

Investigations in Physical Science

Scope and Sequence Chart

LAB TITLE	OBJECTIVES	OVERVIEW	CALIFORNIA SCIENCE CONTENT STANDARDS
LAB #1 Making Models	<ol style="list-style-type: none"> 1. Describe the scientific method. 2. Explain what a hypothesis is. 3. Distinguish between a dependent and independent variable. 4. Explain what a model is. 	Students investigate mystery boxes and develop a variety of hypothesis as to the contents of the boxes. Students then tests each hypothesis. Finally, students develop models to explain the contents of the boxes.	7 th - 7a, 7c, 7d, 7e 8 th - 9a, 9b, 9c 9 th - 10a, 10b, 10c, 10g
LAB #3 Comparing Densities	<ol style="list-style-type: none"> 1. Define density. 2. Describe how to determine density. 3. Define buoyancy 4. Describe the relationship between density and buoyancy. 5. Explain Archimedes' principle. 	Students explore density and buoyancy and the relationship between these two properties of matter. Students conduct an experiment comparing the densities of several liquids using the density formula and a hydrometer.	7 th - 7a, 7c, 7e 8 th - 8a, 8b, 8c, 8d, 9b, 9c,9e, 9f 9 th - 10a, 10b, 10c
LAB #3 Collisions	<ol style="list-style-type: none"> 1. Define inertia 2. Describe the relationship between mass and inertia. 3. Define force. 4. Describe Newton's laws of motion. 	Students learn about force and motion. They use marbles and ramps to discover the relationship between force and inertia, force and acceleration and finally the relationship between action and reaction.	7 th - 7a, 7c, 7e 8 th - 1a, 2a, 2b, 2c, 2d, 2e, 2f, 9b, 9c, 9d, 9e, 9f 9 th - 10a, 10b, 10c
LAB #4 Swinging Energy	<ol style="list-style-type: none"> 1. Distinguish between kinetic and potential energy. 2. Explain how energy is conserved. 3. Define work. 	Students learn about potential and kinetic energy and the relationships between the two. Students conduct an experiment that investigates the energy of a pendulum.	7 th - 7a, 7c, 7e 8 th - 2b, 2d, 2e, 9b, 9c, 9d, 9e 9 th - 10a, 10b, 10c, 10g
LAB #5 Shear Strength	<ol style="list-style-type: none"> 1. Define gravity. 2. Describe factors that affect gravitational force 3. Compare/contrast mass and weight. 	Students investigate gravity and experiment to discover the relationship between gravity and mass. Students experiment to find the force of gravity necessary to tear several types of paper.	7 th - 7a, 7c, 7e 8 th - 2a, 2b, 2c, 2d, 2e, 2f, 9b, 9c, 9d 9 th - 10a, 10b, 10c, 10g

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LAB #6 Antigravity Machine	<ol style="list-style-type: none"> 1. Define force. 2. Explain what balanced forces are. 3. Describe the factors that affect gravitational attraction. 4. Describe Newton's laws of motion. 	Students experiment with antigravity machines (balloons with drinking straw outlets) to learn about force (gravity and thrust), balanced and unbalanced forces and how these demonstrate Newton's laws of motion.	7 th - 7a, 7c, 7e 8 th - 2a, 2b, 2c, 2d, 2e, 2f, 9a, 9b, 9c, 9d 9 th - 10a, 10b, 10c, 10g
LAB #7 Flying Machines	<ol style="list-style-type: none"> 1. Distinguish between balanced and unbalanced forces. 2. Compare/contrast the effects of balanced/unbalanced forces. 3. Describe the factors that affect gravitational attraction. 	Students build paper airplanes to study how balanced and unbalanced forces affect flying objects. Students experiment with rudders and ailerons to make paper airplanes do specific tasks.	7 th - 7a, 7c, 7d, 7e 8 th - 2a, 2b, 2c, 2d, 2e, 2f, 9b, 9c, 9d 9 th - 10a, 10b, 10c, 10g
LAB #8 Marble Roller Coaster	<ol style="list-style-type: none"> 1. Describe the relationship between force and motion. 2. Explain the relationship between potential and kinetic energy 3. Describe Newton's laws of motion. 	Students design and construct marble roller coasters to better understand the concepts of force, motion, potential and kinetic energy. Students are challenged to design roller coasters that has the greatest number of loops.	7 th - 7a, 7c, 7d, 7e 8 th - 1a, 1b, 1c, 1e, 2a, 2b, 2c, 2d, 2e, 9a, 9b, 9c, 9f 9 th - 10a, 10b, 10c, 10g
LAB #9 Balancing Act	<ol style="list-style-type: none"> 1. Describe simple machines. 2. Explain mechanical advantage. 3. Identify fulcrum, effort arm and resistance arm. 4. Distinguish between effort force and resistance force 	Students study simple machines and investigate how simple machines multiply force. Students experiment to determine the mechanical advantage of various levers and use this data to determine the mass of objects.	7 th - 7a, 7c, 7e 8 th - 2b, 2c, 2d, 2f, 9b, 9c 9 th - 10a, 10b, 10c
LAB #10 Whatz Ur State?	<ol style="list-style-type: none"> 1. Explain what matter is. 2. Identify the parts of the atom. 3. Explain the kinetic theory of matter. 4. Describe the states of matter 	Students investigate matter, atoms and the states of matter. To understand the states of matter, students examine and the properties of several substances including shaving cream and glurch.	7 th - 7a, 7c, 7d, 7e 8 th - 3a, 3b, 3d, 3e, 9a, 9b 9 th - 10a, 10b, 10c, 10g

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LAB #11 Is This Your Property?	<ol style="list-style-type: none"> 1. Distinguish between physical and chemical properties. 2. Identify common physical properties of matter. 3. Identify common chemical properties of matter. 	Students begin their study of chemistry by investigating the properties of matter. Students determine the properties of matter and use these properties to distinguish among various samples of liquids.	7 th - 7a, 7c, 7e 8 th - 3a, 3b, 9b 9 th - 10a, 10b, 10c
LAB #12 Kool-Aid™ Chromatography	<ol style="list-style-type: none"> 1. Identify the properties of solutions. 2. Distinguish between solute and solvent. 3. Compare types of solutions. 4. Use chromatography to separated parts of a solution. 	Students investigate solutions, their components and properties and learn the characteristics of various solutions. Students make chromatogram to discover the food dies used in Kool Aid samples.	7 th - 7a, 7c, 7e 8 th - 3a, 3b, 9b, 9c 9 th - 10a, 10b, 10c
LAB #13 Alien Periodic Table	<ol style="list-style-type: none"> 1. Describe the organization of the periodic table of elements. 2. Identify the characteristics of metals, nonmetals, metalloids and noble gases. 	Students study the periodic table to learn how elements are grouped and the characteristics of these groups. Students investigate the properties of samples and construct a model periodic table based on the characteristics.	7 th - 7a, 7c, 7e 8 th - 3f, 7a, 7b, 7c 9 th - 10a, 10b, 10c
Lab #14 Seeing Is Believing	<ol style="list-style-type: none"> 1. Define chemical reaction. 2. Describe the types of chemical reactions. 3. Identify factors affecting reaction rates. 	Students study chemical reactions and learn to identify the characteristics of the various types of reactions. They observe chemical reactions and learn how to write simple equations for each type of chemical reaction observed.	7 th - 7a, 7c, 7e 8 th - 3b, 3c, 3f, 5a, 5b, 5c, 9b, 9c 9 th - 10a, 10b, 10c
Lab #15 Cabbage Test	<ol style="list-style-type: none"> 1. Describe the characteristics of acids. 2. Describe the characteristics of bases. 3. Explain pH. 	Students learn about acids and bases and how they interact. Students use cabbage water to determine if samples are acid or base and then verify their determination by using pH paper and a pH meter..	7 th - 7a, 7c, 7e 8 th - 3b, 3f, 5a, 5e, 9b, 9c 9 th - 10a, 10b, 10c