



Welcome to **Luke's Tailored Tutoring Inc.** (Science)

We are delighted that you are joining the team! This guide will give you specific information to help you get started with us.

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WHO ARE WE?

Our Objective

Our goal is to help each student in their studies

ELEMENTARY SCHOOL: PRIMARY

GRADE 1

- Needs and Characteristics of Living Things
- Materials, Objects, and Everyday Structures
- Energy in Our Lives
- Daily and Seasonal Changes

GRADE 2

- Growth and Changes in Animals
- Movement
- Properties of Liquids and Solids
- Air and Water in the Environment

GRADE 3

- Growth and Changes in Plants
- Strong and Stable Structures
- Forces Causing Movement
- Soils in the Environment

ELEMENTARY SCHOOL: JUNIOR

GRADE 4

Unit 1: Habitats and Communities

- This area of study is concerned with habitats, the natural communities that rely on them, and the effects that habitat changes may have on the interactions of plants and animals.
- Students will discover how dependents acquire energy and resources to survive, including people. Additionally, they will look into both naturally occurring and human activities that affect various habitats.

Unit 2: Pulleys and Gears

- By examining two unique types of wheels—pulleys and gears—this unit helps students deepen their understanding of simple machines. The ability of pulleys and gears to convert one type of motion into another, modify the speed and direction of an object's motion, and alter the amount of force required to move an object will be reviewed.

Unit 3: Light and Sound

- By researching and learning about the characteristics of light and sound, students examine how energy types interact with the environment. Light and sound can be transmitted, reflected, or absorbed by materials.

Unit 4: Rocks and Minerals

- Students learn about geology through the study of rocks and minerals. Students will discover that the distinctive qualities and attributes of rocks and minerals are a result of how they were produced. Students need to understand how human activities involving rocks and minerals not only change the landscape but also have other impacts on the ecosystem.

GRADE 5

Unit 1: Human Organ Systems

- The concept is that the body is made up of several organs and that these organs are components of systems that can be impacted by various factors. The primary organs of the respiratory, circulatory, and digestive systems' location, structure, and function will be taught to students. The significance of good eating and exercise for the efficient operation of organ systems will also be taught.

Unit 2: Forces Acting on Structures and Mechanisms

- The forces acting on structures will be studied and described by the students. They will have a better comprehension of how structures react to forces by measuring and comparing external forces.

Unit 3: Properties of and Changes in Matter

- The environmental impact of material creation, usage, and disposal will be studied by the students. Students will also investigate matter (solids, liquids, and gases) and each type's features. They will also look at the changes in state and compare reversible physical changes with irreversible chemical changes.

Unit 4: Conservation of Energy and Resources

- The transmission of energy from one system to another will be explained to the students. Students must recognize and show an awareness of the safety procedures when creating devices. This includes understanding the need of maintaining a clean workspace.

GRADE 6

Unit 1: The Diversity of Living Things

- Students will discover that diversity in individuals, animals, and ecosystems is a component of biodiversity. Students will evaluate human influences on species and ecosystems through observations of a particular environment and be given the chance to explore various points of view.

Unit 2: Flight

- The characteristics of air that enable flight must first be taught to students. Students will learn what happens when the features of structures take advantage of specific characteristics of air (for example air takes up space, has mass, expands, and can exert a force when compressed). Then, they'll use what they've learned to develop and test a flying prototype.

Unit 3: Electricity and Electrical Devices

- Students will investigate tools that transform electricity into different forms of energy. Their knowledge of how electrical systems operate will be further strengthened through the construction of circuits.

Unit 4: Space Systems

- Students will focus on past and present-day contributions of space science while developing an understanding of the phenomena that result from the movement of different bodies in space. Investigations will involve working with models of the different bodies to allow students to explore their size, position, and motion and help them gain an understanding of Earth as a component of larger systems.

ELEMENTARY SCHOOL: INTERMEDIATE

GRADE 7

Unit 1: Interactions in the Environment

- Students will examine how human impacts the environment. Students will study current ecosystems and elements that could impact system balances while conducting their investigations. Students will discover that communities of plants and animals make up ecosystems and that these communities are reliant on both the non-living elements of the environment as well as one another.

Unit 2: Form and Function

- Students will keep learning about how forces interact with and affect various structural forms. By designing, creating, and testing structures using various methodologies, they will examine how various structural shapes sustain or endure forces. Other factors that affect a structure's functioning, such as the type of structure and centre of gravity, will also be explored.

Unit 3: Matter and Energy

- Students will learn that the majority of matter is either a mechanical mixture or a solution. To describe the nature of matter when doing experiments with both pure substances and mixtures, students will study particle theory.

Unit 4: Heat in the Environment

- The causes and effects of heat will be covered, along with its properties, and relationships to geological and meteorological processes. Students will design and create a device to reduce heat transfer. Additionally, they will use particle theory to help them interpret their findings.

GRADE 8

Unit 1: Cells

- By concentrating on the structure and function of cells in plants and animals, students will continue to expand their understanding of organisms. The usage of microscopes will also be covered with the students which are essential to examine cells in detail.

Unit 2: Systems in Action

- Students will learn to calculate the mechanical advantage of systems, their efficiency, and their effectiveness. Students must be able to identify and explain the importance of mechanical advantages and how they are used in trades and other applicable settings.

Unit 3: Fluids

- Principles of fluid mechanics, technological advancements based on fluids, and careers related to fluids will all be taught to students. Students will experiment with the viscosity and density of various liquids to learn about fluid properties. Students will investigate and measure the buoyant forces on various items to examine the consequences of Archimedes' principle.

Unit 4: Water Systems

- The significance of water systems in global ecosystems will be taught to students. They will also evaluate the recent technological innovations related to water systems.

SECONDARY SCHOOL

GRADE 9 DETAILED

<p>Unit 1: Biological Diversity</p> <ul style="list-style-type: none">● Cell Theory & Mitosis● Parts of a Cell● The Cell Cycle● Biotechnology● Agriculture	<p>Unit 2: Chemistry</p> <ul style="list-style-type: none">● Nature of Matter● Mixtures● Atoms● Periodic Table of the Elements● Atomic Model● Families of the Elements● Valence Electron Notes● Ionic Bonding Notes● Molecular Bonding● Molecular Bonding● Polymers
<p>Unit 3: Electricity</p> <ul style="list-style-type: none">● Static Electricity● Current Electricity● Electric Potential● Resistance● Power● Electric Circuits - Series & Parallel	<p>Unit 4: Earth and Space</p> <ul style="list-style-type: none">● What is in the Night Sky<ul style="list-style-type: none">○ Stars - constellations, life and death of a star, composition, size, brightness, colour○ Other celestial objects - planets○ Great distances - AU, light year● The Sun<ul style="list-style-type: none">○ Sun details and facts○ The Earth and the Sun● Planets<ul style="list-style-type: none">○ Planetary Database○ Inner vs. outer planet○ Order of planets, general facts/comparisons● The Moon<ul style="list-style-type: none">○ Moon phases○ Eclipses - solar and lunar● Objects in Space<ul style="list-style-type: none">○ Comets, asteroids, meteors, and meteorites.● The universe and Earth Creation Theory<ul style="list-style-type: none">○ Big bang theory○ Nebula theory

GRADE 10 DETAILED

Unit 1: Biology

- Microscope
 - Parts and Function
 - Microscope Math
 - Field of View calculations
 - Magnification calculations
 - Estimating cell size calculations
 - Biological Drawings
- Cell Structure and Function
- Cell Cycle - Mitosis
 - Cell Division
 - DNA - structure and function
 - Interphase, prophase, metaphase, anaphase, telophase, cytokinesis
- Plants - Plant Mitosis
- Biotechnology
- Tissues
 - Epithelial, muscle, nervous, connective
 - Dermal, ground, vascular (plant)
 - Cell specialization - stem cells, meristematic cells
 - Organs & Systems, Digestive system, Respiratory system, Circulatory system

Unit 2: Chemistry

- Classification of Matter
- Chemical Properties
- The Periodic Table
- Chemical Reactivity - Forming Ions
- Forming Compounds - Molecular vs. Ionic
- Nomenclature:
 - Binary Ionic, Polyatomic, Multivalent, Molecular
 - Acids - Binary and Oxyacids
- Chemical Reactions
 - Writing Chemical Equations
 - Balancing Equations
- Types of Reactions
 - Synthesis Reactions
 - Decomposition reactions
 - Single Displacement Reactions
 - Double displacement reactions
 - Neutralization
 - Combustion Reactions
- Acids and Bases

Unit 3: Physics

- Sources of Light
 - Luminous vs non-luminous
 - Incandescence
 - Electrical discharge
 - Radiant energy
 - Luminescence, fluorescence, phosphorescence, chemiluminescence, bioluminescence, triboluminescence
- The Nature of Light
 - Heat as Energy
 - Radiation and Waves
 - The Radiation Spectrum
 - Light Waves - Visible and Invisible
- Laws of Reflection
- Regular and Diffuse Reflection
 - Images in a Plane Mirror, Curved Mirrors, Concave mirrors, Convex mirrors
 - Ray diagrams
- Mirror Math
- Refraction of Light
 - Index of refraction, Partial reflection and refraction
 - Finding the critical angle
 - Total Internal Reflection
- Lenses
 - Converging Lenses
 - Diverging Lenses
 - Ray Diagrams
- Lens Equations/ Math

Unit 4: Climate Change

- Earth
- Factors that Affect Climate Change
- Describing Climate
- Indicators & Effects of Climate Change
- Energy Transfer in the Climate System
 - Climate Physics - convection currents, wind patterns, radiation
 - Ocean currents, thermohaline circulation
- Greenhouse Gases
 - Feedback loops for water vapour and global temperature and carbon dioxide
 - anthropogenic vs natural greenhouse effect

GRADE 11 BIOLOGY DETAILED

Unit 1: Biological Diversity

- Biological Drawing, Microscope Skills
- Taxonomy and Classification
 - Binomial nomenclature, The six kingdoms of life, Dichotomous key
- Biodiversity crisis, Invasive species
- Bacteria and Viruses
 - Bacteria, Types of bacteria, Structure of bacteria, Bacterial reproduction, Antibiotic resistance
 - Three-domain system, Characteristics of Archaea, Bacteria, and Eukarya
 - Helpful and harmful bacteria
 - Viruses, Structure of viruses, Replication of viruses
 - Lysogenic cycle
 - Viral vectors and gene therapy
- Plants, Fungi, and Protists
 - Kingdom Protista
 - Fungus-like protists, Animal-like protists, Plant-like protists
 - Eutrophication
 - Kingdom Fungi, Mycorrhiza, Symbiosis in lichens
 - Kingdom Plantae
- The Animal Kingdom
 - Characteristics and classification of animals, Body plan, Classification of animals
 - Invertebrates, simple and complex, joint-legged
 - Vertebrates, Class Mammalia, body temperature

Unit 2: Plants

- Plant Anatomy and Function
 - Vascular vs. Non-Vascular Plants
 - Roots, Stems, Leaves
- Plant Growth and Development
 - Importance of Plant Growth
 - Conditions needed for plant growth
 - Soil
 - Nutrients
 - Organic vs. Inorganic Fertilizers
 - Symbiotic rhizobial bacteria
 - Plant Adaptations
 - Plant Hormones
- Reproductive Mechanisms of Plants
 - Pollinators and Pesticides
 - Vegetative Propagation
 - Sexual Reproduction in Angiosperms
 - Pollination in Angiosperms
 - Seed Development and Germination
 - Dicot Germination
 - Pollen grains
 - Seed Dispersal
 - Sexual Reproduction in Gymnosperms
 - Gamete Formation and Fertilization in Conifers
 - Fertilization and Seed Development

Unit 3: Animals

- Digestive System
 - Nutrition, Polymers and monomers, Macronutrients, Micronutrients, Eating a balanced diet
 - Enzymes and digestion
 - The digestive system and food processing
 - The stomach, Digestion and absorption, Absorption and elimination
 - Accessory organs of digestion
- Respiratory System
 - How the human respiratory system works
 - Lung volume and its measurement
- Circulatory System
 - Human circulatory system, Structure of the human circulatory system
 - Blood cells and platelets, White blood cells (leukocytes)
 - Blood types, Blood vessels, Circulation: pulmonary and systemic
 - Blood pressure
 - Circulation within the heart muscle, How the heart contracts, The structure of the heart, The cardiac cycle and heart sounds
- Disorders of Internal Systems
 - Disorders of the digestive system, Crohn's disease, Ulcers, Heartburn/acid reflux
 - Disorders of the respiratory system, Bronchitis
 - Disorders of the circulatory system

Unit 4: Evolution and Genetics

- Natural Selection and Evidence for Evolution
 - Conditions required for natural selection
 - Variation within the population
 - Evidence of evolution by natural selection
- Evolutionary Mechanisms
 - Genetic variation
 - The four evolutionary forces, Mutation, Migration, Genetic drift, Selection
- Speciation
 - Reproductive-isolating mechanisms
 - Pre-zygotic isolation, Types of selection
- Cell Division
 - Reproduction, Asexual and sexual reproduction
 - DNA, Chromosomes, Haploid and diploid
 - Mitosis, Meiosis
- Mendel's Laws of Inheritance
 - Mendel's Law of Segregation
 - The Punnett square, Monohybrid, Dihybrid
- Chromosomes and Chromosomal Disorders
 - Sex-linked inheritance, Genes
 - Dominant and Recessive Disorders
- Biotechnology
 - Gene therapy, Treatments for human diseases
 - Cloning

GRADE 11 CHEMISTRY DETAILED

<p>Unit 1 : Composition and Properties of Matter</p> <ul style="list-style-type: none">● Atomic Theory<ul style="list-style-type: none">○ Particle Theory of Matter, Types of particles○ States of Matter○ Structure of the atom○ Isotopes, Radioisotopes○ Average atomic mass● Structures and Properties of Elements<ul style="list-style-type: none">○ Locations of electrons in atoms, Bohr-Rutherford diagrams○ Core and valence electrons○ Effect of Inner Electrons○ Atomic Radius○ First Ionization Energy, Electronegativity● Chemical Bonding<ul style="list-style-type: none">○ Reactivity○ Lewis structures○ Determining the Type of Bond○ Ionic bonding, Covalent bonding○ Law of Definite Proportions● Chemical Compounds and their Properties<ul style="list-style-type: none">○ Names and formulas for binary ionic, polyatomic ionic, and binary covalent compounds○ Properties of chemical compounds○ Kinetic Molecular Theory○ Bond polarity, Intermolecular forces● Quantifying elements and compounds<ul style="list-style-type: none">○ Scientific notation○ The Mole, Molar mass, Significant figures○ Percent composition, Empirical and molecular formulas	<p>Unit 2 : Chemical Reactions and Stoichiometric Relationships</p> <ul style="list-style-type: none">● Chemical reactions<ul style="list-style-type: none">○ Balancing chemical equations○ Law of Conservation of Mass○ Counting atoms○ Quantitative relationships in chemical reactions○ Mole ratios● Types of Chemical Reactions<ul style="list-style-type: none">○ Synthesis reactions○ Decomposition reactions○ Single displacement reactions○ The Activity Series of Metals○ Activity series for non-metals○ Double displacement reactions● Chemical Reactions in the Environment<ul style="list-style-type: none">○ Metals and the environment○ Corrosion○ Smelting○ Acids and bases, Acid-base neutralization reactions○ How acids and bases are made○ Combustion, Complete vs. incomplete combustion● Quantities in Chemical Reactions<ul style="list-style-type: none">○ Quantities of reactants and products○ Stoichiometry● Limiting and Excess Reagents<ul style="list-style-type: none">○ Predicting limiting and excess reagents○ Calculating limiting and excess reagents○ Limiting reactants in combustion reactions○ Identifying the limiting reagent○ The Stoichiometric Method: Limiting and Excess○ Calculating excess reactants○ Calculating percent yield
<p>Unit 3: Solutions, Solubility, and Acid-base Chemistry</p> <ul style="list-style-type: none">● Solutions and Their Characteristics<ul style="list-style-type: none">○ Solutions, Ion dissociation, Molecular solutions● Quantitative Characteristics of Solutions<ul style="list-style-type: none">○ The Solution, Percentage, and Molar concentration● Qualitative Analysis of Solutions<ul style="list-style-type: none">○ Solubility and temperature○ Colour of aqueous solutions● Acidic and Basic Solutions<ul style="list-style-type: none">○ Naming acids and bases○ Acid and base theories, Arrhenius's Theory of Acids and Bases○ Acid and base strength○ Acid and base pH○ Titration calculations	<p>Unit 4 : Gases and Atmospheric Chemistry</p> <ul style="list-style-type: none">● Chemical Reactions in the Atmosphere<ul style="list-style-type: none">○ The atmosphere○ What caused the hole in the ozone layer?○ Air Quality Health Index○ Carbon dioxide in the atmosphere● Properties of Gases<ul style="list-style-type: none">○ The Kinetic Molecular Theory○ Kinetic Molecular Theory of Gases○ Variables that can affect gases○ The pressure-volume relationship, The temperature-volume relationship, The pressure-temperature relationship○ The Combined Gas Law● The Ideal Gas Law and Gas Stoichiometry<ul style="list-style-type: none">○ Mixtures of gases○ Partial pressures○ The Ideal Gas Law○ The Law of Combining Volumes○ Molar volume

GRADE 11 PHYSICS DETAILED

<p>Unit 1: Waves and Sound</p> <ul style="list-style-type: none"> ● Characteristics of Waves <ul style="list-style-type: none"> ○ Classifying waves, Transverse, Longitudinal ○ Ideal versus real waves ○ Periodic motion, Quantifying wave motion ○ Simple pendulum, Frequency, Amplitude ○ Universal wave equation ○ Speed of a wave, Reflection of waves ● Transmission of Waves <ul style="list-style-type: none"> ○ Sound as a wave ○ Sound travels in air, Speed of sound in air, Sound travels in various materials ○ Sound is a longitudinal wave ○ The Doppler effect ○ Ultrasound ○ Sonar ● Interference of Waves <ul style="list-style-type: none"> ○ Wave, Constructive, and Destructive interference ○ Principle of superposition ○ Beats, Standing waves, Sonic booms ● Resonance <ul style="list-style-type: none"> ○ Mechanical resonance ○ Sympathetic vibrations ○ Resonance in strings ○ Air columns, Closed air columns, Open air columns 	<p>Unit 2 : Motion and forces</p> <ul style="list-style-type: none"> ● Analyzing Motion <ul style="list-style-type: none"> ○ Uniform motion, Non-uniform motion ○ Scalar versus vector quantities ○ Distance, Position, Displacement, Speed ○ Motion with graphs, Position-time graphs ● Accelerated Motion <ul style="list-style-type: none"> ○ Constant velocity, Average velocity, Instantaneous velocity ○ Acceleration, Kinematics equations ● Projectile Motion <ul style="list-style-type: none"> ○ Projectiles, Vertical and Horizontal projectiles ○ Finding the initial velocity components ● Forces <ul style="list-style-type: none"> ○ Quantifying forces ○ Mass versus weight ○ Free-body diagrams ○ Net force ○ States of Motion ○ Inertia ● Investigating Newton’s Laws <ul style="list-style-type: none"> ○ Force, mass, and acceleration ○ Newton’s Second Law of Motion ○ Newton’s Third Law ○ Action-reaction pairs ○ Force of friction
<p>Unit 3: Energy and Society</p> <ul style="list-style-type: none"> ● Work, Energy and Power <ul style="list-style-type: none"> ○ Sources of energy ○ Energy transformations ○ Electrical appliances ○ Work, Positive work, Zero work, Negative work ○ Power ● Conservation of Energy <ul style="list-style-type: none"> ○ Calculating gravitational potential energy ○ Kinetic energy ○ Law of conservation of energy ○ Percent efficiency ● Thermal Energy and Heat <ul style="list-style-type: none"> ○ Particle motion and thermal energy ○ Thermal energy, heat, and temperature ○ Convection currents in air, Radiation, Conduction ○ Calculating heat transfer, Quantity of heat ○ Cooling curve ● Nuclear Physics <ul style="list-style-type: none"> ○ Nuclear reactions, Nuclear energy ○ Radioactive atoms ○ Nuclear symbols ○ Nuclear decay, Half-life ○ Radiometric dating, Carbon dating 	<p>Unit 4 : Electricity and Magnetism</p> <ul style="list-style-type: none"> ● Static and Current Electricity <ul style="list-style-type: none"> ○ Electric charges, Measuring electric current ○ The Flow of electric charges ○ Calculating electric charge (Q) ○ Static electricity ○ Electric potential and electric potential energy ○ Measuring voltage ○ Ohm’s Law ● Electric Circuits <ul style="list-style-type: none"> ○ Drawing circuits ○ Mixed, Series and parallel circuits ○ Kirchhoff’s Current Law ○ Electric power ○ Cost of electricity ● Electromagnetism <ul style="list-style-type: none"> ○ Law of magnetic poles ○ Oersted’s discovery ○ Right-hand rule #1: Finding the direction of current ○ Right-hand rule #2: Magnetic field around a coil ○ Right-hand rule #3: Motor principle

GRADE 12 BIOLOGY DETAILED

<p>Unit 1: Population dynamics</p> <ul style="list-style-type: none"> ● Exploring human populations <ul style="list-style-type: none"> ○ Types of resources ○ Ecological Footprint ○ Factors Affecting Human Population Growth ○ Environmental consequences of human population growth ● Understanding the characteristics of populations <ul style="list-style-type: none"> ○ Defining and describing populations, Population Dispersion ○ Sampling populations ● Investigating population growth <ul style="list-style-type: none"> ○ How populations change, Population dynamics ○ Modelling and predicting population change ○ Density-dependent and density-independent factors ○ Population cycles and predator-prey dynamics ● Analyzing interactions among species <ul style="list-style-type: none"> ○ Levels of organization in ecological systems, Habitat ○ Types of interactions among organisms ○ Types of defences ○ Symbiosis, Community-level interactions 	<p>Unit 2: Biochemistry</p> <ul style="list-style-type: none"> ● Introducing chemistry for biologists <ul style="list-style-type: none"> ○ Hydrogen bonding in water ○ Properties of acids and bases ○ Neutralization reactions ○ Acid-base buffers ● Understanding macromolecules <ul style="list-style-type: none"> ○ Polymer/monomers ○ Building and breaking down macromolecules ● Exploring enzymes <ul style="list-style-type: none"> ○ Enzyme composition and function ○ Enzyme activation and inhibition ○ Competitive inhibition, Non-competitive inhibition ○ Allosteric activators and inhibitors ○ Feedback inhibition ○ Factors that affect enzyme activity ● Investigating cell transport <ul style="list-style-type: none"> ○ Cell structure, The cell membrane, Active transport ○ Endocytosis, Exocytosis
<p>Unit 3: Metabolic processes</p> <ul style="list-style-type: none"> ● Exploring energy for living organisms <ul style="list-style-type: none"> ○ Dietary energy ○ Metabolic rate ○ Caloric intake and dietary choices ○ Energy and the laws of thermodynamics ○ Energy in reactions ○ Redox reactions ○ ATP: Adenosine triphosphate ● Investigating cellular respiration <ul style="list-style-type: none"> ○ Aerobic cellular respiration ○ The role of enzymes and coenzymes ○ Glucose: An energy source ○ ATP yield through oxidative phosphorylation ○ Alternative metabolic pathways ○ Anaerobic cellular respiration ● Understanding photosynthesis <ul style="list-style-type: none"> ○ Photosynthesis ○ Structures involved in photosynthesis ○ 2 stages of photosynthesis, Light-dependent/independent reactions ○ Energy use and storage in plants ● The interconnectedness of living things <ul style="list-style-type: none"> ○ Comparing photosynthesis and respiration ○ Comparison of the structures and molecules involved in photosynthesis and aerobic cellular respiration 	<p>Unit 4: Molecular genetics</p> <ul style="list-style-type: none"> ● Understanding DNA <ul style="list-style-type: none"> ○ Chemical composition of DNA ○ Nucleotide structure ○ From nucleotides to DNA ○ The spiral or double helix structure of DNA ○ Extraction of DNA ● Investigating DNA replication <ul style="list-style-type: none"> ○ Finding the correct model of DNA replication ○ Stages in DNA replication ● Exploring protein synthesis <ul style="list-style-type: none"> ○ How mutations cause disease ○ Protein synthesis <p>Unit 5: Homeostasis</p> <ul style="list-style-type: none"> ● Introducing homeostasis <ul style="list-style-type: none"> ○ Homeostatic control systems ○ Thermoregulation ● Understanding the urinary system <ul style="list-style-type: none"> ○ Role of the excretory system ○ Main organs of the excretory system ○ Forms of Waste, Nitrogenous Waste ○ Blood pressure ● Discovering the endocrine system <ul style="list-style-type: none"> ○ Types of Hormones: Steroid and Protein ○ Pituitary Gland ● Exploring the nervous system <ul style="list-style-type: none"> ○ The Central and Peripheral Nervous Systems ○ Anatomy of nerve cells, Anatomy of a neuron ○ Neural circuits, The nerve impulse ○ Reflex arc, Propagation of the action potential ○ The brain, Neurotransmitters

GRADE 12 CHEMISTRY DETAILED

<p>Unit 1: Organic chemistry</p> <ul style="list-style-type: none">● Organic Compounds<ul style="list-style-type: none">○ Characteristics of Carbon○ Alkanes, Substituted Alkanes○ Structural Isomers● Hydrocarbons<ul style="list-style-type: none">○ Lipids, Fatty Acids○ Alkenes, Alkynes○ Isomers○ Aromatics● Drawing Compounds<ul style="list-style-type: none">○ The Lewis Structure of Neutral and Charged Compounds○ Valence Shell Electron Pair Repulsion (VSEPR) Theory○ How to Determine the Molecular Shape of a Compound○ Intermolecular Forces● Organic Compound Reactions<ul style="list-style-type: none">○ Addition, Elimination, Substitution, Oxidation, Condensation, and Hydrolysis	<p>Unit 2: Thermodynamic chemistry</p> <ul style="list-style-type: none">● Measuring Energy Changes<ul style="list-style-type: none">○ Calorimetry○ Specific Heat Capacity (c)○ Enthalpy (H)○ Molar Enthalpy○ The Enthalpy of Neutralization Reactions● Hess' Law
<p>Unit 3: Equilibrium</p> <ul style="list-style-type: none">● Balance<ul style="list-style-type: none">○ Reversible Reactions○ Le Chatelier's Principle○ Calculating Change● Constant<ul style="list-style-type: none">○ The Reaction Quotient● Predicting Change<ul style="list-style-type: none">○ The Autoionization of Water● Acid-Base Chemistry and Equilibrium<ul style="list-style-type: none">○ Arrhenius Acids/Bases and Bronsted-Lowry Acids/Bases○ The Relationship Between K_a and K_b for a Conjugate Acid-Base Pair○ The pH of Weak Acids and Bases○ Handling Logarithms, Antilogs and Significant Figures○ Calculating the pH of a Weak Acid or Base● Resisting Change Buffers<ul style="list-style-type: none">○ Buffers	<p>Unit 4: Electrochemistry</p> <ul style="list-style-type: none">● Oxidation Numbers<ul style="list-style-type: none">○ Valence Charges○ Assigning Oxidation Numbers● Balancing Acidic Half Reactions<ul style="list-style-type: none">○ Reduction○ Oxidation○ Reactions in An Acidic Solution○ Reactions in An Alkaline Solution● Standard Reduction Potentials● Voltaic Cells<ul style="list-style-type: none">○ Half-cells○ Salt bridge○ Anode○ Cathode <p>Unit 5:</p> <ul style="list-style-type: none">● Indirect Mechanisms<ul style="list-style-type: none">○ Thomson's Model of the Atom○ Rutherford's Model of the Atom● A Wave or a Particle?<ul style="list-style-type: none">○ The Quantum Model of the Atom○ Orbitals○ Electron Configurations

GRADE 12 PHYSICS DETAILED

<p>Unit 1: Dynamics</p> <ul style="list-style-type: none"> ● Investigating Vectors <ul style="list-style-type: none"> ○ Scalar Quantities vs. Vector Quantities ○ Vectors in 2-Dimensions, Drawing Vectors, Vector Addition ● Exploring Relative Motion <ul style="list-style-type: none"> ○ Relative Motion, Finding the Heading of a Moving Object ○ Vector Subtraction and Relative Velocity ● Examining Kinematics <ul style="list-style-type: none"> ○ Acceleration, Uniform Acceleration Variables ○ Kinematics Equations ○ Vertical, Horizontal, and Angular Projectile Motion ● Forces <ul style="list-style-type: none"> ○ Free-body Diagrams ○ Newton's Laws of Motion, three laws of motion ○ Net Forces, Collinear and Non-Collinear Vectors ○ Static and Kinetic Friction ● Uniform Circular Motion <ul style="list-style-type: none"> ○ Centripetal Acceleration and Force ○ Inertial versus non-Inertial frames, Centrifugal Force 	<p>Unit 2: Energy & Momentum</p> <ul style="list-style-type: none"> ● Work and Energy <ul style="list-style-type: none"> ○ Work, Negative Work, Zero Work ○ Gravitational Potential Energy, Kinetic Energy ○ Work-Energy Theorem, Thermal Energy ○ Conservation of Energy ● Elastic Potential Energy <ul style="list-style-type: none"> ○ Hooke's law ○ Elastic Potential Energy (EPE) ○ Law of Conservation of Energy ○ Simple Harmonic Motion ○ Damping, Suspension Systems ● Impulse and Momentum in One Dimension <ul style="list-style-type: none"> ○ Conservation of Momentum in One Dimension ○ Types of Collisions ○ Head-On Elastic Collisions ● Momentum in Two Dimensions <ul style="list-style-type: none"> ○ Impulse in Two Dimensions ○ Conservation of momentum in two dimensions
<p>Unit 3: Gravitational, Electric and Magnetic Fields</p> <ul style="list-style-type: none"> ● Gravitational Fields <ul style="list-style-type: none"> ○ Universal Gravitation ○ Cavendish's Torsion Balance ○ Geosynchronous Satellites ○ Weight and Artificial Gravity ● Exploring Electric Fields <ul style="list-style-type: none"> ○ Coulomb's Law ○ Law of Electric Charges ○ Electric Fields, Uniform Electric Fields ● Examining Electric Potential and Electric Potential Difference <ul style="list-style-type: none"> ○ Electric Potential Energy ○ Electric Potential Due to a Point Source Charge ○ The Millikan Oil Drop Experiment ● Discovering Magnetic Fields <ul style="list-style-type: none"> ○ Law of Magnetic Poles ○ Magnetic Force on a Charged Particle ○ Charged Particles in the Atmosphere ○ Magnetic Force on a Conductor 	<p>Unit 4: Light as a Wave</p> <ul style="list-style-type: none"> ● Understanding Properties of Waves <ul style="list-style-type: none"> ○ Defining a Wave, Transverse Wave ○ Diffraction, Effect of Wavelength ○ Wave Interference ● Interference of Light <ul style="list-style-type: none"> ○ Young's Double-Slit Experiment, Visible Light ○ Analysis of Light Interference Patterns ○ Holography: A Technology Based on interference ● Light Behaviour <ul style="list-style-type: none"> ○ Thin Film and Single-Slit Interference ○ Variables and equations ○ Multiple Slit Interference ○ Diffraction Grating Pattern ○ Path Difference Due to Film Thickness ● Polarization, Electromagnetic Radiation, and Light <ul style="list-style-type: none"> ○ Polarization of Light ○ Light Wave and Electromagnetism
	<p>Unit 5: Theory of Special Relativity</p> <ul style="list-style-type: none"> ● Frames of Reference <ul style="list-style-type: none"> ○ The Nature of Light, Simultaneity, Time Dilation ● Theory of Special Relativity <ul style="list-style-type: none"> ○ Length Contraction, Length Measurements ○ Time Dilation and Length Contraction ○ Relativistic Mass, and Energy, General Relativity ● Inquiring into Quantum Theory <ul style="list-style-type: none"> ○ Ultraviolet Catastrophe, Units of Quantum Energy ○ The Photoelectric Effect ● Discovering Wave-Particle Duality <ul style="list-style-type: none"> ○ The Compton Effect, The Wave Nature of Matter ○ The de Broglie Wavelength, Electron Microscope

