

# SCIENCE CONTENT STANDARDS

## GRADE 4

|  |  |   |   |   |  |   |  |
|--|--|---|---|---|--|---|--|
| <b>PHYSICAL:</b><br><b>Electricity &amp; Magnetism</b> | Design/build circuits using wires, batteries, bulbs<br><br><b>EM</b> | Compass: build/use to detect magnetic fields<br><br><b>EM</b>           | Electric fields produce magnetic fields; build electromagnet<br><br><b>EM</b> | Role of electromagnets in motors, generators, simple devices<br><br><b>EM</b> | Electrically charged objects attract/repel each other<br><br><b>EM</b> | Magnets have 2 poles; like poles repel, unlike poles attract<br><br><b>EM</b> | Electrical energy can be converted to heat, light, motion<br><br><b>EM</b> |
| <b>LIFE:</b><br><b>Food chains/webs</b>                | Plants are primary source of matter/energy entering most food chains | Producers and consumers are related in food chains and webs and compete | Decomposers recycle matter from dead plants and animals                       |   |  |   |  |
| <b>LIFE:</b><br><b>Ecology</b>                         | Ecosystems characterized by living/non-living components             | Survival within environment   | Plants depend on animals and vice versa                                       | Role of microorganisms  |  |   |  |
| <b>EARTH:</b><br><b>Rocks and minerals</b>             | Igneous, sedimentary, metamorphic: different properties, formation   | Identify common rock-forming minerals                                   |   |   |  |   |  |
| <b>EARTH:</b><br><b>Weathering and Erosion</b>         | Slow processes, rapid processes of change                            | Breaking down rocks through freezing, thawing, growth of roots          | Weathering, transport, deposition by water                                    |   |  |   |  |

# SCIENCE CONTENT STANDARDS

## GRADE 5

|  |  |   |  |   |  |   |  |  |                     |
|--|--|---|--|---|--|---|--|--|---------------------|
| <b>PHYSICAL:<br/>Elements</b>            | Chemical reactions: atoms rearrange to form new products | All matter is made of atoms which can combine into molecules<br><b>AG</b>                 | Properties of metals; pure elements vs. alloys         | Element is one kind of atom; periodic table<br><b>AG</b>    | Nature of atom and arrays of atoms: imaging evidence | Properties used to separate, identify mixtures, compounds | Common substances; properties of solid, liquid, gaseous substances;<br><b>AG</b> | Living organisms, most materials made of just a few elements | Properties of salts |
| <b>LIFE:<br/>Processing food and air</b> | Specialized structures to transport materials            | Circulation of blood; exchange of CO <sub>2</sub> and O <sub>2</sub> in lungs and tissues | Digestive system                                       | Urinary system  | Transport of sugar, water, and minerals in plants    | Photosynthesis  | Cells (plants & animals) obtaining energy by breaking down sugar                 |  |                     |
| <b>EARTH:<br/>Water cycle</b>            | The ocean  | Evaporation, condensation, freezing/melting   | Water in the form of clouds, rain, hail, snow          | Water as a resource; water quality                          | Origin of water used by the local community          |   |  |  |                     |
| <b>EARTH:<br/>Weather</b>                | Heating of Earth causes air movements                    | Role of ocean and water cycle   | Cause and effects of different types of severe weather | Using weather maps/data to predict local weather; forecasts | Pressure within Earth's atmosphere<br><b>AG</b>      |   |  |  |                     |
| <b>EARTH:<br/>Solar System</b>           | Properties of Sun<br><b>SOL</b>                          | Planets, moons, satellites, asteroids<br><b>SPN, PN, EVM, MM</b>                          | Orbits due to gravitational attraction<br><b>PL</b>    |   |  |   |  |  |                     |

# SCIENCE CONTENT STANDARDS

## GRADE 6

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|--|---|---|---|---|--|---|--|
| <b>PHYSICAL:<br/>Heat</b>                    | Heat as movement of energy<br><br><b>SOL</b>                                    | Release of heat from fuel consumption<br><br><b>SOL</b>                                     | Heat transport: conduction and convection<br><br><b>SOL</b>   | Heat transport: radiation<br><br><b>SOL</b>                               |  |   |  |
| <b>LIFE:<br/>Ecology</b>                     | Life using energy: sunlight into chemical energy; from organism to organism     | Details of food-webs  | Producers, consumers, decomposers; energy pyramid             | Ecological roles  | How much an ecosystem can support depends on resources and abiotic factors |   |  |
| <b>EARTH:<br/>Plate Tectonics</b>            | Evidence of plate tectonics   | Layers of the Earth   | Size and movement of plates                                   | Causes of earthquakes and volcanoes                                       | Plates as origin of major geologic events such as mountain building        | How to explain major features of California geology in terms of plate tectonics | Determining epicenter of quake, looking at variables in effects of a quake |
| <b>EARTH:<br/>Shaping Earth's Surface</b>    | Water running downhill is dominant process in shaping landscape                 | Rivers/streams are dynamic systems that erode, transport sediment, flood                    | Beaches are dynamic systems: movement of sand                 | Effect of quakes, volcanoes, landslides and floods on humans and wildlife |  |   |  |
| <b>EARTH:<br/>Energy in the Earth System</b> | Sun is major source for Earth: powers weather and water cycle<br><br><b>SOL</b> | Sun's energy reaches Earth through radiation, mostly as visible light<br><br><b>SOL, LL</b> | Heat from Earth's interior reaches surface through convection | Convection currents distribute heat in the atmosphere and oceans          | Differences in pressure, heat, air movement and humidity result in weather |   |  |
| <b>EARTH:<br/>Resources</b>                  | Energy resources: what makes them useful, what kinds of problems occur          | Different energy and material resources: renewable vs. non-renewable                        | Natural origin of materials used to make common objects       |   |  |   |  |

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## GRADE 7

|   |   |  |  |  |  |   |   |   |   |                            |
|---|---|--|--|--|--|---|---|---|---|----------------------------|
| <b>PHYSICAL:</b><br><b>Physical Principles in Living Systems</b>  | Visible light part of EM spectrum<br><br><b>LL</b>          | Object seen through emitted or reflected light<br><br><b>LL</b>      | Light travels in straight light unless medium changes<br><br><b>LL</b> | Lenses in magnifying glass, eye, camera, tele/micro-scope<br><br><b>LL</b> | Light composed of many colors; varying sensitivity of retina<br><br><b>LL, SPN</b> | Reflection, refraction, transmission, absorption<br><br><b>LL</b> | Angle of reflection = angle of incidence          | Comparison of bodily joints with mechanical devices | Apply levers and mechanical advantage to musculo-skeleton | Functioning of human heart |
| <b>LIFE:</b><br><b>Cell Biology</b>                               | Similar functioning of cells in all living organisms        | Plant and animal cell differences: cell walls, chloroplasts          | Nucleus has genetic info in plant and animal cells                     | Sources of energy: mitochondria, chloroplasts                              | Mitosis: cell division   | Cell differentiation in multicellular organisms                   |   |   |   |                            |
| <b>LIFE:</b><br><b>Genetics</b>                                   | Differences between sexual and asexual organisms            | Sexual reproduction; gene inheritance                                | Inherited trait determined by one or more genes                        | Different genes, copies of gene, dominant copy                             | DNA is genetic material of living organisms  |   |   |   |   |                            |
| <b>LIFE:</b><br><b>Evolution</b>                                  | Genetic variation and environment as causes of evolution    | Why natural selection if mechanism of evolution                      | Evidence from fossils, geology, comparative anatomy                    | Constructing branching diagrams to classify groups                         |  |   |   |   |   |                            |
| <b>LIFE:</b><br><b>Structure &amp; Function in Living Systems</b> | Levels: cells, tissues, organs, organ systems, organism     | Interdependence of organs within system                              | Bones and muscles giving framework for movement                        | Human reproduction: organs and process                                     | Function of umbilicus and placenta during pregnancy                                | Plant reproduction: pollen, ovules, seeds and fruit               | Structures and their functions within eye and ear |   |   |                            |
| <b>EARTH:</b><br><b>Earth and Life History</b>                    | Cumulative effects of slow, consistent geological processes | Effects of major catastrophes: asteroids, volcanoes<br><br><b>MM</b> | Rock layering and age; rock cycle                                      | Age of Earth; age of life on Earth   | Fossils as source of changes in life and environment                               | Effect of plate movement on climate, geography and life           | Major events on geologic time scale               |   |   |                            |

# SCIENCE CONTENT STANDARDS

## GRADE 8

|   |   |   |   |   |  |   |  |
|---|---|---|---|---|--|---|--|
| <b>PHYSICAL:<br/>Motion</b>                 | Defining position   | Defining average speed  | Solve problems with distance, time, average speed                       | Velocity is both direction and speed<br><b>BR</b>   | Changes in velocity<br><b>BR</b>                                     | Interpreting graphs of d vs. t, v vs. t in a single direction     |  |
| <b>PHYSICAL:<br/>Forces</b>                 | Force has both direction and magnitude<br><b>BR</b>                     | When there are more than 1 force, result is cumulative<br><b>BR</b>     | When forces are balanced, motion of object does not change<br><b>BR</b> | Identifying forces on a static object<br><b>BR</b>  | When forces are unbalanced, object will change velocity<br><b>BR</b> | More mass of object, more force needed to accelerate<br><b>BR</b> | Role of gravity in forming planets, stars, solar system<br><b>PL</b> |
| <b>PHYSICAL:<br/>Structure of Matter</b>    | Structure of atom: protons, neutrons, electrons<br><b>EM</b>            | Compounds: formation and properties                                     | Solids formed from atoms and molecules: crystals & polymers             | States of matter and dependence on molecular motion<br><b>AG</b>                          | States of matter and movement of molecules<br><b>AG</b>              | Using periodic table to identify elements<br><b>AG</b>            |  |
| <b>PHYSICAL:<br/>Reactions</b>              | Reactant atoms and molecules form products; new properties              | Idea of atoms explain conservation of matter                            | Chemical reactions liberate or absorb heat                              | Physical processes include freezing and boiling<br><b>AG</b>                              | How to determine whether solution is acidic, basic, or neutral       |   |  |
| <b>PHYSICAL:<br/>Periodic Table</b>         | Regions corresponding to metals, nonmetals, inert gases                 | Atomic number (# neutrons, # protons); isotopes<br><b>AG</b>            | Classify using melting point, density, hardness, conductivity           |   |  |   |  |
| <b>PHYSICAL:<br/>Density &amp; Buoyancy</b> | Density is mass per unit volume<br><b>AG</b>                            | How to calculate density of substances from mass and volume             | Predicting if an object will sink or float                              |   |  |   |  |
| <b>LIFE:<br/>Chemistry of Life</b>          | Why carbon has a central role in the chemistry of life                  | Living organisms made of molecules of C, H, N, O, P, & S                | Different kinds of molecules: small (water, salt); large (DNA)          |   |  |   |  |
| <b>EARTH:<br/>Earth in the Universe</b>     | Galaxies: clusters of billions of stars; different shapes<br><b>SPN</b> | Stars: Sun is one of many; differences in size, color<br><b>SPN, PL</b> | Measure of distances: AU and light-years<br><b>PN</b>                   | Stars are the source of light of all bright objects (moon, planets)<br><b>PL, PN, SPN</b> | Characteristics of objects in solar system<br><b>PN, EVM</b>         |   |  |