**Radio Reception and Transmission**
Lesson explores the electronics behind radio, and its impact on society. Students work in teams to build and test a radio receiver and optional transmitter from either a snap or soldering kit (depending on level and age). They review challenges encountered in the building and testing process, evaluate their results, and share observations with their class.

| Grade 3 | Grade 4 | Grade 5 | Grade 6 | Grade 7 | Grade 8 | IPC | Physics |
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| ***Strand: Scientific Investigation and Reasoning*** |
| 1.A Demonstrate safe practices as described in the Texas Safety Standards during classroom and outdoor investigations including observing a schoolyard habitat. | 1.A Demonstrate safe practices and the use of safety equipment as described in the Texas Safety Standards during classroom and outdoor investigations. | 1.A Demonstrate safe practices and the use of safety equipment as described in the Texas Safety Standards during classroom and outdoor investigations. | 1.A Demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards. | 1.A Demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards. | 1.A Demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards. | 1.A Demonstrate safe practices during laboratory and field investigations. | 1.A Demonstrate safe practices during laboratory and field investigations. |
| 1.B Make informed choices in the use and conservation of natural resources by recycling or reusing materials such as paper, aluminum cans, and plastics. | 1.B Make informed choices in the use and conservation of natural resources and reusing and recycling of materials such as paper, aluminum, glass, cans and plastic. | 1.B Make informed choices in the conservation, disposal, and recycling of materials. | 1.B Practice appropriate use and conservation of resources including disposal, reuse, or recycling of materials. | 1.B Practice appropriate use and conservation of resources including disposal, reuse, or recycling of materials. | 1.B Practice appropriate use and conservation of resources including disposal, reuse, or recycling of materials. | 1.B Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials. | 1.B Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials. |
| 2.A Plan and implement descriptive investigations including asking and answering questions, making inferences, and selecting and using equipment or technology needed to solve a specific problem in the natural world. | 2.A Plan and implement descriptive investigations, including asking well-defined questions, making inferences, and selecting and using appropriate equipment or technology to answer his/her questions. | 2.A Describe, plan and implement simple experimental investigations testing one variable. | 2.A Plan and implement comparative and descriptive investigations by making observations, asking well- defined questions, and using appropriate equipment and technology. | 2.A Plan and implement comparative and descriptive investigations by making observations, asking well- defined questions and using appropriate equipment and technology. | 2.A Plan and implement comparative and descriptive investigations by making observations, asking well- defined questions, and selecting and using appropriate equipment and technology. | 2.B Plan and implement investigate procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology. | 2.E Design and implement investigative procedures including making observations, asking well-defined questions, formulating testable hypotheses, identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness. |
| 2.D Analyze and interpret patterns in data to construct reasonable explanations based on evidence from investigations. | 2.D Analyze data and interpret patterns to construct reasonable explanations from data that can be observed and measured. | 2.D Analyze and interpret information to construct reasonable explanations from direct (observable) and indirect (inferred) evidence. | 2.E Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends. | 2.E Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends. | 2.E Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends. | 2.D Organize, analyze, evaluate, make inferences, and predict trends from data. | 2.J Organize and evaluate data and make inferences from data including the use of tables, charts, and graphs. |
| 2.F Communicate valid conclusions supported by data in writing, by drawing pictures, and through verbal discussion. | 2.F Communicate valid, oral and written results supported by data. | 2.F Communicate valid conclusions in both written and verbal forms. | 2.E Communicate valid conclusions. | 2.K Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports. |
| 3.C Represent the natural world using models such as volcanoes or Sun, Earth, and Moon system, and identify their limitations including size, properties, and materials.  | 3.C Represent the natural world using models such as rivers, stream tables or fossils and identify their limitations, including accuracy and size. | 3.C Draw or develop a model that represents how something works or looks that cannot be seen such as how a soda dispensing machine works. | 3.B Use models to represent aspects of the natural world such as a model of Earth’s layers. | 3.B Use models to represent aspects of the natural world such as human body systems, and plant and animal cells. | 3.B Use models to represent aspects of the natural world such as an atom, a molecule, space or a geologic feature. |  |  |
| 3.D Connect grade level appropriate science concepts with the history of science, science careers and contributions of scientists. | 3.D Connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists. | 3.D Connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists. | 3.D Relate the impact of research on scientific thought and society including the history of science and contributions of scientists as related to the content. | 3.D Relate the impact of research on scientific thought and society, including history of science and contributions of scientists as related to the content. | 3.D Relate the impact of research on scientific thought and society including the history of science and contributions of scientists as related to the content. | 3.D Evaluate the impact of research on scientific thought, society, and the environment. | 3.D Explain the impacts of the scientific contributions of a variety of historical and contemporary scientists on scientific thought and society. |
|  |  |  |  |  |  | 3.E Describe connections between physics and chemistry and future careers. | 3.E Research and describe the connections between physics and future careers. |
| 4.A Collect, record, and analyze information using tools, including microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, wind vanes, rain gauges, pan balances, graduated cylinders, beakers, spring scales, hot plates, meter sticks, compasses, magnets, collecting nets, notebooks, sound recorders, Sun, Earth, and Moon system models; timing devices, including clocks and stopwatches; and materials to support observation of habitats of organisms such as terrariums and aquariums. | 4.A Collect, record, and analyze information using tools, including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, mirrors, spring scales, pan balances, triple beam balances, graduated cylinders, beakers, hotplates, meter sticks, compasses, magnets, collecting nets, and notebooks; timing devices, including clocks and stopwatches; and materials to support observation of habitats of organisms such as terrariums and aquariums. | 4.A Collect and analyze information using tools including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, prisms, mirrors, pan balances, triple beam balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, timing devices including clocks and stopwatches, magnets, collecting nets, notebooks and materials to support observations of habitats or organisms such as terrariums and aquariums. | 4.A Use appropriate tools to collect, record, and analyze information including: journals/notebooks, beakers, Petri dishes, meter sticks, graduated cylinders, hot plates, test tubes, triple beam balances, microscopes, thermometers, calculators, computers, timing devices, and other equipment as needed to teach the curriculum. | 4.A Use appropriate tools to collect, record, and analyze information including: life science models, hand lens, stereoscopes, microscopes, beakers, Petri dishes, microscope slides, graduated cylinders, test tubes, meter sticks, metric rulers, metric tape measures, timing devices, hot plates, balances, thermometers, calculators, water test kits, computers, temperature and pH probes, collecting nets, insect traps, globes, digital cameras and journals/notebooks and other equipment as needed to teach the curriculum. |  |  |  |
| 4.B Use safety equipment as appropriate, including safety goggles and gloves. | 4.B Use safety equipment as appropriate, including safety goggles and gloves. | 4.B Use safety equipment as appropriate, including safety goggles and gloves. |  |  |  |  |  |
| *Strand: Matter and Energy* |
| 5.A Measure, test, and record physical properties of matter including temperature, mass, magnetism, and the ability to sink or float. | 5.A Measure, compare, and contrast physical properties of matter including size, mass, volume, states (solid, liquid, gas), temperature, magnetism, and the ability to sink or float. | ☆ 5.A Classify matter based on physical properties including: mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating), and solubility in water, and the ability to conduct or insulate thermal energy or electric energy. | ✔6.ACompare metals, nonmetals, and metalloids using physical properties such as luster, conductivity or malleability. |  |  | 6.C Analyze physical and chemical properties of elements and compounds such as, color, density, viscosity, buoyancy, boiling point, freezing point, conductivity, and reactivity. | ✔5.ECharacterize materials as conductors or insulators based on their electrical properties. |
| ✔5.C Predict, observe and record changes in the state of matter caused by heating or cooling. | 5.B Predict the changes caused by heating and cooling, such as ice becoming liquid water and condensation forming on the outside of a glass of ice water. |  |  |  |  | 6.A Examine differences in physical properties of solids, liquids and gases as explained by the arrangement and motion of atoms, ions or molecules of the substances and the strength of the forces of attraction between those particles. |  |
| *Strand: Force, Motion and Energy* |
| 6.A Explore different forms of energy including mechanical, light, sound, and heat/thermal in everyday life. | 6.A Differentiate among forms of energy including mechanical, sound, electrical, light, and heat/thermal. | ☆6.A Explore the uses of energy including mechanical, light, thermal, electrical, and sound energy. | ✔8.A Compare and contrast potential and kinetic energy. |  |  | 5.A Recognize and demonstrate that objects and substances in motion have kinetic energy such as vibration of atoms, water flowing down a stream moving pebbles, and bowling balls knocking down pins. | ☆6.B Investigate examples of kinetic and potential energy and their transformations. |
|  |  |  |  |  |  | 5.E Investigate and demonstrate the movement of thermal energy through solids, liquids, and gases by convection, conduction and radiation, such as in weather, living and mechanical systems. |  |
|  |  |  | 9.AInvestigate methods of thermal energy transfer including conduction, convection, and radiation. |  |  | 7.A Investigate changes of state as it relates to the arrangement of particles of matter and energy transfer. | ✔6.F Contrast and give examples of different processes of thermal energy transfer including conduction, convection, and radiation. |
|  |  |  | 9.B Verify through investigations that thermal energy moves in a predictable pattern from warmer to cooler until all the substances attain the same temperature such as an ice cube melting. |  |  |  | ✔6.E Describe how the macroscopic properties of a thermodynamic system such as temperature, specific heat, and pressure are related to the molecular level of matter including kinetic or potential energy of atoms. |
|  |  |  |  |  |  | 5.G Explore the characteristics and behaviors of energy transferred by waves including acoustic, seismic, light and waves on water as they superpose on one another, bend around corners, reflect off surfaces, are absorbed by materials and change direction when entering new materials. | ✔7.A Examine and describe oscillatory motion and wave propagation in various types of media. |
|  |  |  |  |  |  |  | ☆7.BInvestigate and analyze characteristics of waves including velocity, frequency, amplitude, and wavelength and calculate using the relationship between wavespeed, frequency, and wavelength. |
|  |  |  |  |  |  |  | ✔7.C Compare characteristics and behaviors of transverse waves including electromagnetic waves and the electromagnetic spectrum and characteristics and behaviors of longitudinal waves including sound waves. |
|  |  |  |  |  |  |  | ☆7.D Investigate behaviors of waves including reflection, refraction, diffraction, interference, resonance, and the Doppler effect. |
|  |  |  |  |  |  |  | ✔7.F Describe the role of wave characteristics and behaviors in medical and industrial applications. |
|  |  |  |  |  |  | 5.C Demonstrate that moving electric charges produce magnetic forces and moving magnets produce electric forces. | ✔5.G Investigate and describe the relationship between electric and magnetic fields in applications such as generators, motors, and transformers. |
|  |  |  |  |  |  | 5.F Evaluate the transfer of electrical energy in series and parallel circuits, and conductive materials. | ✔5.E Characterize materials as conductors or insulators based on their electrical properties. |
| *Strand: Earth and Space Science* |
|  |  |  |  |  | ✔8.CExplore how different wavelengths of the electromagnetic spectrum such as light and radio waves are used to gain information about distances and properties of components in the universe. |  |  |