Darul Arqam North

Scope and Sequence
10th Grade Chemistry

1st Quarter			
Week	**Unit/Lesson**	**Learning Objectives**	**Reporting Categories**
1st:	**Welcome** **Collect & log Supplies received** **Classroom Rules** **Curriculum overview** **Lab Safety**	Demonstrate Lab Safety practices	1(A) demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers; 1(B) know specific hazards of chemical substances such as flammability, corrosiveness, and radioactivity as summarized on the Material Safety Data Sheets (MSDS); and 1(C) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.
2nd:	**Scientific Investigation and Reasoning**	Distinguish between Hypothesis and Theories	2(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section; 2(B) know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories; 2(C) know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but may be subject to change as new areas of science and new technologies are developed;
3rd:	**Scientific Investigation and Reasoning**	Distinguish between Hypothesis and Theories	2(D) distinguish between scientific hypotheses and scientific theories; 2(E) plan and implement investigative procedures, including asking questions, formulating testable hypotheses, and selecting equipment and technology, including graphing calculators, computers and probes, sufficient scientific glassware such as beakers, Erlenmeyer flasks, pipettes, graduated cylinders, volumetric flasks, safety goggles, and burettes, electronic balances, and an adequate supply of consumable chemicals;

Darul Arqam North

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			2(F) collect data and make measurements with accuracy and precision;
4th:	**Scientific Investigation and Reasoning**	Express and manipulate chemical quantities	2(G) express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notation, and significant figures; 3(C) draw inferences based on data related to promotional materials for products and services;
5th:	**Scientific Investigation and Reasoning**	Evaluate scientific research	3(D) evaluate the impact of research on scientific thought, society, and the environment; 3(E) describe the connection between chemistry and future careers; 3(F) research and describe the history of chemistry and contributions of scientists.
6th:	**Fundamental Concepts of Matter**	Differentiate between physical and chemical changes and properties	4(A) differentiate between physical and chemical changes and properties; 4(B) identify extensive and intensive properties;
7th:	**Fundamental Concepts of Matter**	Differentiate between physical and chemical changes and properties	4(C) compare solids, liquids, and gases in terms of compressibility, structure, shape, and volume; 4(D) classify matter as pure substances or mixtures through investigation of their properties.
8th:	**The Periodic Table**	Explain physical and chemical properties and trends in the periodic table	5(A) explain the use of chemical and physical properties in the historical development of the Periodic Table; 5(B) use the Periodic Table to identify and explain the properties of chemical families, including alkali metals, alkaline earth metals, halogens, noble gases, and transition metals;
9th:	**The Periodic Table**	Explain physical and chemical properties and trends in the periodic table	5(C) use the Periodic Table to identify and explain periodic trends, including atomic and ionic radii, electronegativity, and ionization energy.

Darul Arqam North

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10th Grade Chemistry

2nd Quarter			
Week	**Unit/Lesson**	**Learning Objectives**	**Reporting Categories**
1st:	**Atomic Chemistry**	Understand the electromagnetic spectrum and the mathematical relationships between energy, frequency, and wavelength of light	6(A) understand the experimental design and conclusions used in the development of modern atomic theory, including Dalton's Postulates, Thomson's discovery of electron properties, Rutherford's nuclear atom, and Bohr's nuclear atom; 6(B) understand the electromagnetic spectrum and the mathematical relationships between energy, frequency, and wavelength of light; 6(C) calculate the wavelength, frequency, and energy of light using Planck's constant and the speed of light;
2nd:	**Atomic Chemistry**	Understand Isotopes and Electron configuration	6(D) use isotopic composition to calculate average atomic mass of an element; and 6(E) express the arrangement of electrons in atoms through electron configurations and Lewis valence electron dot structures.
3rd:	**Nuclear Chemistry**	Describe the characteristics of alpha, beta, and gamma radiation	12(A) describe the characteristics of alpha, beta, and gamma radiation;
4th:	**Nuclear Chemistry**	Describe radioactive decay and fission and fusion	12(B) describe radioactive decay process in terms of balanced nuclear equations; 12(C) compare fission and fusion reactions.
5th:	**Types of Bonds**	Name Ionic and Covalent compounds	7 (A) name ionic compounds containing main group or transition metals, covalent compounds, acids, and bases, using International Union of Pure and Applied Chemistry (IUPAC) nomenclature rules;
6th:	**Types of Bonds**	Name Ionic and Covalent compounds	7(B) write the chemical formulas of common polyatomic ions, ionic compounds containing main group or transition metals, covalent compounds, acids, and bases; 7(C) construct electron dot formulas to illustrate ionic and covalent bonds;

Darul Arqam North

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10th Grade Chemistry

2nd Quarter			
Week	**Unit/Lesson**	**Learning Objectives**	**Reporting Categories**
7th:	**Types of Bonds**	Describe the nature of metallic bonds	7(D) describe the nature of metallic bonding and apply the theory to explain metallic properties such as thermal and electrical conductivity, malleability, and ductility;
8th:	**Types of Bonds**	Predict molecular structure	7(E) predict molecular structure for molecules with linear, trigonal planar, or tetrahedral electron pair geometries using Valence Shell Electron Pair Repulsion (VSEPR) theory.
9th:	**Midterm Review Benchmark**	**Midterm Review**	**Midterm Review**

3rd Quarter			
Week		Learning Objectives	Reporting Categories
1st:	**Chemical Reactions**	Define and use the concept of a mole	8(A) define and use the concept of a mole; 8(B) use the mole concept to calculate the number of atoms, ions, or molecules in a sample of material; 8(C) calculate percent composition and empirical and molecular formulas;
2nd:	**Chemical Reactions**	Understand Stoichiometry and Law of Mass Conservation	8(D) use the law of conservation of mass to write and balance chemical equations; and 8(E) perform stoichiometric calculations, including determination of mass relationships between reactants and products, calculation of limiting reagents, and percent yield.
3rd:	**SCIENCE SYMPOSIUM**	Symposium work and prepare for presentation	2(H) organize, analyze, evaluate, make inferences, and predict trends from data; 2(I) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals, summaries, oral reports, and technology-based reports.

Darul Arqam North

Scope and Sequence
10th Grade Chemistry

3rd Quarter			
Week		Learning Objectives	Reporting Categories
4th:	**SCIENCE SYMPOSIUM**	Symposium work and prepare for presentation	3(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student; 3(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;
5th:	**Solutions**	Define general solubility rules	10(A) describe the unique role of water in chemical and biological systems; 10(B) develop and use general rules regarding solubility through investigations with aqueous solutions;
6th:	**Solutions**	Calculate solution concentration using molarity	10(C) calculate the concentration of solutions in units of molarity; 10(D) use molarity to calculate the dilutions of solutions;
7th:	**Solutions**	Distinguish between types of solutions	10(E) distinguish between types of solutions such as electrolytes and nonelectrolytes and unsaturated, saturated, and supersaturated solutions; 10(F) investigate factors that influence solubilities and rates of dissolution such as temperature, agitation, and surface area;
8th:	**Acids and Bases**	Distinguish between Acid-Base definitions and reactions	10(G) define acids and bases and distinguish between Arrhenius and Bronsted-Lowry definitions and predict products in acid base reactions that form water; 10(H) understand and differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions;
9th:	**Acids and Bases**	Define and use pH scale	10(I) define pH and use the hydrogen or hydroxide ion concentrations to calculate the pH of a solution; and 10(J) distinguish between degrees of dissociation for strong and weak acids and bases.

Darul Arqam North

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10th Grade Chemistry

4th Quarter			
Week	Unit/Lesson	Learning Objectives	Reporting Categories
1st:	**Gases**	Describe the different Gas Laws	9(A) describe and calculate the relations between volume, pressure, number of moles, and temperature for an ideal gas as described by Boyle's law, Charles' law, Avogadro's law, Dalton's law of partial pressure, and the ideal gas law;
2nd:	**Gases**	Perform stoichiometric calculations involving gases	9(B) perform stoichiometric calculations, including determination of mass and volume relationships between reactants and products for reactions involving gases;
3rd:	**Gases**	Describe the postulates of kinetic molecular theory	9(C) describe the postulates of kinetic molecular theory.
4th:	**Thermochemistry**	Understand energy and its forms, including kinetic, potential, chemical, and thermal energies	11(A) understand energy and its forms, including kinetic, potential, chemical, and thermal energies;
5th:	**Thermochemistry**	Understand the law of conservation of energy and the processes of heat transfer	11(B) understand the law of conservation of energy and the processes of heat transfer;
6th:	**Thermochemistry**	Use thermochemical equations to calculate energy changes that occur in chemical reactions and classify reactions as exothermic or endothermic	11(C) use thermochemical equations to calculate energy changes that occur in chemical reactions and classify reactions as exothermic or endothermic;
7th:	**Thermochemistry**	Perform calculations involving heat, mass, temperature change, and specific heat. Use calorimetry to calculate the heat of a chemical process.	11(D) perform calculations involving heat, mass, temperature change, and specific heat; 11(E) use calorimetry to calculate the heat of a chemical process.
8th:	**Review for Finals**	**Review for Finals**	**Review for Finals**
9th:	**Finals**	**Extra assignments and activities/Labs**	2(H) organize, analyze, evaluate, make inferences, and predict trends from data; 2(I) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals, summaries, oral reports, and technology-based reports.