SB p. 81.		
55	**Moment of Force**	Students will be able to understand and explain what moment of force is.	■ Teach moment of force, SB p. 86. ■ Discuss the formula of moment of force, SB p. 86. ■ Explain the examples, SB p. 86 – 87: how to solve moment of force.		
56	**Showing the Relationship Between Moment and the Product of Force and Distance**	Students will be able to understand the relationship between moment and the product of force and distance.	■ Perform the activity, SB p. 87 – 88. ■ Discuss the activity in class.		
57	**Moments in a Lever**	Students will be able to analyse moment of force.	■ Use the examples, SB p. 88 – 89 to explain moment of force in a lever.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
			■ Teach how a lever can be balanced. ■ Answer Workbook exercises 1 – 3, p. 45 – 47. ■ Homework: Test Yourself 4.5, question 3, SB p. 90.		
58	**Motion of Objects**	Students will be able to understand the three types of motion.	■ Teach the three types of motion, SB p. 91. ■ Answer Workbook, p. 47. ■ Homework: Test Yourself 4.6, question 3, SB p. 91.		
59	**Conclusion**	Students will be able to conceptualize what they have learned in these lessons.	■ Use conceptual map, SB p. 92 to teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall, SB p. 92 - 93.		
60	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice 93 - 95 of Student's Book and Enrichment Exercises of Workbook pages 48 – 52.			
MIDTERM EXAMINATION					

SCIENCE

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Course Description: Science M3, Semester 2

Subject: Core Science	**Course Number: SC23102**	**Level: M3**
Period: 60 hours/semester	**Academic Credit: 1.5**	**Semester: 2nd**

This course develops students' thinking skills in various aspects such as logical, analytical and critical thinking. This course will also help them develop their investigative skills that are essential for enquiring knowledge, making decision and solving problems to the following topics:

Energy Changes
Forms of energy, energy changes.

Electricity
Electricity, measuring electricity, current, voltage and resistance, parallel and series circuits, current, voltage and resistance in a series circuit, electronic circuits, cost of electrical energy, importance of safety precaution sin the use of electricity.

Solar System, Stars and Galaxies
Planets asteroids, comets and meteoroids, sun, starts and galaxies, existence of the universe, sun-earth-moon.

Space Exploration
Astronomy and space exploration.

This course will help students to learn and ask questions in relation to real situations and their scientific experiences in daily life. It will also help them to develop a range of approaches, including the use of technology to explore and solve problems. Students should be able to represent and communicate scientific ideas and give reasons to support their conclusions. Moreover, students must be able to use the scientific knowledge and understanding with the use of science in the real world.

Grade Level Indicators (GLI):

SC5.1, GLI M3/1 **SC4.1, GLI M3/2** **SC7.1, GLI M3/1** **SC7.2, GLI M3/1**	**SC5.1, GLI M3/2** **SC4.1, GLI M3/3**	**SC5.1, GLI M3/3**	**SC5.1, GLI M3/4**	**SC5.1, GLI M3/5**

Total up to 9 Grade Level Indicators

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Course Syllabus: Science M2, Semester 2

Level: Matthayom 3 Credit: 1.5 | **Period: 60 hours** | **Semester: 2nd Semester** | **Instruction Time: 3 periods/week**

Course Syllabus: Science M3, Semester 2

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
1	**Forms of Energy**	Students will be able to understand energy.	■ Teach what energy is, SB p. 97. ■ Describe the unit of energy, SB p. 97. ■ Discuss various forms of energy, SB p. 97. ■ Lead a discussion about why all living things need energy.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	SC5.1, GLI M3/1
2	**Types of Energy**	Students will be able to identify types of energy.	■ Teach what kinetic energy, SB p. 98 is. ■ Give examples of kinetic energy. ■ Explain potential energy, SB p. 99. ■ Elicit examples of potential energy. ■ Homework: Answer Test Yourself 5.1 p.101.		
3	**Types of Energy**	Students will be able to identify types of energy.	■ Explain and give examples of chemical, sound and heat energy, SB p. 100. ■ Answer workbook exercises 1 – 3 p.54 – 56.		
4	**Energy Changes**	Students will be able to understand how energy changes.	■ Explain how energy changes, SB p. 102. ■ Use the table, SB p. 102 to explain how energy changes.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
5	**Observing Energy Changes**	Students will be able to observe energy changes.	■ Carry out the activity, SB p. 103 – 104 to observe energy changes. ■ Discuss the observation and conclusion of this activity.		
6	**Changes between Potential Energy and Kinetic Energy**	Students will be able to identify the changes between potential energy and kinetic energy.	■ Explain the changes between potential energy and kinetic energy from a swinging pendulum, SB p. 104. ■ Explain the graph describing conversion of potential energy and kinetic energy, SB p. 105.		
7	**Review of Lesson's Concepts**	Students will be able to understand the changes in energy.	■ Answer workbook exercises 1 – 3 p.56 – 59. ■ Homework: Test Yourself 5.2, p.106.		
8	**Conclusion**	Students will be able to conceptualize what they have learned in these lessons.	■ Use conceptual map, SB p.106 to teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall, SB p. 107.		
9	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 107 – 111 of Student's Book and Enrichment Exercises of Workbook pages 59 – 61.			

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SCIENCE

Focus Smart Science 3, Unit 6: Electricity (26 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
10	**Electricity**	Students will be able to identify sources of energy.	■ Elicit the sources of electricity, SB p. 112. ■ Describe and explain Van de Graaff generator. ■ Perform the activity, SB p. 112 to demonstrate the flow of electric current using a Van de Graaff generator.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC5.1, GLI M3/2** **SC5.1, GLI M3/3** **SC5.1, GLI M3/4** **SC5.1, GLI M3/5**
11	**Current, Voltage and Resistance**	Students will be able to understand current, voltage and resistance.	■ Teach current, voltage and resistance, SB p. 113. ■ Teach the flow of electron and current in a circuit.		
12	**Current, Voltage and Resistance (Continued)**	Students will be able to answer questions on electricity.	■ Answer Workbook p. 66. ■ Homework: Test Yourself 6.1, p. 115.		
13	**Measuring Electricity**	Students will be able to know how to measure electricity.	■ Teach students to identify the three important quantities for measuring electricity, SB p. 115. ■ Carry out the activity, SB p. 116 - 117 to understand current and voltage. ■ Discuss the observation and conclusion of this activity.		
14	**Measuring Activity (Continued)**	Students will be able to know some instruments to measure current and voltage.	■ Answer Workbook p. 67. ■ Homework: Test Yourself 6.2, p. 118.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
15	**Current, Voltage and Resistance (Continued)**	Students will be able to understand the relationship between current, voltage and resistance.	■ Teach that current, voltage and resistance are three quantities that are closely connected, SB p. 118. ■ Carry out the activity, SB p. 119 – 120 to study how these three quantities are related. ■ Discuss this activity in class.		
16	**Ohm's Law**	Students will be able to state the formula involving current, voltage an resistance in Ohm's Law.	■ Teach how to solve problems related to current, voltage and resistance by using showing the formula, SB p. 121 ■ Use examples 1 – 2, SB p. 122 to guide students to solve problems involving to current, voltage and resistance.		
17	**Current Voltage and Resistance (Continued)**	Students will be able to answer questions involving current, voltage and resistance.	■ Answer workbook p. 68 - 69. ■ Homework: Test Yourself 6.3, p. 122.		
18	**Parallel and Series Circuits**	Students will be able to understand symbols used to represent different electrical components.	■ Teach the symbols we use to represent different electrical components, SB p. 123 – 124. ■ Answer Workbook exercise 1 p. 69.		
18	**Complete Series and Parallel Circuits**	Students will be able to identify two types of circuits.	■ Teach the two types of circuits, SB p. 124 – 125.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
			■ Carry out the activity, SB p. 125 – 127 to study these circuits. ■ Discuss the observation and conclusion of this activity.		
20	**Complete Series and Parallel Circuits (Continued)**	Students will be able to compare and contrast series and parallel circuits.	■ Compare and contrast series and parallel circuits, SB p. 127. ■ Answer Workbook exercise 2 p. 70. ■ Homework: Test Yourself 6.4, p. 128.		
21	**Current, Voltage, Resistance in a Series Circuit**	Students will be able to understand how current, voltage, and resistance in a series circuit are related.	■ Carry out the activity, SB p. 128 - 129 to study the current, voltage, and resistance in a series circuit. ■ Discuss the observation and conclusion of this activity.		
22	**Current, Voltage, Resistance in a Series Circuit (Continued)**	Students will be able to know the advantages and disadvantages of a series circuit.	■ Teach the advantages and disadvantages of a series circuit, SB p. 130. ■ Answer Workbook exercises 1- 2 p. 70 - 71. ■ Homework: Test Yourself 6.5, p. 130 - 131.		
23	**Current, Voltage and Resistance in a Parallel Circuit**	Students will be able to understand the relationship between current, voltage and resistance in a parallel circuit.	■ Perform the activity, SB p. 131 – 133. ■ Discuss the observation and conclusion of this activity.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
24	**The Advantages and Disadvantages of a Parallel Circuit**	Students will be able to identify the advantages and disadvantages of a parallel circuit.	■ Teach the advantages and disadvantages of a parallel circuit, SB p. 133. ■ Compare and contrast the similarities and difference between a series circuit and a parallel circuit, SB p. 133 - 134.		
25	**Current, Voltage and Resistance in a Parallel Circuit (Continued)**	Students will be able to answer questions about current, voltage and resistance in a parallel circuit.	■ Answer Workbook exercises 1- 2 p. 72 - 73. ■ Homework: Test Yourself 6.5, p. 135.		
26	**Electronic Circuits**	Students will be able to identify some electronic circuits.	■ Teach electronic circuits, SB p. 135-136. ■ Homework: Test Yourself 6.7, p. 136.		
27	**Electronic Circuits (Continued)**	Students will be able to identify some electronic circuits.	■ Answer Workbook exercises 1- 2 p. 72 - 73		
28	**Cost of Electrical Energy**	Students will be able to know the cost of electrical energy.	■ Teach the power and voltage rating of home electrical appliances, SB p. 136. ■ Teach the formula for power, SB p. 136. ■ Use example 3 to teach how to solve problems involving power. ■ Use the table SB p. 137, to show some examples of home appliances and their power and voltage ratings.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
29	**Relationship between Electrical Energy Usage, Power and Time**	Students will be able to know the relationship between electrical energy usage, power and time.	■ Teach the relationship between electrical energy usage, power and time, SB p. 138. ■ Use examples 4 – 5, SB p. 138, to show their relationship.		
30	**The Cost of Electricity**	Students will be able to know how to compute the cost of electricity based on the number of kilowatt-hours.	■ Teach that the cost of electrical energy can be calculated when we know the tariff rate, SB p. 138. ■ Use examples 6 – 7, SB p. 140 - 141 to compute for the cost of electrical energy used.		
31	**The Cost of Electricity (Continued)**	Students will be able to understand how to compute for the cost of electrical energy.	■ Answer Workbook exercises 1- 3 p. 73 - 74. ■ Homework: Test Yourself 6.8, p. 141.		
32	**Importance of Safety Precautions with the Use of Electricity**	Students will be able to explain the possible causes of electrical accidents.	■ Teach the possible causes of electrical accidents, SB p. 141. ■ Teach the steps to avoid electrical accidents, SB p. 142.		
33	**Safety Features at Home to Prevent Electrical Accidents.**	Students will be able to know some safety features at home to prevent electrical accidents.	■ Explain some of the devices used to prevent electrical accidents, SB p. 143. ■ Answer Workbook p. 75 - 76. ■ Homework: Test Yourself 6.9, p. 145.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
34	**Conclusion**	Students will be able to conceptualize what they have learned in these lessons.	■ Use conceptual map, SB p.145 to teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall, SB p. 145 - 146.		
35	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 147 - 151 of Student's Book and Enrichment Exercises of Workbook pages 76 - 80.			

Focus Smart Science 3, Unit 7: Solar System, Stars and Galaxies (19 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
36	**Planets**	Students will be able to analyse planets in the solar system.	■ Elicit the names of the planets in the solar system, SB. p. 153. ■ Discuss the features of each plant, SB p. 153 – 154.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	**SC7.1, GLI M3/1** **SC7.1, GLI M3/1** **SC7.1, GLI M3/1**
37	**Planets (Continued)**	Students will be able to know that distance of a planet from the sun with the time taken to make an orbit.	■ Describe the planets based on the number of moons, SB p. 154. ■ Discuss the distance of each plant from the sun, SB p. 155.		
37	**Planets (Continued)**	Students will be able to know that distance of a planet from the sun with the time taken to make an orbit.	■ Describe the planets based on the number of moons, SB p. 154. ■ Discuss the distance of each plant from the sun, SB p. 155.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
38	**Planets (Continued)**	Students will be able to answer question about the planets.	■ Answer Workbook p. 83. ■ Homework: Test Yourself 7.1, p. 155.		
39	**Asteroids, Comets and Meteoroids**	Students will be able to understand asteroids, comets and meteoroids and their differences.	■ Teach asteroids, comets and meteoroids, SB p. 156. ■ Answer Test Yourself 7.2, SB p. 156 and discuss the answer with the students.		
40	**Asteroids, Comets and Meteoroids (Continued)**	Students will be able to understand asteroids, comets and meteoroids and their differences.	■ Answer workbook exercises 1 – 3 p. 83 – 84.		
41	**Asteroids, Comets and Meteoroids (Continued)**	Sun Students will be able to identify the characteristics of the sun.	■ Teach the characteristics of the sun, SB p. 157. ■ Discuss the characteristics of the sun using the diagram, SB p. 157-158.		
42	**Phenomena Occurring on the Surface of the Sun.**	Students will be able to discuss phenomena occurring on the surface of the sun.	■ Teach phenomena that occurs on the surface of the sun ■ Discuss the characteristics of the sun using the diagram, SB p. 157-158.		
43	**Generation of Energy by the Sun**	Students will be able to explain how the sun generates energy.	■ Discuss how the sun generates energy, SB. p.160. ■ Answer Workbook p. 85. ■ Homework: Test Yourself 7.3, p. 160.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
44	**Stars**	Students will be able to understand stars.	■ Explain what stars are, SB p. 161. ■ Discuss the different types of stars according to sizes, SB p. 161. ■ Discuss the classification of stars, SB p. 161.		
45	**Constellations**	Students will be able to understand what constellations are.	■ Discuss what constellations are, SB p. 162. ■ Explain how stars are formed, SB p. 163 ■ Teach the sequence of the death of stars based on their sizes, SB p. 163.		
46	**Galaxies**	Students will be able to understand what galaxies are.	■ Teach the types of galaxies according to their shapes, SB p. 164. ■ Answer Workbook p. 86 – 87. ■ Homework: Test Yourself 7.4, p. 164.		
47	**Existence of the Universe**	Students will be able to understand the importance of the sun and the moon to life on earth.	■ Teach the importance of the sun to life on earth, SB p. 165. ■ Teach the importance of the moon to life on earth, SB p. 165. ■ Lead a discussion about life on earth without the sun and the moon.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
48	**Existence of the Universe**	Students will be able to understand the importance of the sun and the moon to life on earth.	■ Answer Workbook p. 88. ■ Homework: Test Yourself 7.5, p. 166.		
49	**Sun – Earth – Moon**	Students will be able to identify different phenomena that occur due to the positions of the Sun, Earth and Moon.	■ Teach what will happen due to the position of the sun, earth and moon, SB p. 166. ■ Ask students to explain how day and night happen.		
50	**Seasons/ Moon Phases**	Students will be able to explain how seasons and moon phases occur.	■ Teach seasons, SB p. 168. ■ Use the diagram, SB p. 168 to explain what causes the change of seasons. ■ Teach the moon's phases, SB p. 169 ■ Use the diagram, SB p. 169 to explain the change in moon's phases.		
51	**Eclipses/ Tides**	Students will be able to explain how eclipses and tides occur.	■ Teach eclipses, SB p. 170. ■ Use the diagram, SB p. 168 to explain how solar eclipse occurs. ■ Explain tides, SB p. 169 ■ Use the diagram, SB p. 169 to explain the occurrence of tides.		
52	**Sun – Earth – Moon (Continued)**	Students will be able to answer questions about the sun, the earth and the moon.	■ Answer Workbook p. 88- 90. ■ Homework: Test Yourself 7.6, p. 173.		

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
53	**Conclusion**	Students will be able to conceptualize what they have learned in these lessons.	■ Use conceptual map, SB p. 173 to teach the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall, SB p. 173 – 174.		
54	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 175 – 178 of Student's Book and Enrichment Exercises of Workbook pages 92 – 96.			

Focus Smart Science 3, Unit 8: Space Exploration (6 hours)

Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
55	**Developments in Space Exploration**	Students will know developments in space exploration.	■ Discuss developments in space exploration, SB p. 182.	**Classroom work:** ■ Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects **Assignments/ Homework:** ■ Examining homework **Test/Worksheet/Unit test:** ■ Worksheets, pop quizzes, chapter reviews, unit tests **Midterm and Final Exams**	SC7.2, GLI M3/1
56	**Application of Technology Related to Space Exploration**	Students will be able to apply technology related to space exploration.	■ Discuss the application of technology in space exploration, SB p. 183.		
57	**The Need to Continue Space Exploration**	Students will be able to discuss the need to continue space exploration.	■ Discuss the need to continue space exploration, SB p. 184.		
58	**Astronomy and Space Exploration (Continued)**	Students will be able to answer questions i nvolving astronomy and space exploration.	■ Answer workbook exercise 1-4 p. 97 - 98. ■ Homework: Test Yourself 8.1, p. 186.		

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Lesson 1 hour lesson	Topic	Objectives	Activities	Overall Assessment/ Evaluation	Strand/Grade Level Indicators/
59	**Conclusion**	Students will be able to conceptualize what they have learned in these lessons.	■ Use conceptual map, SB p. 173 to help student to understand the relationship of all the subtopics learnt in this chapter. ■ Revise the lesson using Basic Recall, SB p. 173 - 174.		
60	**Unit Test**	Unit test will be given for every unit. Questions will come from the Mastery Practice pages 175 - 178 of Student's Book and Enrichment Exercises of Workbook pages 92 - 96.			
FINAL EXAMINATION					

Assessment and Evaluation of Students' Achievement

Overall Assessment

The primary goal of assessment and evaluation is to determine whether or not the prescribed learning standards have been achieved. Information is gathered to help teachers determine students' strengths and weaknesses in learning science. The overall assessment also helps teachers to create instructional approaches to motivate students and in assessing the overall effectiveness of classroom practices.

Assessment or evaluation is the method of gathering information from learning sources including assignments, projects, classroom participation and tests that correctly gauge student performance. Overall assessment refers to the quality of judging student performance based on the criteria set for each level. Students will receive feedback from teachers at the end of each semester in the form of a letter. Areas of assessment include:

Classroom work:

- Asking questions; monitoring; assessing projects, tasks and assignments, and other in-class projects

Assignments/Homework:

- Examining homework

Test/Worksheet/Unit test:

- Worksheets, pop quizzes, chapter reviews, unit tests

Mid-term and Final Examinations

Criteria for Grading System

Semester 1:

Test/Quizzes/Unit Test	Seatwork/ Homework	Participation	Midterm Exam	Total (Summative 1)
10	10	5	20	45

Semester 2:

Test/Quizzes/ Unit Test	Seatwork/ Homework	Participation	Final Exam	Total (Summative 2)
15	5	5	30	55

Final Grade is computed by adding Summative 1 (Semester 1) and Summative II (Semester 2)

Summative I	Summative 2	Final Grade
45	55	100

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SCIENCE

IV. Supplementary Curriculum for Science

40 hours a semester (two periods per week)

ABA's supplementary curriculum for Science allows flexibility for our teachers to ensure the best experience for students. It is based on ABA's unique and proven methodology of inspiring creativity, facilitating collaboration, and building confidence in our students. We achieve this by creating a learning environment where students feel safe in taking risks when applying new concepts.

We believe the key to learning Science within this framework is to challenge and engage students with scientific concepts that can be applied within the context of real-life scenarios and situations. In other words, in our classrooms, students will not learn just by listening and memorizing, but also by doing.

The supplementary curriculum for M1-3 Science will be two hours per week for a total of 40 hours per semester. This breaks down to two periods per week. The program is designed to be fluid and flexible, with our teachers taking the lead in assessing the areas in greatest need of study by taking into account a variety of factors including:

1. Student progress
2. Areas within the Core Curriculum that require review or further instruction
3. Filling coursework gaps between the Thai and EP Science programs
4. Additional areas of instruction not included in the Core Curriculum
5. Entertaining, amusing activities that also provide interesting twists on Science

V. Reference Books

Focus Smart Science Textbook, M.1
Focus Smart Science Workbook, M1.

Focus Smart Science Textbook, M2.
Focus Smart Science Workbook, M1

Focus Smart Science Textboook, M3
Focus Smart Science Workbook, M3