**Blast Off !**  
Lesson focuses on aerospace engineering and how space flight has been achieved from an engineering vantage point. Students build and launch a model rocket and consider the forces on a rocket, Newton's Laws, and other principles and challenges of an actual space vehicle launch. They design their structure on paper, learn about aerospace engineering, launch their rocket, and share observations with their class.

| Grade 8 | IPC | Chemistry | 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 Demonstrates safe practices during laboratory and field investigations. | 1.ADemonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles and fire extinguishers. | 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.BDemonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials. | 1.CDemonstrate 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.BPlan and implement investigate procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology. | 2.EPlan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; including graphing calculators, computers and probes, sufficient scientific glassware such as beakers, Erlenmeyer flasks, pipettes, graduated cylinders, volumetric flasks, safety goggles, burettes, electronic balances and an adequate supply of consumable chemicals. | 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.FCollect data and make measurements with accuracy and precision. | 2.HMake measurements with accuracy and precision and record data using scientific notation and International System (SI) units. |
| 2.D Construct tables and graphs, using repeated trials and means, to organize data and identify patterns. | 2.D Organize, analyze, evaluate, make inferences, and predict trends from data. | 2.HOrganize, 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.E Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends. | 2.ECommunicate valid conclusions. | 2.ICommunicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals, summaries, oral reports and technology-based reports. | 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 Communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles and marketing materials. | 3.BCommunicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles and marketing materials. | 3.B Communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles and marketing materials. |
| 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.DEvaluate 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.FResearch and describe the history of physics, chemistry and contributions of scientists. | 3.FResearch and describe the history of chemistry and contributions of scientists. |
|  | 3.EDescribe connections between physics and chemistry and future careers. | 3.EDescribe the connection between 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. | 4.C Compare solids, liquids, and gases in terms of compressibility, structure, shape, and volume. |  |
|  | 7.A Investigate changes of state as it relates to the arrangement of particles of matter and energy transfer. | 9.CDescribe the postulates of kinetic molecular theory. |  |
| 5.FRecognize whether a chemical equation containing coefficients is balanced or not and how that relates to the law of conservation of mass. | 7.C Demonstrate that mass is conserved when substances undergo chemical change and that the number and kind of atoms are the same in the reactants and products. | 8.DUse the law of conservation of mass to write and balance chemical equations. |  |
|  | 5.D Investigate the law of conservation of energy. | 11.BUnderstand the law of conservation of energy and the processes of heat transfer. |  |
|  | 7.D Analyze energy changes that accompany chemical reactions such as those occurring in heat packs, cold packs, and glow sticks and classify them as exothermic or endothermic reactions. | 11.CUse thermochemical equations to calculate energy changes that occur in chemical reactions and classify reactions as exothermic or endothermic. |  |
| ***Strand: Force, Motion and Energy*** | | | |
|  |  | 11.AUnderstand energy and its forms including kinetic, potential, chemical and thermal energies. | 6.BInvestigate examples of kinetic and potential energy and their transformations. |
| 6.ADemonstrate and calculate how unbalanced forces change the speed or direction of an object's motion. | 4.ADescribe and calculate an object’s motion in terms of position, displacement, speed and acceleration. |  | 4.AGenerate and interpret graphs and charts describing different types of motion including the use of real-time technology such as motion detectors or photogates. |
| 6.BDifferentiate between speed, velocity and acceleration. | 4.BMeasure and graph distance and speed as a function of time using moving toys. |  | 4. B Describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, and acceleration. |
|  |  |  | 4.CAnalyze and describe accelerated motion in two dimensions using equations including projectile and circular examples. |
| 6.CInvestigate and describe applications of Newton’s law of inertia, law of force and acceleration and law of action-reaction, such as in vehicle restraints, sports activities, amusement park rides, Earth’s tectonic activities, and rocket launches. | 4.C Investigate how an object’s motion changes only when a net force is applied, including activities and equipment such as toy cars, vehicle restraints, sports activities and classroom objects. |  | 4.DCalculate 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.F Identify and describe motion relative to different frames of reference. |
|  | 4.DAssess the relationship between force, mass and acceleration, noting the relationship is independent of the nature of the force, using equipment such as dynamic carts, moving toys, vehicles and falling objects. |  | 6.CCalculate the mechanical energy of, power generated within, impulse applied to, and momentum of a physical system. |
|  | 4.EApply the concept of conservation of momentum using action and reaction forces such as is illustrated by students on skateboards. |  | 6.DDemonstrate and apply the laws of conservation of energy and conservation of momentum in one dimension. |
|  | 4.F Describe the gravitational attraction between objects of different masses at different distances including satellites. |  | 5.BDescribe and calculate how the magnitude of the gravitational force between two objects depends on their masses and the distance between their centers. |