

**Grade 6**

- LS1. Learners will be able to generate questions that are important to the study of the natural world.
- a. Uses examples to predict/justify outcomes
- LS2. Learners will be able to collect and record observations and data.
- a. Presents qualitative and quantitative data
- LS3. Learners will be able to use a range of scientific methods and techniques to develop and test ideas and explanations.
- LS4. Learners will be able to analyse and evaluate data to explain results.
- a. Suggests improvements/anomalies to methods
- LS5. Learners will be able to explore interconnected ideas and topics.
- LS6. Learners will be able to share and justify thinking.
- LS7. Learners will be able to use critical thinking skills to evaluate and improve progress.
- U1. Learners will understand the characteristic properties of matter and the relationship of these properties to their structure and behaviour.
- a. Characterizes forms of matter by chemical properties
  - b. Understands relationship between mass/change
- U2. Learners will understand that energy can be transferred usefully, stored, or dissipated, but cannot be created or destroyed
- a. Explains opposing forces
- U3. Learners will understand the origin, evolution, and structure of the universe.
- U4. Learners will understand how the earth's surface is formed and the processes that affect other Earth systems.
- U5. Learners will understand that all life forms, at all levels of organisation, use specialised structures and similar processes to meet life's needs.
- U6. Learners will understand that ecosystems display patterns of organisation, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.
- U7. Learners will understand the transmission of traits in living things.
- C1. Learners will communicate effectively with teachers and classmates.
- C2. Learners will contribute positively to the school learning community.
- C3. Learners will appreciate and respect the diversity and unity of multicultural environments.

- C4. Learners will demonstrate responsible behaviour towards society and the environment.
- Takes action to control risks to self and others

### **Grade 7**

- LS1. Generate questions that are important to the study of the natural world.
- Examine the ethical and moral implications of using and applying science.
  - Use real-life examples as a basis for finding out about science
- LS2. Collect and record observations and data.
- Use measurement tools and standard measures to describe objects and materials.
  - Collect and record data using appropriate tools and techniques.
- LS3. Use a range of scientific methods and techniques to develop and test ideas and explanation.
- Plan and carry out practical and investigative activities, both individually and in groups.
- LS4. Analyse and evaluate data to explain results.
- Use findings from observations and experiments to provide evidence for scientific explanations.
- LS5. Explore interconnected ideas and topics.
- Explore how the creative application of scientific ideas can bring about technological developments.
  - Explore how scientific discoveries can change the way people think and behave.
  - Use creativity and innovation in science, and appreciate their importance in enterprise
- LS6. Share and justify thinking.
- Use appropriate methods, including ICT, to communicate scientific information
  - Use scientific terminology to share thinking
- LS7. Use critical thinking skills to evaluate and improve progress.
- LS8. Use appropriate safety procedures.
- Assess risk and work safely in the laboratory, field and workplace

- U1. Develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behaviour.
- Explain that all matter is composed of minute particles called atoms; and explain that all substances are composed of atoms, each arranged into different groupings.
  - Identify elements as substances that contain only one kind of atom and explain that elements do not break down by normal laboratory reactions, such as heating, exposure to electric current, and reaction to acid.
  - Use models or diagrams to show the difference between atoms and molecules.
  - Given graphic or written information, classify matter as an atom /molecule or element/compound (not the structure of an atom.
  - Explain that over one hundred elements exist, and identify the periodic table as a tool for organizing the information about them.
  - Explain that elements are organized in the periodic table according to their properties.
  - Use the periodic table to obtain information about a given element.
  - Predict the effect of thermal energy on the physical properties of water as it changes to and from a solid, liquid, or gas (i.e., freezing/ melting, evaporation/ condensation).

- i. Create diagrams or models that represent the states of matter at the molecular level.
  - j. Explain the effect of increased and decreased thermal energy on the motion and arrangement of molecules.
  - k. Observe the physical processes of evaporation and condensation, or freezing and melting, and describe these changes in terms of molecular motion and conservation of mass.
  - l. Predict the changes in the state of matter when adding or taking away heat (e.g., ice melting, water boiling or freezing, condensation/ evaporation).
  - m. Describe how matter changes from one phase to another (e.g., condensation, evaporation).
  - n. Describe how energy has the ability to create change.
- U2. Energy can be transferred usefully, stored, or dissipated, but cannot be created or destroyed.
- a. Explain that energy, in the form of heat, is usually a by-product when one form of energy is changed to another, such as when machines convert stored energy to motion.
  - b. Describe how thermal energy (heat) is transferred by conduction, convection, and radiation, and how heat conduction differs in conductors and insulators. Explain how thermal energy (heat) consists of the random motion and vibrations of atoms and molecules and is measured by temperature.
  - c. Explain how thermal energy (heat) flows in terms of the transfer of vibrational motion of atoms and molecules from hotter to colder regions.
  - d. Compare the following ways in which energy may be transformed: mechanical to electrical; electrical to thermal.
  - e. Trace energy transformation in a simple closed system (e.g., a flashlight).
  - f. Construct a model to explain the transformation of energy from one form to another. (e.g. an electrical circuit changing electrical energy to light energy in a light bulb, electrical energy to sound, etc).
  - g. Identify various ways in which electrical energy is generated using renewable and non-renewable resources (e.g., wind, dams, fossil fuels, nuclear reactions).
  - h. Describe how an object can have potential energy due to its position or chemical composition.
  - i. Differentiate between kinetic energy, which is the energy of motion and potential energy, which depends on relative position.
  - j. Compare the potential and kinetic energy within a system at various locations or times.
  - k. Explain that energy can change from one form to another (e.g., changes in kinetic and potential energy in a gravitational field, heats of reaction, hydroelectric dams) and that energy is conserved in these changes.
  - l. Describe variables that change an object's speed, direction, or both and identify and describe the forces that cause the change in motion.
  - m. Explain motion in terms of frames of reference and analyse graphs depicting motion and predicted future motion.
  - n. Create a graph devised from measurements of moving objects and their interactions, including: position-time graphs and velocity-time graphs.
  - o. Interpret the relationships of distance versus time, speed versus time, and acceleration versus time graphs.
  - p. Use data to predict how a change in force (greater/ less) might affect the position, direction of motion, or speed of an object (e.g., ramps and balls).
  - q. Investigate and describe how the acceleration of a body is dependent on its mass and the net applied force (Newton's Second Law).

- r. Describe Newton's Laws of Motion; identify examples, illustrate qualitatively and quantitatively drawing vector examples.
  - s. Demonstrate that an object in motion that is unaffected by a force will continue to move at a constant speed and in a straight line. (Newton's First Law).
  - t. Explain that when a force is applied to an object, it reacts in one of three ways: the object either speeds up, slows down, or goes in a different direction.
  - u. Describe the relationship between the strength of a force on an object and the resulting effect, such as the greater the force, the greater the change in motion.
  - v. Use data to determine or predict the overall (net) effect of multiple forces (e.g., friction, gravitational, magnetic) on the position, speed, and direction of motion of objects.
- U3. Gain an understanding of the origin, evolution, and structure of the universe.
- U4. Understand how the Earth's surface is formed and the processes that affect other Earth systems.
- U5. Understand that all life forms, at all levels of organisation, use specialised structures and similar processes to meet life's needs.
- U6. Demonstrate an understanding that ecosystems display patterns of organisation, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.
- U7. Understand the transmission of traits in living things.
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- C1. Communicate appropriately with teachers and classmates.
- C2. Contribute positively and creatively to the school learning community.
- C3. Appreciate and respect the diversity and unity of multicultural environments.
- C4. Demonstrate responsible behaviour towards society and the environment.
- C5. Develop and demonstrate leadership skills.

## **Grade 8**

- LS1. Generate questions that are important to the study of the natural world.
- a. Generate and test theories to explain phenomena
  - b. Study science in local, national and global contexts, and appreciate the connections between these
- LS2. Collect and record observations and data.
- a. Obtain and record data from a wide range of primary and secondary sources
- LS3. Use a range of scientific methods and techniques to develop and test ideas and explanation.
- a. Explore how explanations of many phenomena can be developed using scientific theories, models and ideas
- LS4. Analyse and evaluate data to explain results.
- a. Evaluate scientific evidence and working methods
- LS5. Explore interconnected ideas and topics.
- a. Recognise that modern science has its roots in many different societies and cultures
  - b. Recognise that modern science draws on a variety of valid approaches to scientific practice.
  - c. Recognise the importance of sustainability in scientific and technological developments

- LS6. Share and justify thinking.
- Contribute to presentations and discussions about scientific issues.
  - Use scientific ideas and models to explain phenomena
- LS7. Use critical thinking skills to evaluate and improve progress.
- LS8. Use appropriate safety procedures.
- U1. Develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behaviour.
- Identify elements as substances that contain only one kind of atom and explain that elements do not break down by normal laboratory reactions, such as heating, exposure to electric current, and reaction to acid.
  - Use models or diagrams to show the difference between atoms and molecules.
  - Given graphic or written information, classify matter as an atom/molecule or element/compound (not the structure of an atom).
  - Use data to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter).
  - Differentiate between a mixture and a pure substance.
  - Describe the different atoms and molecules in mixtures (e.g., dissolving carbon dioxide in water produces a type of mixture [solution] of CO<sub>2</sub> and H<sub>2</sub>O molecules).
  - Demonstrate how mixtures can be separated by using the properties of the substances from which they are made, such as particle size, density, solubility and boiling point.
  - Demonstrate that regardless of how parts of an object are arranged, the mass of the whole is always the same as the sum of the masses of its parts.
  - Differentiate between weight and mass.
  - Explain how different substances of equal volume usually have different weights.
  - Differentiate between volume and mass and calculate the density of large and small quantities of a variety of substances (e.g., aluminium foil, water, copper, clay, rock).
- U2. Energy can be transferred usefully, stored, or dissipated, but cannot be created or destroyed.
- Explain that energy, in the form of heat, is usually a by-product when one form of energy is changed to another, such as when machines convert stored energy to motion.
  - Describe how thermal energy (heat) is transferred by conduction, convection, and radiation, and how heat conduction differs in conductors and insulators.
  - Compare the following ways in which energy may be transformed: mechanical to electrical; electrical to thermal.
  - Construct a model to explain the transformation of energy from one form to another. (e.g. an electrical circuit changing electrical energy to light energy in a light bulb, electrical energy to sound, etc).
  - Identify various ways in which electrical energy is generated using renewable and non-renewable resources (e.g., wind, dams, fossil fuels, nuclear reactions).
  - Describe how an object can have potential energy due to its position or chemical composition.
  - Differentiate between kinetic energy, which is the energy of motion and potential energy, which depends on relative position.
  - Compare the potential and kinetic energy within a system at various locations or times.
  - Explain that solar energy reaches Earth through radiation, mostly in the form of visible light.

- j. Describe the sun as the major source of energy for phenomena on Earth's surface, powering winds, ocean currents, the water cycle, and providing energy essential for life functions.
  - k. Explain that photosynthetic cells convert solar energy into chemical energy that is used to carry on life functions or is transferred to consumers and used to carry on their life functions.
  - l. Explain that energy can change from one form to another (e.g., changes in kinetic and potential energy in a gravitational field, heats of reaction, hydroelectric dams) and that energy is conserved in these changes. Explain the law of conservation of matter and energy.
- U3. Gain an understanding of the origin, evolution, and structure of the universe.
- U4. Understand how the Earth's surface is formed and the processes that affect other Earth systems.
- U5. Understand that all life forms, at all levels of organisation, use specialised structures and similar processes to meet life's needs.
- U6. Demonstrate an understanding that ecosystems display patterns of organisation, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.
- U7. Understand the transmission of traits in living things.
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- C1. Communicate appropriately with teachers and classmates.
- C2. Contribute positively and creatively to the school learning community.
- C3. Appreciate and respect the diversity and unity of multicultural environments.
- C4. Demonstrate responsible behaviour towards society and the environment.
- C5. Develop and demonstrate leadership skills.

## **Grade 9**

- LS1. Generate questions that are important to the study of the natural world.
- a. That there are some questions that science cannot currently answer, and some that science cannot address.
- LS2. Collect and record observations and data.
- a. Collect data from primary or secondary sources, including using ICT sources and tools.
- LS3. Use a range of scientific methods and techniques to develop and test ideas and explanation.
- a. Experience how interpretation of data, using creative thought, provides evidence to test ideas and develop theories
  - b. Use both qualitative and quantitative approaches
- LS4. Analyse and evaluate data to explain results.
- a. Evaluate methods of collection of data and consider their validity and reliability as evidence.
- LS5. Explore interconnected ideas and topics.
- a. About the use of contemporary scientific and technological developments and their benefits, drawbacks and risks
  - b. Consider how knowledge and understanding of science informs personal and collective decisions, including those on substance abuse and sexual health

- LS6. Share and justify thinking.
  - a. Explore contemporary and historical scientific developments and how they have been communicated.
- LS7. Use critical thinking skills to evaluate and improve progress.
- LS8. Use appropriate safety procedures.
  - a. Work accurately and safely, individually and with others, when collecting first-hand data

- U1. Develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behaviour.
- a. Explain that all matter is composed of minute particles called atoms; and explain that all substances are composed of atoms, each arranged into different groupings.
  - b. Identify elements as substances that contain only one kind of atom and explain that elements do not break down by normal laboratory reactions, such as heating, exposure to electric current, and reaction to acid.
  - c. Use models or diagrams to show the difference between atoms and molecules.
  - d. Given graphic or written information, classify matter as an atom/molecule or element/compound (not the structure of an atom).
  - e. Explain that elements are organized in the periodic table according to their properties.
  - f. Use the periodic table to obtain information about a given element.
  - g. Predict how an atom's electron arrangement influences its ability to transfer or share electrons and is related its position on the periodic table.
  - h. Describe how elements can combine to form new substances that often have different properties.
  - i. Demonstrate with atomic models (e.g., ball and stick) how atoms can combine in a large number of ways to form a molecule or formula unit (crystal).
  - j. Differentiate between a mixture and a pure substance.
  - k. Describe the different atoms and molecules in mixtures (e.g., dissolving carbon dioxide in water produces a type of mixture [solution] of CO<sub>2</sub> and H<sub>2</sub>O molecules).
  - l. Demonstrate how mixtures can be separated by using the properties of the substances from which they are made, such as particle size, density, solubility and boiling point.
  - m. Identify substances by their physical and chemical properties, such as magnetism, conductivity, density, solubility, boiling and melting points. Identify elements according to their common properties, such as highly reactive metals, less reactive metals, highly reactive non- metals and almost non- reactive gases.
  - n. Separate substances based on their physical properties (e.g., density, magnetism, light transmission, density, luster, malleability, solubility, ductility, boiling point, freezing point, conductivity, flammability) and identify a molecule as the smallest part of a substance that retains its properties.
  - o. Given data about characteristic properties of matter (e.g., melting and boiling points, density, solubility, acid or base), identify, compare, or classify different substances.
  - p. Observe the physical processes of evaporation and condensation, or freezing and melting, and describe these changes in terms of molecular motion and conservation of mass.
  - q. Predict the changes in the state of matter when adding or taking away heat (e.g., ice melting, water boiling or freezing, condensation/ evaporation).
  - r. Describe how matter changes from one phase to another (e.g., condensation, evaporation).

- s. Describe how energy has the ability to create change.
  - t. Explain that oxidation involves combining oxygen with another substance, as in burning or rusting.
  - u. Identify characteristics of chemical changes: (e.g. burning, production of a new substance, production of light, color change, endothermic and exothermic reactions, reactivity).
  - v. Demonstrate how substances can react chemically with other substances to form new substances, known as compounds, and that in such recombinations, the properties of the new substances may be very different from those of the old.
  - w. Identify the reactants and/or products in a chemical reaction.
  - x. Classify chemical reactions by energy type (e.g., endothermic and exothermic). Identify factors that affect reaction rates, such as temperature, concentration and surface area, and explain that dissolving substances in liquids often accelerates reaction rates.
  - y. Determine the effect of various factors on reaction rate (e.g., temperature, surface area, concentration, agitation).
- U2. Energy can be transferred usefully, stored, or dissipated, but cannot be created or destroyed.
- a. Explain that chemical energy is produced by chemical reactions and is dependent upon the arrangements of atoms.
  - b. Explain that stars produce energy from nuclear reactions and that processes in stars have led to the formation of all elements beyond hydrogen and helium.
  - c. Explain that just as electric currents can produce magnetic forces, magnets can cause electric currents.
- U3. Gain an understanding of the origin, evolution, and structure of the universe.
- a. Describe how different stars can be seen at different times of the year and planets change their positions against the background of stars over time.
  - b. Explain that the Sun is a star located within a galaxy of many other stars, "The Milky Way."
  - c. Describe the position of the solar system in the Milky Way galaxy and the universe.
  - d. Explain that billions of galaxies form most of the visible mass in the universe.
  - e. Investigate and describe the basic components of our solar system (e.g., planets, moons, asteroids, comets, and the sun).
  - f. Give evidence for objects that orbit within the Solar System that impact Earth (e.g. Asteroids, Comets).
  - g. Explain that the sun's gravitational pull holds the Earth and other planets in their orbits, just as the planets' gravitational pull keeps their moons in orbit around them gravity is the force that governs the motion in the solar system. Provide an example of how technology has helped scientists investigate the universe.
  - h. Explain the alignment of the earth, moon, and sun during solar and lunar eclipses.
  - i. Use a model to demonstrate and explain that because the Earth is tilted relative to the plane of the Earth's yearly orbit around the sun, sunlight falls more intensely on different parts of the Earth during the year.
  - j. Explain that the difference in heating of the Earth's Surface produces the planet's seasons and weather patterns.
  - k. Relate the tilt of the earth to the distribution of sunlight throughout the year and its effect on climate.
  - l. Explain that the Earth is one of several planets that orbit the sun, and the moon orbits around the Earth. Observe that different stars can be seen at different times of the year and planets change their positions against the background of stars over time.

## **Teda International School**

### Science Grades 6-12

- m. Explain that nine planets of varied size, composition, and surface features move around the sun in elliptical orbits.
  - n. Compare and contrast the planets in terms of size relative to the earth surface and atmospheric features, relative distance from the sun, and ability to support life.
- U4. Understand how the Earth's surface is formed and the processes that affect other Earth systems.
- U5. Understand that all life forms, at all levels of organisation, use specialised structures and similar processes to meet life's needs.
- U6. Demonstrate an understanding that ecosystems display patterns of organisation, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.
- U7. Understand the transmission of traits in living things.
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- C1. Communicate appropriately with teachers and classmates.
- C2. Contribute positively and creatively to the school learning community.
- C3. Appreciate and respect the diversity and unity of multicultural environments.
- C4. Demonstrate responsible behaviour towards society and the environment.
- C5. Develop and demonstrate leadership skills.

### **Grade 10**

- LS1. Generate questions that are important to the study of the natural world..
- LS2. Collect and record observations and data.
- LS3. Use a range of scientific methods and techniques to develop and test ideas and explanation.
- a. Recall, analyse, interpret, apply and question scientific information or ideas
- LS4. Analyse and evaluate data to explain results.
- LS5. Explore interconnected ideas and topics.
- a. To consider how and why decisions about science and technology are made, including those that raise ethical issues, and about the social, economic and environmental effects of such decisions.
- LS6. Share and justify thinking.
- LS7. Use critical thinking skills to evaluate and improve progress.
- LS8. Use appropriate safety procedures.
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- U1. Develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behaviour.
- U2. Energy can be transferred usefully, stored, or dissipated, but cannot be created or destroyed.
- U3. Gain an understanding of the origin, evolution, and structure of the universe.
- U4. Understand how the Earth's surface is formed and the processes that affect other Earth systems.
- U5. Understand that all life forms, at all levels of organisation, use specialised structures and similar processes to meet life's needs.

- U6. Demonstrate an understanding that ecosystems display patterns of organisation, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.
- U7. Understand the transmission of traits in living things.

- C1. Communicate appropriately with teachers and classmates.
- C2. Contribute positively and creatively to the school learning community.
- C3. Appreciate and respect the diversity and unity of multicultural environments.
- C4. Demonstrate responsible behaviour towards society and the environment.
- C5. Develop and demonstrate leadership skills.

### **Grade 11**

- LS1. Generate questions that are important to the study of the natural world..
- LS2. Collect and record observations and data.
- LS3. Use a range of scientific methods and techniques to develop and test ideas and explanation.
- LS4. Analyse and evaluate data to explain results.
- LS5. Explore interconnected ideas and topics.
  - a. How uncertainties in scientific knowledge and scientific ideas change over time and about the role of the scientific community in validating these changes.
- LS6. Share and justify thinking.
- LS7. Use critical thinking skills to evaluate and improve progress.
- LS8. Use appropriate safety procedures.

- U1. Develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behaviour.
  - a. Explain that over one hundred elements exist, and identify the periodic table as a tool for organizing the information about them.
  - b. Explain that elements are organized in the periodic table according to their properties.
  - c. Use the periodic table to obtain information about a given element.
  - d. Predict how an atom's electron arrangement influences its ability to transfer or share electrons and is related its position on the periodic table.
  - e. Describe how elements can combine to form new substances that often have different properties.
  - f. Demonstrate with atomic models (e.g., ball and stick) how atoms can combine in a large number of ways to form a molecule or formula unit (crystal).
  - g. Use data to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter).
  - h. Differentiate between a mixture and a pure substance.
  - i. Describe the different atoms and molecules in mixtures (e.g., dissolving carbon dioxide in water produces a type of mixture [solution] of CO<sub>2</sub> and H<sub>2</sub>O molecules).
  - j. Demonstrate how mixtures can be separated by using the properties of the substances from which they are made, such as particle size, density, solubility and boiling point.
  - k. Identify substances by their physical and chemical properties, such as magnetism, conductivity, density, solubility, boiling and melting points. Identify elements according to their common properties, such as highly reactive metals, less reactive metals, highly reactive non- metals and almost non- reactive gases.

- l. Separate substances based on their physical properties (e.g., density, magnetism, light transmission, density, luster, malleability, solubility, ductility, boiling point, freezing point, conductivity, flammability) and identify a molecule as the smallest part of a substance that retains its properties.
  - m. Given data about characteristic properties of matter (e.g., melting and boiling points, density, solubility, acid or base), identify, compare, or classify different substances.
  - n. Observe the physical processes of evaporation and condensation, or freezing and melting, and describe these changes in terms of molecular motion and conservation of mass.
  - o. Describe the movement of individual particles and verify the conservation of matter during the phase changes (e.g., melting, boiling, or freezing).
  - p. Explain that states of matter depend on the arrangement of the molecules and their motion.
  - q. Demonstrate that regardless of how parts of an object are arranged, the mass of the whole is always the same as the sum of the masses of its parts.
  - r. Differentiate between weight and mass.
  - s. Differentiate between volume and mass and calculate the density of large and small quantities of a variety of substances (e.g., aluminium foil, water, copper, clay, rock).
  - t. Explain that oxidation involves combining oxygen with another substance, as in burning or rusting.
  - u. Identify characteristics of chemical changes: (e.g. burning, production of a new substance, production of light, color change, endothermic and exothermic reactions, reactivity).
  - v. Demonstrate how substances can react chemically with other substances to form new substances, known as compounds, and that in such recombinations, the properties of the new substances may be very different from those of the old.
  - w. Identify the reactants and/or products in a chemical reaction.
  - x. Classify chemical reactions by energy type (e.g., endothermic and exothermic).
  - y. Identify factors that affect reaction rates, such as temperature, concentration and surface area, and explain that dissolving substances in liquids often accelerates reaction rates.
  - z. Determine the effect of various factors on reaction rate (e.g., temperature, surface area, concentration, agitation).
- U2. Energy can be transferred usefully, stored, or dissipated, but cannot be created or destroyed.**
- a. Explain how thermal energy (heat) consists of the random motion and vibrations of atoms and molecules and is measured by temperature.
  - b. Explain how thermal energy (heat) flows in terms of the transfer of vibrational motion of atoms and molecules from hotter to colder regions.
  - c. Demonstrate that visible light from the sun or reflected by objects may be made up of a mixture of many different colors of light.
  - d. Explain the relationship between an object's color and the wavelength of light reflected or transmitted to the viewer's eyes.
  - e. Describe the relationship between frequency and wavelength of any wave.
  - f. Explain that the human eye can only detect wavelengths of electromagnetic radiation within a narrow range; and explain that the differences of wavelength within that range of visible light are perceived as differences in color.
  - g. Explain that chemical energy is produced by chemical reactions and is dependent upon the arrangements of atoms.
  - h. Differentiate between electromagnetic and mechanical waves and represent in diagrams, or other models the visible spectrum as a part of the electromagnetic spectrum (consisting of visible light, infrared, and ultraviolet radiation) and composed of all colors of light.
  - i. Explain the relationship between the mass of an object and the sum of its parts.
  - j. Describe how mass remains constant in a closed system and provide examples relating to both physical and chemical change.
  - k. Explain the law of conservation of matter and energy.
- U3. Gain an understanding of the origin, evolution, and structure of the universe.**

- U4. Understand how the Earth's surface is formed and the processes that affect other Earth systems.
- U5. Understand that all life forms, at all levels of organisation, use specialised structures and similar processes to meet life's needs.
- U6. Demonstrate an understanding that ecosystems display patterns of organisation, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.
- U7. Understand the transmission of traits in living things.

- C1. Communicate appropriately with teachers and classmates.
- C2. Contribute positively and creatively to the school learning community.
- C3. Appreciate and respect the diversity and unity of multicultural environments.
- C4. Demonstrate responsible behaviour towards society and the environment.
- C5. Develop and demonstrate leadership skills.

## **Grade 12**

- LS1. Generate questions that are important to the study of the natural world..
- LS2. Collect and record observations and data.
- LS3. Use a range of scientific methods and techniques to develop and test ideas and explanation.
- LS4. Analyse and evaluate data to explain results.
- LS5. Explore interconnected ideas and topics.
- LS6. Share and justify thinking.
- LS7. Use critical thinking skills to evaluate and improve progress.
- LS8. Use appropriate safety procedures.

- U1. Develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behaviour.
- U2. Energy can be transferred usefully, stored, or dissipated, but cannot be created or destroyed.
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- U6. Demonstrate an understanding that ecosystems display patterns of organisation, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.
- U7. Understand the transmission of traits in living things.

- C1. Communicate appropriately with teachers and classmates.
- C2. Contribute positively and creatively to the school learning community.
- C3. Appreciate and respect the diversity and unity of multicultural environments.
- C4. Demonstrate responsible behaviour towards society and the environment.

C5. Develop and demonstrate leadership skills.