HIGHLANDS SCHOOL DISTRICT
9 WEEK PACING GUIDE
GRADE 4 SCIENCE

COURSE Science 4	UNIT 1: How Can Animals Use Their Senses To Communicate? Number of Weeks __9__	Big Idea(s): Animals have a variety of sense receptors specialized for different kinds of information. Information from multiple senses, as well as memories, can be integrated when animals decide how to react. Communication requires a sender, signal, and receiver. Solutions to human communication problems vary based on criteria and constraints, but digital signals solve many problems and allow messages to be sent quickly and accurately.	Essential Question(s): How can animals sense the world around them? How can animals process and respond to information? How can animals send and receive information to communicate? What are some challenges in communication?	Materials/Resources /Activities: Smithsonian Science for the Classroom Lessons 1-15 (follow teacher's manual for pacing of each lesson) Materials list p. 32 of Teacher Manual
Quarter 1	**Science and Engineering Practices**	**Disciplinary Core Idea**	**Cross Cutting Concepts**	
	Developing and using models Analyzing and interpreting data Engaging in argument from evidence Obtaining, evaluating, and communicating information	**LS1.A**: Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. **LS1.D**: Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. **PS4.B**: An object can be seen when light reflected from its surface enters the eyes. **PS4.C**: Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. **ETS1.C**: Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. **ETS1.A:** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria).	Patterns Cause and effect Systems and system models Structure and function	

		Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	

COURSE Science 4	UNIT 2: How Does Motion Energy Change in a Collision? Number of Weeks __9__	Big Idea(s): Heat, light, and sound are evidence for energy. Motion energy can move to another object in a collision. Faster objects produce more sound in a collision and have more motion energy. Motion energy changes to heat when an object slides on a surface or moves through the air.	Essential Question(s): How does motion energy move and change? How does speed affect motion energy? What causes moving objects to slow down? How can we protect our brains in a collision?	Materials/Resources /Activities: Smithsonian Science for the Classroom Lessons 1-15 (follow teacher's manual for pacing of each lesson) Materials list p. 32 of Teacher Manual
Quarter 2	**Science and Engineering Practices**	**Disciplinary Core Idea**	**Cross Cutting Concepts**	
	Planning and carrying out investigations. Obtaining, evaluating, and communicating information	**PS3.A**: The faster a given object is moving, the more energy it possesses. Energy can be moved from place to place by moving objects or through sound, light, or electric currents. **PS3.B**: Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. Light also transfers energy from place to place. **PS3.C**: When objects collide, the contact forces transfer energy so as to change the objects' motions. **LS1.A**: Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. **ETS1.A**: Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how	Energy and Matter Cause and effect Systems and system models	

		well each one meets the specified criteria for success or how well each takes the constraints into account. **ETS1.B**: Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.	

COURSE **Science 4**	**UNIT 3: What is the Evidence that We Live on a Changing Earth?** Number of Weeks __9__	**Big Idea(s):** There are patterns in the locations of some features of Earth. Tornado and earthquake impact on humans can be reduced through engineering. Erosion by wind, water, glacier movement, and earthquake shaking can change landscapes. Rock layers hold evidence of past landscapes and landscape changes.	**Essential Question(s):** How do volcanoes and earthquakes affect humans? How do Earth processes change the landscape? How do rock layers show that landscapes change?	**Materials/Resources /Activities**: Smithsonian Science for the Classroom Lessons 1-15 (follow teacher's manual for pacing of each lesson) Materials list p. 32 of Teacher Manual
Quarter 3	**Science and Engineering Practices**	**Disciplinary Core Idea**	**Cross Cutting Concepts**	
	Developing and using models Planning and carrying out investigations Analyzing and interpreting data	**ESS1.C**: Local, regional, and global patterns of rock formations reveal changes over time due to Earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. **ESS2.A**: Rainfall helps shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. **ESS2.B**: The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between	Patterns Cause and effect Structure and function	

	Constructing explanations Obtaining, evaluating, and communicating information	continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. **ESS2.E**: Living things affect the physical characteristics of their regions. **ESS3.B**: A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. **PS4.A**: Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach.Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). **ETS1.A:** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. **ETS1.B**: Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. **ETS1.C**: Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.	

COURSE **Science 4**	**UNIT 4: How Can We Provide Energy to People's Homes?** Number of Weeks __9__	**Big Idea(s):** Energy is fundamental to all living and nonliving systems. The energy humans use to power their homes and devices is derived from a variety of natural resources. Solutions to problems consider criteria and constraints and are based on research	**Essential Question(s):** How does energy move and change? What are the advantages and disadvantages of the different energy resources used to generate electricity? How does electricity power our devices? How can you design a house that runs on renewable energy?	**Materials/Resources /Activities**: Smithsonian Science for the Classroom Lessons 1-15 (follow teacher's manual for pacing of each lesson) Materials list p. 32 of Teacher Manual

	Science and Engineering Practices	**Disciplinary Core Idea**	**Cross Cutting Concepts**	
Quarter 4	Developing and using models Designing solutions Obtaining, evaluating, and communicating information	**PS3.A** Energy can be moved from place to place by moving objects or through sound, light, or electric currents. **PS3.B** Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. Ins such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. Light also transfers energy from place to place. Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. **PS3.D** The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practice use. **ESS3.A** Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. **ETS1.A** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. **ETS1.B** Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. Communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. **ETS1.C** Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	Cause and effect Systems and system models Energy and matter	