

Preface

Science plays an important role in our daily life. Science, with the aid of creativity, has produced various instruments and appliances that facilitate the running of our lives and the performance of our works. Science demands the development of our thinking skills in various aspects such as logical, analytical and critical. Science also requires us to develop the investigative skills that are essential for enquiring knowledge, making decisions and solving problems based on available data and evidences. Science is essential to the forming of a modern knowledgeable society. Therefore, all of us need to be provided with scientific knowledge in order to gain an understanding of nature as well as man-made technologies and to apply them by creative and moral means for constructive and productive purposes.

The Basic Education Core Curriculum aims to inculcate the following five key competencies among students:

1. Communication Skill
2. Thinking Skill
3. Problem – Solving Skill
4. Technology Application Skill
5. Technological Application Skill

The learning objectives emphasize on the linking of knowledge to science processes, acquiring of investigative skills, accumulation of knowledge through investigative processes, and problem-solving.

Students are required to participate in all stages of learning with activities involving practical work organized to suit each level of learning. The main learning areas are as follows:

- **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
- **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
- **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
- **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

- **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
- **Processes of Change to 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
- **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
- **Nature of Science and Technology:** Scientific processes; investigation for seeking knowledge, problem-solving, and scientific mind

Strands and Learning Standard

Strand 1: Living Things and Processes of Life

Standard 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 could be applied to one's life and care for other living things.

Standard Sc1.2: Understanding of 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 purpose

Strand 2: Life and the Environment

Standard 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

Standard Sc 2.2: 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

Strand 3: Substances and Properties of Substances

Standard 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 purpose

Standard Sc3.2: Understanding of principles and nature of change in the states of substances; solution formation; reactions; investigative process for seeking knowledge and scientific mind; and communication of acquired knowledge that could be applied for useful purpose

Strand 4: Forces and Motion

Standard Sc4.1: Understanding of the nature of electromagnetic, gravitational and nuclear forces; investigative process of to seeking knowledge and applying acquired knowledge for useful and ethical purposes

Standard Sc4.2: Understanding the characteristics and the types of motion of natural objects; investigative process for seeking knowledge and scientific mind; and communication of acquired knowledge for useful purposes

Strand 5: Energy

Standard Sc5.1: Understanding 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

Strand 6: Change Processes of the Earth

Standard Sc6.1: Understanding of various processes on the Earth's surface and inside the Earth; relationship between various processes that cause 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

Strand 7: Astronomy and Space

Standard Sc7.1: Understanding of evolution of the Solar System, galaxies and the universe; interrelationships within the Solar System and their effects on the living things on the Earth; investigative process for seeking knowledge and scientific mind; and communication of acquired knowledge for useful purpose

Standard Sc 7.2: 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

Strand 8: Nature of Science and Technology

Standard Sc8.1: Application of scientific processes and scientific mind in investigation for seeking knowledge and problem-solving; knowing that most natural phenomena assume definite patterns are explainable and verifiable within the limitations of data and instruments available during particular periods of time; and understanding science, technology, society and the environment are interrelated

Learners' Quality

- Understand characteristics and main components of cells of living things; relationship of function in various systems; genetic transmission; biotechnology; diversity of living things; living things' behaviour and responses to stimuli in the environment.

- Understand components and properties of solutions; pure substances; transformation of substances through change of their state; solution forming and chemical reaction.

- Understand frictional forces; moment of forces; variety of motion in daily life; rules for energy conservation; energy transfer; heat equilibrium; reflection, refraction and density of light.

- Understand relationship between electrical quantities; principles of electrical domestic circuits; electrical energy and basic principles of electronic circuits

- Understand change processes of the Earth's crust; geological sources; factors affecting atmospheric change; reactions within the solar system and effects on various things on Earth; importance of space technology.

- Understand relationship between science and technology; development and effects of development on quality of life and the environment.

- Pose questions with prescription and control of variables; give estimates to several possible answers; plan, investigate, verify, analyse and evaluate data conformity and create bodies of knowledge.

- Communicate thoughts and knowledge obtained from investigation and verification through verbal or written presentation, display, or application of information technology.

- Apply scientific and technological knowledge and processes in life and seek additional knowledge; create projects or work pieces in accord with their interests.

- Show interest, determination, responsibility, care and honesty in investigating and seeking knowledge by applying instruments and methods that provide reliable results.

- Are aware of the value of scientific and technological knowledge applied in daily life and livelihood; show appreciation, honour and respect of inventors' rights to their achievements.

- Show recognition, care and concern, as well as appreciate behaviour for utilization and conservation of natural resources and local environment.

- Work constructively with others; be ready to express opinions and acknowledge views of others

For common understanding and correct interpretation, the curriculum prescribes various codes for learning standards and indicators. One example is shown below:

Sc 1.1 Gr 8/2	
Sc	Subject area of Science
1.1	First subject area, Standard 1
Gr8/2	Indicator 2 for Grade 8 (Mathayom 2)

Yearly Teaching Plan

Science

Grade 8 (Mathayom 2)

10 chapters

120 hours

Learning areas	Time (hours)
1. Food and Addictive Substances <ul style="list-style-type: none">• Classes of food• Importance of balanced diet• Drugs• Alcoholic drinks• Smoking	12
2. Systems in Humans and Animals <ul style="list-style-type: none">• Digestive system in humans• Digestive systems in animals• Circulatory system in humans• Circulatory systems in animals• Respiratory system in humans• Respiratory systems in animals• Excretory system in humans• Excretory systems in animals	21
3. Reproduction <ul style="list-style-type: none">• Sexual and asexual reproduction• Male reproduction system• Female reproduction system• Menstrual cycle• Fertilization and pregnancy• Importance of pre-natal care• Importance of research in human reproduction• Biotechnology in reproduction of animals	16
4. Coordination and Responses <ul style="list-style-type: none">• Stimuli and responses in humans and animals• Human nervous system	11
5. Elements, Compounds and Mixtures <ul style="list-style-type: none">• Elements• Compounds• Mixtures• Separation techniques• Radioactive elements	11

6. Energy and Chemical Changes <ul style="list-style-type: none"> • 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 	13
7. Forces and Motion <ul style="list-style-type: none"> • Understanding forces • Resultant forces on a same plane (net force) • Resultant forces on static objects and moving objects with constant velocity 	7
8. Light <ul style="list-style-type: none"> • Properties of light • Reflection of light • Refraction of light • Light and colors • Uses of light 	10
9. Soil <ul style="list-style-type: none"> • Soil • Soil formation • Soil uses and soil improvement 	6
10. The Earth <ul style="list-style-type: none"> • Layers of the Earth • Rocks • Minerals • Fossil fuels • Natural water 	13

Note: The hours needed for each subtopic can be changed when necessary. The above allocated hours are just a suggestion. Total hours for this subject is as prescribed in the basic learning time structure, while the learners must attain the standard as prescribed in the learning standards and indicators.

Indicators and learning areas

Chapter 1 – Food and Addictive Substances (12 hours)

Indicators	Learning Areas
Sc1.1 Gr8/5 Experiment, analyse and explain nutrients in foods with energy quantity and proportion suitable to gender and age.	<ul style="list-style-type: none">• Classes of food• Importance of a balanced diet
Sc1.1 Gr8/6 Discuss effects of addictive substances on various systems of the body, and guidelines for self-protection from addictive substances.	<ul style="list-style-type: none">• Drugs• Alcoholic drinks• Smoking

Learning Objectives

Students will be taught to:

1. Understand the classes of food.
2. Understand the importance of a balanced diet.
3. Understand harmful addictive substances such as drugs, alcoholic drinks and smoking, their effects on various systems of our body and guidelines for self-protection.

Learning Outcomes

Students will be able to:

1. List the classes of food and their sources.
2. Explain the functions of each class of food.
3. Carry out experiments to determine the presence of certain substances in food using food tests.
4. List the factors that affect the amount of food or energy needed by a person.

5. Analyse the energy provided by types of food.
6. Describe what drugs, alcoholic drinks and smoking are.
7. Describe types of drugs and their effects on our body.
8. Describe how alcoholic drinks and smoking affect our body.
9. Describe the consequences of drug abuse, alcoholic drink and smoking, and ways to avoid them.

Learning Areas

- Classes of food
- Importance of a balanced diet
- Drugs
- Alcoholic drinks
- Smoking

Teaching and Learning Activities

1st – 3rd hours (Classes of food)

1. Explain the reasons we take food.
2. Explain the classes of food – carbohydrates, proteins, fats, vitamins, minerals, water and fiber, and their functions and sources.
3. Ask students to do Questions 1 to 3 on page 5 of the workbook as their homework.
4. Carry out experiments to test food for the presence of glucose, starch, protein and fats. Emphasize the methods used.
5. Ask students to answer Question 4 on page 4 of the workbook as their homework.
6. Have students try Test Yourself 1.1 and discuss the answers with them.

4th – 5th hours (Importance of a balanced diet)

1. Explain what a diet and a balanced diet are.
2. Ask students to answer Questions 1 on page 4 of the workbook as their homework.
3. Discuss the factors that affect the amount of energy or food needed by a person – age, body size, sex, occupation, climate and state of health. Refer to pages 9 and 10.
4. Ask students to answer Questions 2 and 3 on page 5 of the workbook as their homework.
5. Discuss about calorific value of food. Each food contains different amounts of energy.
6. Have students try Test Yourself 1.2 and discuss the answers with them.

6th – 7th hours (Drugs)

1. Explain what drugs and drug abuse are.
2. Discuss the types of drugs – stimulants, depressants, hallucinogens, opiates and inhalants, their functions and harmful effects on us.
3. Ask students the consequences of drug abuse. How does drug abuse affect the drug addict himself, his family and his society as a whole?
4. Brainstorm ways to avoid drug abuse.
5. Ask students to answer the questions of this subtopic on page 6 of the workbook as their homework.
6. Have students try Test Yourself 1.3 and discuss the answers with them.

8th – 9th hours (Alcoholic drinks)

1. Explain what alcoholic drinks are. How are they made?
2. Discuss how these drinks affect our nervous system and health. What happen if we drink alcoholic drinks excessively daily? What harmful effects do alcoholic drinks have on unborn babies?

3. Brainstorm ways to avoid alcoholic drinks.
4. Ask students to answer the questions of this subtopic on pages 6 and 7 of the workbook as their homework.
5. Have students try Test Yourself 1.4 and discuss the answers with them.

10th – 11th hours (Smoking)

1. Discuss the harmful substances found in cigarette smoke – tar, carbon monoxide, nicotine, irritants and carcinogens. What are their negative effects on our body?
2. What are the illnesses caused by smoking?
3. Brainstorm ways to avoid smoking.
4. Ask students to answer the questions of this subtopic on page 7 of the workbook as their homework.
5. Have students try Test Yourself 1.5 and discuss the answers with them.

12th hour (Conclusion)

1. Revise the lesson using Quick Revision page 21.
2. Use Conceptual Map to help students to understand the relationship of all the subtopics learnt in this chapter.
3. Randomly select 5 objective questions and 2 subjective questions from the Mastery Practice in the Textbook and have students solve them in the class. Have students work on the rest of the questions at home.
4. Ask students to complete the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Skills:

1. Observing
2. Classifying
3. Making inferences
4. Communicating
5. Using and handling science apparatus correctly and safely
6. Handling specimen correctly and carefully

Learning Materials:

- Focus Smart Textbook Science M2
- Focus Smart Workbook Science M2



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 1 Food and Addictive Substances

Explanation: Summary of learning outcomes

Contents that you need for teacher to explain further:
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Feeling after learning this chapter:
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Knowledge gained from this chapter:
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**Chapter 1
Food and Addictive
Substances**

Contents that you like the most in this chapter (give your reason):
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Exercises that you like and want to be selected as the outstanding work:
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Application of knowledge from this chapter on your daily life:
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Indicators and learning areas

Chapter 2 – Systems in Humans and Animals (21 hours)

Indicators	Learning Areas
Sc1.1.Gr8/1 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.	<ul style="list-style-type: none">• Digestive system in humans• Digestive systems in animals• Circulatory system in humans
Sc1.1 Gr8/2 Explain relationship of various systems of human beings and apply acquired knowledge for useful purposes.	<ul style="list-style-type: none">• Circulatory systems in animals• Respiratory system in humans• Respiratory systems in animals• Excretory system in humans• Excretory system in animals

Learning Objectives

Students will be taught to:

1. Understand the digestive systems, circulatory systems, respiratory systems and excretory systems in humans and animals.

Learning Outcomes

Students will be able to:

1. Describe the structures and the digestion process in the humans.
2. Describe the types and functions of enzymes involved.
3. Describe the absorption of digested food and water, and defecation in humans.
4. Describe the digestive systems in fish, cows, birds, frogs and crocodiles.
5. Describe the structures in the human circulatory system
6. Explain how human heart and blood vessels function.
7. Compare and contrast blood vessels.
8. Describe the path of blood flow.
9. State the types of circulatory systems in animals.
10. Describe the structures of human respiratory system.
11. State the adaptation of the alveoli for efficient gas exchange.
12. Explain the mechanism of human breathing.
13. Compare and contrast inhalation and exhalation in humans.
14. Compare and contrast the composition of air inhaled and air exhaled.
15. State the organs used in animal respiratory systems.
16. State the organs in human excretory system.
17. State the organs in animal excretory system.

Learning Areas

- Digestive system in humans
- Digestive systems in animals
- Circulatory system in humans
- Circulatory systems in animals
- Respiratory system in humans
- Respiratory systems in animals

- Excretory system in humans
- Excretory system in animals

Teaching and Learning Activities

1st – 5th hours (Digestive system in human)

1. Explain the functions of digestive system.
2. List organs involved in our digestive system in the correct sequence.
3. Discuss the process of digestion in each organs involved. What happens to the food? What enzymes are secreted and what are their functions?
4. Carry out an experiment to show the action of salivary amylase on starch.
Refer page 30.
5. Have students work on Question 3 on page 15 of the workbook as their homework.
6. Discuss how food is absorbed in the small intestine.
7. Discuss how water is reabsorbed in the big intestine.
8. Ask students to answer Questions 1, 2, 4 and 5 on page 14 and 16 of the workbook as their homework.
9. Have students try Test Yourself 2.1 and discuss the answers with them.

6th – 7th hours (Digestive systems in animals)

1. Discuss briefly about the digestive systems in animals. Most of them have similar digestive organs.
2. Emphasize that cows have four compartments in the stomach – rumen, reticulum, omasum and abomasum, to digest the tough fiber in their food.
3. Emphasize that birds have crops to store food and gizzards to grind hard food.
4. Ask students to answer the questions of this subtopic on pages 16 and 15 of the workbook as their homework.
5. Have students try Test Yourself 2.2 and discuss the answers with them.

8th – 11th hours (Circulatory system in humans)

1. Explain the functions of a circulatory system.
2. List the four basic characteristics of our circulatory system – circulating fluid, pumping device, blood vessels and valves.
3. Explain why our circulatory system is known as a double circulatory system.
4. Using the diagram on page 36, discuss the structures of our heart and how blood flows through it. Are oxygenated blood and deoxygenated blood mixed in the heart?
5. Discuss the three parts of a blood vessel – artery, capillary and vein. Compare and contrast them.
6. Ask students to answer Question 1 on page 17 of the workbook as their homework.
7. Using the diagram on page 39, discuss how blood flows in our body.
8. Ask students to answer Question 2 on page 18 of the workbook as their homework.
9. Have students try Test Yourself 2.3 and discuss the answers with them.

12th hour (Circulatory systems in animals)

1. Emphasize that there are three types of circulatory systems – circulatory system with two chambers (fish), circulatory system with four chambers (cows and birds) and circulatory system with three chambers (frogs and crocodiles).
2. Ask students to answer the questions of this subtopic on page 18 of the workbook as their homework.
3. Have students try Test Yourself 2.4 and discuss the answers with them.

13th – 16th hours (Respiratory system in humans)

1. Explain the functions of a respiratory system.
2. Using the diagram on page 42, discuss the parts of a human respiratory system and also their functions.
3. Discuss how alveoli are adapted for efficient gas exchange.
4. Ask students to breathe in and out while placing their palms on their chests. What do they feel? Then ask them to place their palms below their ribcage. What do they feel when they breathe in and out?
5. Explain the breathing mechanism. Guide them to compare and contrast the inhalation mechanism and exhalation mechanism.
6. Carry out the activity to do a stimulation of breathing. Refer to page 44.
7. Ask students to work on Question 1 on page 19 of the workbook as their homework.
8. Compare and contrast the composition of inhaled air, exhaled air and alveolar air.
9. Explain how oxygen and carbon dioxide are absorbed and released from the red blood cell.
10. Ask students to work on Question 2 on pages 19 and 20 of the workbook as their homework.
11. Have students try Test Yourself 2.5 and discuss the answers with them.

17th hour (Respiratory systems in animals)

1. Discuss briefly how blood circulates in animals.
2. Ask students to work on the questions of this subtopic on page 20 of the workbook as their homework.
3. Have students try Test Yourself 2.6 and discuss the answers with them.

18th – 19th hours (Excretory system in humans)

1. Explain the functions of excretory system.
2. List three organs that we use to excrete waste products from our body.
What are the waste products excreted at each organ?
3. Ask students to work on the questions of this subtopic on page 21 of the workbook as their homework.
4. Have students try Test Yourself 2.7 and discuss the answers with them.

20th hour (Excretory systems in animals)

1. List the excretory organs to remove carbon dioxide in animals.
2. Ask students to answer the questions of this subtopic on page 22 of the workbook as their homework.
3. Have students try Test Yourself 2.8 and discuss the answers with them.

21st hour (Conclusion)

1. Revise the lesson using Quick Revision on pages 51 and 52.
2. Use Conceptual Map to help students to understand the relationship of all the subtopics learnt in this chapter.
3. Randomly select 5 objective questions and 2 subjective questions from the Mastery Practice in the Textbook and have students solve them in the class. Have students work on the rest of the questions at home.
4. Ask students to complete the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Skills:

1. Observing
2. Classifying
3. Grouping and classifying
4. Comparing and contrasting
5. Predicting
6. Communicating
7. Using and handling science apparatus correctly and safely
8. Handling specimen correctly and carefully

Learning Materials:

- Focus Smart Textbook Science M2
- Focus Smart Workbook Science M2



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 2 Systems in Humans and Animals

Explanation: Summary of learning outcomes

Contents that you need for teacher to explain further:
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Feeling after learning this chapter:
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Knowledge gained from this chapter:
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**Chapter 2
Systems in Humans
and Animals**

Contents that you like the most in this chapter (give your reason):
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Exercises that you like and want to be selected as the outstanding work:
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Application of knowledge from this chapter on your daily life:
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Indicators and learning areas
Chapter 3 Reproduction (16 hours)

Indicators	Learning Areas
Sc1.1 Gr8/1 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.	<ul style="list-style-type: none"> • Sexual and asexual reproduction • Male reproduction system • Female reproduction system • Menstrual cycle • Fertilization and pregnancy • Important of pre-natal care Importance of research in human reproduction
Sc1.1 Gr8/1 Explain principles and effects of biotechnological application for propagation, improved breeding and increased productivity of animals, and apply acquired knowledge for useful purposes.	<ul style="list-style-type: none"> • Biotechnology in reproduction of animals

Learning Objectives

Students will be taught to:

1. Understand sexual reproduction and asexual reproduction.
2. Understand the human reproduction system.
3. Understand fertilization and pregnancy.
4. Understand the biotechnology in animal reproduction.

Learning Outcomes

Students will be able to:

1. Describe what sexual reproduction and asexual reproduction are.
2. Compare and contrast sexual and asexual reproductions.
3. State the structures in male and female reproductive systems and their functions.
4. Describe the menstrual cycle.
5. Describe fertilization and pregnancy in humans.
6. State steps for pre-natal care.
7. State ways to overcome sterility and methods of birth controls.
8. State the biotechnology used in reproduction of animals.

Learning Areas

- Sexual and asexual reproduction
- Male reproduction system
- Female reproduction system
- Menstrual cycle
- Fertilization and pregnancy
- Important of pre-natal care
- Importance of research in human reproduction
- Biotechnology in reproduction of animals

Teaching and Learning Activities

1st – 2nd hours (Classifying matter)

1. Explain the functions of reproduction system.
2. Explain asexual reproduction.

3. Describe and give examples of asexual reproduction – binary fission, budding, spore formation, vegetative reproduction (runner, bulb, rhizome, corm and stem tuber) and rejuvenation.
4. Explain sexual reproduction.
5. Compare and contrast asexual reproduction and sexual reproduction.
6. Ask students to work on the questions of this subtopic on page 29 of the workbook as their homework.
7. Have students try Test Yourself 3.1 and discuss the answers with them.

3rd – 4th hours (Male reproductive system)

1. Using the diagrams on pages 64 and 65, guide students to identify parts of a male reproductive system and their functions.
2. Explain the structure of a sperm.
3. Explain the changes in a male during puberty.
4. Ask students to work on the questions of this subtopic on page 30 of the workbook as their homework.
5. Have students try Test Yourself 3.2 and discuss the answers with them.

5th – 6th hours (Female reproductive system)

1. Using the diagrams on page 67, guide students to identify parts of a female reproductive system and their functions.
2. Explain the structure of an ovum.
3. Explain the changes in a female during puberty.
4. Compare and contrast between a male gamete and a female gamete.
5. Ask students to answer the questions of this subtopic on page 31 of the workbook as their homework.
6. Have students try Test Yourself 3.3 and discuss the answers with them.

7th – 8th hours (Menstrual cycle)

1. Explain that girls will experience menstruation when they reach puberty. This repeats almost every 28 days. It prepares the uterus for pregnancy.
2. Explain the menstrual cycle and how the lining of the uterus and ovum change or develop.
3. Emphasize that personal hygiene is important during menstruation.
4. Ask students to answer the questions of this subtopic on pages 32 and 33 of the workbook as their homework.
5. Have students try Test Yourself 3.4 and discuss the answers with them.

9th – 10th hours (Fertilization and pregnancy)

1. Discuss how fertilization occurs that leads to pregnancy.
2. Briefly explain how the embryo develops into a fetus during pregnancy. How does an embryo or fetus get its nutrition and excrete its waste?
3. Ask students to work on the questions of this subtopic on page 33 of the workbook as their homework.
4. Have students try Test Yourself 3.5 and discuss the answers with them.

11th hour (Importance of pre-natal care)

1. During pregnancy, what does a mother to-be need to do to ensure the health of her unborn child? Explain that mother to-be needs to have a good balanced diet to cater the needs of two persons. Certain minerals are needed for the growth of the fetus.
2. What should a pregnant woman avoid? Cigarette smoke, alcoholic drinks and drug abuse should be avoided. Explain how these affect the fetus.
3. Ask students to answer the questions of this subtopic on page 34 of the workbook as their homework.
4. Have students try Test Yourself 3.6 and discuss the answers with them.

12th - 13th hours (Importance of research in human reproduction)

1. Explain the meaning of sterility or infertility.
2. Discuss the reasons for infertility and ways to overcome it – nutrition, hormonal treatment, surgery, in-vitro fertilization
3. Explain the meaning of birth control.
4. Discuss some methods of birth control – rhythm, condom, intrauterine contraceptive device, contraceptive pills, spermicides, vasectomy, tubal ligation.
5. Have debate on the advantages and disadvantages of birth control.
6. Ask students to work on the questions of this subtopic on pages 34 and 35 of the workbook as their homework.
7. Have students try Test Yourself 3.7 and discuss the answers with them.

14th – 15th hours (Biotechnology in reproduction of animals)

1. Explain a few methods that are used to improve animal reproduction – superovulation, in-vitro fertilization, embryo transfer, artificial insemination and cloning.
2. Have debate on the use of cloning to reproduce.
3. Ask students to answer the questions of this subtopic on page 36 of the workbook as their homework.
4. Have students try Test Yourself 3.8 and discuss the answers with them.

16th hour (Conclusion)

1. Revise the lesson using Quick Revision on page 83.
2. Use Conceptual Map to help students to understand the relationship of all the subtopics learnt in this chapter.
3. Randomly select 5 objective questions and the subjective question from the Mastery Practice in the Textbook and have students solve them in the class. Have students work on the rest of the questions at home.

4. Ask students to complete the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Skills:

1. Observing
2. Classifying
3. Making inferences
4. Comparing and contrasting
5. Communicating

Learning Materials:

- Focus Smart Textbook Science M2
- Focus Smart Workbook Science M2



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 3 Reproduction

Explanation: Summary of learning outcomes

Contents that you need for teacher to explain further:
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Feeling after learning this chapter:
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Knowledge gained from this chapter:
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Chapter 3 Reproduction

Contents that you like the most in this chapter (give your reason):
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Application of knowledge from this chapter on your daily life:
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Exercises that you like and want to be selected as the outstanding work:
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Indicators and learning areas
Chapter 4 – Coordination and Responses (11 hours)

Indicators	Learning Areas
Sc1.1 Gr8/1 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.	<ul style="list-style-type: none"> • Human nervous system
Sc1.1 Gr8/3 Observe and explain behaviour of human beings and animals responding to internal and external stimuli.	<ul style="list-style-type: none"> • Stimuli and responses in humans and animals

Learning Objectives

Students will be taught to:

1. Understand stimuli and responses in humans and animals.
2. Understand the pathway involved in detecting and responding to stimuli.
3. Understand human nervous system.
4. Understand reflex action.

Learning Objectives

1. State types of stimuli, types and pathway involved in detecting and responding to stimuli.
2. Describe conditioned response.
3. State the components of human nervous system.
4. State the components of human brain and their functions.
5. Describe types of neurons and their functions.

6. State the pathway of transmission of information.
7. Describe the functional structure of human nervous system
8. Describe reflex actions in humans.

Learning Areas

- Stimuli and responses in humans and animals
- Human nervous system

Teaching and Learning Activities

1st – 3rd hours (Stimuli and responses in humans and animals)

1. Explain what stimuli and responses are. Ask students to give examples.
2. Discuss the types of stimuli – external stimuli and internal stimuli.
Explain receptors and effectors.
3. Carry out the activities on pages 89 and 90 to show how humans respond to different types of stimuli and how animals respond to stimuli.
4. Ask students to work on Questions 1 and 2 on page 42 of the workbook as their homework.
5. Explain how we detect a stimulus. Do a demonstration. Call out a student's name loud and see how the student responds. Your voice is an external stimulus. The receptors in the student's ears detect the stimulus and send out a signal to the central nervous system. The system interprets and orders the effectors to respond by turning his head to you.
6. Ask students to work on Question 3 on page 42 of the workbook as their homework.
7. Explain conditioned responses using Ivan Pavlov's study.
8. Ask students to answer Question 4 on page 43 of the workbook as their homework.
9. Have students try Test Yourself 4.1 and discuss the answers with them.

4th – 10th hours (Human nervous system)

1. Using the diagrams on page 93, explain the components in the human nervous system and human brain.
2. Guide students to understand the functions of the components of the human brain.
3. Ask students to work on Question 1 on page 43 of the workbook as their homework.
4. Explain the structure of a neuron.
5. Compare and contrast the three different types of neurons – motor neuron, interneuron and sensory neuron. They have different functions.
6. Ask students to answer Questions 2 and 3 on page 44 of the workbook as their homework.
7. Explain how information is transmitted using the diagram on page 96.
8. Use the examples on pages 97 and 98 for further explanation.
9. Ask students to answer Question 4 on page 45 of the workbook as their homework.
10. Explain the voluntary and involuntary actions. Give some examples.
11. Explain the sympathetic nervous system and parasympathetic nervous system.
12. Compare and contrast between the voluntary and involuntary actions.
13. Ask students how they respond when their fingers are pricked by needles. Explain reflex action.
14. Ask students to answer Question 5 on pages 45 and 46 of the workbook as their homework.
15. Have students try Test Yourself 4.2 and discuss the answers with them.

11th hour (Conclusion)

1. Revise the lesson using Quick Revision on pages 102 and 103.
2. Use Conceptual Map to help students to understand the relationship of all the subtopics learnt in this chapter.
3. Randomly select 5 objective questions and 2 subjective questions from the Mastery Practice in the Textbook and have students solve them in the class. Have students work on the rest of the questions at home.
4. Ask students to complete the Enrichment Exercises in the workbook to test their understanding of this chapter as their homework.

Emphasized Skills:

1. Observing
2. Classifying
3. Comparing and contrasting
4. Making inferences
5. Predicting
6. Communicating
7. Using and handling science apparatus correctly and safely
8. Handling specimen correctly and carefully

Learning Materials:

- Focus Smart Textbook Science M2
- Focus Smart Workbook Science M2



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 4 Coordination and Responses

Explanation: Summary of learning outcomes

**Chapter 4
Coordination
and Responses**

Feeling after learning this chapter:
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Contents that you need for teacher to explain further:
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Knowledge gained from this chapter:
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Contents that you like the most in this chapter (give your reason):
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Exercises that you like and want to be selected as the outstanding work:
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Application of knowledge from this chapter on your daily life:
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Indicators and learning areas

Chapter 5 – Elements, Compounds and Mixtures (11 hours)

Indicators	Learning Areas
Sc3.1 Gr8/1 Explore and explain components and properties of elements and compounds.	<ul style="list-style-type: none">• Elements• Compounds• Mixtures
Sc3.1 Gr8/2 Search for data and compare properties of metallic, non-metallic semi metallic and nuclear elements and apply the knowledge gained for useful purposes.	<ul style="list-style-type: none">• Radioactive elements
Sc3.1 Gr8/3 Experiment and explain principles of substance separation by applying methods of filtering, crystallization, expunctions, distillation and chromatography, and apply the knowledge gained for useful purposes.	<ul style="list-style-type: none">• Separation techniques

Learning Objectives

Students will be taught to:

1. Understand elements, compounds and mixtures.
2. Analyzing separation techniques.
3. Understand radioactive elements.

Learning Outcomes

Students will be able to:

1. Describe elements, compounds and mixtures.
2. Compare and contrast metals, non-metals and metalloids.
3. Compare and contrast compounds and mixtures.

4. Describe separation techniques – filtration, crystallization, distillation, chromatography and liquid-liquid extraction.
5. Describe radioactive elements and their uses.

Learning Areas

- Elements
- Compounds
- Mixtures
- Separation techniques
- Radioactive elements

Teaching and Learning Activities

1st – 3rd hours (Elements)

1. Explain what elements are. Some elements are made up of atoms and some are made up of molecules.
2. Explain that elements can be categorized into three groups – metals, non-metals and metalloids. Compare and contrast these three groups.
3. Carry out the activity to compare the properties of metals and non-metals. Refer to pages 110 and 111.
4. Ask students to answer the questions of this subtopic on page 51 of the workbook as their homework.
5. Have students try Test Yourself 5.1 and discuss the answers with them.

4th hour (Compounds)

1. Explain what a compound is. Give some examples.
2. Ask students to work on the questions of this subtopic on page 52 of the workbook as their homework.
3. Have students try Test Yourself 5.2 and discuss the answers with them.

5th – 6th hours (Mixtures)

1. Explain what a mixture is. Give examples of mixtures with their components.
2. Carry out the activity on page 113 to compare a compound and a mixture.
3. Compare and contrast between a compound and a mixture.
4. Ask students to work on the questions of this subtopic on page 53 of the workbook as their homework.
5. Have students try Test Yourself 5.3 and discuss the answers with them.

7th – 9th hours (Separation techniques)

1. Explain that we can separate the components in a mixture by using the correct techniques. There are a few separation techniques – filtration, crystallization, distillation, chromatography, liquid-liquid extraction.
2. Explain each separation technique.
3. Ask students to work on the questions of this subtopic on pages 54 to 56 of the workbook as their homework.
4. Have students try Test Yourself 5.4 and discuss the answers with them.

10th hour (Radioactive elements)

1. Explain what radioactive elements are. Give examples.
2. Describe the uses of radioactive elements.
3. Ask students to answer the questions of this subtopic on page 56 of the workbook as their homework.
4. Have students try Test Yourself 5.5 and discuss the answers with them.

11th hour (Conclusion)

1. Revise the lesson using Quick Revision on page 121.
2. Use Conceptual Map to help students to understand the relationship of all the subtopics learnt in this chapter.

3. Randomly select 5 objective questions and 2 subjective questions from the Mastery Practice in the Textbook and have students solve them in the class. Have students work on the rest of the questions at home.
4. Ask students to complete the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Skills:

1. Classifying
2. Compare and contrast
3. Analyzing
4. Problem solving
5. Communicating

Learning Materials:

- Focus Smart Textbook Science M2
- Focus Smart Workbook Science M2



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 5 Elements, Compounds and Mixtures

Explanation: Summary of learning outcomes

Contents that you need for teacher to explain further:
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Feeling after learning this chapter:
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Knowledge gained from this chapter:
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Chapter 5
Elements, Compounds
and Mixtures

Contents that you like the most in this chapter (give your reason):
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Exercises that you like and want to be selected as the outstanding work:
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Application of knowledge from this chapter on your daily life:
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Indicators and learning areas
Chapter 6 Energy and Chemical Changes (13 hours)

Indicators	Learning Areas
Sc3.2 Gr8/1 Experiment and explain changes in properties, mass and energy when substances have chemical reactions as well as explain factors affecting the chemical reactions.	<ul style="list-style-type: none"> • 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
Sc3.2 Gr8/2 Experiment, explain and write chemical equations of reactions of various substances, and apply the knowledge gained for useful purposes.	
Sc3.2 Gr8/3 Search for data and discuss effects of chemical substances and chemical reactions on living things and the environment.	
Sc3.2 Gr8/4 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.	

Learning Objectives

Students will be taught to:

1. Analyze physical and chemical changes.
2. Understand chemical equations.
3. Understand the energy involved in chemical reactions.
4. Analyse the factors affecting the rate of a reaction.
5. Understand some chemical reactions and chemical substances in daily life.

Learning Outcomes

Students will be able to:

1. Describe chemical and physical changes, and give examples.
2. Compare and contrast chemical and physical changes.
3. Write and describe chemical equations.
4. Compare and contrast exothermic and endothermic reactions.
5. Draw energy level diagrams of exothermic and endothermic reactions.
6. Give examples of exothermic and endothermic reactions.
7. Describe the factors affecting the rate of a reaction – temperature, concentration, particle size, pressure and catalysts.
8. Describe some chemical reactions and chemical substances in everyday life – combustion of fossil fuels, rusting of iron, photosynthesis and respiration.
9. List and identify the hazard warning symbols.

Learning Areas

- 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

Teaching and Learning Activities

1st – 3rd hours (Physical and chemical changes)

1. Explain that changes can be divided into 2 groups – physical changes and chemical changes. Give examples of both changes that occur in our daily life.
2. Carry out the activity on pages 127 and 128 to study physical changes.
3. Carry out the activity on pages 129 and 130 to study chemical changes.

4. Compare and contrast between the physical and chemical changes.
5. Ask students to answer the questions of this subtopic on page 62 of the workbook as their homework.
6. Have students try Test Yourself 6.1 and discuss the answers with them.

4th – 6th hours (Chemical equations)

1. Explain a chemical change and a chemical equation.
2. Explain what make up a chemical equation. Explain also what chemical symbols and chemical formulas are.
3. Ask students to work on Question 1 on page 63 of the workbook as their homework.
4. Guide students to write chemical equations steps by steps. Use the example on page 132.
5. Explain to students some chemical equations for reactions between metals and oxygen, some metals with acids, some metals with cold water, some metals with steam, acids with carbonates and acids with alkalis.
6. Ask students to work on Questions 2 to 5 on pages 63 and 64 of the workbook as their homework.
7. Have students try Test Yourself 6.2 and discuss the answers with them.

7th – 8th hours (Energy and chemical reactions)

1. Explain that chemical reactions involve some heat change.
2. Exothermic reactions are chemical reactions that release heat to the surrounding and endothermic reactions are chemical reactions that absorb heat from the surrounding.
3. Guide students to draw energy level diagrams for both types of reactions. Explain the diagrams.
4. Carry out the activity on page 136 to study heat change.

5. Give examples of exothermic reactions and endothermic reactions that occur every day.
6. Ask students to work on the questions of this subtopic on pages 64 and 65 of the workbook as their homework.
7. Have students try Test Yourself 6.3 and discuss the answers with them.

9th – 10th hours (Factors affecting the rate of a reaction)

1. List the factors that affect the rate of a reaction – temperature, concentration, particle size, pressure and catalyst.
2. Discuss how these factors affect the rate of reaction. Remind students that reactions occur when the reactants touch each other through collisions.
3. Give examples of how we apply this knowledge in our daily life.
4. Ask students to work on the questions of this subtopic on pages 66 and 67 of the workbook as their homework.
5. Have students try Test Yourself 6.4 and discuss the answers with them.

11th – 12th hours (Chemical reactions and chemical substances in everyday life)

1. Discuss some of the common chemical reactions in our everyday life – combustion of fossil fuels, rusting of iron, photosynthesis and respiration. How we use them? What are produced? What are the word equations?
2. Discuss some of the chemical substances that we use daily. How do we use them? How are they useful? Are they harmful?
3. Discuss also the hazard warning symbols on bottles containing chemicals.
4. Ask students to work on the questions of this subtopic on pages 67 and 68 of the workbook as their homework.
5. Have students try Test Yourself 6.5 and discuss the answers with them.

13th hour (Conclusion)

1. Revise the lesson using Quick Revision on page 145.
2. Use Conceptual Map to help students to understand the relationship of all the subtopics learnt in this chapter.
3. Randomly select 5 objective questions and 2 subjective questions from the Mastery Practice in the Textbook and have students solve them in the class. Have students work on the rest of the questions at home.
4. Ask students to complete the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Skills:

1. Observing
2. Classifying
3. Making inferences
4. Predicting
5. Communicating
6. Using and handling science apparatus correctly and safely
7. Handling specimen correctly and carefully

Learning Materials:

- Focus Smart Textbook Science M2
- Focus Smart Workbook Science M2



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 6 Energy and Chemical Changes

Explanation: Summary of learning outcomes

Feeling after learning this chapter:
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Contents that you need for teacher to explain further:
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Knowledge gained from this chapter:
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Chapter 6
Energy and
Chemical Changes

Contents that you like the most in this chapter (give your reason):
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Exercises that you like and want to be selected as the outstanding work:
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Application of knowledge from this chapter on your daily life:
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Indicators and learning areas
Chapter 7 – Forces and Motion (7 hours)

Indicators	Learning Areas
Sc4.1 Gr8/1 Experiment and explain finding resultant force of several forces on the same plane acting on objects.	<ul style="list-style-type: none"> Understanding force Resultant forces on a same plane (net force)
Sc4.1 Gr8/2 Explain resultant forces acting on static objects or objects moving with constant velocity.	<ul style="list-style-type: none"> Resultant on static objects and moving objects with constant velocity

Learning Objectives

Students will be taught to:

1. Understand force.
2. Analyze the resultant forces on a same plane.
3. Analyze the resultant forces on static objects and moving objects with constant velocity.

Learning Outcomes

Students will be able to:

1. Describe what force is.
2. State resultant force as a combined force.
3. Analyse resultant forces on parallel and non-parallel forces.
4. Analyze the resultant forces on static objects and moving objects with constant velocity.

Learning Areas

- Understanding force
- Resultant forces on a same plane (net force)
- Resultant on static objects and moving objects with constant velocity

Teaching and Learning Activities

1st – 2nd hours (Understanding force)

1. Explain what force is. What are its effects? How do we measure force?
2. Ask students to give some examples of different types of forces.
3. Ask students to work on the questions of this subtopic on page 74 of the workbook as their homework.
4. Have students try Test Yourself 7.1 and discuss the answers with them.

3rd – 4th hours (Resultant forces on a same plane (Net force))

1. Explain what resultant force is. How do directions affect resultant force?
2. Use the examples on pages 152 and 153, explain how to calculate resultant force for parallel forces.
3. As force is a vector quantity, always determine a direction for the force as positive and the other opposite direction for force as negative.
4. Ask students to work on Question 1 on page 75 of the workbook as their homework.
5. Using the examples on pages 154 and 155, guide students to calculate resultant force for non-parallel forces.
6. Ask students to work on Question 2 on pages 75 and 76 of the workbook as their homework.
7. Have students try Test Yourself 7.2 and discuss the answers with them.

5th – 6th hours (Resultant forces on static objects and moving object with constant velocity)

1. For static objects, when the resultant forces are not zero, the objects will move in the direction of the resultant forces.
2. Use the examples on page 156 for explanation.
3. Ask students to work on Questions 1 and 2 on page 77 of the workbook as their homework.
4. For moving objects with constant velocity, the movements of the objects are subjected to the direction of the resultant force. If the resultant force has the same the direction as the moving objects, the objects will speed up. However, if the resultant force has the opposite direction as the moving objects, the objects will slow down.
5. Use the examples on pages 157 and 158 for explanation.
6. Ask students to work on Questions 3 to 5 on pages 77 and 78 of the workbook as their homework.
7. Have students try Test Yourself 7.3 and discuss the answers with them.

7th hour (Conclusion)

1. Revise the lesson using Quick Revision on page 159.
2. Use Conceptual Map to help students to understand the relationship of all the subtopics learnt in this chapter.
3. Randomly select 5 objective questions and the subjective question from the Mastery Practice in the Textbook and have students solve them in the class. Have students work on the rest of the questions at home.
4. Ask students to complete the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Skills:

1. Observing
2. Analyzing
3. Predicting
4. Communicating

Learning Materials:

- Focus Smart Textbook Science M2
- Focus Smart Workbook Science M2



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 7 Forces and Motion

Explanation: Summary of learning outcomes

Contents that you need for teacher to explain further:
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Feeling after learning this chapter:
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Knowledge gained from this chapter:
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Chapter 7
Forces and
Motion

Application of knowledge from this chapter on your daily life:
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Exercises that you like and want to be selected as the outstanding work:
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Contents that you like the most in this chapter (give your reason):
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Indicators and learning areas

Chapter 8 Light (10 hours)

Indicators	Learning Areas
Sc5.1 Gr8/1 Experiment and explain reflection and refraction of light, and apply the knowledge gained for useful purposes.	<ul style="list-style-type: none"> • Properties of light • Reflection of light • Refraction of light
Sc5.1 Gr8/2 Explain effects of brightness on human beings and other living things. Sc5.1 Gr8/3 Experiment and explain absorption of light, heat, seeing colours of objects, and apply the knowledge gained for useful purposes	<ul style="list-style-type: none"> • Light and colors • Uses of light

Learning Objectives

Students will be taught to:

1. Understand the properties of light.
2. Understand reflection of light.
3. Understand refraction of light.
4. Understand light and colors.

Learning Outcomes

Students will be able to:

1. State the properties of light.
2. Describe reflection of light.
3. List the characteristics of image on a plane mirror.
4. List applications of reflection of light in daily life.
5. Describe refraction of light.

6. Investigate the refraction of light.
7. Describe white color and spectrum.
8. List the factors affecting the color reflected into our eyes.
9. List uses of light.

Learning Areas

- Properties of light
- Reflection of light
- Refraction of light
- Light and colors
- Uses of light

Teaching and Learning Activities

1st hour (Properties of light)

1. Explain to students the properties of light.
2. Explain also types of beams of light.
3. Ask students to work on the questions of this subtopic on page 83 of the workbook as their homework.
4. Have students try Test Yourself 8.1 and discuss the answers with them.

2nd – 3rd hours (Reflection of light)

1. Explain how we see things.
2. Explain what reflection means. Explain why we can see ourselves in mirrors and smooth surfaces.
3. Carry out the activity on page 166.
4. Ask students to describe about their own image that they see in a mirror. Explain the features of an image on a plane mirror.
5. Discuss with students how we apply this knowledge in our daily life.

6. Ask students to work on the questions of this subtopic on page 83 of the workbook as their homework.
7. Have students try Test Yourself 8.2 and discuss the answers with them.

4th – 5th hours (Refraction of light)

1. Explain what refraction is.
2. Carry out the activity on page 170.
3. Explain how light refracts when passing through different media.
4. Describe some phenomena involving refraction.
5. Ask students to work on the questions of this subtopic on page 84 of the workbook as their homework.
6. Have students try Test Yourself 8.3 and discuss the answers with them.

6th – 8th hours (Light and colors)

1. Explain that white light is made up of 7 colors – red, orange, yellow, green, blue, indigo and violet.
2. Explain what dispersion is and how it happens.
3. Carry out the activity on page 172.
4. Explain how we see the colors of objects. Use the examples on pages 173 and 174.
5. Ask students to work on the questions of this subtopic on pages 84 and 85 of the workbook as their homework.
6. Have students try Test Yourself 8.4 and discuss the answers with them.

9th hour (Uses of light)

1. Explain with examples how we use light.
2. Ask students to work on the questions of this subtopic on page 86 of the workbook as their homework.
3. Have students try Test Yourself 8.5 and discuss the answers with them.

10th hour (Conclusion)

1. Revise the lesson using Quick Revision on page 176.
2. Use Conceptual Map to help students to understand the relationship of all the subtopics learnt in this chapter.
3. Randomly select 5 objective questions and the subjective question from the Mastery Practice in the Textbook and have students solve them in the class. Have students work on the rest of the questions at home.
4. Ask students to complete the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Skills:

1. Predicting
2. Generating ideas
3. Observing
4. Classifying
5. Making inferences
6. Communicating
7. Using and handling science apparatus correctly and safely
8. Handling specimen correctly and carefully

Learning Materials:

- Focus Smart Textbook Science M2
- Focus Smart Workbook Science M2



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 8 Light

Explanation: Summary of learning outcomes

Contents that you need for teacher to explain further:
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Feeling after learning this chapter:
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Knowledge gained from this chapter:
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Chapter 8
Light

Contents that you like the most in this chapter (give your reason):
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Exercises that you like and want to be selected as the outstanding work:
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Application of knowledge from this chapter on your daily life:
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Indicators and learning areas

Chapter 9 Soil (6 hours)

Indicators	Learning Areas
Sc6.1 Gr8/1 Explore, experiment and explain soil profile, soil properties and the soil formation process.	<ul style="list-style-type: none">• Soil• Soil formation
Sc6.1 Gr8/2 Explore, analyse and explain utilization of soil and improvement of soil quality.	<ul style="list-style-type: none">• Soil uses and soil improvement

Learning Objectives

Students will be taught to:

1. Understand soil.
2. Understand soil formation.
3. Understand soil uses and soil improvement.

Learning Outcomes

Students will be able to:

1. Describe soil and types of soil.
2. Describe soil properties – soil color, soil texture, soil structure, soil consistency
3. Describe soil profile.
4. List the factors affecting soil formation.
5. Sequence the formation of soil.
6. List how we use soil.
7. List how to improve soil.

Learning Areas

- Soil
- Soil formation
- Soil uses and soil improvement

Teaching and Learning Activities

1st – 2nd hours (Soil)

1. Explain to students the components of soil – inorganic materials, organic materials, air, water and soil organisms.
2. Discuss types of soil too.
3. Discuss the soil properties – soil color, soil texture, soil structure and soil consistency.
4. Discuss also about soil profile and the layers in it.
5. Ask students to work on the questions of this subtopic on page 91 of the workbook as their homework.
6. Have students try Test Yourself 9.1 and discuss the answers with them.

3rd hour (Soil formation)

1. Explain the factors that affect soil formation – parent materials, climate, topography, biotic and time.
2. Using the diagrams on page 188, explain how soil is formed.
3. Ask students to work on the questions of this subtopic on page 92 of the workbook as their homework.
4. Have students try Test Yourself 9.2 and discuss the answers with them.

4th – 5th hours (Soil uses and soil improvement)

1. Explain how we use soil. What are the valuable products in the soil?
2. Explain how we improve soil.

3. Ask students to work on the questions of this subtopic on pages 92 and 93 of the workbook as their homework.
4. Have students try Test Yourself 9.3 and discuss the answers with them.

6th hour (Conclusion)

1. Revise the lesson using Quick Revision on pages 191 and 192.
2. Use Conceptual Map to help students to understand the relationship of all the subtopics learnt in this chapter.
3. Have students to solve the Mastery Practice.
4. Ask students to complete the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Skills:

1. Predicting
2. Observing
3. Generating ideas
4. Communicating

Learning Materials:

- Focus Smart Textbook Science M2
- Focus Smart Workbook Science M2



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 9 Soil

Explanation: Summary of learning outcomes

Contents that you need for teacher to explain further:
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Feeling after learning this chapter:
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Knowledge gained from this chapter:
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Chapter 9
Soil

Contents that you like the most in this chapter (give your reason):
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Exercises that you like and want to be selected as the outstanding work:
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Application of knowledge from this chapter on your daily life:
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Indicators and learning areas
Chapter 10 The Earth (13 hours)

Indicators	Learning Areas
<p>Sc6.1 Gr8/3 Experiment with geological process simulation models to explain the rock formation process and the characteristics of components of rocks.</p> <p>Sc6.1 Gr8/4 Test and observe components and properties of rocks for their classification, and apply the knowledge gained for useful purposes.</p> <p>Sc6.1 Gr8/9 Experiment with simulation models and explain processes of weathering, erosion, sweeping away, piling up and crystallisation and the effects of these processes.</p>	<ul style="list-style-type: none"> ● Rocks
<p>Sc6.1 Gr8/5 Verify and explain physical characteristics of minerals and their application for useful purposes.</p>	<ul style="list-style-type: none"> ● Minerals
<p>Sc6.1 Gr8/6 Search for relevant information and explain formation process, characteristics and properties of petroleum, coal and oil shale, and their application for useful purposes.</p>	<ul style="list-style-type: none"> ● Fossil fuels

<p>Sc6.1 Gr8/7 Explore and explain characteristics of natural water sources, and utilization and conservation of local water sources for benefits.</p> <p>Sc6.1 Gr8/8 Experiment with simulation models and explain formation process of ground water sources and underground water sources.</p>	<ul style="list-style-type: none"> • Natural water
<p>Sc6.1 Gr8/10 Search for relevant information, make a model and explain structure and components of the Earth.</p>	<ul style="list-style-type: none"> • Layers of the Earth

Learning Objectives

Students will be taught to:

1. Understand the layers of the Earth.
2. Understand rocks.
3. Understand weathering and erosion.
4. Understand rock cycle.
5. Understand minerals.
6. Understand fossil fuels – coal, petroleum, oil shale.
7. Understand underground water.

Learning Outcomes

Students will be able to:

1. List the layers of the Earth.
2. Describe types of rocks – igneous rocks, sedimentary rocks and metamorphic rocks.

3. Compare and contrast types of rocks.
4. Describe weathering and erosion.
5. Describe rock cycle.
6. List the basic characteristics of minerals.
7. List the physical properties of minerals – color, luster, streak, cleavage, specific gravity, hardness.
8. List uses of minerals.
9. Describe formation of coal, petroleum and oil shale.
10. Relate the importance of water.
11. Describe formation of underground water.

Learning Areas

- Layers of the Earth
- Rocks
- Minerals
- Fossil fuels
- Natural water

Teaching and Learning Activities

1st hour (Layers of the Earth)

1. Explain to students the layers of the Earth – crust, mantle, out core and inner core. What are found in each layer? Which is the hottest layer?
2. Ask students to work on the questions of this subtopic on page 99 of the workbook as their homework.
3. Have students try Test Yourself 10.1 and discuss the answers with them.

2nd – 4th hours (Rocks)

1. Explain types of rocks – igneous rocks, sedimentary rocks and metamorphic rocks. What are their features? How are they formed? Are there any fossils in them?
2. Explain weathering – mechanical weathering and chemical weathering, and erosion. What are the differences between weathering and erosion? What are the differences between mechanical weathering and chemical weathering?
3. Ask students to work on Questions 1 to 5 on page 100 of the workbook as their homework.
4. Explain rock cycle. How rocks are changed from one type to the other?
5. Ask students to work on Questions 6 and 7 on page 101 of the workbook as their homework.
6. Have students try Test Yourself 10.2 and discuss the answers with them.

5th – 6th hours (Minerals)

1. Explain the four basic characteristics of minerals. How do we identify minerals?
2. Describe the physical properties that can be used to classify minerals – color, luster, streak, cleavage, specify gravity and hardness.
3. Brainstorm with students the uses of minerals.
4. Ask students to work on the questions of this subtopic on pages 102 and 103 of the workbook as their homework.
5. Have students try Test Yourself 10.3 and discuss the answers with them.

7th – 9th hours (Fossil fuels)

1. Explain the meaning of fossil fuels. Ask students for examples of fossil fuels.

2. Discuss coal with students. Where does coal originate? How do we get them? How do we use coal?
3. Discuss petroleum with students. Where does petroleum originate? How do we get petroleum? How do we use petroleum?
4. Discuss oil shale with students. Explain what oil shale is. How do we use oil shale?
5. Ask students to work on the questions of this subtopic on pages 103 and 104 of the workbook as their homework.
6. Have students try Test Yourself 10.4 and discuss the answers with them.

10th – 12th hours (Natural water)

1. Discuss the availability of water on our Earth. How do we use water?
2. Discuss underground water. Where does it come from? How do we get it? Is it safe for consumption?
3. Ask students to work on the questions of this subtopic on page 104 of the workbook as their homework.
4. Have students try Test Yourself 10.5 and discuss the answers with them.

13th hour (Conclusion)

1. Revise the lesson using Quick Revision on page 209.
2. Use Conceptual Map to help students to understand the relationship of all the subtopics learnt in this chapter.
3. Have students to solve the Mastery Practice.
4. Ask students to complete the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Skills:

1. Predicting
2. Observing
3. Generating ideas
4. Communicating

Learning Materials:

- Focus Smart Textbook Science M2
- Focus Smart Workbook Science M2



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 10 The Earth

Explanation: Summary of learning outcomes

Feeling after learning this chapter:
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Contents that you need for teacher to explain further:
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Knowledge gained from this chapter:
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Chapter 10
The Earth

Contents that you like the most in this chapter (give your reason):
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Exercises that you like and want to be selected as the outstanding work:
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Application of knowledge from this chapter on your daily life:
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Notes: Strand 8: Nature of Science and Technology is inculcated in all the activities appearing in all the chapters. Through the activities, students will learn to

- pose questions about the matter studied as prescribed or in accord with their interests.
- plan for observation, exploration, verification, study and research by using their own ideas and those of their teachers.
- use suitable materials, instruments for exploration and verification and record results using simple methods.
- arrange data obtained from exploration and verification into groups and present results.
- express opinions in the course of exploration and verification.
- make a record and explain results of the exploration and verification by drawing pictures or writing short texts.
- verbally present their work to understand.