Science 300

Unit	Lesson Title	Lesson Objectives
1 YOU GROW AND CHANGE		
L1	Your Body Breathes Air	Understand that the body needs air Describe how air enters the body
L1a	The Body Needs Oxygen	Understand that animals need oxygen to live
L1e	Experiment S301A-Breathing Patterns	Measure breathing patterns Understand that the body needs oxygen
altl1e2	Experiment S301B-Your Lungs	Feel how lungs move during breathing
L2	Your Body Digests Food	Describe how food moves through the digestive system
L2e	Experiment S301C-Taste Test	Compare how foods pass through a paper towel
L3	Your Body Exercises and Rests	Understand that muscles and bones are important Describe how the heart and diaphragm work Describe how bones help the body
L3e	Experiment S301D-Taking Your Pulse	Practice taking a pulse Understand that a pulse tells how fast the heart is beating
altl3e2	Project S301E-Bone Numbers	Understand that the body is made of many bones
L4	Your Body is Different from an Animal	Describe the differences between humans and animals
2 PLANTS		
L1	Plant Parts	Describe the jobs of roots, stems, and leaves List the plant parts that store food
L1e	Experiment S302A-Root Hairs	Study root hairs on a plant
altl1e2	Experiment S302B-Study a Stem	Study the stem of a plant
L2	Plant Growth	List the things plants need to grow Explain how plants get carbon dioxide
L2e	Experiment S302C-Grow Some Plants	Test how light affects plant growth
L3	Plant Changes	Understand that plants grow and change in different ways List four ways plants can grow
L3e	Experiment S302D-Watch Bean Seeds Grow	Understand that plants come from seeds List the things seeds need to grow
altl3e2	Experiment S302E-Plant a Piece of Potato	Study the growth of a potato plant
altl3e3	Experiment S302F-Bean Plant	Study the growth of a bean plant Understand that some parts of a plant grow faster than other parts

Unit	Lesson Title	Lesson Objectives
3 ANIMALS: GROWTH AND CHANGE		
L1	Animals and The Environment	List the things animals need from the environment Understand that different animals live in different environments
L1e	Experiment S303A-Hourly Temperature Changes	Study how temperature changes with time
altl1e4	Experiment S303B-Heat Energy Comparison	Compare the energy needed to heat water and soil
altl1e5	Project S303C-Desert Locations	List world deserts and their locations
L2	How Animals are Different	Describe how animals are different from one another Understand that animals are built for the environments they live in
L2b	Animal Structures	Compare vertebrates and invertebrates Describe the structure of reptiles, birds, and mammals Define cold-bloodedness Compare insects and spiders
L2e	Project S303D-Vertebrate Chart	Group vertebrates by special characteristics
L2a	Eating and Breathing	Understand that birds use their beaks and feet in different ways to get food Describe how different animals breathe
altl2e2	Project S303E-Sort Birds By Type	Sort bird pictures by diet
L3	How Animals Grow and Change	Describe the metamorphosis of a butterfly Understand that amphibians live in water and on land Describe mammal babies
L3e	Project S303F-Sow Bug Environment	Study the behavior of sow bugs
4 YOU ARE WHAT YOU EAT		
L1	How to Build a Healthy Body	Describe how food helps the body Use the food pyramid to categorize common foods
L1a	How to Build a Healthy Body-2	Compare healthy and unhealthy foods
L2	How to Plan for Healthy Eating	List healthy food choices for breakfast, lunch, snack, and dinner
L3e	Project S304A-Breakfast Chart	Track the foods you eat for breakfast Understand that the body needs foods from each group
altl3e2	Project S304B-Lunch Chart	Track the foods you eat for lunch Understand that the body needs foods from each group
altl3e3	Project S304C-Dinner Chart	Track the foods you eat for dinner Understand that the body needs foods from each group
altl3e4	Project S304D-Chart Totals	Total the foods you ate for breakfast, lunch, and dinner Understand that the body needs foods from each group
L3	How to Form Good Health Habits	Describe healthy dental habits
L3a	Caring for the Eyes and Body	Describe healthy habits for the body and eyes

Unit	Lesson Title	Lesson Objectives
5 PROPERTIES OF MATTER		
L1	Chemistry and Robert Boyle	Understand that chemists study matter Identify Robert Boyle as a famous chemist
L1e	Experiment S305A-Be a Chemist	Experiment with matter
L2	Properties of Matter	Define matter Describe properties of common items Understand that all matter has volume and mass
L2e	Experiment S305B-Volume	Understand that all matter has volume and takes up space
altl2e2	Experiment S305C-Think about Mass	Understand that objects can have different weights and masses
altl2e3	Experiment S305D-Is Air Matter?	Test the mass of air
altl2e4	Project S305E-Matter List	List different types of matter
altl2e5	Experiment S305F-Is Water Matter?	Test the mass of water
L3	Physical Changes	Describe the different properties of solids, liquids, and gasses Give examples of physical change
L3e	Experiment S305G-Mass Measurement	Compare the mass of matter in different states
altl3e2	Experiment S305H-Melting Ice Cubes	Study how temperature affects ice cubes
L4	Chemical Changes	Understand that matter is made of tiny atoms and molecules Give examples of chemical change
6 SOUNDS AND YOU		
L1	Sounds are Made	Understand that sound is made from vibrations Give examples of objects that make sound
L1e	Experiment S306A-Vibrations	Experiment with sound vibrations from a drum
L2	Sounds are Different	Understand that sound travels in waves in all directions
L2a	How Do Sounds Travel?	Describe the different vibrations made by high and low sounds Describe how vocal sounds are made
L2e	Experiment S306B-Sound Patterns	Understand that sound can travel through things
L2e2	Report S306C-Read About Sound	Write about sound
L2e3	Experiment S306D-High and Low Sounds	Study how vibration speed affects sound
altl2e5	Experiment S306E-Loud or Soft?	Experiment with sound vibrations from a coffee can
L3	Sounds are Heard	Describe how the ear hears sound
L3e	Experiment S306F-Think About Hearing	Compare how well sounds are heard
altl3e2	Report S306G-How Animals Hear	Write about animal hearing

Unit	Lesson Title	Lesson Objectives
7 TIME AND SEASONS		
L1	How the Earth Moves	Define rotation and revolution Explain why the sun appears to move in the sky
L1e	Experiment S307A-The Earth	Understand that it can not be light all over the earth at once Understand that when one side of the earth is light the other
L1e2	Experiment S307B-Night	side is dark
altl1e3	Experiment S307C-The Earth's Rotation	Use a clay model to learn about the earth
L2	Why Time Changes	Identify the length of time in a day, year, and leap year Understand that time is not the same all over the world List the number of time zones in the world and in the United States Understand that it is day during different times around the
L2e	Experiment S307D-Different Times	world
altl2e3	Report S307E-Months	Write about how months got their names
L3	Why Seasons Change	Understand that seasons are caused by the tilt of the earth's axis Explain the difference in weather during summer and winter Compare the seasons of the Northern and Southern hemispheres
8 ROCKS AND THEIR CHANGE		
L1	How Rocks are Formed: By Heat	Understand that the earth is made of rock Identify the three layers of the earth Describe how igneous rocks are formed
L1a	Rocks Formed by Volcanoes	Describe igneous rocks are formed Give examples of past volcanic eruptions
L2	How Rocks are Formed: By Pressure	Describe how sedimentary rocks are formed Understand that rocks are made of tiny crystals called minerals Describe how metamorphic rocks are formed
L2e	Experiment S308A-Bubbling Grains of Rock	Watch how vinegar reacts with limestone
L3	Rocks are Changed by Wind and Water	Understand that water carries rocks and soil to different places Understand that wind can wear away rock
L4	Rocks are Changed by Heat and Plants	Describe how heat and cold can break rocks Describe how plants can break rocks
L5	Rocks are Used for Building	Describe how marble, granite, limestone, and gems are used
L5e	Report S308B-Mount Rushmore	Write about Mount Rushmore
L6	Rocks are Used for Enjoyment	Explain how to collect rocks Understand that gems are rare and valuable rocks

Unit	Lesson Title	Lesson Objectives
9 HEAT ENERGY		
L1	Heat Energy (Part 1)	Identify five sources of heat Define friction List the things fire needs to burn
L1e	Experiment S309A-Feeling Friction	Use friction to create heat
l1e2	Experiment S309B-Oxygen and Fire	Understand that fire needs oxygen to burn
L2	Heat Energy (Part 2)	Describe how electricity is created and used for heat Identify the sun as the primary source of heat on earth Explain the effect of color on light absorption
altl1e3	Experiment S309C-Static Electricity	Create static electricity
L2e	Experiment S309D-Water Molecules	Understand that water molecules move faster in hot water
L2e2	Experiment S309E-Changing Liquid to Gas	Understand that heat can change liquid into gas
L3	What Heat Energy Is and Does	Define heat energy Describe how heat energy changes molecule movement Explain how heat energy can change the state of matter
L4	Movement of Heat Energy	Describe how heat moves by radiation, conduction, and convection Understand that heat causes gas to expand and rise
L5	Heat Energy Affects Our Lives	Compare the benefits and problems of heat energy Understand that energy must be used carefully
10 REVIEW		
L1	Physical Change: Change in Man	Review the important things people need to live Review how people breathe Review healthy and unhealthy foods
L2	Physical Change: Change in Plants	Review the jobs of plant roots, stems, and leaves Review the important things plants need to live
L3	Physical Change: Change in Animals	Review the important things animals need to live Review the differences between invertebrates and vertebrates Review the metamorphosis of insects
L4	The Earth	Review matter and describe the three states Review how igneous, metamorphic, and sedimentary rocks are formed Review how rocks can be eroded
L5	Seasons and Times	Review why the earth has seasons Review why time of day is different around the world Review the length of time in a day, year, and leap year
L5e	Project S310A-Rock Collection	Write about rocks
L6	Sounds and Energy	Review sound as a vibration Review how sound moves Review five sources of heat energy Review how heat can change the state of matter
L6e	Experiment S310B-How Sound Travels	Understand that sound can travel through objects
L6e2	Experiment S310C-Temperature Comparisons	Study how color affects temperature

Science 400

Unit	Lesson Title	Lesson Objectives
1 PLANTS		
L1	Plant Life	Compare living and non-living things Understand that plants are living things that grow
L2	Plants Used As Food and Shelter	Describe how plants are used for food List examples of foods that come from plants Describe how plants are used for shelter
altl2e2	Project S401A-Things Made of Wood	List objects made of wood
altl2e3	Report S401B-Read and Write	Write about fruit grown in another country
L3	Plants Used For Enjoyment and Symbols	Understand that plants can be enjoyed Understand that plants are used as state symbols
L3e	Report S401C-Flowers as State Symbols	List state flowers
altl3e2	Report S401D-Flower Paragraph	Write about a state flower
L4	Parts of Plants	Identify the main parts of a plant Describe the jobs of roots, stems, leaves, and flowers
L5	How Plant Parts Function	Describe how roots and root hairs function Describe how plant stems function Understand that tubes in plant stems carry water to the
L5e	Experiment S401E-Celery	leaves
L6	How Plant Parts Function (Part 2)	Identify two important functions of leaves Describe photosynthesis and identify the materials needed to complete the process Understand that when leaves decay they return nutrients to the soil
L7	How Plant Parts Function (Part 3)	Explain why flowers are important Identify parts of a flower

Unit	Lesson Title	Lesson Objectives
2 ANIMALS		
L1	How Animals are Structured	Explain the difference between vertebrates and invertebrates
		Describe characteristics of fish, reptiles, birds, and mammals
		Describe characteristics of elephants
L2	Whales	Identify the largest mammal and largest land mammal
		Describe characteristics of whales
L2e	Report S402A-Types of Whales	Compare three types of whales
L3	Birds	Describe the structure of a bird wing
		Describe the migration of terns and swans
L4	Reptiles and Fish	Describe characteristics of reptiles
		Describe characteristics of fish
altl4e	Report S402B-Writing about Fish	Write about fish
altl4e2	Project S402C-Observing Fish	Observe the behavior of fish
L5	How Animals Eat and Digest Food	Explain how teeth shape and diet are related
		Describe digestion in an animal
L6	How Animals Breathe	Compare the breathing processes of fish, mammals, reptiles, birds, amphibians, and insects
L7	How Animals Act: Mammals	Describe how dogs and cats act when kept as pets
L8	How Animals Act: Salmon	Describe the life cycle of a salmon
L9	How Animals Act: Birds	Describe how ostriches and weaver birds act
		Describe how birds defend their territory
L10	How Animals Act: Insects	Describe the behavior of bees and crickets
		Calculate temperature using cricket chirps
L10e	Report S402D-Honeybee Habits	Write about honeybees
L11	Animal Instinct	Define instinct
		Describe how bats use sonar
		Describe the instinctual behavior of sea turtles
L12	Man Protects Animals	Identify ways man protects animals
altl12e	Project S402E-Animal Scrapbook	Organize animal pictures by special characteristics

Unit	Lesson Title	Lesson Objectives
3 MAN AND HIS ENVIRONMENT		
L1	Ecology	Define ecology and environment Explain why ecology is called the "web of life"
altl1e	Project S403A-Your Environment	Draw and describe your environment
L2	Resources	List four important environmental resources Describe the importance of water, air, light, and soil
L3	Food Chains	Compare food chains and food webs Trace the flow of energy through a food chain/web
L4	Ecosystem Populations	Describe the roles of producers, consumers, and decomposers Give examples of producers, consumers, and decomposers Explain why plants are the most important population
altl4e	Project S403B-Populations	List the plant and animal populations in your environment
L5	Balance of Nature	Explain the importance of balance in an ecosystem Understand that producers must be the largest population for an ecosystem to survive
altl4e2	Project S403C-Make a Pyramid	Organize plants and animals in a population pyramid
altl5e	Report S403D-Rabbits in Australia	Explain how the balance of nature was upset for rabbits in Australia
L6	Water Communities	Describe the roles of organisms in a salt water and river communities
altl6e	Experiment S403E-Still Water Life	Study plant and animal life in a still water communivty
L7	Land Communities	Identify and describe organisms in a field, desert, and forest communities
L7e	Project S403F-Human Communities	Write about the needs and structure of your community
altl7e	Report S403G-Read and Write	Write a story about the life of a bee
altl7e2	Project S403H-Terrarium or Diorama	Create and observe a desert terrarium
altl7e3	Report S403I-Forest Community	Write about plant and animal life in a forest community
L8	Misuse of the Environment	Describe different types of erosion and pollution Describe ways to conserve resources and protect the environment Explain why many animals are endangered or extinct
altl8e	Project S403J-Ask an Expert	Interview an agricultural agent Write what you learned about soil
altl8e2	Report S403K-Endangered Species	Write about an endangered animal
L9	Resource Conservation	Describe ways to replace natural resources Describe ways to conserve existing resource Explain how the sun can be used as a resource
altl9e	Report S403L-How to Save Energy	Write about renewable energy List ways to save energy
L10	Environmental Preservation	Describe how national parks preserve natural resources
altl10e	Report S403M-Special Treasures	Write about a national park

Unit	Lesson Title	Lesson Objectives
4 MACHINES		
L1	Machines Are Needed: Work	Understand that man has used machines to do work Explain how gravity and friction affect machines
altl1e	Report S404A-Galileo	Read and answer questions about Galileo Galilie
altl1e2	Experiment S404B-Gravity	Examine how air friction affects gravity
L2	Machines Are Needed: Energy	Describe energy Compare potential and kinetic energy Explain the relationship between energy and force and work
L3	Simple Machines: Lever	Describe how a lever works Give examples of common levers
L3e	Experiment S404C-Hammer and Nail	Compare work with and without use of a simple machine
altl3e2	Experiment S404D-Seesaw	Examine how fulcrum location affects amount of work needed
L4	Simple Machines: Inclined Plane	Describe how an inclined plane works Give examples of common inclined planes
altl4e	Experiment S404E-Inclined Plane	Compare work with and without use of a simple machine
L5	Simple Machines: Wedge and Screw	Identify wedges and screws as special inclined planes Describe how wedges and screws work Give examples of common wedges and screws
altl5e	Experiment S404F-Screw and Nail	Compare the strength of a nail and a screw
L6	Simple Machines: Wheel and Axle	Describe how a wheel and axle works Describe how gears work Give examples of common wheels and axles and gears
L7	Simple Machines: Pulleys	Describe how a pulley works Compare fixed and block and tackle pulleys Define mechanical advantage
altl7e	Experiment S404G-Pulleys	Compare the mechanical advantage of two pulley types
L8	Compound Machines	Define compound machine Give examples of common compound machines

Unit	Lesson Title	Lesson Objectives
5 ELECTRICITY AND MAGNETISM		
L1	Electricity	Identify lightning as an electrical charge Identify the three particles in an atom Describe what happens when an atom loses or gains electrons
L1e	Report S405A-Thomas Edison	Write about Thomas Edison
L1e2	Experiment S405B-Static Electricity	Examine the effects of static electricity
L2	Currents and Circuits	Describe Volta's electrical cell Compare conductors and insulators and give examples of each Compare the electrical flow in complete and broken circuits
L2e	Project S405C-Conductors	Classify items as conductors or nonconductors
altl2e2	Experiment S405D-Wet Cell	Create a battery using wire and a lemon
altl2e3	Project S405E-Electric Objects	List household items that use electricity
L3	Electrical Use and Safety	List uses for electricity in everyday life Describe the safety benefits of fuses and circuit breakers Describe electrical safety precautions
L3e	Project S405F-Fuses in Use	Study and write about car fuses
L4	Magnetism	Describe the properties of a magnet Define and give examples of electromagnets Explain how a generator makes electricity
L4e	Experiment S405G-Use a Magnet	Test the attraction between a magent and various objects
L4e2	Experiment S405H-Make a Magnet	Make a magnet from a nail
altl4e3	Experiment S405I-Magnet Poles	Identify the poles of a magnet
altl4e4	Experiment S405J-Testing a Magnet	Test the north pole of a magnet
altl4e5	Experiment S405K-Generate Electricity	Create an electrical current using a magnet
altl4e6	Experiment S405L-Electromagnet	Create an electromagnet
altl4e7	Report S405M-Explorers	Write about the explorers who discovered the North and South poles

Unit	Lesson Title	Lesson Objectives
6 WATER AND MATTER		
L1	Water	Identify the three states of water
		Describe what happens to water when it is heated and cooled
		Compare the Fahrenheit and Celsius temperature scales
L1e	Experiment S406A-Ice	Examine the properties of ice
altl1e2	Experiment S406B-Ice Volume	Compare the volume of ice and water
L2	Water as a Liquid	Identify sources of water in nature
		Describe the water cycle
		Describe the importance of water in the body
altl2e2	Experiment S406C-Potato	Determine the amount of water in a potato
L3	Water as a Gas	Describe the water cycle
		Understand that when water condenses it changes from a gas to a liquid
altl3e	Experiment S406D-Forming Dew	Observe condensation
L4	Water as a Solvent	Compare soluble and insoluble substances
		Explain the difference between a solution and a suspension
L4e	Experiment S406E-Solubility	Compare the solubility of different materials
L5	Matter	Describe the properties of solids, liquids, and gasses
		Compare mass and weight of matter
		Describe the properties of common items
L6	Molecules and Atoms	Understand that all matter is made of molecules
		Understand that molecules are made of atoms
altl6e	Experiment S406F-Molecules	Compare the strength of smell of perfume and amonia
L7	Elements	Define element and give common examples
		Identify common elements by chemical sign
7 WEATHER		
L1	The Atmosphere	Understand that plants and animals need air to live
		Identify the levels of the atmosphere
		Describe the characteristics of the troposphere and stratosphere
altl1e	Experiment S407A-Air and Space	Determine if air has volume
L2	Temperature	Describe how the sun heats the air
		Compare temperatures at high and low elevations
L2e	Experiment S407B-Temperature	Compare the effect of heat on different materials
L3	Air Pressure	Compare air pressure at high and low elevations
		Describe how wind is created by warm and cool air
L3e	Experiment S407C-Pressure	Observe the effect of pressure
L4	Forces of Weather	Explain how thunder and lightning can be used to tell the
		Describe storm safety precautions
		Describe the characteristics of different types of storms
L5	Sand and Dust Storms	Describe the effects of sand and dust storms
altl5e	Report S407D-Hurricanes	Write about hurricanes
		Describe how different instruments are used to measure and
L6	Prediction of Weather	predict weather
altl6e	Project S407E-Thermometers	Compare Fahrenheit and Celsius thermometers

Unit	Lesson Title	Lesson Objectives
8 OUR SOLAR SYSTEM AND THE UNIVERSE		
L1	A Trip Through Space	Order the eight planets in the solar system Describe characteristics of the eight planets
L2	Our Big Universe	Explain how the telescope was invented Describe how telescopes, spectroscopes, and radio telescopes help scientists study space
	Report S408A-Astronomy	Write about on the telescope, spectroscope, orradio
L2e	Instruments	telescope
altl2e	Essay S408B-Astronomy	Write about the importance of the mind in astronomy
L3	The Sun	Describe the importance of the sun
altl3e	Essay S408C-Ancient People	Explain the reason behind ancient beliefs about the sun
L4	Movements	Describe the movement of the sun Describe how gravity affects the motion of the sun and planets Explain how Newton discovered gravity
altl4e	Report S408D-Isaac Newton	Write about Isaac Newton
L5	Heavenly Bodies Around the Sun	Compare revolution and rotation Describe the characteristics of planets, meteors, comets, and asteroids
L6	Our Moon	Describe the characteristics of the moon and its orbit Explain the importance of the Apollo 11 mission
L6e	Experiment S408E-Moon Phases	Use a model to create phases of the moon
L7	The Stars and Space	Compare astrology and astronomy Describe how stars are used to tell seasons, time, and direction
altl7e	Essay S408F-Astrology	Explain why astrology is a false science
L8	The Milky Way and Other Galaxies	Identify our galaxy as the Milky Way Understand that the universe is infinite and contains many other galaxies
9 THE PLANET EARTH		
L1	The Air (Atmosphere)	Identify and describe the layers of the atmosphere
L1e	Experiment S409A-Condensation	Condense water on a glass
L2	Gases in the Atmosphere	Identify the gases in the atmosphere Understand that oxygen is necessary for life
L3	The Water (Hydrosphere)	Explain the importance of water Describe the distribution and sources of water on earth Describe the water cycle
altl3e	Essay S409B-Psalm 147	Interpret the meaning of Psalm 147
L4	Salt Water	Describe the characteristics of oceans and seas Describe the effects of ocean currents
altl4e	Experiment S409C-Currents	Create a convection current in water
L5	The Land (Lithosphere)	Identify the layers of the earth Describe the characteristics of each layer Describe how the spherical shape of the earth was discovered
L5e	Experiment S409D-Shadows	Compare the shadows made by a disk and a sphere
L6	Earth's Land Formations	Describe characteristics of mountains, plains, and volcanoes Describe the effects of earth's gravity and magnetism
L7	Earth's Rotation and Revolution	Describe the rotation and revolution of the earth

Unit	Lesson Title	Lesson Objectives
10 UNDERSTANDING GOD'S WONDERFUL CREATION		
L1	Review: The Solar System	Understand that God created the universe Review the characteristics of the sun, moon, planets and stars
L2	Review: The Earth	Review the structure and function of plants Review the structure and behavior of animals Review how animals are protected by man
L3	Review: Matter	Review the properties of matter, molecules, and elements Review the states of matter
L4	Review: Water	Review the states of water Review the sources and uses of water
L5	Review: Weather	Review the states of water Review the sources and uses of water
altl5e	Project S410A-Weather Scrapbook	Create a scrapbook on different types of weather
L6	Review: Electricity and Magnetism	Review the effects of gravity on the earth and in space Review the parts of an atom Review electricity and electrical safety precautions Review magnetism and the use of electromagnets
altl6e	Project S410B-Thomas Alva Edison	List five facts about Thomas Edison
L7	Review: Machines	Review the use and structure of simple and compound machines
L8	Review: Ecology	Review the importance of balance in nature Review the flow of energy in a food chain/web Review organisms in forest, desert, river, ocean, and field communities
L9	Review: Conservation	Review ways to conserve energy and natural resources Review causes of pollution and erosion
altl9e	Report S410C-Passenger Pigeon	Write about passanger pigeons

Science 500

Unit	Lesson Title	Lesson Objectives
1 CELLS		
L1	The Basic Unit of Living Things: A Cell	Give a basic definition of a cell and explain what a cell is. Label the different basic parts of a cell. Identify different types of cells.
L2	Viewing Cells	Identify different types of cells. Use a microscope to examine examples of different types of cells.
L2e	Experiment: Skin Cells	
L3	The Life and Activity of Cells	Label the different basic parts of a cell. Identify different types of cells. Explain in more detail the make-up of the cell membrane, cytoplasm, and nucleus. Examine some unique characteristics of different types of cells.
L4	Plants and Unicellular Organisms	
L4e	Experiment: Onion Cells	Examine the structure of onion cells using a microscope
L4e2	Experiment: Pond Water Examination	Observe pond water organisms using a microscope
L4e3	Experiment: Cheek Cells	Examine cheek cells using a microscope Compare cheek and skin cells
L4e4	Experiment: Blood Cells	Examine blood cells using a microscope
L5	Tissue	Describe the function of plant tissue Describe the functions of different types of animal tissue
L6	Energy and Growth of Cells	Define what energy is and explain how plants and animals receive and produce energy.
L7	Cell Reproduction	Explain how cells reproduce and grow.

Unit	Lesson Title	Lesson Objectives
2 PLANTS: LIFE CYCLES		
L1	Classifying Living Things and Plants	Classify all living things into one of five kingdoms. Explain differences between the main categories of plants, fungi, and protists.
L2	Parts of Plants	Identify the main kinds and parts of plants. Describe the life cycles of plants, fungi, and some protists.
L3	Seed Bearing Plants	Describe the life cycles of plants, fungi, and some protists. Relate the structure of plants, fungi, and protists with their reproduction in a life cycle. Identify the main reproductive parts of seed-bearing and spore-bearing organism.
L4	Flowering Plants	Identify the main reproductive parts of seed-bearing and spore-bearing organism.
L4e	Experiment S502A-Flower Dissection	Identify the main reproductive parts of seed-bearing and spore-bearing organism. Relate the structure of plants, fungi, and protists with their reproduction in a life cycle.
L5	Fertilization	Identify the main reproductive parts of seed-bearing and spore-bearing organism.
L5e	Experiment S502B-Seed Dissection	Identify the main reproductive parts of seed-bearing and spore-bearing organism.
L6	Cone-Bearing Plants	Identify the main reproductive parts of seed-bearing and spore-bearing organism.
L6e	Project S502C-Examining Cones	Identify the main reproductive parts of seed-bearing and spore-bearing organism.
altl6e2	Project S502D-Seed Hunt	Identify the main reproductive parts of seed-bearing and spore-bearing organisms.
L7	Spore Bearing Plants and Fungi	Describe the life cycles of plants, fungi, and some protists. Explain differences between the main categories of plants, fungi, and protists. Relate the structure of plants, fungi, and protists with their reproduction in a life cycle.
L8	Fern Plants	Identify the main reproductive parts of seed-bearing and spore-bearing organisms. Relate the structure of plants, fungi, and protists with their reproduction in a life cycle.
altl8e	Report S502E-Walking Fern	Explain differences between the main categories of plants, fungi, and protists.
L9	Fungi	1. Describe the life cycles of plants, fungi, and some protists. 2. Explain differences between the main categories of plants, fungi, and protists. 3. Relate the structure of plants, fungi, and protists with their reproduction in a life cycle.
L9e	Experiment S502F-Mold	1. Describe the life cycles of plants, fungi, and some protists. 2. Relate the structure of plants, fungi, and protists with their reproduction in a life cycle.
L10	One-celled Living Things	1. Describe the life cycles of plants, fungi, and some protists. 2. Explain differences between the main categories of plants, fungi, and protists. 3. Relate the structure of plants, fungi, and protists with their reproduction in a life cycle.

Unit	Lesson Title	Lesson Objectives
3 ANIMALS: LIFE CYCLES		
L1	Invertebrates: Life Cycles	Describe the life cycles of invertebrates. Explain the differences between the life cycles of invertebrates.
L2	One-celled Organisms	Identify protozoa as single celled organism Compare the structure of amoeba and paramecium Describe the reproduction of one-celled organisms
altl2e	Report S503A-Protozoa	
L3	Egg-Laying Invertebrates	Identify characteristics of insects Compare the life stages of different insects Describe the reproduction of insects
altl3e	Experiment S503B-Mealworm	Observe the behavior and growth of a mealworm
altl3e2	Report S503C-The Spider	Research and answer questions about spiders
altl3e3	Report S503D-Insect Study	Write about the life cycle of an insect
L4	Worms and Mollusks	Compare the life stages of a worms and mollusks Identify characteristics of worms and mollusks
L5	Vertebrates: Life Cycles	Identify characteristics of vertebrates Describe the life stages of vertebrates
L6	Egg-Laying Vertebrates	Describe the life cycle of salmon Explain why the theory of fish evolution into amphibians is false
L7	Egg-Laying Vertebrates (Part 2)	Describe the life cycle of a frog
L8	Egg-Laying Vertebrates (Part 3)	Describe characteristics of reptiles, amphibians, and birds Describe the life cycles reptiles and robins
altl8e	Experiment S503E-Chicken Egg	Examine the external and internal structure of a chicken egg
L9	Live-Bearing Vertebrates	Describe characteristics of mammals Describe the life cycle of a mammal
altl9e	Report S503F-Mammals	Write about a mammal
altl9e2	Essay S503G-God and Animals	Write an essay on the meaning of Psalm 104

Unit	Lesson Title	Lesson Objectives
4 BALANCE IN NATURE		
L1	Balance of Nature: Physical Environment	Identify factors that are required for life Describe the water cycle Understand that organisms depend on each other Describe the carbon dioxide - oxygen cycle Explain the importance of carbon dioxide and oxygen for plants and animals
altl1e	Project S504A-Cycles	Draw the water cycle, carbon cycle, and chemical cycle
L2	Ecosystems	Define and identify producers, consumers, and decomposers Identify and describe food chains in nature Explain why nature needs population differences between producers, consumers, and decomposers
L2e	Project S504B-Terrarium Project	Build the terrarium.
L3	The Prairie: Web of Life	Explain what is meant by a food chain and to give examples. Know some details about the web of life in a prairie ecosystem
altl3e	Project S504C-Prairie Land	List prairie lands in North America
L4	The Prairie: Web of Life (Part 2)	Define and identify producers, consumers, and decomposers Identify and describe food chains in nature Explain why nature needs population differences between producers, consumers, and decomposers
altl4e	Report S504D-Prairie Birds	Write about a prairie bird
L5	The Prairie: Food Chains	Explain food chains
altl5e	Project S504E-Prairie Food Chain	List food chains found in the prairie
altl5e2	Project S504F-Special Environments	Write about an environment
L6	Humans and the Web of Life	Name two problems that human beings have made for God's web of life
L7	Humans and the Web of Life (Part 2)	Understand the nature of man's stewardship of the world

Unit	Lesson Title	Lesson Objectives
5 TRANSFORMATION OF ENERGY		
L1	Energy	Describe energy Identify forms of energy Describe work
L2	Work	Understand work
L3	Work From Energy	Define work Understand how to measure work
altl3e	Experiment S505A-Heat From the Sun	Investigate how light energy and temperature are related
L4	Forms of Energy	Describe forms of energy Define friction
altl4e	Experiment S505B-Heat from Bending	Investigate how movement and heat are related
altl4e2	Experiment S505C-Heat Energy from a Chemical Reaction	Investigate how chemical energy and temperature are related
L5	Chemical Energy	Describe how chemical energy can be transfomed into heat energy
L6	Energy in the Future	Explain the relationship between work and energy. Identify energy concerns of today that may be problems of the future. Describe several possible energy sources of the future.
L7	Future Sources of Energy	Describe several possible energy sources of the future.
L7e	Experiment S505D-Solar Energy for Heat	Investigate how light energy and water temperature are related
6 RECORDS IN THE ROCK: THE FLOOD		
L1	Before the Flood: The Bible Record	Describe plant and animal life before the flood
L2	Before the Flood: The Physical Record	Describe plant and animal life before the flood
L3	The Flood: The Bible Record	Describe Bible records of the earth before, during and after the Flood
altl3e	Project S506A-Noah	Write a news article about an interview with Noah
L4	The Flood: The Physical Record	Describe the physical record of the Flood
altl4e	Report S506B-Ancient Flood Stories	Research and answer questions about flood stories from other cultures
L5	After the Flood: The Bible Record	Describe Bible records of the earth before, during, and after the Flood. Identify changes in the earth after the Flood. Explain the relationship between Bible records of the Flood and physical records.
L6	After the Flood: The Physical Record	Describe physical records of the earth before, during, and after the Flood. Identify changes in the earth after the Flood. Explain the relationship between Bible records of the Flood and physical records.

Unit	Lesson Title	Lesson Objectives
7 RECORDS IN THE ROCK: FOSSILS		
L1	Fossil Formation	Describe characteristics of different fossil types Explain where fossils may be found
L1e	Project S507A-Mold Fossil Copy	Create a copy of a fossil mold
altl1e	Project S507B-Cast Fossil Copy	Create a copy of a fossil mold
L2	Fossil Formation Part 2	Describe how petrified and carbonized fossils are formed Understand that fossils are the result of rapid burial
L3	Fossil Locations	Identify locations where fossils have been found
L4	Reading Fossils: Identification	Describe fossil identification procedures.
L5	Reading Fossils: Earth's Age	Understand that the earth is relatively young
altl5e	Project S507C-Plant and Animal Fossils	Draw a picture and write an article about a plant or animal group
L6	Reading Fossils: Difficulties	Identify difficulties in fossil identification Identify clues that can help identify fossils Describe how scientists use clues to make conlcusions about fossils
altl6e	Project S507D-Fossil Clues	Identify clues for fossil identification
L7	Reading Fossils: Reconstruction	Describe how scientists reconstruct fossils
altl7e	Project S507E-Label the Skeleton	Use a skeleton to infer what an animal might have looked like
altl7e2	Project S507F-Be Creative	"Reconstruct" a skeleton using bones of different animals
8 RECORDS IN ROCK: GEOLOGY		
L1	Features of the Earth	Describe the size and shape of the earth
L1e	Project S508A-Examine an Orange	Examine the skin of an orange at two diffferent distances Compare your observations to the appearance of the earth's surface
L2	Layers of the Earth	Describe the earth's layers
L3	Rocks on the Earth's Surface	Describe the rocks on the earth's surface
altl3e	Project S508B-Examine a Mineral	Examine the structure of salt using a magnifying glass
L4	Kinds of Rocks	Describe the different kinds of rocks
altl4e	Report S508C-Rocks	Research and write about a type of rock
altl4e2	Project S508D-Rock Hunt	Complete an activity about rocks
L5	Changes in the Earth	Describe the forces that change the earth's surface Tell how the surface of the earth is changing Compare the structure of minerals in rocks and in their natural state
altl5e	Experiment S508E-Erosion	Investigate the effect of running water on soil erosion
L6	Causes of Surface Change	Describe the forces that change the earth's surface Tell how the surface of the earth is changing
L7	Earthquakes and Volcanoes	Describe forces from under the surface of the earth
altl7e	Project S508F-Volcano Summary	Research and write a summary on a famous volcano
L8	Results of Forces	Understand that the earth is always changing

Unit	Lesson Title	Lesson Objectives
9 CYCLES IN NATURE		
L1	Properties of Matter	Identify the properties of matter Tell about the changes in matter
L2	Properties of Matter (Part 2)	Identify properties of matter Tell about the changes in matter
L2e	Experiment S509A-Volume	Calculate the volume of an object using water displacement
L3	Changes in Matter	Compare physical and chemical changes Describe the three states of matter and how they are affected by temperature Identfiy common chemical changes
altl3e	Experiment S509B-Water in Liquid State	Compare the shape of water in different containers
altl3e2	Experiment S509C-Chemical and Physical Changes	Compare physical and chemical changes using heat energy
L4	Conservation of Matter	Explain the law of conservation
altl4e	Experiment S509D-Conservation of Matter	Make a prediction using prior knowledge Test the law of conservation of matter
L5	Structure of Matter	Explain the structure of matter
L6	Other Natural Cycles: Seasons	Describe the four seasons
L7	The Cause of Seasons	Explain why seasons occur
altl7e	Project S509E-Globe	Use a model to determine why the earth has seasons
L8	Comets	Describe comets
altl8e	Report S509F-Famous Comets	Research and write about a comet
L9	Life	
altl9e	Experiment S509G-Water Evaporation	Investigate the effect of water temperature on rate of evaporation
L10	God's Order	Explain Bible accounts of God's order in creation.
10 LOOK AHEAD		
L1	Living Things: Plants, Fungi, Protists, and Monerans	Review the heirarchy of structure in an organism Review and describe the components of a plant cell Review how plants make their own food
L2	Living Things: Animals and Animal-Like Protists	Review common protozoa and invertebrates Review characteristics, life cycles, and reproduction of vertebrates
L3	Living Things: Balance of Nature	Review how all living things depend upon one another
L4	The Earth: Records of Life	Explain geological records. Compare physical records and Biblical records of the earth's past.
L5	The Earth: Fossils	Review different types of fossil Review how fossils are formed
L6	The Earth: Records in Rock	Review Biblical records that explain the geological history of the earth
L7	Order in Creation	Describe the balance of nature.
L8	Energy and Work	Identify types of energy and work
L9	Matter	Review the structure and properties of matter Review physical change and chemical change Review cycles in nature

Science 600

Unit	Lesson Title	Lesson Objectives
1 PLANT SYSTEMS		
L1	Photosynthesis: Location	Identify parts of a leaf Identify the location of photosynthesis
	Experiment S601A-Anacharis	
L1e	Photosynthesis	Investigate the effect of light on photosynthesis
L2	Photosynthesis: The Leaf Factory	Identify the components and products of photosynthesis Describe how the carbon cycle affects photosynthesis Understand that only green plants can make food using photosynthesis
L2e	Experiment S601B-Seeds	Investigate the effect of light on growth of a seed Investigate the effect of water on growth of a seed
L3	Photosynthesis: Products	Use an equation to represent photosynthesis Describe how glucose is used to make starch, fats, and proteins
L3e	Experiment S601C-Digestive Enzymes	Investigate the effect of saliva enzymes on the digestion of starch
L4	Photosynthesis: Raw Materials	Identify the raw materials plants need for photosynthesis
L5	Investigation: Plant Growth	Identify the best light color for plant growth
L6	Transport System: Roots	Identify and describe parts of a root Describe how roots transport and store water and food
L6e	Experiment S601D-Root Observation	Examine root hairs on a sprouting seed
L7	Transport System: Stems and Leaves	Identify parts of a stem Identify and describe parts of a leaf
L7e	Experiment S601E-Celery	Observe the transport of water in a celery stalk
L8	Regulatory System	Describe how natural plant chemicals help plants grow Describe how artificial chemicals affects plants
altl8e	Experiment S601F-Growing Roots	Observe the growth of a plant from a cutting

Unit	Lesson Title	Lesson Objectives
2 ANIMAL SYSTEMS		
L1	Digestive System: Structure	Identify organs in the digestive system Describe the process of digestion
L2	Digestive System: Function	Describe the role of the mouth in digestion Describe how food is passed from the mouth to the stomach Describe the role of the stomach in digestion
L2e	Experiment S602A-Digestion	Observe the effect of rennin on digestion of milk
L3	Digestive System: Function (Part 2)	Describe the role of the small intestines in digestion Describe the role of the large intestines in digestion
L3e	Experiment S602B-Oil and Soap	Create an emulsion using oil, water, and soap
L3e2	Experiment S602C-Passing Food	Compare the diffusion of sugar and starch across a semi-permeable membrane
L4	Circulatory System	Describe how the circulatory system functions Compare arteries, veins, and capillaries Compare red blood cells, white blood cells, and platelets Understand that blood can be used to diagnose health problems and diseases
L4e	Experiment S602D-Pulse Rate	Investigate the effect of exercise on pulse rate
altl4e2	Project S602E-Heart	Examine and research the heart
L5	Excretory System	Describe the structure and function of the excretory system Identify factors that can damage the lungs Identify health problems related to skin and kidneys
L5e	Experiment S602F-Carbon Dioxide	Compare the amount of carbon dioxide in the air and in your breath
altl5e2	Project S602G-Lungs	Examine and research the lungs
L5e3	Experiment S602H-Evaporation and Cooling	Compare the rate of evaporation of water and alcohol
L6	Muscular System	Compare voluntary and involuntary muscles Describe the function and location of cardiac, striated, and smooth muscle
L7	Skeletal System	Describe and give examples of different types of joints Describe the function of bones Describe health problems that can affect muscles and bones

Unit	Lesson Title	Lesson Objectives
3 PLANTS AND ANIMAL BEHAVIOR		
L1	The Nervous System	Describe the structure and function of the nervous system Identify and describe the functions of the cerebrum, cerebellum, and medulla
L1e	Report S603A-The Eye	Write about the structure and function of the eye
L1e2	Report S603B-The Ear	Write about the structure and function of the ear
L2	Nerves and Spinal Column	Describe the function of the spinal cord and nerves Identify and describe the structure of a neuron Identify the functions controlled by the ganglia and plexus
L3	Response and Intelligence	Compare and give examples of instinct, reflex, and learned response Describe three types of learned response Recognize man's superior intelligence over animals
altl3e	Report S603C-Instincts	Write about animal instincts
L3e2	Experiment S603D-Response	Teach a response to a goldfish
altl3e3	Experiment S603E-Trial and Error	Investigate the effect of practice on performance
L4	Plant Behavior	Define and describe the different types of tropisms Describe the role of auxin in phototropism Describe the behavior of touch-sensitive plants
L4a	Investigation: Tropisms	Predict the tropistic behavior of plants
L5	Terrestrial Biomes	Define biome Describe characteristics and locations of different terrestrial biomes
L6	Aquatic Biomes	Describe characteristics of aquatic biomes
L7	Food Chains	Define food chain Identify the role of producers, consumers, and decomposers in a food chain
L8	Nature: Cycles and Balance	Describe the carbon-hydrogen-oxygen cycle Define symbiosis and parasitism Give examples of how man affects nature
altl8e	Report S603G-Man's Influence	Write about an extinct or endangered animal

Unit	Lesson Title	Lesson Objectives
4 MOLECULAR GENETICS		
L1	Reproduction	Describe the reproductive structures of flowers in relation to inheritance in plants.
altl1e	Project S604A-Flower Structure	Dissect and examine the structure of a flower
L2	Male-Female Reproduction	Compare mitosis and reduction division Understand that the number of chromosomes is halved during reductive division
altl2e	Project S604B-Lima Bean Embryo	Dissect and examine the structure of a bean embryo
L3	Inheritance	Distinguish between dominance and recessiveness. Explain how many traits depend on multiple genes. Introduce the work of Gregor Mendel on genetic traits. Solve a Punnett Square and analyze the data.
altl3e	Project S604C-Mendel's Discovery	Examine the genetic characteristics of pea seeds Use a Punnet Square to predict offspring of pea plants
L4	Taste, Dominance, and Multiple Genes	Describe the function of taste buds Explain incomplete dominance Understand that many traits are controlled by more than one gene
L4e	Experiment S604D-Taste Gene Lab	Investigate your genetic make-up for PTC taste
altl4e2	Project S604E-Traits	Compare the frequency of dominant and recessive traits in a sample population
L5	DNA	Explain how genes and DNA transmit traits. Give examples of the use of hybrids and mutations that humans have selected for food provision. Give examples of the interaction between genes and the environment.
altl5e	Experiment S604F-Albinos	Investigate the frequency of albinism in seedlings
altl5e2	Report S604G-Genetics	Explain how genetics have improved plants or animals
L6	Mutation	Understand that mutations do not add new genes Explain why mutations do not support evolutionary theory Describe albinism
altl6e	Project S604H-Seed or Seedless	Observe the results for the recessive gene of albinism.
L7	The Use of Mutations	Describe how mutations are used to grow fruit
altl7e	Project S604I-Pea Pod	Observe the size of peas in a pod
L8	Temperature Influence on Coloration	Give examples of the interaction between genes and the environment.

Unit	Lesson Title	Lesson Objectives
5 CHEMICAL STRUCTURE AND CHANGE		
L1	Chemical Structure	Define and give examples of matter and chemicals. Describe and give examples of the different states of matter.
L1e	Experiment S605A-Solid, Liquid, Gas	Observe the physical properties of a solid, liquid, and gas
L2	Chemical Elements and Atoms	Compare properties of liquids and solids Distinguish between atoms and elements Compare three atomic models
L3	Molecules and Compounds	Define molecule and compound Give examples of common compounds
L3e	Experiment S605B-Copper Iodide Experiment S605C-Calcium	Create a compound through a chemical change.
L3e2	Carbonate	Create a compound through a chemical change
L4	Periodic Table	Identify common chemical symbols Explain the stucture of chemical formulas
L4e	Project S605D-Water Molecule Model	Make a model of a water molecule
L5	Atomic Weights	Define atomic weight Define atomic number Calculate the number of neutrons using atomic number and atomic mass number Calculate neutrons and electrons using atomic mass and
altl5e	Project S605E-Atomic Number	atomic mass number
L6	Arrangement of the The Periodic Table	Identify the chemists who created the periodic table Compare atomic weight and atomic mass number Describe how the periodic table is arranged Define isotope
L6e	Project S605F-Use the Periodic Table	Complete a chart of chemical symbols
L7	Chemical Change	Write the chemical formulas for some compounds. Identify acids and bases.
altl7e	Project S605G-Chart and Diagram	Create a diagram of an atom Interpret information from the Periodic Table
altl7e2	Report S605H-Chemical Discoveries	Write about an important chemical discovery
L8	Acids and Bases	Compare the characteristics of acids and bases Describe how to test for acids and bases Use phenolphthalein to identify acidic, base, and neutral
L8e	Experiment S605I-Acid or Base?	solutions
altl8e2	Project S605J-From Memory	Type John 1:3 and Hebrews 3:4 from memory
altl8e3	Project S605K-Cause and Effect	Identify cause and effect in chemistry
altl8e4	Project S605L-Chemical Symbols	Identify chemical names by symbol Identify chemical symbols by name
altl8e5	Project S605M-Discussion	Discuss and answer questions about chemistry

Unit	Lesson Title	Lesson Objectives
6 LIGHT AND SOUND		
L1	Waves: Sound	Name the source of all sound and tell how sound waves travel. Describe the parts of a sound wave and a light wave. Explain the difference between amplitude and pitch. Describe how sound waves are received by the ear. List some substances through which sound can travel and through which light can travel. Name the speeds of light and sound. Describe the electromagnetic spectrum.
L1e	Experiment S606A-Test Tube Tunes	Investigate how the amount of water in a test tube and pitch are related
L1e3	Project S606B-Sound Vibrations	Use a tuning fork to observe sound vibrations
L2	Light Waves	Compare the speeds of sound and light Describe how refraction and reflection affect light waves Compare how transparent, translucent, and opaque materials affect light waves
L2e2	Project S606C-Light Waves	Use a rope to model the structure of light waves
L2e	Project S606D-Refracted Light	Observe how refracted light can change the appearance of objects in water
L3	The Spectrum	Explain how Sir Isaac Newton discovered that sunlight is composed of colors. List the colors of sunlight's color spectrum in correct order.
L3e	Project S606E-Color Spectrum	Create the visible spectrum
altl3e2	Project S606F-Create a Rainbow	Create a rainbow using water
L4	Colors	Explain what makes things around us different colors.
L4e	Project S606G-Color Wheel	Make a color wheel Understand that white light contains all the colors in the spectrum
L4e2	Experiment S606H-Subtractive Colors	Create different colors using paper and cellophane Understand that objects absorb all colors except the color you see
altl4e3	Experiment S606I-Mixing Colored Lights	Create different colors using cellophane
L5	Mixing Colors	List the primary colors of sunlight and tell what color is produced when they are mixed. List the primary colors of pigments (colorants) and tell what colors are produced when they are mixed.
altl5e	Experiment S606J-Mixing Colorants	Create different colors using food coloring

Unit	Lesson Title	Lesson Objectives
7 MOTION AND ITS MEASUREMENT		
L1	Motion, Force, and Work	Define force Understand that work is done only when force moves and object
L2	Measurement of Work	Calculate work using force and distance Understand that the rate of work does not affect the amount of work done
L2e	Experiment S607A Forces of Lifting and Pulling	Calculate work using a spring scale
altl2e2	Project S607B Unscramble Activity	Review vocabulary words
L3	Power and Newton's Laws of Motion	Define and calculate power Describe horsepower
altl3e	Report S607C-Horsepower and	Complete an activity on power
altl3e2	Experiment S607D-Your Horsepower	Calculate the work done climbing stairs Calculate your horsepower
L4	Newton's Laws of Motion and	List the three laws of motion and the Universal Law of
L4e	Experiment S607E-The Law of Inertia	Test the law of inertia Understand that an object at rest will stay at rest unless acted
L5	Change in Motion	Describe how friction affects work Explain the work principle Calculate the efficiency of a machine Give examples of machines that change the direction of motion
8 SPACESHIP EARTH		
L1	Earth's Motion	Describe earth's size and shape and its motion through space.
altl1e1	Experiment S608A-Balloon Globe	Explain the seasons of the year and how they occur.
L2	Earth's Rotation	Explain how night and day occur on the earth. Define the time zones on earth and be able to locate the prime
L3	Time	meridian and the International Dateline.
L3e	Experiment S608B-Observing Shadows	Observe how shadows change as a result of the earth's revolution.
L4	Earth's Orbit	Explain the seasons of the year and how they occur. Describe what happens when the vernal and autumnal equinoxes occur.
L5	Eclipses	Describe what happens during a solar eclipse and a lunar eclipse.
altl5e	Project S608C-Fact or Opinion	Identify statements as fact or opinion.
L5e2	Experiment S608D-Eclipses	Describe what happens during a solar eclipse and a lunar eclipse.
L6	The Solar System	Name and describe the main parts of our solar system. List the nine major bodies (including the dwarf planet) of our solar system from the sun outward and describe the relative size and composition of each body.
altl6e	Report S608E-Planets	Learn basic facts about the planets. Compare the surfaces of Venus and Mars.
L7	Asteroids, Comets, and Meteoroids	Define and describe some major characteristics of asteroids, comets, and meteoroids.

Unit	Lesson Title	Lesson Objectives
9 ASTRONOMY AND THE STARS		
L1	Astronomy	Define and describe the science of astronomy. Correctly interpret findings of astronomy in light of faith in God and His creation of the universe. Know some of the important people and events in the history of astronomy.
altl1e1	Report S609A-Great Astronomers	Learn about important astronomers and their discoveries
L2	Astronomy Today	Describe some important developments occurring in astronomy today.
L3	Stars	Describe the composition of most stars. Describe how stars vary in color, size, temperature, and brightness.
L4	Elements and Spectra	Tell how spectra are used to investigate stars.
altl4e1	Project S609B-The Spectroscope	Make a spectroscope Compare the spectra of different light sources
altl4e2	Experiment S609C-Spectrography	Compare the spectra of different light sources
altl4e3	Experiment S609D-Oil on Water	Observe the spectrum made by a natural prism
L5	Magnitude and Luminosity	Describe how stars vary in color, size, temperature, and brightness.
L6	Light Years and Astronomical Units	Define light-year and astronomical unit
L7	Constellations and Major Stars	Know and identify some major constellations and stars. Understand how the stars are used to determine location.
L7e	Project S609E-Betelgeuse and Aldebaran	Rearrange the letters in Betelgeuse and Aldebaran to make new words
altl7e2	Project S609F-Constellations	Draw the arrangement of stars in common constellations

Unit	Lesson Title	Lesson Objectives
10 THE EARTH AND THE UNIVERSE		
L1	The Photosynthesis System	Review the process, materials, and products of photosynthesis
L2	The Transport System of Plants	Review the transport and regulatory systems of plants
L3	The Digestive System	Review the organs and function of the digestive system
L4	The Excretory System	Review the organs and function of the excretory system
L5	Skeletal and Muscular Systems	Review the structure and function of the skeletal system Review the different types of muscle
L6	The Nervous System	Review the areas of the brain and structure of neurons
L7	Genetics and Reproduction	Discuss genetics and aspects of reproductive systems in plants and animals.
L8	Ecological Systems	Give some examples of biomes and cycles in nature.
altl8es	Report S610A-Biomes	Describe the conditions, plants, and animals of six terrestrial biomes
L9	Physics and Chemistry: Matter	Explain the nature of matter and relate the various particles to the structure of matter. Explain the main divisions of the Periodic Table of the Elements and identify common chemical symbols.
L10	Physics and Chemistry: Light	Explain the basic concepts of light and the ways that colors are produced.
L11	Physics and Chemistry: Sound	Explain how sound is produced and describe the characteristics of sound.
L12	Physics and Chemistry: Motion	Explain some basic components of motion such as force, work, laws of motion, and changes in motion.
L13	Physics and Chemistry: Machines	Explain some basic components of motion such as force, work, laws of motion, and changes in motion.
L14	Earth's Rotation	Describe the various motions of earth.
L15	Earth's Revolution	Describe the various motions of earth.
L16	Our Solar System	Name and describe the various parts of our Solar System. Name and describe the various parts of our Solar System. Identify important people, events, and observing equipment in the history of astronomy. Describe how stars differ and identify some of their main characteristics.

Science 700

Unit	Lesson Title	Lesson Objectives
1 WHAT IS SCIENCE?		
L1	Tools of a Scientist 1	Understand the purpose of science Identify three processes of scientific investigation List the five senses Identify the basic metric units for measurement.
L2	Tools of a Scientist 2	Identify the purpose and major categories of the classification systems Distinguish between inductive and deductive reasoning
L3	Methods of a Scientist 1	Describe and apply the first three steps of the scientific method Define Hypothesis
L4	Methods of a Scientist 2	Describe and apply the final steps of the scientific method
L5	The Scientist	Describe characteristics of a scientist List achievements of George Washington Carver
L6	The Four Major Areas of Science	List and describe the four major areas of science Give examples of the fields of science that fall under the four major areas
L7	Careers in Science	Explore professional careers in science.
2 PERCEIVING THINGS		
L1	Measurement: The Metric System	Identify how standard units are used for measurement in science Explain the advantages of the metric system List standard units and order metric system prefixes
L2	Measurement: Size and Distance	Identify the basic unit of length in the metric system Convert meters to millimeter, centimeters, and kilometers
L3	Measurement: Area	Identify the standard unit of area Calculate area using correct standard metric units and the formula: area = length x width.
L4	Measurement: Volume	Identify the standard units for volume of liquids and solids Calculate volume using the formula: volume = l x w x h Convert liters to milliliters and milliliters to cubic centimeters
L5	Measurement: Mass	Identify the standard unit for mass Distinguish between mass and weight Convert kilograms to grams, milliliters, and cubic centimeters
L6	Graphs: Uses, Bar, and Line	Understand and list the uses of graphs Identify the components of line and bar graphs Distinguish between independent and dependent variables Interpret the information given by a bar or line graph
L7	Graphs: Pictographs and Pie Charts	Understand the uses of pictorials and pie charts Interpret information given in a pictorial or pie graph
L7e	Experiment S702A-Making Graphs	Design and draw three different graphs based on information given in tables

Unit	Lesson Title	Lesson Objectives
3 EARTH IN SPACE (PART 1)		
L1	Stargazing	Discuss what Scripture tells us about the sun, moon, and stars Distinguish between astrology and astronomy Describe the environs of our solar system Identify and apply the astronomers' unit of measure for calculating distances in the universe
L2	Star Charts	Identify the principal constellations of each season Utilize star charts to locate constellations Describe Aristotle's Geocentric theory and Ptolemy's modification Identify characteristics of meteors and meteor showers
L2e	Experiment S703A-Constellations	Draw and construct a Zodiac Constellation Finder Chart the different constellations as they appear after sunset
L3	Astronomy	Identify basic features of the astrolabe Define and apply working definitions of altitude and azimuth Identify key positions on the celestial sphere in relation to positions on earth Explain the impact of the scientific method on the Transparent Sphere Hypothesis
altl3e	Experiment S703B-Astrolabe	Build an astrolabe Test the astrolabe by locating and recording positions of heavenly bodies Write a report of findings
L4	Astronomers	List the early astronomers and their contributions to Heliocentric theory Compare the positions of Copernicus and Ptolemy List important tools of the astronomer Identify parts of the telescope and distinguish between refracting and reflecting telescopes
altl4ess	Essay S703C-Galileo	Write a two-page report using references correctly

Unit	Lesson Title	Lesson Objectives
4 EARTH IN SPACE (PART 2)		
L1	The Sun's Energy	Identify the main source of energy for phenomena on the earth's surface List the four benefits of the sun State Einstein's Nuclear-fusion theory
L2	The Sun's Family	Differentiate between the inner and outer planets Identify defining characteristics of the terrestrial planets Define retrograde motion and provide an example
L3	Outer Planets	Identify the Jovian planets and some of their defining characteristics Distinguish between perihelion and aphelion Identify planet characteristics that do not support evolutionary theories of the origin of the solar system
L4	Asteroids and Comets	Identify defining characteristics of asteroids and comets Provide evidence about comets that supports a young solar system Calculate weight on another planet's surface
L5	The Moon	Identify characteristics of the orbit, phases and rotation of the moon Explain how the moon effects the tides
L6	Eclipses	Distinguish between a solar and lunar eclipse Identify characteristics of total and partial eclipses
5 THE ATMOSPHERE		
L1	Structure of the Atmosphere	Identify the primary gases found in the atmosphere Describe the function of the ozone layer Identify the five layers of the atmosphere
L2	Solar Effects	Describe the greenhouse effect Describe the role of the atmosphere in respiration and photosynthesis List ways in which the atmosphere protects mankind
L2e	Experiment S705A-The Greenhouse	Construct a simple greenhouse Measure and record temperatures Summarize data
L3	Natural Cycles	List the steps of the water cycle Describe the two basic processes of life involved in the carbon- Explain the processes of nitrogen fixation and denitrification in the nitrogen cycle Understand that all natural cycles are dependent on one another
L4	Pollution	Name the different types of pollutants found in the atmosphere Describe the effects of pollutants on humans, animals, and plants Recognize the responsibility of a Christian to help minimize pollution

Unit	Lesson Title	Lesson Objectives
6 WEATHER		
L1	Elements of Weather	Name the four elements of weather Identify the main causes of weather conditions Describe how a thermometer works.
L2	Wind	Identify the major causes of wind over various earth surfaces Describe the influence of the Coriolis effect on wind patterns Describe the general wind patterns on the earth Identify the role of the jet stream in weather prediction
L3	Pressure	List weather instruments together with their functions Identify the relationship between high and low pressure areas and weather conditions Define relative humidity Identify causes of rain, snow, sleet, and hail
L1e	Experiment S706A-Dew Point	Define dew point Determine the dew point of the surrounding air Collect data and summarize findings
L4	Weather in Motion	List the four types of air masses Identify the three types of clouds
L5	Fronts	Identify weather conditions that produce fronts List the types of fronts List factors influencing the formation of thunderstorms, tornadoes, and hurricanes Recognize the threat that storms pose to humans
L6	Weather Forecasting	Identify the different means that meteorologists utilize to gather weather data Recognize the different symbols associated with weather maps Describe methods used in professional weather forecasting
7 CLIMATE		
L1	Climate: General	Compare and contrast weather and climate Review the four factors that affect weather and climate Understand how the four factors contribute to the long-term climate of a region
L2	Climate: Worldwide	Distinguish between latitude and longitude Identify how altitude and bodies of water affect climate List methods used to classify an area's climate List and describe the five basic climate areas.
L3	Climate: Regional	Identify the major climate areas and their defining characteristics
L4	Climate: Regional (Part 2)	Identify the major climate areas and their defining characteristics Assess the effects of the different climate areas across the continents

Unit	Lesson Title	Lesson Objectives
8 THE HUMAN ANATOMY (PART 1)		
L1	Human Building Blocks	Identify the structure of the typical cell Describe the basic functions of the cell
L1e	Experiment S708A-Cheek Cell	Collect, observe, and describe cheek cells, guided by the video model Use science equipment and supplies according to instructions Summarize findings based on observations
L2	Human Framework	Explain the functions of the skeletal system List the muscle types together with their functions Identify some of the major bones of the skeletal system.
L3	Skin	Identify the three layers of the skin Explain the functions of the skin Identify reasons why people from around the world have different skin colors.
L4	Human Nervous System	Identify the 3 main parts of a neuron Describe how nerve impulses travel from one neuron to the next List vital functions of the spinal cord and the brain
altl4e	Project S708B-Human Brain	Conduct research of an interesting aspect of the brain using reliable sources Plan and write a five-hundred word report Use and cite references correctly
L5	Senses	Identify the five senses and the organs associated with each Describe the major parts and functions of the eyes, ears, and nose List the four tastes that are detected by the tongue.

Unit	Lesson Title	Lesson Objectives
9 THE HUMAN ANATOMY (PART 2)		
L1	The Respiratory System	Name the organs involved in the respiratory system Explain the functions of the organs involved in the respiratory system
L2	The Circulatory System	Identify the organs that make up the circulatory system Describe the structure and function of the heart List functions of the different blood vessels
L2e	Experiment S709A-Heart Rate	Calculate heart rate using both abbreviated and standard methods Compare a resting heart rate to a rate following brief exercise Record data and summarize findings
L3	The Digestive System--Part 1	List the three functions of the digestive system Identify the parts of the digestive system and describe their functions Identify the parts of a tooth
L4	The Digestive System--Part 2	Describe the structure and the functions of the small and large intestine Discover how the liver, pancreas, and the gall bladder assist in digestion Trace the path a piece of food travels through the digestive system
L5	The Excretory System	Identify the main function of the excretory system Describe the structure and the functions of the kidneys, bladder, and skin as members of the excretory system
L6	The Endocrine System	Explain the purpose of the Endocrine system Describe the functions of the pituitary, thyroid, parathyroid, and adrenal glands

Unit	Lesson Title	Lesson Objectives
10 REVIEW		
L1	Scientists at Work	Review the steps of the scientific method Review the metric system Review the use of the four different types of graphs and charts
L1e	Experiment S710A-Red Celery	Perform an experiment following the scientific method Record and summarize their findings.
L2	Famous Scientists	Review famous Christian scientists and their discoveries Review the contributions and scientists involved in astronomy Review the contributions of scientists to meteorology and medicine
L3	The Astronomer at Work	Review the four constellations that are important to people in the Northern Hemisphere List the parts of the solar system
L4	Planets	List and review the planets in order Assess evidence of a comets lifespan for a young solar system Review the characteristics of and the phenomena caused by the moon Understand the importance of tools for the study of astronomy
L5	The Meteorologist at Work	Understand the importance of meteorology to different people and professions Review the structure of the atmosphere Recognize the two types of pollution
L6	Studying the Weather	Review the four components of weather and the instruments used to measure each Name and review the four types of air masses Understand how clouds are formed and describe the three types Describe how fronts form and their effect on the weather Understand how meteorologists gather data for forecasting the weather
L7	Studying Climates	Differentiate weather and climate Review the global causes of climate Review the different classifications of climate
L8	The Medical Scientist at Work	Evaluate and explain the statement that "man is a marvelous product of intelligent design Review the components of the skeletal system Review the functions of the muscles Review the structure and functions of the skin
L9	Nervous and Endocrine Systems	Review the functions of the nerve cells, the brain and the spinal cord Review the five senses and the organs associated with each Review the functions of the various glands
L10	Circulatory and Respiration Systems	Understand and review the functions of the respiratory and the circulatory system Identify and describe the organs involved in the respiratory system Identify and describe the components of circulatory system
L11	Digestive and Excretory Systems	Explain how the digestive and excretory system work together Review the organs and functions of the organs associated with the digestive system Review the organs and the functions of the organs associated with the excretory system

Science 800

Unit	Lesson Title	Lesson Objectives
1 SCIENCE AND SOCIETY		
L1	Science Today	Define the term "science" Describe briefly the history of ancient and medieval scientists List the three renaissance scientists and their contributions
L2	Post-Renaissance Science	Evaluate the evolutionary theory as purposed by de LaMarck and Darwin and the implications it had on scientific research Recognize the contributions of John Dalton and Louis Pasteur Name some modern scientists and their contributions
L2e	Essay S801A-Mendel	Write an essay about Gregor Mendel
L3	Today's Scientist	List and describe the steps involved in the scientific method State the four defined units of the metric system Write any numeral in scientific notation and change any scientific notation back to a numeral Determine the number of significant figures in a number Demonstrate the ability to add using significant figures
L4	Science and Technology	Distinguish technology from pure science Provide examples of technology during ancient, medieval, renaissance, post-renaissance and modern times Recognize the importance of the invention of the printing press to the reading of Scripture
altl4e	Essay S801B-Da Vinci	Write an essay about Leonardo daVinci's inventions
L5	Limitations	Examine the need for a moral guide, the Bible, as scientific knowledge increases Explore the goals today for technology in life science, physical science, and earth science List some of the difficulties and problems that technology is faced with in today's society

Unit	Lesson Title	Lesson Objectives
2 STRUCTURE OF MATTER (PART 1)		
L1	Properties of Matter (1)	Define and describe the two fundamental properties of all matter Describe the ways matter can be classified Explain how to use mass and volume to find the density of an object State Archimedes Principle Distinguish between boiling point and freezing point
L1e	Experiment S802A-Determining Volume	Measure a common geometric shape in centimeters and record answers Calculate volume for the geometric shape Utilize the method of displacement to determine volume Answer questions and summarize results
altl1e	Experiment S802B-Metric Measurements	Utilize a balance to find mass Calculate volume from measurements Calculate density from data on mass and volume Read a Celsius thermometer
L2	Properties of Matter (2)	Explain what a chemical property is Identify the three states of matter Distinguish between crystalline and amorphous solids
L3	Atoms and Molecules	Discuss the contributions made by Dalton, Bohr, and Chadwick to the development of the atomic theory List the four major types of atomic particles and their properties Define atomic mass (weight)
L4	Molecules	Define molecules Describe how bonds are formed in molecules Explain the molecular model of matter
L5	Elements	Define element Examine how the periodic table is organized Calculate the number of electrons, protons, and neutrons in a given atom
L6	Compounds	Explain what a compound is and how it forms Analyze the use of chemical formulas to name a compound Interpret a chemical formula
L7	Mixtures	Define mixtures Provide an example of a mixture
L7e	Experiment S802C-Mixtures	Utilize a filter to separate a mixture of sand and water Summarize your findings

Unit	Lesson Title	Lesson Objectives
3 STRUCTURE OF MATTER (PART 2)		
L1	Matter and Change	Describe and give an example of a physical change Explain the effects of heat on matter
L1e	Experiment S803A-Phase Changes	Record the data Summarize your findings
L2	Solutions	Define soluble and insoluble Describe the processes of evaporation and condensation Distinguish between the heat of fusion and the heat of vaporization
L3	Chemical Changes	Distinguish between a physical and chemical change and provide an example of each List some indicators of a chemical change Explain the Law of Conservation of Mass Interpret a chemical equation Define and provide an example of oxidation
L3e	Experiment S803B-Forms of Change	Determine the change as physical or chemical Write a scientific report including the specifications given in the experiment
L4	Nuclear Changes	Describe a nuclear change Differentiate between fission and fusion
L5	Acids	Describe properties common to all acids List some common acids Classify substances as weak or strong acids Define indicator and give an example
L6	Bases	Describe properties common to all bases List some common bases Provide an example of an indicator for a base
L6e	Experiment S803C-Cabbage	Use indicator for each substance to determine if substance is an acid or a base Summarize results and the experimental method
L7	Salts	Describe a salt and provide examples Explain a neutralization reaction Explain what an electrolyte is
4 HEALTH AND NUTRITION		
L1	Foods and Digestion	List the six types of nutrients and provide examples of each Examine the purpose of each nutrient Trace the path food takes through the digestive system
L2	Diet	Examine the basis of the food pyramid and its design Provide examples from each level of the pyramid
L2e	Experiment S804A-Food Record	Record your diet for a week utilizing the chart Write a description of the foods eaten in each category
L3	Nutritional Diseases	Discuss the use of chemicals in food production and their effects Examine the importance of healthy foods to a diet Describe symptoms of various vitamin deficiencies Evaluate the relationship between allergic reactions and addiction reactions
L3e	Essay S804B-Nutrition	Write an essay about nutrition
L4	Hygiene	Recognize the contributions of Louis Pasteur Identify the primary way to control contagious diseases Demonstrate knowledge of good hygiene Demonstrate knowledge of proper health maintenance

Unit	Lesson Title	Lesson Objectives
5 ENERGY (PART 1)		
L1	Mechanical Energy	Distinguish between kinetic and potential energy Compare force and work Define energy
L2	Potential Energy	Define potential energy Provide examples of objects possessing potential energy
L3	Other Forms of Energy	Explain how heat is produced by friction when work is done Distinguish between heat and temperature Describe the three processes that transfer heat Provide examples of objects that serve as good insulators
L4	Chemical Energy	Describe how chemical reactions are used to produce heat and electrical energy Provide examples of machines that convert chemical energy to mechanical energy
L5	Atomic Energy	State the Law of Conservation of Matter and Energy Recognize that mass is converted to energy in a nuclear reaction Describe the structure of the atom and its subatomic particles Distinguish between fission and fusion
L6	Energy Conversion and Entropy	Understand that in order to do work, energy must be converted from one form to another Discuss some common energy conversions Explain how generators convert mechanical energy to electricity Define entropy State the Second Law of Thermodynamics
altl6ess	Essay S805A-Entropy	Write a report on the implications of entropy to a Christian

Unit	Lesson Title	Lesson Objectives
6 ENERGY (PART 2)		
L1	Magnetism	Discuss the history of magnetism List some materials that can exert magnetic fields Explain what is meant by a magnetic field and how to detect it
L1e	Experiment S806A-Magnetism	Diagram the magnetic fields around the magnets
L2	Electricity and Magnetism	Calculate the strength of a magnetic force if strength and distance are known Examine the use of electromagnets Explain what a superconductor is
L3	Electricity	List the three Electrostatic laws Explain the effects produced by the accumulation of a static electric charge
L4	Electrical Circuits	Compare simple electrical circuits to a valve water system Distinguish between direct current and alternating current List two factors that limit the amount of electric current that will flow through a simple circuit Utilize Ohm's law to calculate resistance in simple circuits List some uses of electricity
L5	Energy for the Future	Identify and describe the conventional energy sources Compare and contrast the characteristics, uses, and locations of coal, petroleum, and natural gas Identify and describe alternative energy sources Describe the various ways that solar energy is used Recognize that radioactive waste is the major problem associated with nuclear energy
altl5e	Experiment S806B-Hot Dog Cooker	Write a report on solar energy

Unit	Lesson Title	Lesson Objectives
7 MACHINES (PART 1)		
L1	Distance	Recognize problems associated with comparison measurement and the English system Understand that the SI system (metric system) is based on multiples of ten
L1essay	Essay S807A-Scientists	Write a report on one of the Christian scientists listed
L2	Measuring Distance	List some tools used for direct measurement Define Global Positioning Systems Evaluate the use of scale drawings and geometry for indirect measurement Understand the application of geometry used in the examples
L3	Force	Define the terms force and gravity Recognize the contributions of Galileo and Newton to mathematics and science State Newton's three laws of motion and use them to explain how objects move
L4	Force Vectors	Distinguish between a scalar quantity and a vector quantity Explain the use of arrows to represent vectors Demonstrate how to draw a force vector Demonstrate how to add and subtract vectors
L5	Work	Define the terms work and joule Discuss James Joules' contribution to the field of physics Recognize situations when work is accomplished
L6	Work and Energy	Evaluate the relationship that exists between work and energy Understand the conversion from potential to kinetic energy and vice versa Define the term power Perform calculations to find power

Unit	Lesson Title	Lesson Objectives
8 MACHINES (PART 2)		
L1	Friction	Describe friction and its causes Identify when friction is helpful
L1a	Types of Friction	Distinguish between starting and sliding friction Understand how friction is proportional to the "normal force" Calculate the coefficient of friction Describe strategies to reduce friction
L2e	Experiment S808A-Friction Investigation	Calculate coefficient of friction for the matchbox Answer questions and summarize results
L2	Levers	Describe a lever and provide examples List the three things that machines are capable of doing Differentiate between Actual Mechanical Advantage and Ideal Mechanical Advantage Calculate efficiency of a machine using the formulas given
L3	Wheel and Axle, Pulleys, and Gears	Describe the wheel and axle and provide examples Describe the different pulleys and provide examples Describe gears and their uses Understand how to utilize the formulas for AMA, IMA, and efficiency for the wheel, axle, and pulleys
altl3e	Experiment S808B-Pencil Sharpener	Determine the AMA, IMA and efficiency of the pencil sharpener
L4	Inclined Plane, Wedge, and Screw	Describe the inclined plane and provide examples Calculate the AMA, IMA, and the efficiency of an inclined plane Describe the wedge and provide examples Describe the screw and provide examples

Unit	Lesson Title	Lesson Objectives
9 BALANCE IN NATURE		
L1	Photosynthesis and Food	Describe a basic leaf structure Explain how chlorophyll acts as a catalyst in plant cells Describe the function of the stomata Explain the two phases of photosynthesis
L2	Food	Discuss the history of food production and the importance of the Industrial Revolution to it Recognize the accomplishments of Gregor Mendel and Luther Burbank to the field of genetics
L3	Natural Cycles	Explain the process of nitrification by bacteria Understand the relationship between legumes and bacteria Understand the importance of bacteria and fungi to decay List some strategies for preventing decay
L4	The Water Cycle	Explain the water cycle on earth Differentiate between evaporation, precipitation, and transpiration Explain how photosynthesis and respiration are the basis of the carbon-oxygen cycle
L5	Balance and Disruption	Define Ecology Recognize the difference between habitat and community Explain what a food chain is Understand how natural controls work in a community Discuss the causes of ecological disruptions and provide examples
L6	Resources	Explain why proper agricultural and forestry practices are essential to the future of soil and forests Understand the importance of recycling Evaluate the use of alternative energy sources to conserve fossil fuels Recognize the causes of water and air pollution and strategies to correct them Discuss some negative impacts to wildlife and the wilderness caused humans

Unit	Lesson Title	Lesson Objectives
10 SCIENCE AND TECHNOLOGY		
L1	Basic Science	Recognize science and technology as a career choice Review the steps of the scientific method Understand the use and importance of the metric system to science
L2	Characteristics of Matter	Review the ways to classify matter by properties Review the four facts that describe matter Discuss the discovery of the atom and elements Understand the use of chemical symbols and formulas to denote elements and compounds Provide an example of a mixture and recognize that mixtures can be separated by physical means
L3	Matter in Change	Review physical changes and provide examples Review chemical changes and provide examples Distinguish an acid from a base
L4	Energy	Review potential, kinetic, and mechanical energy Recognize the relationship between heat energy and molecular motion Understand that most matter with the exception of water experience thermal expansion Review the three types of heat transfer
L5	Chemical and Atomic Energy	Review the First and Second Law of Thermodynamics Review the interpretation of a chemical equation Review the use of the atom for energy purposes and for destruction Discuss the pros and cons of using atomic (nuclear) energy Review entropy
L6	Magnetism and Electricity	Compare magnetism and electricity Review magnetic theory Understand how magnets and electromagnets are used Explain lightning as an example of static electricity Understand what current electricity is and its sources
L7	Machines at Work	Review how machines help us do work Provide examples of when friction is helpful and when it is harmful Describe the six types of simple machines and evaluate the mechanical advantage of each
L8	Life Science	Review the six essential nutrients and provide examples of each Review the food pyramid as an important guideline for a proper diet Understand that a nutritious diet and proper hygiene are preventative measures for disease and other illnesses Review photosynthesis Review the natural cycles common to the earth
L9	Vocations in Science and Technology	Explore and evaluate science and technology as possible avenues for a career Review and assess skills and areas of interest that they have Review desirable job application skills

Science 900

Unit	Lesson Title	Lesson Objectives
1 OUR ATOMIC WORLD		
L1	Structure of Matter	Describe the four phases of matter and their characteristics Recognize John Dalton's contributions to the theory of matter Describe the three subatomic particles and their properties Define atomic number Demonstrate the ability to find an element from an atomic model
L2	Radioactivity	Discuss the work of Henri Becquerel and Marie Curie Explain what radioactivity means Distinguish between the three types of decay List two ways that radioactivity can be detected
L3	Atomic Nuclei	Determine the number of protons, electrons, and neutrons for an element given its atomic weight and number Define isotope Describe the characteristics of alpha and beta particles and gamma rays Distinguish between sub-atomic particles Recognize that nuclear structure is not fully understood
L4	Nuclear Energy	State the Law of Conservation of Matter and Energy Describe the relationship between chain reactions and critical mass Recognize the different components of a nuclear reactor Differentiate between fission and fusion Discuss Enrico Fermi's work to nuclear energy
L4e	Essay S901A-Reactors	Write a report on nuclear reactors
L5	Applications and Environmental Hazards	State the three uses of radioactive isotopes Recognize the problems associated with meeting the growing energy demand of the United States Evaluate the dangers and benefits of nuclear energy
2 VOLUME, MASS, AND DENSITY		
L1	Volume	Understand the use of standards for measuring matter Recognize the liter as the international standard for volume Explain the displacement method for determining volume
L1e	Experiment S902A-Determining Volume	Utilize the mathematical method and displacement method to determine volume
L2	Mass	Understand how to use an equal arm balance Recognize the kilogram as the international standard for mass State the two factors that determine gravitational force Calculate weight or mass using the proportional constant for gravity and the formula w = mg
L2e	Experiment S902B-Mass of Gas	Write a report on the mass of gas
L3	Density	Define density Describe the three variables that affect density State Archimedes Principle Demonstrate the calculation and measurement of specific gravity

Unit	Lesson Title	Lesson Objectives
3 PHYSICAL GEOLOGY		
L1	Earth Structures	Discuss the history of discovering the shape of the earth Describe the formation and characteristics of the three categories of rock in the Earth's crust
L2	Internal Structures	Identify the components of the earth's crust Describe the structure of the mantle Provide evidence of a young earth Explain the structure of the core and understand that it is inferred knowledge
L3	Igneous Structures	Name components of igneous rock Evaluate the evidence proposed by evolutionary oriented geologists Explain how magma is converted to different types of intrusive rock Describe the different lava flows Recognize that volcanoes also exist under the oceans
L3essay	Essay S903A-Volcanic Eruptions	Write a report on three recent volcanoes
L4	Mountains	Describe the different types of mountains and understand how they were formed Describe erosion remnants
L5	Earth Changes	Distinguish between erosion and sedimentation Describe mechanical and chemical weathering
L6	Erosion and Sediment	Describe the different ways rivers and streams cause erosion and sedimentation Describe the different formations that are caused by wind erosion and sedimentation Distinguish between features caused by glaciers Recognize the explanation for glaciation by creation scientists
L7	Oceans	Provide examples of weathering that occurs along a coastline Describe how rivers deposit sediment in the ocean Describe the formation of reefs and bioherms Describe how turbidity currents form sedimentary rock in oceans Understand where groundwater comes from
L8	Earth Movements	Provide three examples of isostasy Examine why isostasy can not explain the folding of sediment that formed mountain ranges
L8e	Experiment S903B-Specific Gravity	Measure the mass of a rock in air and in water Calculate the rock's specific gravity
L8e2	Experiment S903C-Gravity	Calculate change in potential energy and weight Record the results in a report
L9	Plate Tectonics	Provide evidence for plate tectonic theory Evaluate plate tectonic theory according to Scripture and the evidence provided

Unit	Lesson Title	Lesson Objectives
4 HISTORICAL GEOLOGY		
L1	An Observational Science	Distinguish between objective knowledge and subjective knowledge Discuss the history of geology Recognize the assumptions of the Uniformitarian principle
L2	Sedimentary Rock	Explain reasoning for the importance of sedimentary rock in studying historical geology Evaluate the assumption that strata took many years to develop against examples that point to rapid deposition of sedimentary rock Recognize the different types of sedimentary rock Name the four terms that are used to describe the ordered arrangement of sedimentary rock
L3	Fossils	Identify and describe the various types of fossils Distinguish between the four sub-sciences of Paleontology Examine the evidence that indicates rapid deposition worldwide
L4	Crustal Changes	Differentiate between orogenic and epeirogenic crustal changes Provide examples of areas where orogenic and epeirogenic crustal changes occurred Recognize the economic significance of historical geology
L5	Measuring Time	Understand the meaning of relative time and absolute time in geologist's terms Explain the Law of Superposition Recognize that thrust faults, intrusion, and unconformities (as observed) do not follow the Law of Superposition Explain the difficulty in interpreting the variation of sea level in different locations
L6	Absolute Time	Explain why tree rings and annual scales on animals may be used to determine absolute time Examine the use of seawater and heat loss to date the Earth Evaluate the conflicting results of radiometric dating

Unit	Lesson Title	Lesson Objectives
5 OCEANOGRAPHY		
L1	Chronology and Techniques for Investigation	Discuss the beginnings of Oceanography and the people who contributed Name significant people that contributed to the science of Oceanography Describe equipment and techniques used for the development of Oceanography Define sonar
L2	Major Discoveries and Submersible Research	Describe the different topographical features of the ocean floor Recognize the use of different submersible vessels to do research and rescue Identify minerals that can be recovered from the oceans
L1e1	Essay S905A-The Moon and Tides	Write a report on the moon and tides
L3	Geological Structure and Results of Profiling	Compare and contrast the two proposed theories for continental drift Distinguish between coring, seismic profiling and refraction, and echo sounding Examine the discoveries that provide evidence for global tectonics and sea-floor spreading Define lithosphere
L4	Turbidity, Sedimentation, and Currents	Explain the evidence for rapid deposition of sedimentary rocks which cover the Earth Recognize how ocean sediments confirm the sea-floor spreading theory Be familiar with the major current systems Describe the causes of currents as described by Ekman
L5	Biology of the Ocean	Recognize the economic importance of ocean fish as a food source and other products for many countries Understand the responsibility man has to properly manage the fishing industry Examine some of the practices used for better fishing Describe a food chain for the ocean
L6	Chemistry of the Ocean	Name the five most abundant chemicals in sea water List the primary reason for nearly constant worldwide temperatures Explain how the ocean is important to the carbon dioxide cycling process Describe the effects of salinity in sea water
L7	Physical Properties of the Ocean	Distinguish between neap tides and spring tides List the causes and effects of tides and waves Describe some potential energy sources derived from the ocean
L7e1	Essay S905B-Marine Report	Write a report on some aspect of fish meal or on Jacques Cousteau and his contributions to oceanography

Unit	Lesson Title	Lesson Objectives
6 ASTRONOMY		
L1	Presuppositions	Define Astronomy Recognize the discord between evolution scientists as astronomers and creation scientists as astronomers
L2	Extent of the Universe	Recognize the vastness of the universe Differentiate between the Milky Way and our solar system List the planets in order from the sun in the solar system Discuss how Bode's Law was utilized to distinguish distance of planets from the sun
L3	Constellations	Review the most popular northern and southern circumpolar constellations Explain the brightness ratio using the magnitude classification system Follow the example to calculate magnitude difference between two stars
L3a	Measuring the Universe	Understand what the Hubble Constant measures Explain why Hubble's work gave credibility to the "Big Bang" theory Understand what the Cephid Variable measures Explain how quasars, apparent velocities, and quantized red shifts have brought about controversy to the "Big Bang" theory
L4	Gathering Light and Types of Telescopes	Describe characteristics of the first refracting telescope Identify chromatic aberration and the corrections made for it Define focal length and determine magnifying power of a telescope Describe characteristics of the reflecting telescope List advantages and disadvantages of the reflecting telescope and the refracting telescope
L5	Other Types of Telescopes	Explain what a spectrograph does Describe the uses and advantages of radio telescopes Recognize the uses and advantages of satellite-mounted telescopes such as Hubble
L5e1	Essay S906A-Telescopes	Write a report on new developments in telescopes
L6	Space Explorations	List the requirements for launching satellites Describe the different orientations of the orbits and the functions the satellite is capable of Identify spacecraft missions that have provided a wealth of information

Unit	Lesson Title	Lesson Objectives
7 BODY HEALTH (PART 1)		
L1	Microorganisms	Recognize that germs, microbes, and microorganisms describe the same thing Discuss the discovery of the germ as a disease-causing agent Recognize that all people are affected by germs
L2	Categories of Pathogenic Organisms	Define pathogenic Distinguish between and describe the five categories of pathogenic organisms Recognize that viruses do not belong to a kingdom
L3	Characteristics of Infectious Diseases	Discuss the different ways in which infectious diseases spread Distinguish between systemic and localized infections Understand the best natural defenses against disease
L3essay	Essay S907A-Medical Science	Write a report on one of the suggested topics
L4	Digestive Infections	Provide examples of digestive infections Discuss the causes, symptoms, diagnosis, treatment, and prevention of different digestive infections
L5	Respiratory Infections	Provide examples of respiratory infections Discuss the causes, symptoms, diagnosis, treatment, and prevention of different respiratory infections
L6	Nervous System Infections	Define meningitis Describe the causes, symptoms, diagnosis, treatment, and
L7	Common Viral Infections	Describe the cause, symptoms, diagnosis, treatment, and prevention of the common cold Explain the popular theory on the common cold
L8	Childhood Viral Infections	Recognize that measles, mumps, chicken pox, and rubella are viral infections Describe the cause, symptoms, diagnosis, treatment, and prevention of common childhood diseases
L9	More Serious Viral Infections	List the serious viral diseases Describe the cause, symptoms, diagnosis, treatment, and prevention of serious viral diseases
L10	Protozoan Infections	Explain how protozoa enter the body Describe the cause, symptoms, diagnosis, treatment, and prevention of amoebic dysentery and malaria
L11	Rickettsial Infections	Recognize a requirement of all rickettsial organisms Distinguish the differences between the three types of typhus fever Describe the transmission of, symptoms, diagnosis, treatment, and prevention of typhus and Rocky Mountain Spotted Fevers
L12	Fungal Infections	Describe the causes, symptoms, diagnosis, treatment, and prevention of ringworm and athlete's foot

Unit	Lesson Title	Lesson Objectives
8 BODY HEALTH (PART 2)		
L1	Body Defense Mechanisms	Discuss the beginning of awareness of preventative health measures Explain what species immunity is Describe the body's natural defense mechanisms Explain the purpose of different cells in fighting pathogens
L2	Medical Drugs	List the four groups of drug classifications Differentiate between disinfectant and antiseptic Describe the use of disinfectants and antiseptics and provide examples of each
L2e1	Essay S908A-Chemotherapy	Write a report on chemotherapy
L3	Environmental Conditions	List the requirements needed to meet hygenic standards Provide examples of organisms common to humans Explain what is meant by "your environment"
L4	Medical Advances and Total Health	Recognize and discuss the progression of medical advancements
L5	Governmental Agencies and Volunteer Groups	List the three categories of public health organizations Identify the responsibilities of the United States Department of Health and Human Services (HHS) and the Center for Disease Control (CDC) Understand the breakdown of responsibility to the state and local health departments Describe the duties of the World Health Organization (WHO) Recognize some of the volunteer health and welfare organizations
L6	Medical and Drug Control Organizations	State the mission of the National Institute of Health (NIH) Describe the responsibilties of the Food and Drug Administration (FDA) Recognize the contributions of the American Medical Association and the National Cancer Institute to the advancement of medicine

Unit	Lesson Title	Lesson Objectives
9 SCIENCE AND TOMORROW		
L1	Ecology	Explain the responsibility of man to be a good steward of the earth according to Scripture Review man's position in the biosphere Examine the problems facing man today in caring for the environment Discuss the misuse and abuse caused by man and the methods that are being used to correct it
L2	Agriculture and Waste	Explain strategies used to increase agricultural productivity and the problems associated with them Examine the reasons for the uneven distribution of the existing world food supply Explore possible solutions to the problem of waste
L3	Population	Examine the rate of growth in the world Recognize the problems associated with population growth Describe man's response to the population growth
L4	Energy Sources	Define fossil fuels List the three fossil fuels Describe problems associated with fossil fuels
L5	Debate: Fossil Fuels, Nuclear/Natural Power	Describe problems associated with fossil fuels Distinguish between a fission and fusion reaction Compare and contrast the advantages and disadvantages of fission and fusion Name and describe other natural energy sources
L6	Industry, Transportation, and Urbanization	Recognize the importance of industry and describe ways it has affected the world Explain how cities have tried to alleviate transportation problems Be familiar with future plans for transportation Describe how urbanization had affected transportation and housing
L7	Outer Space	Identify the factors that are important to space travel Recognize how space exploration has contributed to mankind Describe differences between the United States space program and the Russian space program Name some significant milestones in space exploration List the future goals of the space programs
L8	Inner Space and Self Exploration	Explain the importance of ocean exploration Describe the problems associated with ocean exploration and list some possible solutions Recognize man's responsibility to God as a steward of the universe

Unit	Lesson Title	Lesson Objectives
10 REVIEW		
L1	Nuclear Power	Compare atomic structure to the solar system Calculate number of protons, neutrons and electrons in a given atom or isotope using atomic mass and atomic number Review the processes of fission and fusion and list advantages and disadvantages to each Describe other energy sources
L2	The Metric System	Identify the metric units for length and volume Recognize the advantages of using the metric system for conversions
L3	Weight Versus Mass	Distinguish between mass and weight Identify the metric units for mass and weight
L4	Deposition Versus Erosion	Review the known causes of deposition in the world Review the causes of erosion Provide reasoning for a young Earth
L5	The Oceans, Continents; Earth in Space	Recognize that ridges and trenches correspond with areas of earthquake activity and volcanoes Review the theories for continental separation Define and describe plate tectonics Review the solar system and the instruments used to study it
L6	Practical Health	List the suggested vaccinations for traveling abroad Provide preventative health measures for campers and hikers Recognize the importance of immunizations and personal health records
L7	Population and Environment	Describe how population growth has affected many different aspects of life today Discuss today's environmental concerns

Science 1000

Unit	Lesson Title	Lesson Objectives
1 TAXONOMY: KEY TO ORGANIZATION		
L1	The History of Taxonomy	Define taxonomy Discuss the history of taxonomy Explain why Carolus Linnaeus is referred to as the "Father of Taxonomy" Define species
L2	Binomial Nomenclature	Understand the purpose of using Latin for binomial nomenclature Identify the two parts that make up the binomial name List the seven levels of classification
L3	Concept of Species	Differentiate between the two meanings of species Discuss the problems that taxonomy faces today
L4	Plant and Animal Classification	Develop an understanding of the use of a dichotomous taxonomic key Provide examples of characteristics a taxonomist may use in plant classification Provide examples of characteristic a taxonomist may use in animal classification Recognize the word endings in names given to the different taxa
L4e	Experiment S1001A-Fruit	Utilize a plant key to classify a variety of fruits
altl4e2	Activity S1001B-Keying Plants	Select ten flowers to make a dichotomous key
altl4e3	Activity S1001C-Keying Animals	Select ten to twenty animals to construct a dichotomous key
L5	Search For A System	Using the five kingdom classification system, develop an
L6	Taxonomy and Origins	Describe and differentiate between the Artificial and Natural
L7	Models of Origin	Evaluate reasoning for using the five-kingdom system of Compare and contrast the Creation model and the Evolution Evaluate the Creation model and the Evolution model using
L7e	Project S1001D-Research	Write a report on the origin of life
altl7e2	Project S1001E-Origins	Choose one of the following projects on origins

Unit	Lesson Title	Lesson Objectives
2 BASIS OF LIFE		
L1	Molecular Basis of Life	Identify the essential elements in living organisms Describe the structure of the atom Define atomic number and atomic mass Distinguish between molecules, diatomic molecules, compounds, and mixtures
L2	Properties of Compounds	Understand why elements combine Differentiate between cations and anions Describe an ionic bond and provide an example
L2e	Experiment S1002A-Static Electricity	Perform an experiment of ionic bonding
L3	Covalent Bonding	Explain covalent bonding and provide an example Describe what a hydrogen bond is
altl3e	Experiment S1002B-Temperature	Investigate water as a temperature control
L4	Importance of Inorganic Compounds	Discuss why water is the medium in which living processes occur Describe the actions of acids, bases, and salts when dissolved in water Distinguish between acids and bases
L4e	Experiment S1002C-Water Properties	Investigate water as a solvent
altl4e	Experiment S1002D-Indicators	Determine acidity and basicity of common household products utilizing indicators
L5	Chemical Reactions	Distinguish between the four types of chemical reactions Explain the Law of Mass Action as it relates to chemical reactions Define activation energy Explain the effects of temperature on activation energy
L6	Organic Compounds	Distinguish between organic and inorganic compounds Identify the properties of carbon that explain its importance to life
L7	Carbohydrates	Explain why carbohydrates are important to living organisms Recognize the basic formula of a carbohydrate Distinguish between monosaccharides, disaccharides, and polysaccharides
altl7e	Experiment S1002E-Starch	Perform investigations for presence of starch or sugar
L8	Lipids	Identify and describe the three types of lipids Recognize the vital functions of proteins to living organisms Explain why the variety of amino acids contributes to the variety of proteins
L9	Nucleic Acids	Distinguish between DNA and RNA Describe the structure of DNA and RNA
L10	Enzymes	Explain why enzymes are vital to living organisms Describe the action of enzymes in living organisms
altl10e	Experiment S1002F-Digestion	Perform investigations to explore the action of enzymes on digestion

Unit	Lesson Title	Lesson Objectives
3 MICROBIOLOGY		
L1a	Microbial Taxonomy	Identify the five established kingdoms Differentiate between prokaryotes and eukaryotes Describe the basic characteristics common to bacteria Identify representatives of the Protista kingdom and their characteristics Identify representatives of the Fungi kingdom and their characteristics
L1	The Microscope	Discuss the history of the microscope Identify the different variations of light microscopes Understand why electron microscopes are used Learn the parts of the compound microscope
L1e	Experiment S1003A-Microscope	Practice using a compound microscope
L2	Protista: The Protozoa	Describe the structure of an amoeba Identify the characteristics of an amoeba Describe the structure of a paramecia Identify the characteristics of a paramecium
L2e	Experiment S1003B-Protozoan	Prepare cultures and slides with pond water
altl2e	Experiment S1003C-Amoeba	Utilizing a microscope and prepared slide, observe an amoeba
L3	Flagellated Protozoa	Describe the structure of an euglena Identify the basic characteristics of an euglena
altl3e	Experiment S1003D-The Euglena	Utilizing a microscope and prepared slide, observe an euglena
L4	Economic Significance of the Protozoa	Define parasite Identify disease causing protozoa and describe the diseases they cause
L5	Protista: The Algae	Recognize the variety and diversity of algae Describe characteristics common to green algae Describe characteristics common to golden-brown algae
altl5e	Experiment S1003E-Algae	Prepare and observe cultures and slides of various algae
altl5e1	Project S1003F-Water Investigation	Select a body of fresh water and make observations
L6	Protista: Fire Algae	Describe representatives of fire algae Describe representatives of brown algae Describe representatives of red algae Recognize the significant economic contributions of algae
L7	The Fungi	Distinguish between saprophytes and parasites Describe general characteristics of fungi Recognize important uses of various fungi
L7e	Experiment S1003G-Fungi	Observe a variety of fungi using a microscope or a hand lens
L8	The Monera	Understand how bacteria are identified Recognize the commercial and economic importance of bacteria Distinguish between Gram-positive and Gram-negative bacteria

Unit	Lesson Title	Lesson Objectives
3 MICROBIOLOGY - cont.		
L9	The Rickettsias	Describe the characteristics of cyanobacteria Describe human diseases caused by rickettsias, and identify the vector Describe general characteristics of rickettsias Recognize the unique replication of viruses Understand that viruses are capable of causing several diseases Discuss how and why the first vaccination occurred
altop	Experiment S1003H-Algae Observations	Examine prepared slides of nostac and spirogyra
4 CELLS		
L1	The Cell-An Introduction	Evaluate the two cell theories Recognize cells as basic building blocks of life Note differences between plant and animal cells
L1e	Experiment S1004A-Cheek Cells	Prepare and observe a slide of cheek cells
altl1e	Experiment S1004B-Onion Cells	Prepare and observe a slide of onion cells
L2	Cell Design	Describe the structure of the plasma membrane Differentiate and describe the five methods of transport into and out of the cell
L3	Cell Membrane Function	Define osmosis Distinguish between the terms hypotonic, hypertonic, and isotonic
L3e	Experiment S1004C-Osmosis	Perform an experiment about osmosis
L4	Organelles	Understand the process of glycolysis and the Krebs cycle for the production of ATP Describe the structure and function of the mitochondria as an organelle of the cell Discuss the function of a lysosome Identify where all energy is derived from
L5	Production of Needed Material	Provide a brief explanation of the structure and function of the endoplasmic reticulum, ribosomes, and the Golgi bodies Describe the structure and function of DNA found in the nuclei of cells Define and differentiate between mitosis and meiosis Distinguish the differences between plant and animal cells
L6	Cells in Organisms	List in order the five levels of cellular organization Recognize that, with each level, complexity increases Provide examples of specialized cells
altl6e	Experiment S1004D-Tissues	Observe several types of tissue cells using a microscope

Unit	Lesson Title	Lesson Objectives
5 PLANTS: GREEN FACTORIES		
L1	How Is a Plant Made?	List the various jobs that cells are capable of Distinguish how plant cells are similar and different from other cells
L2	Parts of the Plant Cell	Explain the function of the nucleus and the two structures found in the nucleus Review the structure and function of the organelles found in the cytoplasm Describe the structure and function of the chloroplasts in the plant cell Recognize the function of the cell wall in plant cells
L3	Anatomy and Morphology	Understand how a tissue culture works Describe the special tissues in a plant List and describe the five plant organs Discuss the basic reproductive method Identify the flower parts
L4	How do Plants Grow?	Follow the seedling development of a bean Compare and contrast the structures of a monocot and a dicot Differentiate between an annual and a perennial
L4e	Experiment S1005A-Seeds	Collect four different types of seeds and perform the investigation
L5	Developmental Anatomy	Explain germination of a seed Describe the elongation process of the root tip Discuss the differentiation of the plant cells Understand the process of increased girth in a plant
L6	How do Plants Work?	Define agronomy Discuss the history and men involved in the search for "how do plants grow?" Understand and write the equation for photosynthesis Understand the importance of radioisotopes in discovering the processes of photosynthesis
L7	Photosynthesis: A Closer Look	Distinguish between the light and dark reaction of photosynthesis List and describe factors that affect photosynthesis Recognize proteins are necessary for life to exist Understand the necessary components for the production of proteins by humans and animals
altl7e	Experiment S1005B-Terrarium	Construct a terrarium
L8	Respiration	Define respiration and write the overall reaction Identify the life sustaining results obtained from respiration List and describe the changes that take place in the three stages of respiration
L9	How do Plants Help People?	Discuss briefly the history of crop production to meet demand Explain the green revolution that is taking place in the world

Unit	Lesson Title	Lesson Objectives
6 HUMAN ANATOMY AND PHYSIOLOGY		
L1	Digestive System	Identify and describe the function of the organs of the digestive system Trace the path that food takes through the digestive system Explain the purpose of villi in the small intestine Explain the two common conditions that disturb the function of the bowels
L2	Excretory System	Identify the two systems involved in excretion of wastes Describe in detail the structure and function of the kidneys Recognize the importance of the kidneys
L3	Respiratory System	Differentiate between external and internal respiration Identify the function of the respiratory system Describe the structure and function of the organs involved in the respiratory system
L4	Circulatory System	Identify the functions of the circulatory system Distinguish between the solid and liquid portion of blood Describe the three groups of cells comprising the solid portion of blood Recognize anemia and hemophilia as disorder of the blood Understand the significance of blood types
L5	The Heart	Distinguish between the structures of the heart involved in pulmonary circulation and systemic circulation Trace the pathway blood circulates through heart, lungs, and body via the veins and arteries Understand blood pressure readings Recognize what the electrocardiogram is used for Identify and describe the function of the lymphatic system
L5e	Experiment S1006A-Heart Rate	Perform and experiment on heart rate
L6	Body Framework	Identify the functions of the skeletal system Describe the structure of bones and cartilage Locate and identify the major bones in the body Provide examples of different kinds of joints Locate and identify parts of the teeth and mouth
L7	Muscular System	Describe the action and components of a muscle fiber Differentiate between the three muscle types Distinguish between a tendon and ligament Compare and contrast the movement of the skeletal muscles and the smooth muscles Identify disorders associated with the muscular system
altl7e	Experiment S1006B-Muscle Types	Observe slides of the three muscle types
L8	Reproductive System	Define sexual reproduction Discuss the development of a mature egg (ovum) in a female Discuss the production of sperm and semen in a male Explain what occurs during fertilization
L9	Environmental Interactions	Identify the divisions and functions of the nervous system Describe the basic structure of a nerve cell Identify and describe the different parts of the brain Understand the path of a reflex arc Differentiate between the parasympathetic and the sympathetic nervous system

Unit	Lesson Title	Lesson Objectives
6 HUMAN ANATOMY AND PHYSIOLOGY - cont.		
L10	Sensory Systems: The Eye	Locate the structures of the eye Describe the functions of the structure of the eye Trace the path light takes upon entering the eye Describe common vision problems
L11	Sensory Systems: Hearing, Taste, Touch	Locate and describe the function of the three parts of the ear Recognize the location and the different tastes the tongue is capable of detecting Recognize the types of smells detected by the nose Distinguish between the five different receptors located in the skin Discuss common skin problems
L12	Endocrine System	Describe the location and function of the thyroid and parathyroid glands and the hormones they secrete Describe the hormonal control of the pancreas and adrenal glands Explain the release of hormones from the ovaries and testes Explain the relationship and the hormonal control of the pituitary and the hypothalamus Identify common diseases and conditions of the thyroid and the pancreas
L13	Immune System and Disease	Explain the three lines of defense a human body is capable of Explain why allergies occur List some major categories of disease

Unit	Lesson Title	Lesson Objectives
7 GENETICS: GOD'S PLAN OF INHERITANCE		
L1	Genetics: God's Plan of Inheritance	Discuss the importance of Mendel's work and results that led to the principle of segregation and the principle of dominance and recessiveness
L2	Probabilities	Identify the terms adopted to designate parents and generations Distinguish between phenotype and genotype Distinguish between heterozygous, homozygous and alleles Recognize the relationship between random events and probability Understand the calculation of probability of independent events Relate probability of events to Mendel's principle of segregation using the seed experiment
L2e	Experiment S1007A-Probability	Perform an experiment on probability
L3	Cross Predictions	Understand the use of the Punnett square Explain a test cross and a dihybrid cross Review Mendel's principle of independent assortment
L4	Application of Mendelian Genetics	Describe the occurrence of incomplete dominance and provide an example Describe multiple alleles and provide an example
L5	Chromosome Basis of Heredity	Understand why Sutton used Drosophila to study genetics State Sutton's chromosome theory Distinguish between the haploid and diploid condition of Define meiosis
L6	Chromosomes in Meiosis	Identify and describe the stages of meiosis Distinguish the differences between spermatogenesis and Explain how crossing-over occurs
L7	Sex Chromosomes	Understand that the male chromosome is the sex determiner for most species Discuss the discovery of sex-linked inheritance and provide an example Explain how nondisjunction may occur and provide an example
L8	Molecular Genetics	Understand the one-gene-one-polypeptide concept and apply it to Mendel's studies on peas Explain how environment may modify or alter a gene Discuss how mutations occur and the possible effects of mutations
L8e	Experiment S1007B-Molecular Genetics	Perform an experiment on molecular genetics
L9	Human Genetics	Analyze the problems associated with studying human genetics Examine the main methods used to study traits in humans
L10	Factors Studied	Explain how blood type is an example of both multiple alleles and incomplete dominance Recognize that differences in blood types occur among different nationalities Discuss in detail the sex-linked trait of hemophilia
L11	Inherited Diseases	Explain how sickle-cell anemia in Africa may be beneficial rather than harmful Describe abnormalities caused by disjunction of sex chromosomes Explain how Down's Syndrome and Turner Syndrome occur List common traits that are known to be inherited

Unit	Lesson Title	Lesson Objectives
8 CELL DIVISION AND REPRODUCTION		
L1	Cell Division	Identify the result of mitosis Recognize the purpose of mitosis
L2	Meiosis	Review the phases of meiosis Recognize the functions or purposes of meiosis Compare and contrast mitosis and meiosis
L3	Stages of Mitosis	Identify and describe the stages of mitosis Define cytokinesis List and describe factors that affect the rate of mitosis
L3e	Experiment S1008A-Mitosis	Observe slides of onion root and roundworm for mitosis
L4	Asexual Reproduction	Describe different means of asexual reproduction Discuss advantages of asexual reproduction
altl4e	Experiment S1008B-Fragmentation	Perform an experiment of fragmentation on flatworms
L5	Plants	Define the terms vascular and propagation Describe the different types of asexual reproduction in stems and provide examples Explain the asexual reproduction in bulbs and adventitious roots
altl5e	Experiment S1008C-Bulb Structure	Using an onion, make observations of a bulb
L6	Practical Applications in Plants	Describe and provide examples of methods used to grow plants asexually List the advantages of grafting
altl6e	Experiment S1008D-Cuttings	Perform investigations of different types of cuttings
L7	Sexual Reproduction	Review sexual reproduction Discuss advantages of sexual reproduction
L8	Fertilization	Describe isogamy and isogametes Describe anisogamy and anisogametes Describe Oogamy and oogametes Explain fertilization and conjugation Distinguish the gametes producing organs in higher plants and animals
altl8e	Experiment S1008E-Sexual Reproduction	Make observations of an egg cell and a sperm cell using prepared slides
L9	Sexual Reproduction in Animals	Distinguish between a haplontic and diplontic life cycle Describe internal and external fertilization Recognize the importance of cell differentiation
L9e	Experiment S1008F-Tissue Structure	Observe different types of cells
L10	Metamorphosis	Describe and differentiate between complete and incomplete metamorphosis Provide examples of animals that undergo metamorphosis
L11	Sexual Reproduction in Plants	Describe the heteromorphic alternation of generations by plants Differentiate between sporophytes and gametophytes
L12	Life Cycles of Ferns and Pines	Study the life cycle of the fern Note the differences between the sporophyte and gametophyte generation Study the life cycle of the pine as a gymnosperm Note the differences between the sporophyte and gametophyte generations
altl12e	Experiment S1008G-Ferns and Pines	Prepare a slide of sporangia from a fern leaf and observe
altl12e2	Experiment S1008H-Flowers	Examine a variety of flowers and identify the parts

Unit	Lesson Title	Lesson Objectives
9 ECOLOGY, POLLUTION, AND ENERGY		
L1	Principles of Ecology	Define ecology Recognize what parts make an ecosystem State the principles of ecology using the ecosystem concept
L2	Environmental Factors	Identify the environmental factors that are important to habitats Recognize that the variety of habitats on earth are directly related to the variety of living things State the principles of ecology related to the environmental concept
L3	Food Chains	Recognize that organisms containing chlorophyll are the first link in the food chain State the principles of ecology using the food chain concept Evaluate the analogy of the balance of nature to a see-saw as an example of dynamic equilibrium State the principles of ecology using the balance of nature concept
L4	Ecological Relationships	List and describe the maps that ecologists use to define biomes Explain how biomes are named by ecologists
L5	Communities and Habitats	Explain the use of ERTS-I by ecologists Distinguish between the terms biosphere, biomes, habitats, and communities Recognize that when environments are mismanaged, the earth becomes less able to support life Understand the use of quadrats, transects, and inventories by ecologists for counting and sampling plants and animals Provide examples of endangered species
L5e	Experiment S1009A-Habitats	Select a habitat and set up a living community
altl5ep	Experiment S1009B-Biomes	Explain what part of the ecosystem each living organism fulfills
altl5e2	Experiment S1009C-Quadrats	Choose a quadrat location and count and list different plant and animal species in the quadrat
altl5es	Experiment S1009D-Inventory	Take an inventory of all the plants and animals in a designated area
L6	Pollution Affects Ecology	Understand the causes and effects of pollution in the environment
L7	Pollution Problems	Identify problems that create pollution Recognize the particles and chemicals that make up smog Discuss and demonstrate strategies that will help solve the pollution problem
L8	Energy Affects Ecology	Differentiate between potential and kinetic energy Identify and describe different forms of energy Recognize the problems associated with the burning of fossil fuels Understand the importance of energy conservation Recognize and describe alternative energy sources
L8essay	Essay S1009E-Stewardship	Locate Bible verses associated with our stewardship of the earth and rewrite each Bible verse using one's own interpretation

Unit	Lesson Title	Lesson Objectives
10 PRINCIPLES AND APPLICATIONS OF BIOLOGY		
L1	Study of Life	Discuss the harmony between science and Scripture State and describe the steps of the scientific method Identify limitations of the scientific method
L2	Definition of Life	Name common characteristics of living organisms
L3	Basic Principles of Life	Examine the levels of organization in living organisms Recognize that diversity is the reason for taxonomy Define and describe the term homeostasis
L4	Control System	Differentiate between the afferent and efferent pathways of a homeostatic control system Recognize the role of chemical transmitters Review the components of reproduction as growth and the new individual
L5	Environment of Life	Understand the many components of a food web Identify how energy flows through an ecosystem Describe ways that we can be good stewards of the earth
L6	Applications of Biology	Assess the possible solutions to genetic disease Explain genetic counseling Review microorganisms and some of the diseases they cause Name three types of immunity
L7	Green Revolution	Discuss how the world is addressing world hunger

Science 1100

Unit	Lesson Title	Lesson Objectives
1 MEASUREMENT AND ANALYSIS		
L1	An Introduction to Chemistry and Metric Measurement	Relate historic facts about the history of measurement Relate the common metric prefixes Convert between metric units of length using a "metric line"
altl1e	Report S1101A-Metric System	Research and describe the history of measurement and its impact on the advancement of science and societies
L2	Measuring Volume in the Chemistry Laboratory	Identify typical laboratory instruments used to measure volume Convert between cubic length measurements and other metric volume measurements
L3	Measuring Mass in the Chemistry Laboratory	Differentiate between mass and weight Convert between metric units of mass using a "metric line"
L4	Showing Precision in Measurements	Differentiate between accuracy and precision Determine how many digits should be in a measurement using any particular scale Relate good laboratory procedures for measuring length, mass and volume
L4e	Project S1101B-Measuring Length with Precision	Demonstrate proficiency in using a metric ruler to make precise measurements
altl4e2	Experiment S1101C-Masses	Demonstrate proficiency in using a centigram balance to make precise measurements
L5	Observation and Hypothesizing	Differentiate between qualitative and quantititive measurements Describe a good experimental methodology
l6	Using Graphs to Analyze Data	Relate basic procedures for presenting a well defined graph Differentiate between graphs depicting direct and inverse relationships between variables Recognize and use basic equations for simple graphed lines
L7	Using Significant Figures to Show the Reliability of Data	Determine how many significant digits are in a measurement Multiply and divide and apply significant digit rules to the answer
L8	Using Scientific Notation with Significant Figures	Convert numbers into scientific notation Do mathematical operations with numbers in scientific notation while maintaining significant figure rules
L9	Doing Chemistry Your Way: Find Your Future	Demonstrate an awareness of the many opportunities in the career fields relating to chemistry
altl10	Practice in Measuring Metric Volumes	Judge metric volume measurements in the 100 to 500 mL range to within +/- 20 mL Feel confident using a graduated cylinder reliably
altl11	Learning to Make Useful and Detailed Observations	Recognize that valuable data in chemistry can be subtle and that careful and detailed observations are required

Unit	Lesson Title	Lesson Objectives
2 STARTING THE INVESTIGATION: HOW TO IDENTIFY ELEMENTS, COMPOUNDS, AND MIXTURES		
L1	The Basic Ingredient: Chemical Elements	Differentiate between physical and chemical properties Relate several facts from the development of chemical science Know the symbols and spellings of the names of several common chemical elements
L2	Using Chemical and Physical Properties to Identify Substances	Use the hardness scale to help identify an unknown substance Calculate density from direct and indirect measurements Use density measurements to help identify an unknown substance Identify a substance as organic or inorganic from its chemical formula
L2e	Experiment S1102A-Observations of a Phase Change	Identify differences in energy content of various phases and how these can be visually demonstrated Interpret graphs produced from data collected during the phase change process Communicate conclusions
altl2e2	Experiment S1102B-Salt and Sand	Differentiate between the physical properties of sand and salt Plan and implement an investigative procedure to separate the salt/sand mixture Communicate results
L3	Creating Compounds: Investigating Chemical Changes	Use the hardness scale to help identify an unknown substance Calculate density from direct and indirect measurements Use density measurements to help identify an unknown substance Identify a substance as organic or inorganic from its chemical formula
altop1	Report S1102C-Density	Differentiate between materials based on their densities Plan and implement an investigative procedure to verify the identity of a substance based on its density Communicate results of the experiment and include a discussion of factors of a material that affect its density
L4	Identifying Different Types of Mixtures	Differentiate between heterogeneous and homogeneous mixtures Differentiate between solute and solvent Understand that the solution process involves a physical change Relate differences between colloids, suspensions, and solutions and give examples of each
L4e	Experiment S1102D-Using the Tyndall Effect to Identify Colloids	Differentiate between a solution and a colloid based on the Tyndall Effect Clearly state the basis for the Tyndall Effect Communicate findings

Unit	Lesson Title	Lesson Objectives
3 EXPLORING LAWS FOR GASES AND CONSERVATION OF MASS		
L1	Nothing Stays Put - The Basis for Diffusion and Pressure	Explain that the random motion of molecules causes the diffusion of gases State the relationship between the molecular weight of the diffusing material Define atomic weights as recorded on a periodic table Relate that pressure is created by collisions
L2	Gases and Kinetic Molecular Theory	Understand that elastic collisions occurs without the loss of energy Relate the basic ideas of the Kinetic Molecular Theory Read from a phase diagram chart Define and use the term "triple point"
altl2e	Project S1103A-Graphing Kinetic Energy	Apply the principles of Kinetic Molecular Theory to graphs of molecular motion
L3	Pressure-Volume Relationships in Gases (Boyle's Law)	State the inverse relationship between pressure and volume in an ideal gas Be familiar with common units for pressure Solve problems using Boyle's Law
L4	Temperature-Volume Relationships in Gases (Charles' Law)	Explain what temperature measures in a system Explain the concept of absolute zero and the Kelvin temperature scale Convert between Celsius and Kelvin temperature scales Solve problems using Charles' Law
L4e	Experiment S1103B-Finding Absolute Zero Experimentally	To organize data onto a graph To better understand the concept of extrapolation Visualize the relationship between the temperature and volume of a gas To evaluate, make inferences, and predict trends from data Communicate findings
altl4e2	Project S1103C-Absolute Zero: Real or Theoretical?	Use original sources to document findings concerning the research question Support your position with conclusions from research
L5	Combined Gas Law	Solve problems using the combined gas law Relate the values and meanings of "standard temperature and pressure"
L6	Counting Gas Particles: The Measure of the Mole	State Avogadro's Hypothesis Understand that Avogadro's number (which is equal to 1 mole of items) is determined by defining 1 mole as the number of atoms in exactly 12 grams of carbon-12 Relate that the atomic mass of any substance (expressed in grams) contains one mole of atoms Relate that the molar volume of any gas at STP is 22.4 L
L7	How Big is a Mole? Avogadro's Number	Calculate the molecular or atomic weight (mass) of a substance from its chemical formula Determine the number of particles in a given mass of a substance and its chemical formula State the value of Avogadro's number as 6.02 x 1023and know that this is equal to one mole of particles

Unit	Lesson Title	Lesson Objectives
3 EXPLORING LAWS FOR GASES AND CONSERVATION OF MASS - cont.		
L8	Demonstrating Conservation of Mass with Balanced Equations	Relate the concept of conservation of mass Identify products and reactants in chemical equations Use coefficients to balance chemical equations Know how to calculate the masses of reactants and products in a chemical reaction from the masses of the reactants or products and the relevant atomic masses
altl8es	Essay S1103D-Biography	Research and describe the important contributions of investigators to the science of chemistry
altl9	Examining the Use of Certain Gases as Propellants	Describe the sources and properties of specific gases important to ozone depletion reactions Understand the interaction of energy (sunlight) and matter (chemicals) in the stratosphere of Earth
altl10	A Metal Can Meets Mr. Charles and Mr. Boyle	Describe experimental outcomes in terms of established laws
altl11	How 'Gas Laws' Impact Scuba Diving	Describe practical outcomes of the application of gas laws in aquatic settings
altl12	More 'Gas Laws' and Scuba Diving	Describe practical outcomes of the application of gas laws in aquatic settings

Unit	Lesson Title	Lesson Objectives
4 THE DISCOVERY OF ATOMS: NATURE'S BUILDING BLOCKS		
L1	The Golden Years of Chemistry	Explain the early concept of the atom as described by Democritus Explain and apply the Law of Multiple Proportions as proposed by Dalton Relate the experimental basis for Thompson's discovery of the electron Relate the major contributions of the Curie's to the development of atomic theory
altl1e	Experiment S1104A-Physical Properties of Elements	Devise investigative procedures, selecting appropriate equipment and technology Form a testable hypothesis Collect, analyze and display results of investigative procedures Communicate findings
altl1e2	Experiment S1104B-Chemical Properties of Some Metals	Form a testable hypothesis Collect, analyze and display results of investigative procedures Communicate findings
L2	Masters of Classic Atomic Theory	Relate the experimental basis for Rutherford's discovery of the nucleusdescribe the nucleus of the atom as being very small compared to the overall size of the atom but containing most of the mass Describe the particles and rays that are emitted from radioactive atoms Relate that Bohr's initial electron organizational atomic structure was determined by studying the spectra of simple atoms Determine the atomic number and number of electrons of and element given its atomic mass Explain that Schrodinger extended the work of Bohr and deBroglie to develop the field of quantum mechanics
L3	Designing an Organizational Map: The Periodic Table	Relate the position of an element in the periodic table to its atomic number and its atomic mass Use the periodic table to identify metals, metalloids, nonmetals, and noble gases Understand the difference in trends between groups and families Relate that the properties of an atom are mainly determined by the valence electrons Explain the concept of periodicity
L4	The Bohr Model Revisited	Explain that spectral lines are the result of energy released as electrons transition to lower energy levels and that the energy released is quantized Describe the filling order for the electrons of an atom in terms of level and sublevel Relate how many electrons each sublevel type (s,p,d,f) can accommodate
L5	Charging Up: Ionization of Atoms	Use the periodic table to identify trends in ionization energy Explain, based on properties of atoms, why periodic trends in ionization energy exist

Unit	Lesson Title	Lesson Objectives
4 THE DISCOVERY OF ATOMS: NATURE'S BUILDING BLOCKS - cont.		
L6	A Closer Look Inside: Nuclear Reactions	Explain the process of nuclear degeneration starting with parent nuclides and moving to daughter nuclides of an original stock of radioactive material Realize that most common elements have naturally radioactive isotopes Understand that "binding energy" is the nuclear force that overcomes the electromagnetic repulsion of protons in the nucleus and holds it together State that the change in mass seen in nuclear reactions was predicted by Einstein in the equation E = mc2 fusion) is much larger than in a chemical reaction Understand that alpha, beta, and gamma radiation produce different amounts and kinds of damage Understand that alpha, beta, and gamma radiation can be used to the benefit of mankind Balance nuclear equations
altl6e	Report S1104C-Fission Reactors	Describe in detail the process of energy production in a nuclear reactor Document the use of nuclear reactors in this country and world-wide Evaluate the impact of this scientific advancement on societies and the environment
Unit	**Lesson Title**	**Lesson Objectives**
5 MOLECULAR STRUCTURE		
L1	Chemical Accounting: Stoichiometry	Evaluate a balanced chemical reaction to determine the yield of a certain product given appropriate information (mass, number of moles, number of atoms) about the reactants Understand that all chemical reactions proceed according to conservation of mass laws
L2	Valence Structure	Determine how a particular atom will gain stability by gaining or losing valence electrons to obtain the noble gas (octet) structure Relate that it is the valence electrons that determine a material's chemical activity
L3	Determining Chemical Formulas	Use the concept of valence electrons to determine how atoms will combine to form stable compounds
L4	Electron Availability: Prelude to Bonding	Define ionization energy and relate its trends on the periodic table
L5	Types of Chemical Bonds	Define electronegativity and relate its trends on the periodic table Predict the type of bond that exists in a binary compound based on the class of element to which the anion and cation belong to (metal, nonmetal) Predict the type of bond that exists in a binary compound based on the relative values of electronegativities
L6	Polar Covalent Molecules and Dot Structures	Draw a dot structure of an element using its valence electrons Determine if a compound is polar based on symmetry
L6e	Experiment S1105A-Demonstrating Polar Properties	Describe experimental outcomes in terms of molecular shape and polarity Apply ideas to the findings of other scientists

Unit	Lesson Title	Lesson Objectives
6 CHEMICAL REACTIONS, RATES AND EQUILIBRIUM		
L1	Evidence for Chemical Change	Explain that energy is exchanged when bonds are broken and re-assembled Relate that temperature is a measure of the kinetic energy of a system Understand that enthalpy is a measure of the internal bonding energy of molecules and cannot by measured directly Distinguish between exothermic and endothermic processes given appropriate information in the balanced equation Give several indicators that suggest that a chemical reaction has occurred
L1e	Experiment S1106A-Observing Chemical Changes	To better conceptualize various indicators for chemical change
altl1e2	Experiment S1106B-Chemical Reactions	Do this experiment
altl1e3	Experiment S1106C-Ammonium Nitrate	Do this investigation
L2	Enthalpy of Reaction	Determine the enthalpy of a reaction given a balanced chemical equation Determine if a reaction is exothermic or endothermic based on its enthalpy of reaction
L3	Using Gibbs Free Energy to Predict Spontaneous Reactions	Describe comparative entropies of gases, liquids, and solids Use the Gibbs free energy equation to determine if a reaction will be spontaneous
L4	Factors that Affect Reaction Rates: Solution Concentration	Understand that reactions occur at different rates Determine mole fraction, molarity, molality, and percent solute of a solution
L4e	Experiment S1106D-Affect of Solution Concentration on Reaction Rate	Devise investigative procedures, selecting appropriate equipment and technology Form a testable hypothesis Collect, analyze and display results of investigative procedures Observe how a trend in solution concentration for a specific solution affects reaction rate Communicate findings
L5	Factors that Affect Reaction Rate: Temperature, Catalysts, Concentration of Reactants	Understand that all reaction rates respond to changes in temperature Explain that all reactions require at least a small amount of activation energy Describe the use of catalysts to lower activation energy Understand that increasing reactant concentration increases reaction rate and, that in gases, this can affectively be caused by decreasing volume or raising the pressure

Unit	Lesson Title	Lesson Objectives
6 CHEMICAL REACTIONS, RATES AND EQUILIBRIUM - cont.		
L6	Reaction Equilibriums and Equilibrium Constants	Understand that some reactions do not go "to completion" and instead enter into reversible reactions that occur at a constant rate between product and reactant Write an equilibrium expression from a balanced chemical equation Determine from the value of an equilibrium constant, whether reactants or products are favored
L6ex	Activity S1106E-Exploring Factors that Affect Equilibrium	Evaluate experimental results showing equilibria shifts due to temperature change
L7	Conditions Affecting Equilibrium	Apply LeChatelier's Principle in cases where equilibrium is stressed by concentration, temperature, pressure or volume
7 EQUILIBRIUM SYSTEMS		
L1	Chemist's Toolbox	Solve problems concerning moles, gram formula weights, and balanced equations Observe significant figure rules in all calculations
L2	Solutions	Understand that solutions are homogeneous mixtures of two or more substances Relate that solutions can exist in three phases, solid, liquid or gaseous Explain the relationship between the concentration of the solute in a solution and the freezing point depression or the boiling point elevation
L3	Solution Concentration: Molarity	Calculate the concentration of the solute in terms of molarity Make dilution calculations from original stock solutions
L4	Electrical Nature of Solutions	Relate that acids, bases, and salts are three types of compounds that form electrolytes in solution Understand that covalent compounds must both dissociate and ionize to form electrolytic solutions, whereas ionic compounds only need to dissociate
L5	Solubility	Predict the number of ions a solute may contribute to a solution List factors that influence the solubility of a solute in a solvent
L6	The Dissolving Process	Describe the dissolving process at the molecular level
L6e	Experiment S1107A-Solubility Trends	Form a testable hypothesis Collect, analyze and display results of investigative procedures Draw conclusions from experimental data concerning solubility trends Communicate findings
L7	The Solubility Constant	Write a solubility constant expression for a given solution process Predict from the value of a solubility constant if a solute is soluble or insoluble
L8	Acid-Base Equilibria	Understands how solubility is affected by the common ion effect State definitions and properties of acids and bases Understand that strong acids/bases fully dissociate while weak acids only partially dissociate Write an equilibrium constant (Ka or Kb) for the dissociation of an acid or base

Unit	Lesson Title	Lesson Objectives
7 EQUILIBRIUM SYSTEMS - cont.		
altl8e	Experiment S1107B-Acid Strength	Form a testable hypothesis for what happens when HCl and marble interact based on a chemical reaction Determine how acid strength affects the speed and strength of the reaction Collect, analyze and display results of investigative procedures Communicate findings
L9	pH Scale	Use the pH scale to characterize a solution as acidic, basic, or neutral Do calculations of pH from hydrogen ion or hydroxide ion concentration Relate that the ion product of water (Kw) is a constant equal to 10-14
L10	Titration of Acids and Bases	Do calculations using the method of titration in determining the concentration of an unknown acid/base Understand that the process of neutralization leads to the formation of salt and water
L11	Redox Equilibria	Determine the oxidized and reduced species in a reaction Determine the oxidizing and reducing agent in a reaction
L12	Redox and Oxidation Potentials	Assign oxidation numbers to all members of a compound Understand that on the list of oxidation potentials, any reactant will act as an oxidizing agent for any agent above it
altl13	Activity: Solution Concentration vs. Conductivity	Graph experimental data and interpret results for peer review
altl14	pH Calculations	Perform pH calculations using a calculator

Unit	Lesson Title	Lesson Objectives
8 CARBON CHEMISTRY: HYDROCARBONS		
L1	Organic Compounds	Determine from its formula whether a compound is organic or inorganic Briefly describe the origin of petroleum products and some of its current uses
L2	Sources of Organic Compounds	List some sources natural sources of organic compounds and the major products from each Describe how fractional distillation is used to separate petroleum fractions
altl2e	Experiment S1108A-Volatility	Form a testable hypothesis concerning the relative volatility of the solvents being investigated Collect, analyze and display results of investigative procedures Do research to extend the application of these results to practical circumstances Communicate findings
L3	A Closer Look at the Carbon Atom	Describe the valence structure of carbon and how this influences it's tendency to enter into covalent bonds Compare and contrast common carbon crystals, ie, diamond and graphite
L4	Bonding in Organic Compounds	Determine if a bond is likely to be ionic or covalent base on electronegativity differences
L5	Alkanes: Saturated Hydrocarbons	Use the naming system for the first ten compounds in the alkane series Understand the concept of structural isomers State that the most important chemical reaction of alkanes is combustion Relate that alkanes are chemically fairly unreactive Explain that saturated hydrocarbons have all carbons bonded to 4 other atoms
L6	Unsaturated Hydrocarbons	Relate that unsaturated hydrocarbons have fewer than 4 bonds to other atoms State that the family of hydrocarbons with double bonds is known as the alkenes State that the family of hydrocarbons with triple bonds is known as the alkynes Explain that unsaturated hydrocarbons are very reactive with the major reaction being an addition process which occurs at the site of the double or triple bond Relate the basic nature of cyclic compounds, such as benzene

Unit	Lesson Title	Lesson Objectives
9 CARBON CHEMISTRY: FUNCTIONAL GROUPS		
L1	Common Reactions of Saturated Hydrocarbons	Relate that substitution by halides is the most common reaction of saturated hydrocarbons other than combustion State the use of several organic halides which are important industrially or historically
L2	Reactions of Unsaturated Hydrocarbons	Explain that unsaturated chain hydrocarbons undergo addition reactions to become saturated Explain that aromatic hydrocarbons (benzene) undergoes substitution Relate that DDT is an important substituted aromatic hydrocarbon
L3	Alcohols	Recognize the hydroxyl functional group Explain the basic process by which alcohols are manufactured Name several important industrial alcohols
L4	Aldehydes, Acids, and Ketones	State that aldehydes contain the functional group -CHO, and formaldehyde is a common example of this class of chemicals State that the carboxylic acids contain the -COOH group and formic acid is a common example of this class of chemicals State that ketones contain the functional group C=O on one of the interior carbons and a common ketone is acetone
l5	Esters	State that the functional group of an ester is -COO- and play many roles in nature, including taste molecules Use the naming framework to derive a name for a particular ester
L6	Nitrogen Functional Groups	Explain that ammonia is manufactured using the Haber process State that the functional group of an primary amine is -NH2, and list several uses of amines Use the naming framework to derive a name for a particular amine State that the functional group of amides is -C0NH2 and explain that amides provide the structural link in proteins Use the naming framework to derive a name for a particular amide
L7	Proteins and Amino Acids	Explain that proteins are made by the polymerization of amino acids State that the condensation process joins amino acides in a peptide link to form proteins
L7e	Experiment S1109A-Preparation of a Polymer	Evaluate scientific data Develop questions from an initial investigation

Unit	Lesson Title	Lesson Objectives
10 CHEMISTRY REVIEW		
L1	Measurement and Analysis	Review making metric conversions Review reading metric instruments to the proper degree of precision
L2	Scientific Analysis and Significant Figures	Review guidelines for good scientific methodology Review rules for manipulating significant figures Review rules for converting numbers to and from scientific notation
L3	Elements, Compounds, and Mixtures	Review examples of physical properties of substances such as density Review examples of chemical properties of substances such as combustion Review indicators to differentiate between various types of mixtures (solutions, colloids and suspensions)
L4	Gases and Moles	Review ideas pertaining to gases, Boyle's and Charles' Law, Avogradro's Hypothesis, Molecular Kinetic Theory Review solving problems using Boyle's and Charles' Law and the combined gas law Review calculating molecular weights Review solving molar mass problems based on balanced equations
L5	Atomic Structure and Nuclear Reactions	Review the basic structure of the atom Review information that can be determined about an atom from a periodic table entry Review the three natural forms of radiation that occur during the decay process and their inherent dangers Review balancing nuclear equations Review the significance of fission and fusion reactions
L6	The Periodic Law	Review the trends that occur on the periodic table such as in ionization energy and electron affinity Review the idea that properties of families depend on valence electrons Review the labeling an atom's electronic structure at the sub-level (s,p,d,f) Review the concept that energy is released when electrons move from one energy level to a lower one
L7	Molecular Structure	Review determining the identity of an element from its electron configuration Review determining chemical formulas for compounds using information about the placement of an element on the periodic table Review the internal difference between different types of bonds, such as covalent, metallic and ionic Review the idea that unequal sharing of electrons causes covalent bonds to become polar
L8	Chemical Reactions, Rates, and Equilibrium	Review the concept of heat of enthalpy and determining exothermic and endothermic reactions Review recognizing signs that a chemical reaction has occurred

Unit	Lesson Title	Lesson Objectives
10 CHEMISTRY REVIEW - cont.		
L9	Reaction Dynamics	Review various methods for calculating solution concentration Review writing equilibrium constants from balanced equations Review predicting what adjustment a system that is in equilibrium will make when stressed
L10	Solutions	Review the relationship between the concentration of the solute and the freezing point depression or boiling point elevation of a solution Review making dilutions from an originally known solution concentration Review the concept that various factors influence more or less of the solute to dissolve Review the idea that some solutes make electrolytic solutions
L11	Solubility Equilibrium	Review how to interpret values of Ksp for a solution Review physical and chemical properties of acids and bases Review the relationship between the pH of a solution and the hydrogen ion concentration
L12	Neutralization	Review the significance of the ion product of water (Kw) and that it is always equal to 10-14 Review the idea that titration is often used to find concentration in an acid-base system Review the concept that acids and bases combine in a neutralization reaction to form water and salt Review determining which reactants undergo oxidation and which undergo reduction
L13	Organic Compounds	Review natural sources of carbon compounds Review naming patterns for saturated and unsaturated straight chain families (alkanes, alkenes and alkynes) Review the atomic structure of carbon that give it its unique bonding properties
L14	Hydrocarbon Chemistry	Review recognizing representatives of each of the major functional groups of hydrocarbons studied: halogenated hydrocarbons, alcohols, aldehydes, acids, ketones, esters, amines, and amides

Science 1200

Unit	Lesson Title	Lesson Objectives
1 KINEMATICS		
L1	Measuring Scalars and Vectors	Do calculations using scientific notation Make conversions within the metric system Observe rules of significant figures when doing calculations involving measurements Differentiate between measurements that are scalars and those which are vectors
L1e	Experiment S1201A-Making a Soda Straw Balance	Plan, design and troubleshoot a design for a sensitive balance for low-mass objects Draw conclusions about the validity of the design based on trial data comparing the accuracy of the machine to a standardized source
L2	Measurement of Length	Distinguish between distance and displacement Solve problems concerning displacement vs. distance
altl2e	Experiment S1201B-Oleic Acid	Plan and implement an investigative procedure to determine the size of a molecule Express measurements using scientific notation Analyze data and present findings for peer review Research and compare to previous findings Communicate results
L3	Rate of Length Change: Speed	Differentiate between speed and velocity Solve problems concerning average and instantaneous speed
altl3e	Report S1201C-Galileo	Research and describe the important contributions of investigators to the science of physics Indicate contributions that made an impact historically and how that science is still being used today
L4	Rate of Length Change: Velocity	Solve problems concerning velocity
L5	Rate of Velocity Change	State acceleration as being any change in the magnitude or direction of the velocity vector Solve problems concerning straight line acceleration and centripetal acceleration
L6	Acceleration Due to Gravity	Solve problems using equations for uniform acceleration State that acceleration due to gravity at the surface of the earth is 9.80 m/s^2
L7	Fields and Models	Understand that there are constructs called fields penetrating vast areas of space that can be mapped and studied and whose affect can be measured Explain that a model demonstrates the behavior and characteristics of a particular phenomenon

Unit	Lesson Title	Lesson Objectives
2 DYNAMICS		
L1	Newton's First and Second Laws	State that a force is required to cause an object to change its state of motion (Newton's First Law) Understand that when a force is applied an acceleration will occur (Newton's Second Law) Use Newton's Second Law (F=ma) to solve problems Solve problems concerning momentum and impulse
altl1e	Report S1202A-Isaac Newton	Research and describe the important contributions of investigators to the science of physics Indicate contributions that made an impact historically and how that science is still being used today
L2	Gravity	Explain that gravity is a field property generated by all objects with mass that can be quantified by an inverse square law known as Newton's Fourth Law, also known as the Universal Law of Gravitation
L3	Uniform Circular Motion	Explain that in centripetal acceleration and centripetal force, the vector is directed toward the center of the circular motion Use equations of centripetal acceleration and centripetal force to solve problems
L3e	Experiment S1202B-Circular Motion	Test how well theory fits results as predicted by equations for centripetal motion Make and interpret graphs Make valid conclusions concerning the data
L4	Newton's Third Law and Conservation of Momentum	State that for every action force there is an equal and opposite reaction force (Newton's Third Law) Explain that the total momentum of a system is conserved Solve problems based on the idea of conservation of momentum
altl4e	Experiment S1202C-Explosion	Plan and implement an investigative procedure to verify the validity of the conservation of momentum laws Analyze data and present findings for peer review Research and compare to previous findings using similar mechanisms Communicate results
L5	Kepler's Laws of Planetary Motion	Relate the contributions of several planetary scientists to the development of the heliocentric theory Understand Kepler's first and second law conceptually Apply Kepler's third law mathematically
altl5e	Report S1202D-Solar System	Research and describe the important contributions of investigators to the science of physics Indicate contributions that made an impact historically and how that science is still being used today
altl5e2	Experiment S1202E-Kepler's Law	Make measurements with precision using the data provided Analyze and evaluate to determine the validity of Kepler's Second Law Communicate findings

Unit	Lesson Title	Lesson Objectives
3 WORK AND ENERGY		
L1	Work, Kinetic, and Potential Energy	Explain that work is a scalar quantity equal to the force applied to an object times the distance the object moves in the direction of that force Explain that work is a measure of energy expended State that kinetic energy is energy of motion and is equal to 1/2mv^2 State that there are many forms of potential energy and that gravitational potential energy is equal to mgh Solve problems involving work, kinetic and potential energy
altl1e	Report S1203A-Nuclear Energy	Evaluate the impact of scientific research and technology on society and the environment Describe connections between the various branches of science involved in the nuclear question (physics, chemistry, and biology)
L2	Conservation of Energy	Explain that total amount of energy in a system remains constant although energy may be transformed from one form to another within the system Solve problems based on the concept of conservation of energy
L3	Power and Efficiency	Explain that power is the rate at which work is done or energy is expended Solve problems using power equations State that machines can be rated according to their efficiency, which is a measure of the ratio of the work done compared to the energy applied Solve problems involving efficiency and related ratios, such as IMA and AMA
L3e	Experiment S1203B-Simple Machines	Make quantitative observations and measurements with precision Analyze, evaluate and predict patterns from data Communicate findings
L4	Heat Energy	Explain that the amount of heat needed to change the temperature of one gram of a substance one degree Celsius is termed the specific heat of that substance Solve problems involving specific heat and calorimetry Understand that when sufficient heat is added to a sample it may change phase State that there are four phases of matter
L5	Latent Heat	Explain that latent heat is heat added to or removed from a system which causes a phase change with no change in the temperature of the system Solve problems involving latent heats
altl5e	Experiment S1203C-Latent Heat	Implement this procedure for determining the latent heat of fusion of water Collect data and make measurement with appropriate precision Analyze and evaluate data Compare data to referenced material Analyze procedure for sources of error Communicate findings for peer review

Unit	Lesson Title	Lesson Objectives
3 WORK AND ENERGY - cont.		
L6	Laws of Thermodynamics	converted from one form to another (First Law of Thermodynamics) State that whenever energy is transformed from one form to another, some energy is dissipated as heat energy and cannot be transformed into mechanical energy (Second Law of Thermodynamics) Calculate efficiency in a heat engine
4 INTRODUCTION TO WAVES		
L1	Characteristics of Waves	Explain that pulses and series of pulses (waves) are a method of transferring energy Describe wave characteristics such as amplitude, velocity, wavelength and frequency Note that waves propagate in a variety a forms including longitudinal, transverse and torsional Solve problems concerning wave velocity using the knowledge that velocity equals wavelength times frequency
L1e	Experiment S1204A-Wave Speeds	Make quantitative observations and measurements at the appropriate level of precision Analyze, evaluate and predict trends from data Communicate conclusions for peer review
altl1e	Experiment S1204B-Pulses	Formulate a testable hypothesis concerning how pulses transfer energy Make qualitative observations Analyze and predict trends from data Communicate conclusions
L2	Wave Phenomena	Describe wave characteristics such as reflection, refraction, diffraction and interference
L2e	Experiment S1204C-Waves	Formulate a testable hypothesis concerning how waves will reflect from a barrier Make quantitative observations and measurements with appropriate precision Analyze and predict trends from data Communicate conclusions
altl2e	Experiment S1204D-Bending Waves	Make quantitative observations and measurements at the appropriate level of precision Analyze, evaluate and predict trends from data Communicate conclusions for peer review
L3	Sound Waves	Describe sound wave characteristics such as beats, resonance, the Doppler Effect and shock waves Explain that the speed of sound is dependent on the medium and the temperature Solve problems concerning beats, the Doppler Effect and the speed of sound
altl3e	Experiment S1204E-Doppler Effect	Make qualitative observations of a moving source producing regular pulses Communicate findings

Unit	Lesson Title	Lesson Objectives
5 LIGHT		
L1	Speed of Light: Historical Calculations	Evaluate the impact of technology on the advance of scientific research Describe the contributions of Galileo, Roemer and Michelson to the calculation of the speed of light State that the speed of light is taken to be a constant 3.00 x 10^8 m/s in a vacuum
L2	Properties of Light	Describe properties of light such as reflection, refraction, polarization, dispersion and scattering Solve problems using the index of refraction of light with various media
L2e	Experiment S1205A-Light Angles	Formulate a testable hypothesis Make quantitative observations and measurements at an appropriate level of precision Evaluate and predict trends from data Communicate conclusions for peer review
altl2e2	Experiment S1205B-Water Refraction	Formulate a testable hypothesis concerning how light will refract as it enters the water medium and as it re-enters the air medium Make quantitative observations and measurements at an appropriate level of precision Analyze data to determine the index of refraction for water Research to compare results to established findings Communicate conclusions
L3	Mirrors	Understand the interaction of light with concave and convex mirrors Use ray diagrams to demonstrate the path of reflected light from a mirror Solve problems using the lens equation and its corollaries
L3e	Experiment S1205C-Convergence	Formulate a testable hypothesis about how wave will behave as they meet each other in the water medium Make qualitative observations Evaluate results from data Communicate conclusions
L4	Lenses	Understand the interaction of light with concave and convex lenses Use ray diagrams to demonstrate the path of light through a lens Solve problems using the lens equation and its corollaries
L5	Light Phenomena and Models of Light	Explain the significance of the Young Two Slit experiment, the photoelectric effect, and the Taylor experiment to the definition of light Describe phenomena that characterize light as a wave and phenomena that characterize it as a particle
altl5e	Experiment S1205D-Light Observations	Make quantitative observations and measurements at an appropriate level of precision Analyze data to determine the width of a slit Communicate conclusions including a discussion of the reliability of the data

Unit	Lesson Title	Lesson Objectives
6 STATIC ELECTRICITY		
L1	Electric Charges	Describe the historical development of the understanding of electric charge as originating in the atom Differentiate between materials that are insulators and those that are conductors Understand that like charges repel and unlike charges attract
L2	Coulomb's Law	Recognize the significance of Coulomb's Law being in the format of an inverse square law State that the basic unit of charge is the coulomb and that the charge on a single electron is 1.6 10^{-19} Coulombs Use Coulomb's Law to solve problems
altl2e	Experiment S1206A-Static Electricity	Formulate a testable hypothesis concerning which materials donate electrons and which materials collect electrons Make qualitative observations and collect data Research to compare results to established findings Communicate findings
L3	The Transfer of Charges	Differentiate between a conductor and an insulator State that an electroscope is an instrument that is capable of measuring electric charge Realize that an object will become positively charged if it has a net loss of electrons
L4	Electric Fields	Understand that all electric charges produce an electric field around them State that, by convention, fields point in the direction a positive test charge would move if placed in the field Solve problems to determine field strength given appropriate data State that voltage is determined by the strength of the electric field between two parallel plates and the distance that separates them; V = Ed Understand that natural electric fields exist that cause lightning discharges and account for low grade currents in seawater
L5	Electric Potential	State that Ohm's Law relates voltage, current and resistance; V=IR Electric fields have units of volts/meter or newtons/coulomb When a charge moves through an electric field energy is expended and work is done
L6	Potential and Energy	Define capacitance Understand how charge is stored in a capacitor Solve problems concerning potential energy, capacitance and work Understand that a battery stores chemical energy that can continuously recharge a set of parallel plates to maintain the electric field between them, whereas a capacitor stores electrical energy and has a finite supply of electrons

Unit	Lesson Title	Lesson Objectives
7 ELECTRIC CURRENTS		
L1	Sources of EMF	Realize that originally current was thought to be the flow of positive charges Understand that in an electric current, electrons flow from a source of high potential to an area of lower potential Understand that a source of electromotive force (emf), such as a battery or generator, must do work to raise electrons to a state of relatively high potential so that they, in turn, can do work
altl1e	Project S1207A-Research and Report	Research and describe the impact of early electrical theorists on the development of society, economics and technology Describe connections between the fields of physics, chemistry and biology having to do with this study
L2	Fluid Flow	Understand that conductance of a conduit is directly proportional to its cross-sectional area and inversely proportional to its length Solve problems concerning conductance Realize that if resistance to flow is too great, current will stop
L3	Resistance	Realize that electrical work is done only when electrons are forced by a source of emf against a resistance Understand that resistance is a function length, cross-sectional area, and resistivity (which is determined by the geometric electrical structure) of the resisting material State that conductance is the reciprocal of resistance Solve problems involving resistance and conductance
L4	Ohm's Law	Know that Ohm's Law relates voltage or source of EMF, current, and resistance; V = IR Use Ohm's Law to solve problems
L5	Circuits	Become familiar with symbols for simple circuit elements Differentiate between circuit diagrams of series and parallel circuits Understand that in series circuits, each resistor receives the same amount of current, but that the voltage drop at each resistor varies according to the magnitude of the resistance Understand that in parallel circuits, each resistor receives the same amount of voltage (that of the emf), but that the current received at each resistor varies according to the magnitude of the resistance Apply and solve problems using Ohm's Law to a series circuit Apply and solve problems using Ohm's Law to a parallel circuit Apply Watt's Law for power in both series and parallel circuits

Unit	Lesson Title	Lesson Objectives
8 MAGNETISM		
L1	Fields and Forces	Understand that a magnetic field has direction as defined by a test magnetic north pole Realize that the density of field lines is used to depict the strength of a magnetic field State that magnets always have two poles and that the field, by convention, flows out of the north pole and into the south in a continuous loop Understand that a current carrying wire creates a magnetic field which flows around the wire in a circle concentric with its circumference Realize that if a current carrying wire is coiled into a loop so that it forms a structure called a solenoid, that its magnetic field will be shaped similar to that of a bar magnet
altl1e	Experiment S1208A-Magnetic Fields	Follow these directions and complete the activities
L2	Forces	State that the magnitude of the force of attraction between two magnetic poles follows an inverse square law Understand that the force on a charge moving in a magnetic field depends on the magnitude of the charge, its velocity, and the direction in which the charge moves relative to the field direction Solve problems using the Biot-Savart force law: F = qvB Use the right hand rules to determine the direction of force on a moving charge in a magnetic field State that magnetic field strength is measured in teslas
L3	Electromagnetism	Understand that a moving charge creates a time-varying magnetic and electric field, which combined is referred to as an electromagnetic field Solve problems to determine the strength of the magnetic field around a current carrying long straight wire Use the right hand rule to determine the direction of the magnetic field around a current carrying long straight wire Realize that the magnetic fields in current carrying wires add as vectors Note that the magnetic field around a solenoid takes on the shape of a bar magnet. This is due to the vector addition of the magnetic fields of the current, which is carrying windings
altl3e	Experiment S1208B-Magnetic Fields	Try this investigation to determine the shape of the magnetic field around a long, straight wire.
L4	Electromagnetic Induction	Understand that a changing magnetic field is required to cause a current to flow in a coil of wire and that this process is referred to as magnetic induction Recall that an emf is a source of electromotive potential or the ability to do electric work and is measured in volts Realize that an emf is induced in a coil of wire when it is in the vicinity of a changing magnetic flux or field density Understand that a transformer consists of two solenoids wound on the same core and is used to change the varying emf in the first solenoid into a different emf in the second solenoid Understand that a generator uses mechanical energy to rotate a loop made of conducting material through a magnetic field, so that an alternating current is induced in the loop as it changes position in the field

Unit	Lesson Title	Lesson Objectives
8 MAGNETISM - cont.		
L5	Electron Beams	Understand the experimental process by which the charge to mass ratio for the electron was discovered State that in a cathode ray tube (CRT), electrons are accelerated in a beam by a "dropping" through a series of voltages Realize that the direction of the electron beam in a CRT is determined by the interplay of two magnetic fields that are perpendicular to each other which, in turn, control where the beam will hit the screen to produce an image
9 ATOMIC AND NUCLEAR PHYSICS		
L1	Quantum Theory	Understand and describe the photoelectric effect State that the photoelectric effect provides evidence for the quantum theory of light Use the photoelectric equation to solve problems Use Planck's equation to solve problems
L2	X-Rays, Matter Waves, and the Uncertainty Principle	Become familiar with Roentgen discovery of X-rays Understand that X-rays are produced when electrons are rapidly decelerated in the process of a collision with a metal Calculate X-ray energies Realize that an X-ray diffraction pattern can be used to determine the crystalline pattern of atomic spacing in a material Understand that matter has both wave and particle characteristics Determine the deBroglie wavelength of moving objects Understand the implications of the Heisenberg Uncertainty Principle and solve problems using it
L3	Early Atomic Models	Describe the Thomson Model of the atom Describe the importance of the Marsden-Geiger experiment Describe the Rutherford Model of the atom Explain the difference between the production and appearance of continuous, emission and adsorption spectra
altl3e	Report S1209A-Early Atomic Physics	Research and describe the impact of early atomic theorists on the development of society, economics and technology

Unit	Lesson Title	Lesson Objectives
9 ATOMIC AND NUCLEAR PHYSICS - cont.		
L4	Bohr Model	State that Bohr's postulates assumed that the allowed electron orbits were definite and discrete Understand that the principal quantum number of an electron is a whole number and is an integral multiple of the number of wavelengths that will fit on a particular orbit circumference Calculate the orbital radius of electrons in the hydrogen atom Determine the velocity of a hydrogen electron in a particular orbit Realize that electrons in orbit about a positive nucleus possess both kinetic and potential energy Understand that energy is emitted from the atom in the form of electromagnetic radiation when an electron moves from a higher to lower energy level Calculate the total energy of an electron at a particular energy level Understand that the unique line spectra of each element is due to the discrete electron orbits allowed by the Bohr model and its modifications Calculate the wavelength of energy emitted during orbital transitions
L5	Nuclear Theory	State that the atomic number is the number of protons in the atom Realize that the binding energy that holds the nucleons of the nucleus together results from a small loss of mass from those nucleons as that nucleus is composed and that this loss is called the mass defect Understand that the conversion of mass to binding energy in the nucleus was predicted in Einstein's equation, $E = mc^2$ Solve problems concerning binding energy and mass defect State that unstable nuclei decay naturally by expelling gamma radiation, beta and alpha particles and that these unstable nuclei are considered "radioactive" Determine the half-life of radioactive materials
L6	Nuclear Reactions	Understand that electrostatic repulsive forces are longer ranged, but not as strong as nuclear attractive forces between protons Realize that the "Liquid Drop Model" helps to explain the interplay of electrostatic forces as a nucleus fissions State that when unstable nuclei fission, they do so with a loss of mass and that this mass is converted into energy
L7	Fusion and Applications of Nuclear Energy	Realize that fusion reactions in the sun join hydrogen atoms to create helium and the release of energy Understand that nuclear reactions of many types are useful in medical, biological, and physical science Understand the basic structure of a fission nuclear power plant

Unit	Lesson Title	Lesson Objectives
10 REVIEW		
L1	Mechanics	Review ideas and solve problems concerning velocity and acceleration
L2	Dynamics	Review Newton's laws Review solving problems involving Newton's laws, gravity, impulse and momentum Review Kepler's laws Review solving problems involving Kepler's laws
L3	Energy	Review the concepts of kinetic and potential energy and solve problems concerning these ideas Review the concepts of power and efficiency and solve problems concerning these ideas
L4	Wave Motion	Review the various types of waves and wave phenomena Review solving problems using the wave equation
L5	Light and Sound	Review the wave properties of light Review the particle properties of light Review drawing ray diagrams to depict refraction and reflection of light Review the use of the lens formula for solving problems Review properties of sound and sound phenomena
L6	Electricity and Magnetism	Review the sources magnetic fields Review the sources and properties of charged particles
L7	Fields and Forces	Review the definition and properties of an electric field Review the use of Coulomb's Law to solve problems Review solving problems for magnetic field strength Review the electric field orientation in the two-plate capacitor and solving problems for work done by a capacitor Review the process of magnetic field generation about a current-carrying wire and the shape this field acquires Review the use of the right hand rule for determining relative directions of magnetic force, velocity of a moving charge and direction of the magnetic field experienced by the moving charge Review induction and some of its applications
L8	Circuits	Recall that if free electrons in a conductor have a source of emf and a closed path or circuit, they will flow as a current of electricity Recall that a circuit consists of a source of emf to supply voltage (or potential), a conductor through which current flows, and at least one resistor which receive the energy of the electrons Review the use of Ohm's Law to solve circuit problems Review the differences between series and parallel circuits Review solving problems for power in electric circuits

Unit	Lesson Title	Lesson Objectives
10 REVIEW - cont.		
L9	Modern Physics	Review the history of atomic theory including the work of Thomson, Milliken, Rutherford, Geiger and Marsden Review the supporting spectral evidence for the planetary model of the atom first envisioned by Rutherford Review the refinements to the electron orbital structure called for by the experiments of Bohr, Plank, Hertz and Einstein Recall features of the atomic model that support the particle theory of light
L10	The Bohr Atom	Review how Bohr was able to show a correlation between the line spectrum for an element and his proposed model for the transition of electrons between energy levels Recall that the momentum of each energy level must be some multiple of Planck's constant Recall that the circumference of each energy level must be some integral multiple of the electron's deBroglie wavelength
L11	Duality	Recall that all moving objects produce waves called deBroglie waves whose wavelength are defined by the momentum of the particle Review the application and foundations of the Heisenberg Uncertainty Principle
L12	Nuclear Energy	Review the relationship between neutrons and isotopes of an element Review the relationship between mass defect and binding energy Recall the three natural decay products of an unstable nucleus, gamma rays, alpha and beta particles and some of their effects Review the half-life calculation for radioactive isotopes