

Hyman Brand Hebrew Academy Science Standards and Grade Level Benchmarks

Implemented Fall 2009

K Science Scope and Sequence with Benchmarks & Indicators

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and Personal Environment	History and Nature of Science
Grades K-2 Standards	The student will experience science as <i>full inquiry</i> . In the elementary grades, students begin to develop the physical and intellectual abilities of scientific inquiry through planning and conducting simple investigations	The student will explore the world by observing and manipulating common objects and materials in the environment. i.e. Properties of objects Position & motion of objects; forces Sound Electricity & magnetism	The student will begin to develop an understanding of biological concepts. i.e. Organisms and their environments Life cycles of organisms	The student will observe closely the objects and materials in their <i>environment</i> . i.e. Properties of earth materials Objects in the sky Changes in earth & weather	The student will have a variety of educational experiences that involve science and <i>technology</i> . i.e. Technological design Problem solving skills Apply understanding of science & technology	The student will have a variety of experiences that provide understanding for various science-related personal and environmental change i.e. Personal health Identify health risks Changes in the environment	The student will experience scientific enquiry and learn about people from history i.e. How people practice science
K Benchmarks & Indicators	1.1 The student will be involved in activities that develop skills necessary to conduct scientific inquiries: 1.1.1 Identifies properties of objects 1.1.2 Classifies objects 1.1.3 Uses materials and tools and proper safety 1.1.4 Asks and answers questions 1.1.5 Describes observations orally or pictorially	2.1 The student will develop skills to describe objects: 2.1.1 Describe properties of objects and measure them 2.1.2 Separate groups of objects 2.1.3 Compares solids and liquids 2.1.4 Compares different objects positioning	3.1 The student will develop an understanding of the characteristics of living things: 3.1.1 Life occurs in an environment that supplies its needs 3.1.4 Examines structures of living things	4.3 The student will observe and compare objects in the sky. The student will describe changes in the weather: 4.3.1 Day-to-day weather 4.3.2 Records weather changes 4.3.3 Discusses weather safety procedures	5.1 The student will learn about the world around them: 5.1.1 Explores how things work	6.1 The student will demonstrate responsibility for their own health: 6.1.1 Personal care	7.1 The student will know they practice science: 7.1.1 Involved in explorations
K Activities	Properties of objects Grouping Uses tools, magnifying glasses Alike/ different Science center	Sink & Float Magnets Shapes, size classification Intro matter Positioning objects	Plant parts Classroom animals Necessities/survival of life Plant requirements Animal requirements	Weather observations and recording Weather charts Natural disasters in Kansas	Magnifying glasses	Hand washing Teeth Personal Hygiene Exercise Appropriate clothing Taste and texture	

1st Grade Science Scope and Sequence with Benchmarks and Indicators

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and Personal Environment	History and Nature of Science
Grades K-2 Standards	<p>The student will experience science as <i>full inquiry</i>. In the elementary grades, students begin to develop the physical and intellectual abilities of scientific inquiry through planning and conducting simple investigations</p> <p>i.e. Learn the skills to do a scientific investigation Plan and conduct an investigation</p>	<p>The student will explore the world by observing and manipulating common objects and materials in the environment.</p> <p>i.e. Properties of objects Position & motion of objects; forces Sound Electricity & magnetism</p>	<p>The student will begin to develop an understanding of biological concepts.</p> <p>i.e. Organisms and their environments Life cycles of organisms</p>	<p>The student will observe closely the objects and materials in their <i>environment</i>.</p> <p>i.e. Properties of earth materials Objects in the sky Changes in earth & weather</p>	<p>The student will have a variety of educational experiences that involve science and <i>technology</i>.</p> <p>i.e. Technological design Problem solving skills Apply understanding of science & technology</p>	<p>The student will have a variety of experiences that provide understanding for various science-related personal and environmental changes.</p> <p>i.e. Personal health Identify health risks Changes in the environment</p>	<p>The student will experience scientific inquiry and learn about people from history.</p> <p>i.e. How people practice science</p>
1st Benchmarks & Indicators	<p>1.1 The student will be involved in activities that develop skills necessary to conduct scientific inquiries:</p> <p>1.1.1 Identifies properties of objects 1.1.2 Classifies objects 1.1.3 Uses materials and tools and proper safety 1.1.4 Asks and answers questions 1.1.5 Describes observations orally or pictorially</p>	<p>2.1 The student will develop skills to describe objects:</p> <p>2.1.3 Compares solids and liquids 2.1.4 Compares different objects' positioning</p>	<p>3.1 The student will develop an understanding of the characteristics of living things:</p> <p>3.1.1 Life occurs in an environment that supplies its needs 3.1.2 Observes life cycles</p>	<p>4.3 The student will describe changes in the weather:</p> <p>4.3.1 Day-to-day weather 4.3.2 Records weather changes 4.3.3 Discusses weather safety procedures</p>	<p>5.1 The student will learn about the world around them:</p> <p>5.1.1 Explores how things work 5.1.2 Uses technology to experience science</p>	<p>6.1 The student will demonstrate responsibility for their own health:</p> <p>6.1.1 Personal care 6.1.2 Healthy foods</p>	<p>7.1 The student will know they practice science:</p> <p>7.1.1 Involved in explorations</p>
1st grade Activities	<p>Science fair Intro Scientific Process KWL</p>	<p>Weather Water cycle Solids, liquids and gases Thunder and lightening Transportation: movement and friction</p>	<p>Plants Trees</p>	<p>Weather types and survival World weather Pollution</p>	<p>Weather measuring machines Satellites Past weather Predictions</p>	<p>Health Nutrition Assembly line changes</p>	<p>Medications and vaccinations Ford assembly line</p>

2nd Grade Science Scope and Sequence with Benchmarks & Indicators

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and Personal Environment	History and Nature of Science
Grades K-2 Standards	<p>The student will experience science as <i>full inquiry</i>. In the elementary grades, students begin to develop the physical and intellectual abilities of scientific inquiry through planning and conducting simple investigations</p> <p>i.e. Learn the skills to do a scientific investigation Plan and conduct an investigation</p>	<p>The student will explore the world by observing and manipulating common objects and materials in the environment.</p> <p>i.e. Properties of objects Position & motion of objects; forces Sound Electricity & magnetism</p>	<p>The student will begin to develop an understanding of biological concepts.</p> <p>i.e. Organisms and their environments Life cycles of organisms</p>	<p>The student will observe closely the objects and materials in their <i>environment</i>.</p> <p>i.e. Properties of earth materials Objects in the sky Changes in earth & weather</p>	<p>The student will have a variety of educational experiences that involve science and <i>technology</i>.</p> <p>i.e. Technological design Problem solving skills Apply understanding of science & technology</p>	<p>The student will have a variety of experiences that provide understanding for various science-related personal and environmental changes</p> <p>i.e. Personal health Identify health risks Changes in the environment</p>	<p>The student will experience scientific enquiry and learn about people from history</p> <p>i.e. How people practice science</p>
2nd Benchmarks & Indicators	<p>1.1 The student will be involved in activities that develop skills necessary to conduct scientific inquiries: 1.1.1 Identifies properties of objects 1.1.2 Classify objects 1.1.3 Uses materials and tools and proper safety 1.1.4 Asks and answers questions 1.1.5 Describes observations orally or pictorially</p>	<p>2.1 The student will develop skills to describe objects: 2.1.1 Describe properties of objects and measure them 2.1.2 Separate groups of objects</p>	<p>3.1 The student will develop an understanding of the characteristics of living things: 3.1.2 Observes life cycles 3.1.4 Examines structures of living things</p>	<p>4.1 The student will describe <i>properties</i> of earth materials: 4.1.1 Describes the earth materials (soil, rock, water, grass, etc)</p> <p>4.2 The student will observe and compare objects in the sky: 4.2.1 Observes and recognizes the sun, moon , stars, clouds, birds, airplanes, and other objects in the sky 4.2.2 Describes how the sun provides light and warmth</p>	<p>5.1 The student will learn about the world around them: 5.1.1 Explores how things work 5.1.2 Uses technology to experience science</p>	<p>6.1 The student will demonstrate responsibility for their own health: 6.1.1 Personal care 6.1.2 Healthy foods 6.1.3 Safety</p>	<p>7.1 The student will know they practice science: 7.1.1 Involved in explorations 7.1.2 Uses technology to learn about people in science</p>
2nd Grade Activities	<p>Science fair Scientific Process KWL</p>	<p>Magnetism Matter</p>	<p>Life Cycles (plants and seeds, dissecting seeds, raising butterflies) Systems of the human body</p>	<p>Solar System Make up of the Earth</p>	<p>Technology of space exploration Graphing</p>	<p>Effects of behavior (food and behavior choices) regarding health of human body Safety</p>	<p>Copernicus Galileo Neil Armstrong Marie Curie Science biographies</p>

3rd Grade Science Scope and Sequence with Benchmarks & Indicators

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and Personal Environment	History and Nature of Science
Grades 3-4 Standards	<p>The student will experience science as full inquiry. IN the elementary grades students begin to develop the physical and intellectual abilities of scientific inquiry</p> <p>i.e. Plan and conduct a simple investigation</p>	<p>The student will increase their understanding of the properties of objects and materials that they encounter on a daily basis. The student will compare, describe, and sort and classify these materials by observable properties.</p> <p>i.e. Properties of objects Position & motion of objects; forces Sound Electricity, & magnetism</p>	<p>The student will develop an understanding of biological concepts through direct experience with living things, their life cycles and their habitats.</p> <p>i.e. Organisms and their environments Life cycles of organisms</p>	<p>The student will observe objects, materials and changes in their environment, note their properties, distinguish one from another and develop their own explanations making sense of their observations.</p> <p>i.e. Properties of earth materials Objects in the sky Changes in earth & weather</p>	<p>The student will have a variety of educational experiences which involve science and technology. The student will begin to understand the design process.</p> <p>i.e. Technological design Problem solving skills Apply understanding of science & technology</p>	<p>The student will demonstrate personal health and environmental practices</p> <p>i.e. Personal health Identify health Risks Changes in the environment</p>	<p>The student will experience some things about scientific enquiry and learn about people from history</p> <p>i.e. People who practice science</p>
3rd Benchmarks & Indicators	<p>1.1 The student will develop the skills necessary to do full inquiry by asking questions, completing an investigation, answering the question and sharing the results with others:</p> <p>1.1.1 Ask questions that can be investigated 1.1.2 Plans a simple investigation 1.1.3 Employs appropriate tools, safety and procedures to gather data</p>	<p>2.1 The student will develop the skills to describe objects:</p> <p>2.1.4 Recognizes the difference between and solid, liquid and a gas</p> <p>2.3 The student will recognize and demonstrate what makes sounds:</p> <p>2.3.1. Identifies that sound is a vibration 2.3.2 Discriminate between different sounds 2.3.3 Discriminates between pitches</p> <p>2.4 The student</p>	<p>3.1 The student will develop knowledge of organisms and their environment:</p> <p>3.1.1 Compare and contrast different organisms and their structures 3.1.2 Compare the basic needs of different organisms 3.1.3 Discuss survival using senses</p>	<p>4.1 The student will develop an understanding of the properties of earth materials:</p> <p>4.1.1 Understand earth materials by classifying, collecting 4.1.2 Experiments with soil types 4.1.3 Describes properties of water cycle</p> <p>4.3 The student will develop skills necessary to describe changes in the earth and weather:</p> <p>4.3.1 Describe changes of earth surface</p>	<p>5.1 The student will work with a technology design:</p> <p>5.1.1 identifies simple design problems</p> <p>5.2 The student will apply their understanding about science and technology:</p> <p>5.2.1 Understand how design problems improve the world 5.2.3 Works with others to solve problems 5.2.4 Awareness of all the different types of people involved in science 5.2.5 Investigates how science uses tools</p>	<p>6.2 The student will demonstrate an awareness of changes in the environment:</p> <p>6.2.1 Define pollution 6.2.2 Develop solutions to pollution problem 6.2.3 Practice recycling</p>	<p>7.1 The student will develop an awareness that people practice science:</p> <p>7.1.1 Students participate in science inquiry by asking questions 7.1.2 Studies the lives of scientists</p>

		will experiment with electricity: 2.4.1 Demonstrate that magnets repel and attract 2.4.3 Construct a simple circuit					
3rd grade activities	Science fair Scientific Process KWL	Electricity Light sources Circuits Sound & magnetism	Animal Kingdom Classification Food chains Habitats Water cycle senses	Earth works Soil Water Ecosystems Recycling	Tools	Earth works	Graham Bell

4th Grade Science Scope and Sequence with Benchmarks & Indicators

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and Personal Environment	History and Nature of Science
Grades 3-4 Standards	The student will experience science as full inquiry. IN the elementary grades students begin to develop the physical and intellectual abilities of scientific inquiry i.e. Plan and conduct a simple investigation	The student will increase their understanding of the properties of objects and materials that they encounter on a daily basis. The student will compare, describe, and sort and classify these materials by observable properties. i.e. Properties of objects Position & motion of objects; forces Sound Electricity, & magnetism	The student will develop an understanding of biological concepts through direct experience with living things, their life cycles and their habitats. i.e. Organisms and their environments Life cycles of organisms	The student will observe objects, materials and changes in their environment, note their properties, distinguish one from another and develop their own explanations making sense of their observations. i.e. Properties of earth materials Objects in the sky Changes in earth & weather	The student will have a variety of educational experiences which involve science and technology. The student will begin to understand the design process. i.e. Technological design Problem solving skills Apply understanding of science & technology	The student will demonstrate personal health and environmental practices i.e. Personal health Identify health Risks Changes in the environment	The student will experience some things about scientific enquiry and learn about people from history i.e. People who practice science
4th Benchmark & Indicators	1.1 The student will develop the skills necessary to do full inquiry by asking questions, completing an investigation, answering the question and sharing the results with others: 1.1.1 Ask questions that can be investigated 1.1.2 Plans a simple investigation 1.1.3 Employs appropriate tools, safety and procedures	2.1 The student will develop the skills to describe objects: 2.1.1 Describe properties of objects using appropriate tools 2.1.2 Describe and classify objects 2.1.3 Observes how one object interacts with another 2.2 The student will describe the motion of objects: 2.2.1 Describe motion 2.2.2 Describe position changes after movement 2.4 The student will experiment with magnetism: 2.4.2 Design an experiment based on magnetism	3.1 The student will develop knowledge of organisms and their environment: 3.1.1 Compare and contrast different organisms and their structures 3.1.2 Compare the basic needs of different organisms 3.2 The student will observe and illustrate the life cycles of various organisms: 3.2.1 Compare different life cycles	4.1 The student will develop an understanding of the properties of earth materials: 4.1.4 Observes fossils 4.2 The student will observe and describe objects in the sky: 4.2.1 Observes moon and stars 4.2.2 Observes shadows 4.2.3 Discusses suns provides light and heat and maintains earths temp 4.3 The student will develop skills necessary to describe changes in the earth and weather: 4.3.2 Observe and describe daily and seasonal weather changes	5.1 The student will work with a technology design: 5.1.1 Identifies simple design problems 5.2 The student will apply their understanding about science and technology: 5.2.1 Understand how design problems improve the world 5.2.2 Invent a product to solve problems 5.2.3 Works with others to solve problems 5.2.4 Awareness of all the different types of people involved in science 5.2.5 Investigates how science uses tools	6.1 The student will develop an understanding of personal health: 6.1.1 Food and health 6.1.2 Safety prevents injuries 6.1.3 Responsible for own health	7.1 The student will develop an awareness that people practice science 7.1.1 Students participate in science inquiry by asking questions 7.1.2 Studies the lives of scientists

	to gather data 1.1.4 Can communicate and critique own and other investigations						
4th grade activities	Science fair Scientific Process KWL	Magnets	Insects life cycle Add different Oceans Biomes Circle life	Waves Moon and Tide Fossils	Computer graphing Measurement Metric Inventors of machines Magnetism design	Personal Hygiene	Lives of scientists

5th Grade Science Scope and Sequence with Benchmarks & Indicators

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and Personal Environment	History and Nature of Science
Grades 5-7 Standards	<p>The student will develop the abilities to complete scientific inquiry, be able to demonstrate how scientific inquiry is applied and develop understandings about scientific inquiry</p> <p>i.e. Design and conduct investigations Asking scientific questions Understanding about scientific inquiry</p>	<p>The student will apply process skills to develop an understanding of physical science including: properties, changes of properties of matter, motion and forces and transfer energy</p> <p>i.e. Measuring and describing properties of matter Changes in properties of matter Motions & forces Transfer of energy</p>	<p>The student will apply process skills to explore and understand structure and function in living systems, reproduction and heredity, regulation and behavior, populations and ecosystems and diversity and adaptations of organisms.</p> <p>i.e. Function of structures in organisms Reproduction & heredity Regulation & behavior Populations & Ecosystems Diversity & adaptations of organism</p>	<p>The student will apply process skills to explore and develop an understanding of the structure of the earth system, earth's history and earth in the solar system</p> <p>i.e. Changes in structure of the earth system Past & present earth processes Components of the solar system Motion & forces that affect earth/space phenomena</p>	<p>The student will demonstrate understanding of technological design and understandings about science and technology</p> <p>i.e. Abilities of technological Design to change our views Understanding science & technology</p>	<p>The student will apply process skills to explore and develop an understanding of issues of personal health, population, resources and environment and natural hazards</p> <p>i.e. Apply scientific knowledge to personal health The effect of human activity on resources & the environment Risks & causes of natural hazards</p>	<p>The student will examine and develop an understanding of science as a historical endeavor</p> <p>i.e. Scientific habits of mind Contributions to science throughout history</p>
5th Benchmarks & Indicators	<p>1.1 The student will demonstrate abilities necessary to do the process of scientific inquiry:</p> <p>1.1.1 Identifies questions that can be answered through scientific investigation 1.1.2 Designs and conducts scientific investigations safely,</p>	<p>2.3 The student investigates motions and forces:</p> <p>2.3.1 Identifies forces, gravity and friction 2.3.2 Describes measures and represents data on graphs 2.3.4 Investigates simple machines pulleys and bicycle gears</p> <p>2.4 The student will understand and</p>		<p>4.1 The student will understand that the structure of the earth system is continuously changing due to earth's physical and chemical processes:</p> <p>4.1.1 Identifies properties of the earth: oceans, fresh water, atmosphere 4.1.2 Models earths cycles, weather, erosion,</p>	<p>5.1 The student will demonstrate abilities of technological design</p> <p>5.1.1 Identifies technology as a solution, product, and designs an instrument</p> <p>5.2 The student will develop an understanding of the similarities, differences and relationships in</p>	<p>6.1 The student will understand scientific knowledge relative to personal health</p> <p>6.1.1 Identifies the benefits and risks of nutrition, exercise and personal health</p>	<p>7.1 The student will develop scientific habits of mind</p> <p>7.1.1 Practice intellectual honesty and display open-mindedness</p> <p>7.2 The student will research contributions throughout history:</p> <p>7.2.1 Recognize that new knowledge leads to new</p>

	<p>using tools and technology, and interpreting and analyzing data</p> <p>1.1.3 Identifies evidence and inferences</p> <p>1.1.4 Communicates results</p>	<p>demonstrate the transfer of energy:</p> <p>2.4.1 Understands potential and kinetic energy</p> <p>2.4.2 Work = heat, light, sound, electrical, chemical and nuclear energy</p> <p>2.4.3 Observes light interacts with matter: transmitted, reflected, refracted and absorbed</p> <p>2.4.4 Understand heat transferred from hot to cold by radiation, convection and conduction</p>		<p>deposition</p> <p>4.2 The student will understand past and present earth processes and their similarity:</p> <p>4.2.1 Understands the earth's processes and tectonic changes, catastrophes</p>	<p>science and technology:</p> <p>5.2.1 Compares different scientists and engineers work</p> <p>5.2.2 Evaluates benefits and risks of technological solutions</p> <p>5.2.3 Identifies different cultural contributions</p>		<p>questions and replication of experiments helps in the understanding of science</p>
<p>5th grade Activities</p>	<p>Individual Science fair</p> <p>Scientific process</p> <p>KWL</p>	<p>Forces and motion</p> <p>Light energy</p> <p>Heat</p> <p>Simple machines</p>		<p>Rocks and minerals</p> <p>Oceans and erosion and</p> <p>Tectonic plates</p>	<p>Graphing excel</p> <p>Measurement</p> <p>Metric</p>	<p>Personal Hygiene</p> <p>Puberty</p>	

6th Grade Science Scope and Sequence with Benchmarks & Indicators

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and personal environment	History and nature of Science
Grades 5-7 Standards	<p>The student will develop the abilities to do scientific inquiry, be able to demonstrate how scientific inquiry is applied and develop understandings about scientific inquiry</p> <p>i.e. Design and conduct investigations Asking scientific questions Understanding about scientific inquiry</p>	<p>The student will apply process skills to develop an understanding of physical science including: properties, changes of properties of matter, motion and forces and transfer energy</p> <p>i.e. Measuring and describing properties of matter Changes in properties of matter Motions & forces Transfer of energy</p>	<p>The student will apply process skills to explore and understand structure and function in living systems, reproduction and heredity, regulation and behavior, populations and ecosystems and diversity and adaptations of organisms.</p> <p>i.e. Function of structures in organisms Reproduction & heredity Regulation & behavior Populations & Ecosystems Diversity & adaptations of organism</p>	<p>The student will apply process skills to explore and develop an understanding of the structure of the earth system, earth's history and earth in the solar system</p> <p>i.e. Changes in structure of the earth system Past & present earth processes Components of the solar system Motion & forces that effect earth/space phenomena</p>	<p>The student will demonstrate of technological design and understandings about science and technology</p> <p>i.e. Abilities of technological Design to change our views Understanding science & technology</p>	<p>The student will apply process skills to explore and develop an understanding of issues of personal health, population, resources and environment and natural hazards</p> <p>i.e. Apply scientific knowledge to personal health The effect of human activity on resources & the environment Risks & causes of natural hazards</p>	<p>The student will examine and develop an understanding of science as a historical endeavor</p> <p>i.e. Scientific habits of mind Contributions to science throughout history</p>
6th Benchmarks & Inferences	<p>1.1 The student will demonstrate abilities necessary to do the process of scientific inquiry:</p> <p>1.1.1 Identifies questions that can be answered through scientific investigation 1.1.2 Designs and conducts scientific investigations safely, using tools and technology, and interpreting and analyzing data</p>	<p>2.3 The student will investigate motion and forces:</p> <p>2.3.2 Describes measures and represents data on graphs</p>	<p>3.1 The student will model structures of organisms and relate functions to the structures:</p> <p>3.1.1 Understand the cell theory 3.1.2 Compare cells, organs, tissue, organ systems and organisms 3.1.4 Concludes disease, damage, heredity and aging can cause malfunction in an organism</p>	<p>4.3 The student will identify and classify stars, planets and other solar systems:</p> <p>4.3.1 Compares planets, stars, comets and asteroids 4.3.2 Models special relationship of plants and stars 4.3.3 Identifies space exploration methods</p> <p>4.4 The student will model motions and identify forces that explain earth phenomena:</p>	<p>5.1 The student will demonstrate abilities of technology design:</p> <p>5.1.1 Identifies technology as a solution, product, and designs an instrument</p> <p>5.2 The student will develop understandings of the similarities, differences and relationships in science and technology:</p> <p>5.2.1 Compares different scientists and</p>	<p>6.1 The student will understand scientific knowledge relative to personal health:</p> <p>6.1.1 Identifies the benefits and risks of nutrition, exercise and personal health</p>	<p>7.1 The student will develop scientific habits of mind:</p> <p>7.1.1 Practice intellectual honesty and display open-mindedness</p> <p>7.2 The student will research contributions throughout history</p> <p>7.2.1 Recognize that new knowledge leads to new questions and replication of experiments helps in the understanding of science</p>

	1.1.3 Identifies evidence and inferences 1.1.4 Communicates results			4.4.1 Demonstrates object, space time phenomena 4.4.2 Describe angles of incidence of solar energy and heat and the earth	engineers work 5.2.2 Evaluates benefits and risks of technological solutions 5.2.3 Identifies different cultural contributions		
6th grade activities	Scientific method, Experimental design Data logging Graphing, Interpretation, and presenting data		Human body – main systems Dissections heart, eye ball, Kidney	Astronomy unit	Graphing, presentation, laboratory methods and tools, telescopes, space exploration	Food pyramid and diet log Flour Baby	

7th Grade Science Scope and Sequence with Benchmarks & Indicators

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and personal environment	History and nature of Science
Grades 5-7 Standards	<p>The student will develop the abilities to do scientific inquiry, be able to demonstrate how scientific inquiry is applied and develop understandings about scientific inquiry</p> <p>i.e. Design and conduct investigations Asking scientific questions Understanding about scientific inquiry</p>	<p>The student will apply process skills to develop an understanding of physical science including: properties, changes of properties of matter, motion and forces and transfer energy</p> <p>i.e. Measuring and describing properties of matter Changes in properties of matter Motions & forces Transfer of energy</p>	<p>The student will apply process skills to explore and understand structure and function in living systems, reproduction and heredity, regulation and behavior, populations and ecosystems and diversity and adaptations of organisms.</p> <p>i.e. Function of structures in organisms Reproduction & heredity Regulation & behavior Populations & Ecosystems Diversity & adaptations of organism</p>	<p>The student will apply process skills to explore and develop and understanding of the structure of the earth system, earth's history and earth in the solar system</p> <p>i.e. Changes in structure of the earth system Past & present earth processes Components of the solar system Motion & forces that effect earth/space phenomena</p>	<p>The student will demonstrate of technological design and understandings about science and technology</p> <p>i.e. Abilities of technological Design to change our views Understanding science & technology</p>	<p>The student will apply process skills to explore and develop an understanding of issues of personal health, population, resources and environment and natural hazards</p> <p>i.e. Apply scientific knowledge to personal health The effect of human activity on resources & the environment Risks & causes of natural hazards</p>	<p>The student will examine and develop an understanding of science as a historical endeavor</p> <p>i.e. Scientific habits of mind Contributions to science throughout history</p>
7th Benchmarks & Indicators	<p>1.1 The student will demonstrate abilities necessary to do the process of scientific inquiry:</p> <p>1.1.1 Identifies questions that can be answered through scientific investigation 1.1.2 Designs and conducts scientific investigations safely, using tools and technology, and interpreting and analyzing data 1.1.3 Identifies evidence and inferences 1.1.4 Communicates results</p>	<p>2.1 The student will observe, compare and classify properties of human matter:</p> <p>2.1.1 Compares and classifies the 4 states of matter 2.1.2 Compares and contrasts matter: elements, compounds and mixtures 2.1.3 Identifies properties of matter by BP, MP, solubility and density</p> <p>2.2 The student will observe, measure, infer and classify changes in properties of matter</p> <p>2.2.1 Understand the relationship between atoms</p>	<p>3.1 The student will model structures of organisms and relate functions to the structures:</p> <p>3.1.3 Compares unicellular and multi cellular organisms</p> <p>3.2 The student will understand the role of reproduction and heredity for all living things:</p> <p>3.2.1 Differentiates between asexual and sexual reproduction 3.2.2 Understand heredity</p>	<p>4.1 The student will develop an understanding of the sources of energy that power the subsystems and cycles of the dynamic earth: geosphere, hydrosphere, atmosphere and biosphere:</p> <p>4.1.1 understands constructive and destructive processes including weathering, erosion and deposition, dynamically change the surface of the earth 4.1.2 understand the theory of Plate</p>	<p>5.1 The student will demonstrate abilities of technology design:</p> <p>5.1.1 Identifies technology as a solution, product, and designs an instrument</p> <p>5.2 The student will develop understandings of the similarities, differences and relationships in science and technology:</p> <p>5.2.1 Compares different scientists and engineers work</p>	<p>6.2 The student will understand the impact of human activity on resources and environment:</p> <p>6.2.1 Investigates the effect of human activity on the environment</p> <p>6.3 The student will understand that natural hazards are dynamic examples of earth processes which cause us to evaluate risks:</p> <p>6.3.1 Recognize the human impact on</p>	<p>7.1 The student will develop scientific habits of mind:</p> <p>7.1.1 Practice intellectual honesty and display open-mindedness</p> <p>7.2 The student will research contributions throughout history:</p> <p>7.2.1 Recognize that new knowledge leads to new questions and replication of experiments helps in the understanding of science</p>

	<p>1.2 The student will apply different kinds of investigation to different kinds of questions: 1.2.1 Develops questions and adapts scientific process 1.2.2 Differentiates between qualitative and quantitative data</p> <p>1.3 The student will analyze how science advances through the interactions of new ideas, scientific investigation, skepticism and examinations of evidence of varied explanations: 1.3.1 Developing alternative questions of inquiry after an experiment 1.3.2 Evaluates peer work</p>	<p>and elements 2.2.2 Measures and graphs the effect of temp on matter</p>	<p>3.2.3 Characteristics result from heredity and the environment</p> <p>3.3 The student will describe homeostasis, the regulation and balance of internal conditions in response to a changing environment: 3.3.1 Internal and external environment affect an organisms behavior 3.3.2 Ingestions of materials are required for survival</p> <p>3.4 The student will identify and relate interactions of populations of organisms within an ecosystem: 3.4.1 Recognize abiotic and biotic factors and their interaction 3.4.2 Understands the limiting factors of an ecosystem 3.4.3 Trace energy flow from the sun from producer to consumer and food webs</p> <p>3.5 The student will observe the diversity of living things and relate their adaptations to their survival or extinction: 3.5.1 compare internal factors of different organisms 3.5.2 understand adaptation of organisms 3.5.3 associates extinct species with environmental changes and insufficient adaptation</p>	<p>Tectonics 4.1.3 Ultimate source of energy comes from the sun and energy, climate and weather are influenced by geographic features, cloud cover and the earth's rotation 4.1.4 Understand the process of water cycling though surface water, ground water and the atmosphere</p> <p>4.2 The student will develop an understanding of the origin and development of the dynamic earth system: 4.2.1 Understands geological time is used to understand the earths past</p>	<p>5.2.2 Evaluates benefits and risks of technological solutions 5.2.3 Identifies different cultural contributions</p>	<p>catastrophes 6.3.2 Evaluates risks associated with natural hazards</p>	
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7th Grade Activities	Labs Data collection Lab simulations Lab designing	Chemistry	Kingdom Survey Comparative anatomy through the dissection of a worm, insect, frog, fish, squid, sea star Ecology Plant collections Pond water analysis for protists	Geology		Geology	Related scientists
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8th Grade Science Scope and Sequence with Benchmarks & Indicators

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and personal environment	History and nature of Science
Grades 8-12	<p>The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry</p> <p>i.e. Conduct independent scientific inquiry Apply technology and mathematics to do scientific inquiry</p>	<p>2A Chemistry: The student will develop an understanding of the structure of the atom, compounds, chemical reactions, and the interactions of energy and matter</p> <p>2B Physics Motions & forces Conservation of mass and energy; 1st & 2nd Laws of Thermodynamics Interactions of energy & matter</p>	<p>Biology The student will develop an understanding of the cell, molecular basis of heredity, biological evolution, interdependence of organisms, matter, energy and organization in living systems and the behavior of organisms</p> <p>i.e. Structure and function of the cell Molecular and chromosomal basis of heredity Biological evolution Interdependence of organisms with physical environment Matter, energy, & organization in living systems Behavior of animals Diversity of structure and function in</p>	<p>The student will develop an understanding of energy in the earth system, geochemical cycles, the formation and organization of the earth system, the dynamics of the earth/moon/sun system and the organization and development of the universe</p> <p>i.e. Energy in earth Subsystems Interactions of Earth's subsystems Origin and development of the earth system Dynamics of the solar system Organization and development of the universe</p>	<p>The student will develop an understanding of personal and community health, population growth, natural resources, environmental quality, natural and human-induced hazards, and science and technology in local, national, and global settings</p> <p>i.e. Technology is applied science Abilities of technological design</p>	<p>The student will develop understanding of personal and community health, population growth, natural resources, environmental quality, natural and human induced hazards, and science and technology in local, national and global settings science as a human endeavor, the nature of</p>	<p>The student will develop understanding of science as a human endeavor, the nature of scientific knowledge and historical perspectives</p>
8th Benchmark & Indicators	1.1 The student will demonstrate the abilities necessary to do	2.3 The student will investigate motion and forces: 2.3.1 Identifies forces, gravity		4.3 The student will identify and classify stars, planets and other solar system	5.1 The student will develop an understanding that technology is applied	6.1 The student will develop an overall functioning of human systems and	7.1 The student will develop an understanding that science is a human

	<p>scientific inquiry: 1.1.1 Actively ask research questions 1.1.2 Actively engages in an investigation by developing questions, gathering and analyzing data and conducting research 1.1.3 Actively engage in using technology and math in their scientific investigations 1.1.4 Actively conduct an inquiry using logical evidence 1.1.5 Actively communicates and defends results and conclusion</p>	<p>and friction 2.3.2 Describes measures and represents data on graphs 2.3.3 recognizes Newton’s law of motion 2.3.4 investigates simple machines pulleys and bicycle gears</p> <p>2.4 The student understands the transfer of energy: 2.4.1 Understands potential and kinetic energy 2.4.2 Work = heat, light, sound, electrical, chemical and nuclear energy 2.4.3 Observes light interacts with matter: transmitted, reflected, refracted and absorbed 2.4.4 Understand heat transferred from hot to cold by radiation, convection and conduction</p>		<p>components: 4.3.1 compare and contrast the characteristics of stars, planets, moons, comets and asteroids. 4.3.2 models spatial relationships of the earth/moon/plants/sun system to scale. 4.3.3 identifies past and present methods used to explore space</p> <p>4.4 The student will model motions and identify forces that explain earth phenomena: 4.4.1 demonstrate and models object/space/time relationships that explain phenomena such as the date, month, year, seasons, moon phases, eclipses and tides 4.4.2 describes how the angle of incidence of solar energy striking the earth’s surface affects the amount of heat energy absorbed at the earth’s surface</p>	<p>to science: 5.1.1 Understands how technology is the application of scientific knowledge for functional purposes 5.1.2 Understands creativity, imagination and a broad scientific knowledge bases are required to produce useful results 5.1.3 Understands science advances new technologies, which open new areas for scientific inquiry</p>	<p>their interactions with the environment in order to understand specific mechanisms and processes related to health issues: 6.1.1 Understand some chemical and physical hazards and accidents can be avoided through safety education</p> <p>6.3 The student will understand that human populations use natural resources and influence environmental quality: 6.3.1 Understands natural resources from the lithosphere and ecosystems 6.3.2 Understands earth does not have infinite resources</p> <p>6.4 The student will understand the effect of natural and human-influenced hazards: 6.4.1 Understands natural process of earth may be hazardous to humans 6.4.2 Understands there is a need to access potential risk and danger from natural and human induced hazards</p> <p>6.5 The student will develop an understanding of the relationship between science,</p>	<p>endeavor that uses models to describe and explain the physical universe: 7.1.1 Understand that science is both vocational and avocational 7.1.2 Science uses peer review 7.1.3 Recognizes the universality of science 7.1.4 Recognize the role of society and science 7.1.5 Understand the issues surrounding moral, ethical, spiritual values 7.1.6 Recognize societies role in science</p> <p>7.2 The student will develop an understanding of the nature of scientific knowledge: 7.2.1 Understand that science can explain the make up of the world 7.2.2 Understand science knowledge is based on empirical evidence 7.2.3 Understand hypothesis, inferences, laws and theories 7.2.4 Understand that a testable hypothesis or inference must have empirical evidence</p> <p>7.3 The student will understand science from historical perspective: 7.3.1 Understand the history of science 7.3.2 Demonstrate that scientific method historically is more inductive rather than deductive</p>
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						technology, and society: 6.5.1 Understands the process in science and technology can be affected by social issues and challenges, science and technology indicate what can happen, not what should happen	
8th grade Activities		Physics Motions and Forces Sound and light Electricity and Magnetism Electric house and circuits		Meteorology		Space exploration Electricity	

9th Grade Science Scope and Sequence with Benchmarks & Indicators

Biology

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and personal environment	History and nature of Science
Grades 8-12	<p>The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry</p> <p>i.e. Conduct independent scientific inquiry Apply technology and mathematics to do scientific inquiry</p>	<p>2A Chemistry: The student will develop an understanding of the structure of the atom, compounds, chemical reactions, and the interactions of energy and matter</p> <p>2B Physics Motions & forces Conservation of mass and energy; 1st & 2nd Laws of Thermodynamics Interactions of energy & matter</p>	<p>Biology The student will develop an understanding of the cell, molecular basis of heredity, biological evolution, interdependence of organisms, matter, energy and organization in living systems and the behavior of organisms</p> <p>i.e. Structure and function of the cell Molecular and chromosomal basis of heredity Biological evolution Interdependence of organisms with physical environment Matter, energy, & organization in living systems Behavior of animals Diversity of structure and function in</p>	<p>The student will develop an understanding of energy in the earth system, geochemical cycles, the formation and organization of the earth system, the dynamics of the earth/moon/sun system and the organization and development of the universe</p> <p>i.e. Energy in earth Subsystems Interactions of Earth's subsystems Origin and development of the earth system Dynamics of the solar system Organization and development of the universe</p>	<p>The student will develop an understanding of personal and community health, population growth, natural resources, environmental quality, natural and human induced hazards, and science and technology in local, national, and global settings</p> <p>i.e. Technology is applied science Abilities of technological design</p>	<p>The student will develop understanding of personal and community health, population growth, natural resources, environmental quality, natural and human induced hazards, and science and technology in local, national and global settings science as a human endeavor, the nature of</p>	<p>The student will develop understanding of science as a human endeavor, the nature of scientific knowledge and historical perspectives</p>
9th Benchmark & Indicators	<p>1.1 The student will demonstrate the abilities necessary to do scientific inquiry: 1.1.1 actively ask research questions</p>		<p>3.1 The student will demonstrate an understanding of the structure and function of cells: 3.1.2 understand cells are composed of a variety of specialized structures with specific functions 3.1.2 understand cell functions</p>		<p>5.1The student will develop an understanding that technology is an applied science: 5.1.1 understands how technology is</p>	<p>6.1 The student will develop an understanding of the overall functioning of human systems and their interaction with the environment in order to</p>	<p>7.1 the student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe: 7.1.1 understand that science</p>

	<p>1.1.2 actively engages in an investigation by developing questions, gathering and analyzing data and conducting research</p> <p>1.1.3 actively engage in using technology and math in their scientific investigations</p> <p>1.1.4 actively conduct an inquiry using logical evidence</p> <p>1.1.5 actively communicates and defends results and conclusion</p>		<p>involve specific chemical reactions</p> <p>3.1.3 understand cells function is a result of stored information in DNA and RNA molecules</p> <p>3.1.4 understand some plants contain chloroplast which is where photosynthesis occurs</p> <p>3.1.5 cells can be differentiated enabling complex multicellular organisms to form</p> <p>3.2 The student will demonstrate an understanding of chromosomes, genes, and the molecular basis of heredity</p> <p>3.2.1 understand living organisms contain DNA and RNA as their genetic material which proved the instructions that specify the characteristics of organisms</p> <p>3.2.2 understand organisms have a characteristic number of chromosomes, one pair determines the sex of an individual</p> <p>3.2.3 understand that heredity information is contained in genes, located in the chromosome of each cell</p> <p>3.2.4 understand gametes carry genetic information</p> <p>3.2.5 understand expressed mutations occur in DNA at low rates</p> <p>3.3 The student will understand biological evolution:</p> <p>3.3.1 understand biological evolution, descent with modification, diversification comes from a common ancestor</p> <p>3.3.2 understand populations of organisms adapt to environmental challenges as a result of genetic drift, genetic variation, and genetic change</p> <p>3.3.3 understand biological evolution is used to explain biodiversity</p> <p>3.3.4 understand organisms vary widely within populations, variations allows for natural selection</p> <p>3.3.5 understand the primary mechanism acting on variation is natural selection</p> <p>3.3.6 understand biological evolution</p>		<p>the application of scientific knowledge for functional purposes</p> <p>5.1.2 understands creativity, imagination and a broad scientific knowledge bases are required to produce useful results</p> <p>5.1.3 understands science advances new technologies, which open new areas for scientific inquiry</p>	<p>understand specific mechanisms and processes related to health issues:</p> <p>6.1.1 understand some chemical and physical hazards and accidents can be avoided through safety education</p> <p>6.1.3 understand informed personal choices concerning fitness and health involve an understanding of chemistry and biology</p> <p>6.1.4 understand selection of foods and eating patterns determine nutritional balance which affects emotional and physical well being</p> <p>6.4 The student will understand the effect of natural and human-influenced hazards:</p> <p>6.4.2 understands there is a need to access potential risk and danger from natural and human induced hazards</p> <p>6.5 The student will develop an understanding of the relationship between science, technology, and society</p> <p>6.5.1 understands the process in science and technology can be affected by social issues and challenges, science and technology indicate what can happen, not what should happen</p>	<p>is both vocational and avocational</p> <p>7.1.2 science uses peer review</p> <p>7.1.3 recognizes the universality of science</p> <p>7.1.4 recognize the role of society and science</p> <p>7.1.5 understand the issues surrounding moral, ethical, spiritual values</p> <p>7.1.6 Recognize societies role in science</p> <p>7.2 The student will develop an understanding of the nature of scientific knowledge:</p> <p>7.2.1 Understand that science can explain the make up of the world</p> <p>7.2.2 understand science knowledge is based on empirical evidence</p> <p>7.2.3 understand hypothesis, inferences, laws and theories</p> <p>7.2.4 understand that a testable hypothesis or inference must have empirical evidence</p> <p>7.3 The student will understand science from historical perspectives.</p> <p>7.3.1 understand the history of science</p> <p>7.3.2 demonstrate that scientific method historically is more inductive rather than deductive</p>
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		<p>is a broad unifying theoretical framework for biology</p> <p>3.4 The student will understand the interdependence of organisms and their interaction with the physical environment:</p> <p>3.4.1 understand that atoms and molecules are part of the earth's cycle between living and non living components</p> <p>3.4.2 understand energy is received, transformed and expanded in ecosystems</p> <p>3.4.3 understand the distribution and abundance of organisms and populations in ecosystems are limited to the carrying capacity</p> <p>3.4.4 Understand organisms cooperate and compete in complex, interdependent relationships</p> <p>3.4.5 understand how human beings live within and impact ecosystems</p> <p>3.5 The student will develop an understanding of matter, energy and organization in living systems:</p> <p>3.5.1 understands living systems requires a continuous input of energy to maintain their chemical and physical organization</p> <p>3.5.2 understand the sun as the primary source of energy for life through photosynthesis</p> <p>3.5.3 understand food molecules contain biochemical energy, which is necessary for cellular respiration</p> <p>3.5.4 understand the structure and function of an organism serves to sustain it appropriately</p> <p>3.6 The student will understand the behavior of animals:</p> <p>3.6.1 understand animals have behavioral responses to internal changes and external stimuli</p> <p>3.6.3 understand behaviors are often adaptive when viewed in terms of survival and reproductive success</p> <p>3.7 The student will demonstrate an understanding of the diversity</p>				
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			<p>of structure and function in organisms:</p> <p>3.7.1 understand differences in structure and function of unicellular and multicellular organisms and the major systems</p> <p>3.7.2 understand that homeostasis is the dynamic regulation and balance of all organisms internal environment and is suitable for survival</p> <p>3.7.3 understand living things change and follow specific patterns of developmental stages called life cycles</p> <p>3.7.5 understand that taxonomy is the systematic way in which organisms are placed into hierarchical groups according to their physical and genetic characteristics and evolutionary history</p>				
9 th grade activities	<p>* See Unit Goals Below</p> <p>Data collection Metric system Analyzing data</p>		<p>* See Unit Goals Below</p> <p>Biological Evolution, behavior, carrying capacity and classification of life Chemicals of life Structure and function of the cell, and organelles Photosynthesis and cellular respiration Carbon and nitrogen cycles Plant Kingdom and plant hormones DNA structure & replication Protein synthesis Mendel genetics Punnet squares Molecular and chromosomal basis of heredity</p>		<p>* See Unit Goals Below</p> <p>Changes in technology lead to new Theories</p> <p>New inventions driven by politics, health, money, discoveries. Earth is a closed system</p>	<p>* See Unit Goals Below</p> <p>Food label analyzing Human health and nutrition Environmental Quality Global warming debate</p>	<p>* See Unit Goals Below</p> <p>Scientific paper reviews History of Classification Changes over time History of Microscopes DNA and genetics history Human genome project Noble prizes Scientific theories</p>

*** Unit Goals**

Unit 1 (Chapters 1, 2, 14, 15)

Introduction to Life, Evolution and The History of the Earth

The student will:

- Analyze what constitutes life: New cells are produced from existing cells, all living things are composed of cells, and cells are the basic unit of structure and function in living things.
- Be able to explain how all living organisms reproduce, grow, interact and change and adapt with a changing environment.
- Predict and plan experiments using the scientific method.
- Understand the diversity of life and be able to arrange and classify organisms based on the molecular make up of the organism as well as its organization of its systems: prokaryote, eukaryote, autotroph, heterotroph, nervous, digestive, skeletal, and muscular.
- Compare different classification methods and the modern use of cladograms

- Describe the Theory of Evolution and the role Charles Darwin had on the modern theory of evolution, in particular the role of adaptation, speciation, and survival of the fittest.
- Compare the different types of evidence used to help substantiate the theory of evolution: fossil evidence, continental drift, homologous structures, geographic distribution, molecular biology, natural selection
- Explain possible hypothesis for the existence of life on Earth and the diversity changes.
- Predict and appreciate how the behavior of one organism can affect many others.

Unit 2 (Chapter 19, 20, 21, 22, 8)

Plant Kingdom

The student will:

- Describe the similarities and differences between the four main divisions of the Plant Kingdom: Bryophytes (mosses), Pterophytes (ferns), Gymnosperms (cone bearing) and Angiosperms (flowering plants)
- Compare and contrast the main characteristics and structure of dicot and monocot angiosperms: Roots, leaf veins, vascular structure, and cotyledon type.
- Describe the difference between a fruit and a vegetable.
- Describe to function of xylem and phloem within a plants vascular system.
- Describe the structure of a flower and its role in reproduction: Sepals, petals, embryo sac, style, stigma, pollination, fruit, pollen tube
- Describe the role of plant hormones, circadian rhythms and Photoperiodism
- Analyze the importance of plants to life and the role of Oxygen
- Analyze the impact of humans and the carbon cycle on a global level: greenhouse effect, global warming, increasing carbon dioxide.
- Compare and contrast the nutrients necessary for a health plant growth and explain the nitrogen cycle

Unit 3 (Chapters 4, 5, 29)

Chemistry of life

The student will:

- Know the most common elements in living organisms.
- Compare the structure of an atom, molecule and a salt.
- Compare and contrast ionic and covalent bonding.
- Describe how water forms hydrogen bonds.
- Understand the major role water plays in allowing organisms to reproduce and grow.
- Explain what a solution is and how the pH of a solution can be changed. (solute, solvent, solution, acidic, neutral, basic)
- Compare and contrast the structure and function of the four main building blocks of life: Carbohydrates, Lipids, Proteins and Nucleic acids.
- Explain how an enzyme changes the rate of a reaction inside a living organism.
- Describe the main components and function of the human digestive system: mouth, esophagus, stomach, small intestines, large intestines, anus.
- Recommend good nutritional choices based on the buildings blocks of life and the human digestive system.

Unit 4(Chapter 6)

The Cell

The student will:

- Understand that the concept of life is based on the modern cell theory: New cells are produced from existing cells, all living things are composed of cells, and cells are the basic unit of structure and function in living things.
- Compare and contrast eukaryote and prokaryote cells
- Compare and contrast plant and animal cells
- Describe how microscopes aid in the study of cell structure
- Explain the structure and role of the plasma membrane: fluid mosaic membrane, phospholipids, diffusion, osmosis, passive and active transport, endocytosis and exocytosis
- Describe the structure and function of the main organelles found in side a cell: Nucleus, mitochondrion, ribosome, endoplasmic reticulum, golgi body, vacuoles, chloroplast, lysosomes, cytoskeleton.

Unit 5 (chapter 7)

The Mitochondria (Cellular respiration) and The Chloroplast (Photosynthesis)

The student will:

- Compare and contrast and autotroph with an heterotroph
- Describe the structure and role of ATP in a cell: energy storing molecule, made up of three phosphates and adenine
- Describe the detailed structure of a mitochondrion organelle: outer membrane, inner membrane, cristae, matrix.

- Describe and explain in the basic steps involved, the molecules needed and the products of cellular respiration and appreciate the complexity of the reactions involved in glycolysis, Krebs cycle and Electron Transport chain.
- Compare and contrast anaerobic and aerobic respiration
- Explain what would happen to an animal cell and a yeast cell when there is no oxygen present for cellular respiration: Fermentation and lactic acid formation
- Describe in detail the structure of the chloroplast: stroma, thylakoid, double membrane, granum.
- Describe and explain in the basic steps involved in of photosynthesis and appreciate the complexity of the reactions involved in the Light reaction and the Calvin Cycle

Unit 6 (Chapters 9, 11)

Nucleus (DNA Structure and cell division)

The student will:

- Explain why cells divide and make new cells: repair, reproduction and growth
- Describe the structure of a chromatin: DNA, histones (proteins), tightly coiled and super coiled
- Explain the difference between a chromatin, chromosome and replicated chromatid.
- Explain the history of the discovery of DNA: Griffith, Hershey and Chase, Watson and Crick, Rosalind Franklin
- Describe the building blocks of a DNA molecule: Nucleotides, nitrogenous bases (A,T, C and G), double helix, complimentary base pairing, 5' and 3', sense and nonsense strands
- Explain how and why DNA replicates itself into sister chromatids: unzipping, DNA polymerase, semiconservative replication.
- Describe in detail the four stages of the cell cycle: G1, S, G2 and Mitotic phase
- Describe in details the main Mitosis steps involved that ensures the replicated DNA is equally divided into two identical daughter cells: Prophase, Metaphase, Anaphase, Telophase and cytokinesis in plant and animal cells
- Explain how cancer is just a function of Mitosis gone wrong
- Compare and contrast a benign tumor, malignant tumor, and metastasis

Unit 7 (Chapters 11.4-11.6)

Protein synthesis

The student will be able to:

- Explain some of the major roles of proteins
- Compare and contrast the basic structure of a protein with its 3-D structure
- Explain the process' involved in making a protein and where they occur inside the cell
- Compare and contrast DNA and RNA
- Explain how four bases are used to code the 20 amino acids necessary for making a protein
- Compare and contrast transcription and translation
- Explain how only 20 000 genes can make more than 100 000 different proteins: Splicing
- Compare the main types of gene mutations and their consequences

Unit 8 (Chapters 9, 10, 11)

Meiosis and Genetics

The student will:

- Be able to summarize the role Gregor Mendel played in the modern genetic theory including vocabulary that compares dominant and recessive traits, genotype and phenotype, cross fertilization, purebred, homozygous and heterozygous, Punnett squares, test crosses, monohybrid and dihybrid crosses
- Be able to explain the different steps of Meiosis and describe how four different haploid cells are produced that are genetically different from each other: Meiosis I, Meiosis II, crossing over, genetic recombination, random assortment in metaphase I and II,
- Compare and contrast mitosis and meiosis
- Compare and contrast the formation of male and female human gametes: oogenesis and spermatogenesis.
- Describe and read karyotypes for sex and chromosome abnormalities
- Compare and contrast gene and chromosome mutations
- Describe the results from sex linked traits

10th Grade Science Scope and Sequence with Benchmarks& Indicators
Chemistry

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and personal environment	History and nature of Science
Grades 8-12	<p>The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry</p> <p>i.e. Conduct independent scientific inquiry Apply technology and mathematics to do scientific inquiry</p>	<p>2A Chemistry: The student will develop an understanding of the structure of the atom, compounds, chemical reactions, and the interactions of energy and matter</p> <p>2B Physics Motions & forces Conservation of mass and energy; 1st & 2nd Laws of Thermodynamics Interactions of energy & matter</p>	<p>Biology The student will develop an understanding of the cell, molecular basis of heredity, biological evolution, interdependence of organisms, matter, energy and organization in living systems and the behavior of organisms</p> <p>i.e. Structure and function of the cell Molecular and chromosomal basis of heredity Biological evolution Interdependence of organisms with physical environment Matter, energy, & organization in living systems Behavior of animals Diversity of structure and function in</p>	<p>The student will develop an understanding of energy in the earth system, geochemical cycles, the formation and organization of the earth system, the dynamics of the earth/moon/sun system and the organization and development of the universe</p> <p>i.e. Energy in earth Subsystems Interactions of Earth's subsystems Origin and development of the earth system Dynamics of the solar system Organization and development of the universe</p>	<p>The student will develop an understanding of personal and community health, population growth, natural resources, environmental quality, natural and human-induced hazards, and science and technology in local, national, and global settings</p> <p>i.e. Technology is applied science Abilities of technological design</p>	<p>The student will develop understanding of personal and community health, population growth, natural resources, environmental quality, natural and human induced hazards, and science and technology in local, national and global settings science as a human endeavor, the nature of</p>	<p>The student will develop understanding of science as a human endeavor, the nature of scientific knowledge and historical perspectives</p>
10th Benchmark	<p>1.1 The student will demonstrate the abilities necessary to do scientific inquiry: 1.1.1 Actively ask research questions 1.1.2 actively engages in an investigation by developing questions.</p>	<p>2A 1 The student will understand the structure of an atom: 2A.1.1 understands atoms, matter, subatomic particles 2A.1.2 understands isotopes, atomic number, mass number, radioactive decay and radioactive energy</p> <p>2A 2 The student will</p>			<p>5.1The student will develop an understanding that technology is an applied science: 5.1.1 understands how technology is the application of scientific knowledge for functional purposes</p>	<p>6.1 The student will develop an understanding of the overall functioning of human systems and their interaction with the environment in order to understand specific mechanisms and processes related to health issues:</p>	<p>7.1 the student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe: 7.1.1 understand that science is both vocational and avocational</p>

	<p>gathering and analyzing data and conducting research</p> <p>1.1.3 actively engage in using technology and math in their scientific investigations</p> <p>1.1.4 actively conduct an inquiry using logical evidence</p> <p>1.1.5 actively communicates and defends results and conclusion</p>	<p>understand the states and properties of matter:</p> <p>2A.2.1 understand chemists use kinetic energy and potential energy to explain chemical and physical properties</p> <p>2A.2.2 understands the periodic table lists elements by atomic number, which results in trends within groups, periods and subcategories</p> <p>2A.2.3 understands bonds result when valence electrons are transferred or shared in ionic or molecular bonds</p> <p>2A3 The student will gain basic concepts of chemical reactions:</p> <p>2A.3.1 understands a chemical reaction occurs when one or more substance reacts to form a new substance, with the Law of conservation of matter and energy</p> <p>2A.3.2 understand and perform mathematical calculations through stoichiometry</p> <p>2A.3.3 understands the difference between acids, bases, salts. Perform calculations to determine the concentration of ions in a solution</p>			<p>5.1.2 understands creativity, imagination and a broad scientific knowledge bases are required to produce useful results</p> <p>5.1.3 understands science advances new technologies, which open new areas for scientific inquiry</p>	<p>6.1.1 understand some chemical and physical hazards and accidents can be avoided through safety education</p> <p>6.1.3 understand informed personal choices concerning fitness and health involve an understanding of chemistry and biology</p> <p>6.3 The student will understand that human populations use natural resources and influence environmental quality</p> <p>6.3.2 understands earth does not have infinite resources</p> <p>6.4 The student will understand the effect of natural and human-influenced hazards:</p> <p>6.4.1 understands natural process of earth may be hazardous to humans</p> <p>6.4.2 understands there is a need to access potential risk and danger from natural and human induced hazards</p> <p>6.5 The student will develop an understanding of the relationship between science, technology, and society</p> <p>6.5.1 understands the process in science and technology can be affected by social issues and challenges, science and technology indicate what can happen, not what should happen</p>	<p>7.1.2 science uses peer review</p> <p>7.1.3 recognizes the universality of science</p> <p>7.1.4 recognize the role of society and science</p> <p>7.1.5 understand the issues surrounding moral, ethical, spiritual values</p> <p>7.1.6 Recognize societies role in science</p> <p>7.2 The student will develop an understanding of the nature of scientific knowledge:</p> <p>7.2.1 Understand that science can explain the make up of the world</p> <p>7.2.2 understand science knowledge is based on empirical evidence</p> <p>7.2.3 understand hypothesis, inferences, laws and theories</p> <p>7.2.4 understand that a testable hypothesis or inference must have empirical evidence</p> <p>7.3 The student will understand science from historical perspectives.</p> <p>7.3.1 understand the history of science</p> <p>7.3.2 demonstrate that scientific method historically is more inductive rather than deductive</p>
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10th Activities	* See Unit Goals Below Formal lab reports and lab design Metric system Conversion factors Scientific notation Excel Graphing Design own labs Write formal lab report	* See Unit Goals Below Structure of atoms Subatomic particles Electron configuration Periodicity Periodic table Structure & properties of matter Chemical v Physical properties Moles, Solutions Chemical reactions Bonds Gas Laws Stoichiometry			* See Unit Goals Below Changes in technology and our understanding of matter Medicine advances Inventions and changes in technology	* See Unit Goals Below Lab safety techniques Nonrenewable v renewable resources Human interactions and the changes involved with the Earth	* See Unit Goals Below History of the discovery of the atom Changes over time Nobel prizes Open-ended science Theory and further discovers and how they affect a Theory Advances
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*** Unit Goals**

Unit 1 (chapters 1-3)

Introduction to Chemistry:

The student will:

- Understand and describe the main divisions of chemistry: organic, inorganic, physical, analytical and biochemical.
- Be able to state the SI units for length, mass, volume, density, and temperature
- Be able to analyze data using accurate scientific methods with metric measurements using correct dimensional analysis.
- Be able to calculate base and derived units using scientific notation.
- Understand the different types of graphs and will know the difference between the independent and dependent variables on a graph.
- Understand how chemical equations are written using proper scientific vocabulary and notation: reactants, \rightarrow , \leftrightarrow , products (s), (aq), (l), (g) \downarrow , \uparrow ,
- Be able to compare and contrast the different divisions of matter.
- Understand the different states of matter and how they affect the molecular make up of matter.
- Describe and predict the difference and similarities between chemical and physical changes and properties.

Unit 2 (Chapter 3.3, 11, 15.4, 17.2 pages 532-541)

Solutions

The student will:

- Classify different types of mixtures: homogenous, heterogeneous
- Recommend a method of separating a mixture based on the mixture type and the state of matter
- Be able to explain what a mole is and how many particles are in a mole (6.02×10^{23} particles)
- Be able to use dimensional analysis to convert grams to moles and moles to particles.
- Be able to distinguish between a saturated, unsaturated and supersaturated solution.
- Be able to use Molarity to describe the concentration of a solution
- Interpret a phase diagram of a given element: critical point, solid, liquid, gas phases, triple point
- Be able to make and dilute their own stock solutions.
- Be able to explain the three main components of the collision theory
- Interpret energy diagrams for an exothermic or endothermic reaction
- Be able to use proper scientific methods and conduct appropriate scientific methods whilst solving a lab scenario and analyzing data
- Be able to predict the rate of a reaction if the temperature, surface area, concentration or a catalyst was changed and change a phase diagram to show the change

Unit 3 (Chapters 4-7)

Elements and the Periodic Table:

The student will:

- Be able to write the correct symbol, number of p, n, e, and atomic number, atomic mass, mass number, for selected elements
- Be able to summarize the history behind the discovery of subatomic particles and the atomic theory: protons, neutrons and electrons.
- Be able to illustrate the location of the subatomic particles and describe their role in the atom.
- Be able to compare the electron configuration of different elements and ions

- Be able to design an experiment that involves exciting electrons.
- Explain the difference between s, p, f and d orbitals
- Explain the main divisions of the periodic table: metals, non metals and metalloids, transition metals, inner transition metals, groups (alkali metals, alkaline earth metals, nitrogen, oxygen, halogens and noble gasses) and periods
- Be able to determine the type of element using different experiments using conductivity, reaction with an acid, malleability, ductility.
- Infer the reaction of an element based on its valence electrons
- Understand periodic trends: atomic radii, Electronegativity, groups, valence electrons,

Unit 4 Chapters 8, 9, 13.2,

The Bonds of life: Chemical Bonding

The student will:

- Distinguish, compare and discriminate between ionic, covalent and metallic bonds
- Understand the role electronegativity plays in bonding
- Understand intermolecular bonding: dispersion forces, dipole dipole and hydrogen.
- Describe the formation of cations and anions using Lewis dot structures and stability
- Classify monatomic and polyatomic ions
- Be able to name formula units using modern scientific names and common names and deciphering formula units
- Be able to name covalent compounds and molecules, including certain common acids
- Compare the difference between the molecular formula, structural formula and 3-D models to determine the shape of molecules using VESPR terminology (linear, trigonal planar, Tetrahedral, Trigonal pyramidal and bent).

Unit 5 (Chapters 10, 16, 20)

Chemical Reactions and Redox Reactions

The student will:

- Be able to write and balance all types of chemical reactions
- Be able to compare and contrast five main types of reactions: Synthesis, combustion, decomposition, single replacement, double replacement
- Predict the products in single replacement, combustion, synthesis and double replacement reactions
- Determine the net ionic equation of a double replacement reaction
- Understand the difference between Entropy, Enthalpy and energy change in a given reaction
- Be able to accurately use the redox language to describe which compound is being reduced and which one is being oxidized
- Explain the difference between oxidation and reduction

Unit 6 (Chapter 12, 14)

Stoichiometry and Gas Laws

The student will:

- Be able to use Stoichiometry to predict the theoretical yield, and the amount of reactants to produce a certain amount of product.
- Be able to predict the limiting reactant in any given chemical reaction
- Compare and contrast Boyle, Charles and Gay Lussac's laws associated with the behavior of gases
- Understand the kinetic theory associated with the behavior of gases
- Identify when to use the complete gas law or ideal gas law
- Understand the behavior of gases at STP (22.4L/mol)
- Use Stoichiometry to calculate the volume of a gas formed from a solid

Unit 7 (Chapter 19, some of 22.1, 22.2 and 22.3)

Acids and Bases and Organic Molecules

The student will:

- Understand the different terminology used when describing acids and bases: Arrhenius, Bronsted and Lowry, conjugative acid and conjugative base, amphoteric, weak acid, strong acid, weak acid, strong base, pH, pOH, neutralization, end point, buffering
- Be able to determine the molarity of an acid using titration
- Compare and contrast acids and bases
- Understand the three main types of organic molecules: alkanes, alkenes and alkynes
- Be able to name and arrange the first ten alkanes by their number of carbons

11th/12th Grade Science Scope and Sequence with Benchmarks& Indicators
Physics (Conceptual and Honors)

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and personal environment	History and nature of Science
Grades 8-12	<p>The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry</p> <p>i.e. Conduct independent scientific inquiry Apply technology and mathematics to do scientific inquiry</p>	<p>2A Chemistry: The student will develop an understanding of the structure of the atom, compounds, chemical reactions, and the interactions of energy and matter</p> <p>2B Physics Motions & forces Conservation of mass and energy; 1st & 2nd Laws of Thermodynamics Interactions of energy & matter</p>	<p>Biology The student will develop an understanding of the cell, molecular basis of heredity, biological evolution, interdependence of organisms, matter, energy and organization in living systems and the behavior of organisms</p> <p>i.e. Structure and function of the cell Molecular and chromosomal basis of heredity Biological evolution Interdependence of organisms with physical environment Matter, energy, & organization in living systems Behavior of animals Diversity of structure and function in</p>	<p>The student will develop an understanding of energy in the earth system, geochemical cycles, the formation and organization of the earth system, the dynamics of the earth/moon/sun system and the organization and development of the universe</p> <p>i.e. Energy in earth Subsystems Interactions of Earth's subsystems Origin and development of the earth system Dynamics of the solar system Organization and development of the universe</p>	<p>The student will develop an understanding of personal and community health, population growth, natural recourses, environmental quality, natural and human-induced hazards, and science and technology in local, national, and global settings</p> <p>i.e. Technology is applied science Abilities of technological design</p>	<p>The student will develop understanding of personal and community health, population growth, natural resources, environmental quality, natural and human induced hazards, and science and technology in local, national and global settings science as a human endeavor, the nature of</p>	<p>The student will develop understanding of science as a human endeavor, the nature of scientific knowledge and historical perspectives</p>
11/12th Benchmark & indicators	<p>1.1 The student will demonstrate the abilities necessary to do scientific inquiry: 1.1.1 Actively ask research questions 1.1.2 actively engages in an investigation by developing questions, gathering and analyzing data and conducting</p>	<p>2B1 The student will understand the relationship between forces and motion: 2B.1.1 understand Newton's law and the variables of time, position, velocity and acceleration to describe the position and motion of particles 2B.1.2 understand physicist use conservation laws to</p>			<p>5.1The student will develop an understanding that technology is an applied science: 5.1.1 understands how technology is the application of scientific knowledge for</p>	<p>6.1 The student will develop an understanding of the overall functioning of human systems and their interaction with the environment in order to understand specific mechanisms and processes related to health issues:</p>	<p>7.1 the student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe: 7.1.1 understand that science is both vocational and avocational</p>

	<p>research</p> <p>1.1.3 actively engage in using technology and math in their scientific investigations</p> <p>1.1.4 actively conduct an inquiry using logical evidence</p> <p>1.1.5 actively communicates and defends results and conclusion</p>	<p>analyze the motion of objects</p> <p>2B.2.1 understand that matter has energy and mass and energy can be interchanged</p> <p>2B2 The student will understand the conservation of mass and energy, and the first and Second Laws of Thermodynamics:</p> <p>2B.2.2 understand the first law of thermodynamics (sum of all its energies)</p> <p>2B3 the student will understand the nature of the fundamental interactions of matter and energy:</p> <p>2B.2.3 understand the second law of thermodynamics (entropy is increasing)</p> <p>2B.3.1 There are four forces in nature: strong nuclear, weak nuclear, electromagnetic and gravitational</p> <p>2B.3.2 understand waves have energy and can transfer energy when they interact with matter</p> <p>2B.3.3 understand interference of waves with each other</p> <p>2B.3.4 understand the principles of reflection and refraction</p> <p>2B.3.5 Understand electromagnetic waves result when a charged particle is accelerated or decelerated</p> <p>2B.3.6 understand basic circuits and electrostatics</p>			<p>functional purposes</p> <p>5.1.2 understands creativity, imagination and a broad scientific knowledge bases are required to produce useful results</p> <p>5.1.3 understands science advances new technologies, which open new areas for scientific inquiry</p>	<p>6.1. understand some chemical and physical hazards and accidents can be avoided through safety education</p> <p>6.4 The student will understand the effect of natural and human-influenced hazards:</p> <p>6.4.1 understands natural process of earth may be hazardous to humans</p> <p>6.4.2 understands there is a need to access potential risk and danger from natural and human induced hazards</p> <p>6.5 The student will develop an understanding of the relationship between science, technology, and society</p> <p>6.5.1 understands the process in science and technology can be affected by social issues and challenges, science and technology indicate what can happen, not what should happen</p>	<p>7.1.2 science uses peer review</p> <p>7.1.3 recognizes the universality of science</p> <p>7.1.4 recognize the role of society and science</p> <p>7.1.5 understand the issues surrounding moral, ethical, spiritual values</p> <p>7.1.6 Recognize societies role in science</p> <p>7.2 The student will develop an understanding of the nature of scientific knowledge:</p> <p>7.2.1 Understand that science can explain the make up of the world</p> <p>7.2.2 understand science knowledge is based on empirical evidence</p> <p>7.2.3 understand hypothesis, inferences, laws and theories</p> <p>7.2.4 understand that a testable hypothesis or inference must have empirical evidence</p> <p>7.3 The student will understand science from historical perspectives.</p> <p>7.3.1 understand the history of science</p> <p>7.3.2 demonstrate that scientific method historically is more inductive rather than deductive</p>
11/12	Formal lab reports	<ul style="list-style-type: none"> • Motions & forces • Conservation of mass and energy; 1st & 2nd Laws of Thermodynamics □ Interactions of energy & matter 					

11th /12th Grade Science Scope and Sequence with Benchmarks & Indicators
Anatomy & Physiology

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and personal environment	History and nature of Science
Grades 8-12	<p>The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry</p> <p>i.e. Conduct independent scientific inquiry Apply technology and mathematics to do scientific inquiry</p>	<p>2A Chemistry: The student will develop an understanding of the structure of the atom, compounds, chemical reactions, and the interactions of energy and matter</p> <p>2B Physics Motions & forces Conservation of mass and energy; 1st & 2nd Laws of Thermodynamics Interactions of energy & matter</p>	<p>Biology The student will develop an understanding of the cell, molecular basis of heredity, biological evolution, interdependence of organisms, matter, energy and organization in living systems and the behavior of organisms</p> <p>i.e. Structure and function of the cell Molecular and chromosomal basis of heredity Biological evolution Interdependence of organisms with physical environment Matter, energy, & organization in living systems Behavior of animals Diversity of structure and function in</p>	<p>The student will develop an understanding of energy in the earth system, geochemical cycles, the formation and organization of the earth system, the dynamics of the earth/moon/sun system and the organization and development of the universe</p> <p>i.e. Energy in earth Subsystems Interactions of Earth's subsystems Origin and development of the earth system Dynamics of the solar system Organization and development of the universe</p>	<p>The student will develop an understanding of personal and community health, population growth, natural recourses, environmental quality, natural and human-induced hazards, and science and technology in local, national, and global settings</p> <p>i.e. Technology is applied science Abilities of technological design</p>	<p>The student will develop understanding of personal and community health, population growth, natural resources, environmental quality, natural and human induced hazards, and science and technology in local, national and global settings science as a human endeavor, the nature of</p>	<p>The student will develop understanding of science as a human endeavor, the nature of scientific knowledge and historical perspectives</p>
Benchmarks and Indicators	<p>1.1 The student will demonstrate the abilities necessary to do scientific inquiry:</p>		<p>3.1 The student will demonstrate an understanding of the structure and function of cells: 3.1.2 understand cells are composed of a variety of specialized structures with specific functions 3.1.2 understand cell functions involve specific chemical reactions 3.1.3 understand cells function is a result of stored information in DNA and RNA molecules</p>		<p>5.1The student will develop an understanding that technology is an applied science: 5.1.1 understands how technology is the application of scientific knowledge for functional purposes 5.1.2 understands creativity, imagination and a broad scientific knowledge bases are</p>	<p>6.1 The student will develop an understanding of the overall functioning of human systems and their interaction with the environment in order to understand specific mechanisms and processes related to health issues: 6.1.2 understand the severity of disease symptoms is dependent on may factors 6.1.1 understand some</p>	<p>7.1 The student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe: 7.1.1 understand that science is both vocational and avocational 7.1.2 science uses peer review 7.1.3 recognizes the universality of science 7.1.4 recognize the role of society and science 7.1.5 understand the issues surrounding moral, ethical,</p>

		<p>3.1.4 understand some plants contain chloroplast which is where photosynthesis occurs</p> <p>3.1.5 cells can be differentiated enabling complex multicellular organisms to form</p> <p>3.4 The student will understand the interdependence of organisms and their interaction with the physical environment:</p> <p>3.4.5 understand how human beings live within and impact ecosystems</p> <p>3.6 The student will understand the behavior of animals:</p> <p>3.6.1 understand animals have behavioral responses to internal changes and external stimuli</p> <p>3.6.3 understand behaviors are often adaptive when viewed in terms of survival and reproductive success</p> <p>3.7 The student will demonstrate an understanding of the diversity of structure and function in organisms:</p> <p>3.7.1 understand differences in structure and function of unicellular and multicellular organisms and the major systems</p> <p>3.7.2 understand that homeostasis is the dynamic regulation and balance of all organisms internal environment and is suitable for survival</p> <p>3.7.3 understand living things change and follow specific patterns of developmental stages called life cycles</p> <p>3.7.5 understand that</p>		<p>required to produce useful results</p> <p>5.1.3 understands science advances new technologies, which open new areas for scientific inquiry</p>	<p>chemical and physical hazards and accidents can be avoided through safety education</p> <p>6.1.3 understand informed personal choices concerning fitness and health involve an understanding of chemistry and biology</p> <p>6.1.4 understand selection of foods and eating patterns determine nutritional balance which affects emotional and physical well being</p> <p>6.2 The student will demonstrate an understanding of population growth:</p> <p>6.2.1 understands the rate of change in populations is determined by the combined effects of birth, death, emigration and immigration</p> <p>6.2.2 understand a variety of factors influences birth rates and fertility rates</p> <p>6.2.3 understand that human populations have limits to growth</p> <p>6.4 The student will understand the effect of natural and human-influenced hazards:</p> <p>6.4.1 understands natural process of earth may be hazardous to humans</p> <p>6.4.2 understands there is a need to assess potential risk and danger from natural and human induced hazards</p> <p>6.5 The student will develop an understanding of the relationship between science, technology, and</p>	<p>spiritual values</p> <p>7.1.6 Recognize societies role in science</p> <p>7.2 The student will develop an understanding of the nature of scientific knowledge:</p> <p>7.2.1 Understand that science can explain the make up of the world</p> <p>7.2.2 understand science knowledge is based on empirical evidence</p> <p>7.2.3 understand hypothesis, inferences, laws and theories</p> <p>7.2.4 understand that a testable hypothesis or inference must have empirical evidence</p> <p>7.3 The student will understand science from historical perspectives.</p> <p>7.3.1 understand the history of science</p> <p>7.3.2 demonstrate that scientific method historically is more inductive rather than deductive</p>
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			taxonomy is the systematic way in which organisms are placed into hierarchical groups according to their physical and genetic characteristics and evolutionary history			society 6.5.1 understands the process in science and technology can be affected by social issues and challenges, science and technology indicate what can happen, not what should happen	
11/12th grade activities			* See Unit Goals Below Diversity of structure and function in a human organism Anatomy of the body system Interaction /physiology of these systems Dissection of heart, eye, cat, kidney.			* See Unit Goals Below Human diseases Technology advances	* See Unit Goals Below ethics

*** Unit Goals**

Unit 1: Introduction and Review Chapters 1, 2, 3.1, 3.2 & 3.3

The student will:

- Be able to use the proper scientific terminology associated with anatomy and physiology and explain the difference between Anatomy and Physiology.
- Be able to identify any of the eleven main body systems and explain their main function.
- Understand how the human body interacts and remains in homeostasis through a number of biofeedback mechanisms and enzymes.
- Understand how the human body is made up of organic molecules such as lipids, carbohydrates, proteins and nucleic acids.
- Be able to distinguish between the different components of a cell and compare and contrast their functions, and the intercellular and intracellular interactions.
- Be able to discriminate how substances and compounds enter or leave a cell through diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, transcytosis.
- Be able to describe and explain how ATP is made and used inside the body on a molecular level

Unit 2: Tissue chapters 5 and 20

The student will be able to:

- Categorize how stem cells differentiate and specialize into one of the 210 different types of human cells.
- Compare and contrast between a morula, blastosysts, embryo and fetus
- Compare and contrast the different types of stem cells: totipotent, pluripotent, multipotent, unipotent, adult, embryonic
- Explain how the three germ layers form during gastrulation
- Compare and contrast the four different types of tissue present in the human body, epithelial, connective, muscle, nervous
- Compare and contrast the eight different types of epithelial tissue
- Compare and contrast the three main types of: merocrine, apocrine and holocrine glands and the three different types of secretions.
- Identify the different components associated with connective tissue
- Compare and contrast the eight different types of connective tissue
- Compare and contrast the three main types of Muscle tissue
- The student will be able to describe the main function of Blood tissue and it is four components: RBC, WBC, platelets and plasma
- Identify when a tissue becomes an organ
- Compare the four main types of membranes

Unit 3: Integumentary System Chapter 6

1. The student will be able to label and describe the anatomy of the Integumentary System

2. The student will be able to describe the role and function of each main parts: epidermis, dermis, sensory receptors, hair follicles, nails and glands.
3. The student will be able to describe the physiology of the Integumentary as a whole.
4. The student will be able describe the role the Integumentary system plays in the negative feedback mechanism that allows the homeostasis of body temperature.
5. The student will be able to explain what happens to the Integumentary system when a person ages.

Unit 4: Skeletal System Chapter 7

1. The student will understand the classification and general structure of bones: long, short, flat, irregular, sesmoid, epiphysis, spongy, compact, diaphysis, medullary cavity, yellow and red bone marrow, and periosteum
2. The student will be able to describe the main differences between osteoblasts, osteocytes, and osteoclasts in bone tissue
3. The student will be able to describe the histology of bone tissue
4. The student will be able to describe how bones develop and mend after a fracture
5. The student will be able to describe the axial and the appendicular skeleton
6. The student will be able to explain the changes that occur as a person age
7. The student will be able to compare and contrast ligaments, tendons, joints and the movement of joints

Unit 5: Muscular system Chapter 8

The student will be able to:

1. Describe the macro and micro make up of muscle tissue
2. Explain the action of myosin and actin in a muscle contraction
3. Compare and contrast skeletal muscle to smooth and cardiac muscle
4. Explain how muscle tissue is bundled into muscle fibers
5. Explain how muscle tissue contracts using actin and myocin filaments.
6. Explain how a nerve stimulus moves a muscle fiber
7. Compare and name the main types of muscles that moves our appendages, trunk and head

Unit 6: Circulatory system & Blood Chapter 12 and 13

1. The student will be able to identify all the vessels associated with the heart.
2. The student will be able to compare and contrast the systemic, cardio and pulmonary vascular systems.
3. The student will be able to discuss the flow of oxygenated and deoxygenated blood throughout the body.
4. The student will be able to discuss the reaction of the heart chambers as pressure changes.
5. The student will be able to describe the movement of the heart muscles due to electrical impulses.
6. The student will be able to compare and contrast the four different heart valves and describe how the function
7. The student will be able to describe the composition of blood and explain why it is a tissue
8. The student will be able to identify and describe the function of the pericardium, epicardium, myocardium and the endocardium
9. The student will be able to recognize heart abnormalities and explain any possible solutions.
10. The student will be able to describe the “lubb dub” sounds of the heart.
11. The student will understand the difference between systolic and diastolic pressure
12. The student will understand the difference between veins and arteries: oxygen content, location, valves and pressure.

Unit 7: Nervous System Chapter 9

The student will be able to:

1. Explain the similarities and differences between the CNS and the PNS
2. Explain the four main types of neurological cells and their functions
3. Explain the structure of a neuron and the function of its main parts: axon, dendrites, cell body, myelin sheath.
4. Explain the different types of neurons by their structure and their function
5. Identify how a neuron sends messages from one cell to another
6. Explain the Na^+ and K^+ pump and how it causes a neuron to be polarized
7. Describe and explain an action potential and how it depolarizes a cell if it reaches its threshold potential
8. Explain refractory period
9. Compare neurotransmitters and describe the role they play in the synapse of a neuron.
10. Compare and contrast convergence and divergence of neurons
11. Describe and explain how drugs affect the activity in the synaptic cleft
12. Describe the four main parts of the brain and their main function
13. Describe how the cerebrum is divided into different lobes
14. Describe the brain stem and the diencephalon and all its parts
15. Describe the three membranes that make up the meninges

16. Explain reflex arc works from the sensory receptor to the motor effector

Unit 8: Senses Chapter 10

1. The student will understand the external and internal make up of the eye .
2. The student will be able to describe the function of the pupil, lens, iris, cornea, ciliary muscles, retina, choroid coat, sclera, aqueous humor, vitreous humor, blind spot, optic disc, fovea centralis and rods and cones.
3. The student will understand how light converges and diverges through convex and concave lenses.
4. The student will be able to describe how images focused as they are passed through the lens.
5. The student will understand the olfactory organs and how they interact with each other.
6. The student will understand how the taste buds and receptors interact with each other.
7. The student will understand the anatomy of the external and internal ear.
8. The student will understand how the external and internal ear interact to direct sound waves into recognizable patterns

Unit 9: Cat dissection:

Digestive Chapter 15, Respiratory Chapter 16 & Urinary Chapter 17

The student will be able to:

1. Identify and explain all the different parts of the cats digestive system and their main functions
2. Compare the cats digestive system to the human digestive system
3. Identify and explain all the different parts of the cats respiratory system
4. Compare the cats respiratory system to the human respiratory system
5. Identify and explain all the different parts of the cats urinary system
6. Compare and contrast the male and female urinary system
7. Identify the main parts of the kidney and explain their functions: renal arteries and veins, cortex, nephrons, Loop of Henley, ureters, bladder,, urethras
8. Explain how the blood is filtered and cleaned in the kidney using diffusion, osmosis, pressure differentiation, and hormones.
9. Identify imbalances and problems associated with the function of the kidney.

Unit 10: Reproductive System Chapter 19

The student will be able to:

1. Explain the function and anatomy of the external and internal structures of the male and female reproductive systems.
2. Explain the location of hormone production and the negative feedback system of the male hormones gonatropins (GnRH), FSH, LH and the androgen testosterone
3. Compare and contrast oogenesis and spermatogenesis (number of viable cells, time occurrence and location of occurrence)
4. Explain ovulation, the hormones involved and where innitaite: gonatropins (GnRH) FSH, LH, estrogen,
5. Explain the divisions of fertilization, where they take place and the major changes in each phase: zygote, blastula, embryo and fetus
6. Explain the major functions of the placenta and the unusual large umbilical oxygenated vein that takes materials to the fetus and the two smaller deoxygenated arteries that remove waste from the fetus.

Unit 11:Endocrine System Chapter 11

The student will be able to:

1. Compare and contrast the different parts of the endocrine system: Pituitary, thyroid, parathyroid, pancreas, pineal, thymus, reproductive, digestive
2. Compare and contrast the structure of steroid and nonsteroid hormones and how the initiate a response on the cellular level.
3. Analyze normal functioning of this system with all the other systems and how positive and negative feedback works within these systems.

11th /12th Grade Science Scope and Sequence with Benchmarks & Indicators

Other Electives

	Inquiry	Physical Science	Life Science	Earth and Space Science	Science and Technology	Science and personal environment	History and nature of Science
Grades 8-12	<p>The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry</p> <p>i.e. Conduct independent scientific inquiry Apply technology and mathematics to do scientific inquiry</p>	<p>2A Chemistry: The student will develop an understanding of the structure of the atom, compounds, chemical reactions, and the interactions of energy and matter</p> <p>2B Physics Motions & forces Conservation of mass and energy; 1st & 2nd Laws of Thermodynamics Interactions of energy & matter</p>	<p>Biology The student will develop an understanding of the cell, molecular basis of heredity, biological evolution, interdependence of organisms, matter, energy and organization in living systems and the behavior of organisms</p> <p>i.e. Structure and function of the cell Molecular and chromosomal basis of heredity Biological evolution Interdependence of organisms with physical environment Matter, energy, & organization in living systems Behavior of animals Diversity of structure and function in</p>	<p>The student will develop an understanding of energy in the earth system, geochemical cycles, the formation and organization of the earth system, the dynamics of the earth/moon/sun system and the organization and development of the universe</p> <p>i.e. Energy in earth Subsystems Interactions of Earth's subsystems Origin and development of the earth system Dynamics of the solar system Organization and development of the universe</p>	<p>The student will develop an understanding of personal and community health, population growth, natural recourses, environmental quality, natural and human-induced hazards, and science and technology in local, national, and global settings</p> <p>i.e. Technology is applied science Abilities of technological design</p>	<p>The student will develop understanding of personal and community health, population growth, natural resources, environmental quality, natural and human induced hazards, and science and technology in local, national and global settings science as a human endeavor, the nature of</p>	<p>The student will develop understanding of science as a human endeavor, the nature of scientific knowledge and historical perspectives</p>
Benchmarks and Indicators	1.1 The student will demonstrate the abilities necessary to do scientific inquiry:			<p>4.3 The student will develop an understanding of dynamics of our solar system: 4.3.1 understand gravitational attraction of objects in the solar system</p> <p>4.3.2 understand the relationships between the earth, moon and sun and explains tides, season and moon phases</p> <p>4.3.3 understands the</p>	<p>5.1 The student will develop an understanding that technology is an applied science: 5.1.1 understands how technology is the application of scientific knowledge for functional purposes 5.1.2 understands creativity, imagination and a broad scientific knowledge bases are</p>		<p>7.1 The student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe: 7.1.1 understand that science is both vocational and avocational 7.1.2 science uses peer review 7.1.3 recognizes the universality of science 7.1.4 recognize the role of society and science 7.1.5 understand the issues surrounding moral, ethical,</p>

				<p>relative sizes and distances of objects in the solar system 4.3.4 understands the sun, earth, and other objects in the solar system formed from a nebular cloud, dust or gas</p> <p>4.4 The student will develop an understanding of the organization of the universe, and its development: 4.4.1 understands stellar evolution 4.1.2 understands the current scientific explanation of the origin and structure of the universe 4.4.3 understands how the tools of astronomy have revolutionized the study of the universe</p>	<p>required to produce useful results 5.1.3 understands science advances new technologies, which open new areas for scientific inquiry</p>		<p>spiritual values 7.1.6 Recognize societies role in science</p> <p>7.2 The student will develop an understanding of the nature of scientific knowledge: 7.2.1 Understand that science can explain the make up of the world 7.2.2 understand science knowledge is based on empirical evidence 7.2.3 understand hypothesis, inferences, laws and theories 7.2.4 understand that a testable hypothesis or inference must have empirical evidence</p> <p>7.3 The student will understand science from historical perspectives. 7.3.1 understand the history of science 7.3.2 demonstrate that scientific method historically is more inductive rather than deductive</p>
12 Activities				ASTRONOMY	Technology advances		Ethics