

## **THEME: UNDERSTANDING HOW OUR WORLD WORKS**

### **STANDARD 1: Learners understand the nature of scientific knowledge and inquiry.**

#### **BENCHMARKS**

##### **Level I (K - Gr. 2):**

1. Explain about things around them by observing, exploring asking questions and developing hypotheses. Scientific investigation is something everyone can do.
2. Explain that in order to support a hypothesis they can expect to obtain consistent results. Many factors may influence the result of an experiment.
3. Identify factors that may influence the result of an experiment. Learners illustrate that they should be able to question and evaluate evidence.
4. Realize that accurate description is important in science because it enable people to compare their observations. The use of instruments and a variety of sources provides more information about things than can be obtained by just observing things without such help.
5. Realize it is helpful to work together and to share findings with others. All group members should reach their own individual conclusions.
6. Recognize that scientific knowledge involves the responsibility to use it wisely.
7. Use their senses to explore the world.
8. Organize and classify objects from the environment into groups.
9. Ask questions based on observations.

##### **Level II (Gr. 3 – Gr. 5):**

1. Design simple experiments, develop hypotheses, and draw conclusions from them.
2. Use scientific tools and instruments to construct, measure and examine objects.
3. Record information accurately.
4. Consider clear communication as an essential part of science.

##### **Level III (Gr. 6- Gr. 8)**

1. Record scientific records of investigations which reflect the importance of reporting honestly, clearly, and accurately.
2. Draw independent conclusions based on data, using critical reasoning to construct models, defend conclusions, and recognize the validity of other positions.
3. Devise hypotheses that lead to fruitful investigations.
4. Write clear, step-by-step instructions for conducting scientific investigations, operating equipment, or following a procedure.
5. Analyze and evaluate scientific data to draw a valid conclusion.
6. Write and describe coherent accounts of scientific activities and alternative interpretations of the results.
7. Select and use tools and instruments to conduct scientific activities.
8. Demonstrate the ideas of system, model, change, and scale in exploring scientific and technological matters.

##### **Level IV (Gr. 9-Gr.12)**

1. Analyze and evaluate experimental designs for accuracy, including variables, controls, adequate data sampling, and logical conclusions and suggest design improvements when appropriate.
2. Choose appropriate summary statistics to describe group differences, always indicating the spread of the data as well as the scientific data's central tendencies.
3. Make and use tables, charts, graphs, and scale drawings to justify scientific arguments and claims in oral and written presentations.
4. Participate in group discussions on scientific topics by restating or summarizing accurately what others have said, asking for clarification or elaboration, and expressing alternative positions.
5. Select the most appropriate tool for a specific, direct measurement and choose appropriate units for reporting various magnitudes.

**STANDARD 2: Learners understand the physical environment and its rules.**

**BENCHMARKS**

**Level I (K - Gr. 2):**

1. Describe objects in terms of their physical properties and material make up.
2. Recognize that processes can change materials, but not all materials respond in the same way to the processes.
3. Describe the daily and monthly changes of the moon's appearance.
4. Describe the properties of light.

**Level II (Gr. 3 – Gr. 5):**

1. Describe matter as being made up of particles too small to be seen.
2. Predict that heating and cooling causes changes in properties of matter.
3. Demonstrate that the mass of an object is always the sum of its parts.
4. Describe how matter can combine in different ways to make new materials.
5. Explain the significance of the rotation of the earth.
6. Describe the planets, their positions, relative size, and relation to the sun and other stars.

**Level III (Gr. 6- Gr. 8):**

1. Describe current scientific theories about the universe and how those theories evolved.
2. Relate how key features of the earth influence climate, weather, and the water cycle.
3. Explain scientific theories of the earth's surface formation and how those theories developed.
4. Explain the relationship between force, mass, and the motion of objects.
5. Describe the wave nature of different phenomenon including sound and electromagnetic radiation.
6. Evaluate observable patterns in celestial bodies and their related physical phenomenon.

**Level IV (Gr. 9-Gr.12)**

1. Determine the relationship between force, mass, and the motion of objects.
2. Describe how waves carry energy.
3. Explain different wave phenomena.
4. Describe the relationship between electric and magnetic fields and will be able to apply that knowledge.
5. Explain current scientific theories about the universe and the supporting evidence.

**STANDARD 3: Learners understand the structure and properties of matter and energy.**

**BENCHMARKS**

**Level I (K - Gr. 2):**

1. Describe energy in terms of making things happen.
2. Identify examples of forms of energy.

**Level II (Gr. 3 - Gr. 5):**

1. Compare forms of energy and energy transformation.
2. Identify energy as a limited resource and understand the need for its conservation.

**Level III (Gr. 6- Gr. 8):**

1. Diagram basic structure of atoms and how that structure contributes to functional characteristics.
2. Explain how society uses and conserves various sources of energy.
3. State that energy cannot be created or destroyed but only changed from one form into another.

**Level IV (Gr. 9-Gr.12)**

1. Describe the work of early scientists in the evolving model of the atom.
2. Describe the development and organization of the periodic table and use it to predict characteristics of elements.
3. Identify types of chemical reactions, write balanced equations, and perform stoichiometric calculations using the mole concept.
4. Describe the structure of an atom, and explain why its electron configuration determines how the atom can interact.
5. Recognize gravitational, electrical, magnetic, and atomic forces as major kinds of forces in nature.
6. Describe the electromagnetic spectrum and its characteristics.
7. Explain the law of conservation of matter and energy.
8. Describe the concept of entropy and its principles.

**STANDARD 4: Learners understand the interrelationship between structure and function.****BENCHMARKS****Level I (K - Gr. 2):**

1. Compare plants and animals in terms of how they look and in what they do.
2. Describe life cycles of plants and animals.
3. Describe reproduction, seed dispersal, germination, and growth in plants.

**Level II (Gr.3- Gr.5)**

1. Identify the external and internal structures that contribute to the ability of organisms to obtain food.
2. Describe the life cycle of humans.
3. Distinguish between traits inherited from parents and learned behaviors.
4. Identify the levels of organization in living organisms including cells, tissues, organs, and organ systems.

**Level III (Gr. 6- Gr. 8):**

1. Identify basic cell structures, organelles, and their functions.
2. Describe the structure, functions and reproduction of living cells.
3. Describe the basic processes of the human body and its development
4. Compare the basic functions of organisms such as photosynthesis, respiration, digestion, and excretion and know that they occur at a cellular level.

**Level IV (Gr. 9-Gr.12)**

1. Explain the structures and functions of the basic molecules of living organisms and the chemical reactions necessary for life.
2. Describe the cell as the fundamental unit of living organisms capable of receiving and integrating messages and responding to changes in the environment.
3. Explain the structure and function of DNA.
4. Analyze the organization, development and basic processes of the human body.
5. Evaluate the nature of disease.

**STANDARD 5: Learners understand the dynamic and interactive natural forces that shape the world.****BENCHMARKS****Level I (K- Gr.2):**

The standard is not addressed at this level.

**Level II (Gr.3 – Gr.5):**

The standard is not addressed at this level.

**Level III (Gr.6- Gr.8):**

The standard is not addressed at this level.

**Level IV (Gr. 9 – Gr. 12):**

1. Determine the interactions and effects of different physical cycles (i.e., atmospheric or oceanic circulation) on the Earth's environment.
2. Evaluate the distribution of different types of climate and related effects on physical and human geography.

**STANDARD 6: Learners understand the nature and operation of technology systems. Learners understand how to be proficient in the use of technology.**

**BENCHMARKS**

**Level I (K - Gr. 2):**

1. Use input and output devices to successfully operate technology.
2. Use a variety of media and technology resources for directed and independent learning activities.
3. Communicate about technology using developmentally appropriate and accurate terminology.
4. Use developmentally appropriate multimedia resources to support learning.

**Level II (Gr. 3 – Gr. 5):**

1. Use common input and output devices efficiently and effectively.
2. Discuss common uses of technology in daily life and the advantages and disadvantages those uses provide.

**Level III (Gr. 6 – Gr. 8):**

1. Apply strategies for identifying and solving routine hardware and software problems.
2. Demonstrate an understanding of concepts underlying hardware, software, and connectivity, and of practical applications to learning and problem solving.

**Level IV (Gr. 9 – Gr. 12):**

1. Make informed choices among technology systems, resources, and services.