

CUSD #95

Learner Science Objectives

Eighth Grade

Matter and Energy Part I: Forces and Motion

- Name the two properties of all matter – 12.7.33
- Describe how volume and mass are measured – 12.7.34
- Compare mass and weight – 12.7.34
- Explain the relationship between mass and inertia – 12.7.64
- Give examples of matter's different properties – 12.7.34
- Describe how density is used to identify different substances – 12.7.35, 12.7.38, 12.7.66
- Compare physical and chemical properties – 12.7.33-12.7.36, 12.7.38-12.7.39
- Explain what happens to matter during physical and chemical changes – 12.7.36

- Identify the relationship between motion and a reference point – 12.7.63
- Identify the two factors on which speed depends – 12.7.63
- Determine the difference between speed and velocity – 12.7.68
- Analyze the relationship of velocity to acceleration – 12.7.63-12.7.64, 12.7.68
- Interpret a graph showing acceleration – 12.7.63
- Give examples of different kinds of forces – 12.7.63
- Determine the net force on an object – 12.7.63
- **Use vectors for addition and subtractions of net force – 12.7.68**
- Compare balanced and unbalanced forces – 12.7.63
- Explain why friction occurs – 12.7.63
- List the types of friction, and give examples of each – 12.7.63
- Explain how friction can be both harmful and helpful – 12.7.63
- Define gravity and the law of universal gravitation – 12.7.63
- Describe the difference between mass and weight – 12.7.69

- Explain how gravity and air resistance affect the acceleration of falling objects – 12.7.63
- Describe why objects in orbit appear to be weightless – 12.7.69
- Describe projectile motion – 12.7.69
- State and apply Newton's laws of motion – 12.7.64
- Compare the momentum of different objects – 12.7.64
- Relate the concepts of inertia and momentum to Newton's Laws 12.7.64

- Determine when work is being done on an object – 12.7.65
- Calculate the amount of work done on an object – 12.7.65
- Explain the difference between work and power – 12.7.65
- Explain how a machine makes work easier – 12.7.65

- Describe and give examples of the force-distance trade-off that occurs when a machine is used – 12.7.65
- Calculate mechanical advantage – 12.7.65
- Explain why machines are not 100 percent efficient – 12.7.65
- Identify and give examples of the six types of simple machines – 12.7.65
- Analyze the mechanical advantage provided by each simple machine – 12.7.65
- Identify the simple machines that make up a compound machine – 12.7.65, 13.7.13

This is a time dependent unit of study.

- Explain the relationship between energy and work – 12.7.65
- Compare kinetic and potential energy – 12.7.65
- Summarize the different forms of energy (chemical, light, sound, thermal, nuclear) – 12.7.49, 12.7.65
- Describe an energy conversion – 12.7.50
- Give examples of energy conversions among the different forms of energy – 12.7.50, 12.7.51
- Explain the role of machines in energy conversions – 12.7.52
- Explain the law of conservation of energy – 12.7.48
- Give examples of how thermal energy is always a result of energy conversion – 12.7.50, 12.7.52
- Explain why perpetual motion is impossible – 12.7.49

Matter and Energy Part II: Chemistry

- Describe pure substances – 12.7.33-12.7.35
- Describe the characteristics of elements, and give examples – 12.7.34
- Explain how elements can be identified – 12.7.34, 12.7.35
- Classify elements according to their properties – 12.7.34-12.7.40
- Describe the properties of compounds – 12.7.41
- Identify the differences between an element and a compound – 12.7.40
- Give examples of common compounds – 12.7.41
- Describe the properties of mixtures – 12.7.33-12.7.39
- Describe methods of separating the components of a mixture – 12.7.38, 12.7.39
- Analyze a solution in terms of its solute, solvent, and concentration – 12.7.38, 12.7.39
- Compare the properties of solutions, suspensions, and colloids – 12.7.38, 12.7.39
- Compare the different models of the atom – 12.7.42, 12.7.43
- Explain how the atomic theory has changed as scientists have discovered new information about the atom – 12.7.43
- Compare the charge, location, and relative mass of protons, neutrons, and electrons – 12.7.42, 12.7.43
- Calculate the number of particles in an atom using the atomic number, mass number, and overall charge – 12.7.44, 12.7.45
- Calculate the atomic mass of elements – 12.7.44, 12.7.45

HAL/Gifted Classes – Mastery of the curricular objectives is expected. Additional bold items are introduced.

- Describe how elements are arranged in the periodic table – 12.7.38, 12.7.39, 12.7.41-12.7.43
- Compare metals, nonmetals, and metalloids based on their properties and on their location in the periodic table - 12.7.38, 12.7.39, 12.7.41-12.7.43
- Describe the difference between a period and a group - 12.7.38, 12.7.39, 12.7.41-12.7.43
- Explain why elements in a group often have similar properties - 12.7.38, 12.7.39, 12.7.41-12.7.43
- Describe the properties of the elements in the groups of the periodic table - 12.7.38, 12.7.39, 12.7.41-12.7.43
- **Explain the Periodic Table of Elements structural and property trends - 12.7.38, 12.7.39, 12.7.41-12.7.43**

- Describe chemical bonding – 12.7.43-12.7.46
- Identify the number of valence electrons in an atom 12.7.43-12.7.46 -
- Describe ionic, covalent, and metallic bonding - 12.7.43-12.7.46
- **Name various ionic and covalent compounds - 12.7.43-12.7.46**
- Describe the properties associated with substances containing each type of bond - 12.7.43-12.7.46

- **Describe and identify clues of a chemical reaction – 12.7.43-12.7.46**
- **Interpret, name, and write simple chemical formulas – 12.7.43-12.7.46**
- **Write and balance simple chemical equations – 12.7.43-12.7.46**
- **Explain how a balanced chemical equation illustrates the law of conservation of mass – 12.7.43-12.7.46**
- **Describe and classify the basic four types of chemical reactions – 12.7.43-12.7.46**
- **Explain exothermic and endothermic reactions – 12.7.43-12.7.46**
- Describe the factors that affect rates of chemical reactions – 12.7.43-12.7.46

- Describe the properties of ionic and covalent compounds - 12.7.43-12.7.46
- Classify compounds as ionic or covalent based on their properties - 12.7.43-12.7.46
- Describe the properties and uses of acids and bases – 12.7.47
- Explain the difference between strong acids and bases and weak acids and bases – 12.7.47
- Identify acids and bases using the pH scale – 12.7.47
- Describe the properties and uses of salts – 12.7.47

Earth Science / Environmental Science

- Critically analyze current issues in science – 13.7.08, 13.7.09
- Integrate prior science knowledge into analysis of current science issues – 13.7.08, 13.7.10
- Good science vs. bad science – 13.7.12
- Ethics in science and media influence of science – 13.7.08, 13.7.12

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Science, Technology, and Society

- Literature in Science – 11.7.01, 11.7.02, 13.7.13
 - MSN - Short stories by Ray Bradbury – “The Veldt”, “There Will Come Soft Rains”, “All Summer in a Day”
 - MSS – to be determined
 - **Biographical research on various scientists – 13.7.07, 13.7.09**
- Good science vs. bad science – 13.7.08, 13.7.12
- Ethics in science and media influence of science – 13.7.12

Skill Development - Math and Data Skills

- Metric System of Measurement – 11.7.02, 13.7.05, 13.7.13
 - Know the base units and their use
 - Know the prefixes and how they relate to the basic unit
 - Be familiar with the use of the system
 - **Dimensional analysis and unit factoring label method**

- Lab Procedure – 11.7.01-11.7.10, 13.7.01, 13.7.05
 - Be able to recognize the various pieces of equipment
 - Know the names of lab equipment
 - Know how to use the equipment – triple beam balance, graduated cylinder, beakers, Bunsen burner/propane burner, metric ruler
 - Know basic safety rules in the lab

- Lab Report Format – 11.7.01-11.7.10, 13.7.01, 13.7.02, 13.7.05
 - Familiarity with basic written reports
 - Know the difference between purpose and hypothesis
 - Know the difference between results and conclusion
 - Quantify materials and procedures
 - Be able to make the connection between hypothesis and conclusion
 - Organize data (charts, graphs, tables) and results (calculations and data record)
 - Imbed in every lab - purpose, hypothesis, materials, procedures, data, results, and conclusions

- Organization Strategies – 13.7.13
 - Strengthen science text book reading skills and determine critical information needed for application
 - Data Analysis – 13.7.04
 - Qualitative and Quantitative observations/data
 - Understanding variables independent, dependent, and control groups
 - Know how to organize information using multiple formats

- Writing Skills/Lab Writing – 13.7.03-13.7.05
 - Complete Sentences (Reflect question in their answer)
 - No Excused Spelling Words
 - Ideas must be supported and evidence must be stated
 - Punctuation and Grammar
 - No use of pronouns
 - Lab reports written in third person
 - Acceptable use of resources with citations of pictures and text

- Organization of Information – various examples – 11.7.02
 - Standard outline format
 - Two – column notes
 - Visual Notes

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- SQ3R
 - Bullet Points
 - Concept Mapping
 - Graphic organizers
 - Vocabulary words with pictures
 - Organization ISN
- Math/Data Skills – 11.7.01, 11.7.02, 13.7.05, 13.7.13
 - Basic algebra
 - Dimensional Analysis
 - **Significant Figures**
 - Measuring with accuracy and precision
 - **Unit – factor label method**
 - Doing multiple step equations
 - Understanding variables in a formula
 - Formula manipulation
 - Various types of graphing
 - Creation of data tables
 - Qualitative and Quantitative observations/data
 - Understanding variables independent, dependent, and control groups
- Technology Skills – 11.7.06
 - **Excel Program for graphing x-y plots**
 - Word for typing lab reports and projects
 - Power points for presentations
 - Exposure to Publisher
 - Internet reliable web site
 - Appropriate use of Internet resources
 - Acceptable use of Internet resources with citations of pictures and text
- Comprehension Skills – all standards – 11, 12, 13
 - Bloom’s taxonomy is used
 - Lab applications with synthesis and evaluation
 - Open Ended responses/problems (analysis, synthesis, evaluation)
 - **Problem based learning skills**