# California Science Standards

*The most important standards for ALL of our students.*

# Grade 8

Focus on Physical Science

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| | **Motion** |
| 1. | The velocity of an object is the rate of change of its position. As a basis for understanding this concept: |
| | *c. Students know* how to solve problems involving distance, time, and average speed. |
| | *d. Students know* the velocity of an object must be described by specifying both the direction and the speed of the object. |
| | *f. Students know* how to interpret graphs of position versus time and graphs of speed versus time for motion in a single direction. |
| | **Forces** |
| 2. | Unbalanced forces cause changes in velocity. As a basis for understanding this concept: |
| | *b. Students know* when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces. |
| | *d. Students know* how to identify separately the two or more forces that are acting on a single static object, including gravity, elastic forces due to tension or compression in matter, and friction. |
| | **Structure of Matter** |
| 3. | Each of the more than 100 elements of matter has distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements. As a basis for understanding this concept: |
| | *a. Students know* the structure of the atom and know it is composed of protons, neutrons, and electrons. |
| | *b. Students know* that compounds are formed by combining two or more different elements and that compounds have properties that are different from their constituent elements. |
| | *e. Students know* that in solids the atoms are closely locked in position and can only vibrate; in liquids the atoms and molecules are more loosely connected and can collide with and move past one another; and in gases the atoms and molecules are free to move independently, colliding frequently. |
| | **Earth in the Solar System (Earth Sciences)** |
| 4. | The structure and composition of the universe can be learned from studying stars and galaxies and their evolution. As a basis for understanding this concept: |
| | *b. Students know* that the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, temperature, and color. |
| | *e. Students know* the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids. |
| | **Reactions** |
| 5. | Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept: |
| | *b. Students know* the idea of atoms explains the conservation of matter: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same. |
| | *d. Students know* physical processes include freezing and boiling, in which a material changes form with no chemical reaction. |
| | *e. Students know* how to determine whether a solution is acidic, basic, or neutral. |
| | **Chemistry of Living Systems (Life Sciences)** |
| 6. | Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept: |
| | *b. Students know* that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur. |
| | *c. Students know* that living organisms have many different kinds of molecules, including small ones, such as water and salt, and very large ones, such as carbohydrates, fats, proteins, and DNA. |

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| **Grade 8** (Cont'd) | |
| **Periodic Table** | |
| 7. | The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms. As a basis for understanding this concept: |
| | *a. Students know* how to identify regions corresponding to metals, nonmetals, and inert gases. |
| | *b. Students know* each element has a specific number of protons in the nucleus (the atomic number) and each isotope of the element has a different but specific number of neutrons in the nucleus. |
| | *c. Students know* substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity. |
| **Density and Buoyancy** | |
| 8. | All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept: |
| | *b. Students know* how to calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume. |
| | *c. Students know* the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced. |