**Using Ohm’s Law to Build a Voltage Divider**

Students will design, build, and characterize one of the basic circuits of electrical engineering, the voltage divider. These circuits produce a wide range of output voltages and are building blocks for more complex circuits. Circuit design will emphasize the concepts of Ohm’s Law and students will explore mathematical relationships of parallel and series resistors. Students will demonstrate their design efforts by building prototype circuits and using test measurement tools to confirm their predictions.

| Grade 8 | IPC | Physics |
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| ***Strand: Scientific Investigation and Reasoning*** | | |
| 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 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 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.B Design and implement comparative and experimental investigations by making observations, asking well-defined questions, formulating testable hypotheses and selecting and using appropriate equipment and technology. |  |  |
| 2.C Collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers. | 2.C Collect data and make measurements with precision. |  |
| 2.D Construct tables and graphs, using repeated trials and means, to organize data and identify patterns. |  |  |
| 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.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.B Use models to represent aspects of the natural world such as an atom, a molecule, space or a geologic feature. |  |  |
| 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. |
| *Strand: Matter and Energy* | | |
|  | 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. |  |
|  | 6.C Analyze physical and chemical properties of elements and compounds such as, color, density, viscosity, buoyancy, boiling point, freezing point, conductivity, and reactivity. |  |
| ***Strand: Force, Motion and Energy*** | | |
| 6.A Demonstrate and calculate how unbalanced forces change the speed or direction of an object's motion. | 4.A Describe and calculate an object’s motion in terms of position, displacement, speed and acceleration. | 4.D Calculate the effect of forces on objects including the law of inertia, the relationship between force and acceleration, and the nature of force pairs between objects. |
| . | 4.G Examine electrical force as a universal force between any two charged objects; and compare the relative strength of the electrical force and gravitational force. | 5.C Describe and calculate how the magnitude of the electrical force between two objects depends on their charges and the distance between them. |
|  |  | 5.D Identify examples of electric and magnetic forces in everyday life. |
|  | 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.B Demonstrate common forms of potential energy including gravitational, elastic, and chemical, such as a ball on an inclined plane, springs and batteries. |  |
|  | 5.F Evaluate the transfer of electrical energy in series and parallel circuits, and conductive materials. | 5.F Design, construct, and calculate in terms of current through, potential difference across, resistance of, and power used by electric circuit elements connected in both series and parallel combinations. |