

Bethlehem Lutheran School, Lakewood, CO
Science Curriculum Grade 8 (revised 6/11)

God created, rules, and orders His universe. Science is the framework through which we discover, observe, analyze and synthesize the natural laws of God's creation. Understanding these laws and the systematic nature of the world assists and enhances the student's awareness and ability to be a better steward of God's earth and universe.

Science provides a conceptual framework for the understanding of natural phenomena and their causes and effects. Science study develops students to be scientifically literate, to be able to recognize that science is not value-free, and to be capable of making ethical and moral judgments regarding science, social and technological issues.

The science curriculum of Bethlehem Lutheran School will provide the students with an understanding of God's creation in the areas of Life Science, Physical Science, and Earth Science through facts, observation, and experimentation.

State Standard 1

Physical Science: Students know and understand common properties, forms, and changes in matter and energy.

Classroom objectives

- 1.1 The students will be able to define the term element and list the properties used in describing an element.
- 1.2 The students will be able to define and calculate the moments of levers.
- 1.3 The students will be able to explain how light passes through the human eye and is detected by the brain.
- 1.4 The students will be able to relate the ideas of kinetic molecular theory to the relative motion of particles of matter.
- 1.5 The students will be able to describe what energy is and calculate kinetic energy.
- 1.6 The students will be able to state the laws of conservation of energy.

- 1.7 The students will be able to describe how a chemical change differs from a physical change and provide examples of each.
- 1.8 The students will be able to explain the changes that might occur when an element undergoes a physical change.
- 1.9 The students will be able to describe synthesis and decomposition reactions.
- 1.10 The students will be able to describe how an atom's valence electrons affect bonding.
- 1.11 The students will be able to describe the relationship between pH scale and the acidity of solution.
- 1.12 The students will be able to explain single and double displacement reaction, redox reactions, and describe the chemistry of hydrocarbons.
- 1.13 The students will be able to define and calculate power, horsepower, and efficiency of machines.
- 1.14 The students will be able to state the law of conservation of matter and energy, define nuclear fission and nuclear fusion.

- 1.15 The students will be able to compare and contrast the characteristics of suspensions, solutions, colloids, and emulsions.
- 1.16 The students will be able to describe what is meant by momentum and state the factors that affect momentum.
- 1.17 The students will be able to state Newton's three Laws of Motion.
- 1.18 The students will be able to perform basic calculations using Newton's Laws of Motion.
- 1.19 The students will be able to list the three subatomic particles and give the electrical charge of each.
- 1.20 The students will be able to make calculations concerning falling bodies using the basic formulas: $d=.5gt$, $v=gt$.
- 1.21 The students will be able to relate the formation of hydroxide ions to the ionization and dissociation of acids and bases in water.
- 1.22 The students will be able to describe the characteristics of solids, liquids, and gases.
- 1.23 The students will be able to elucidate and calculate the mechanical advantage of various simple machines.
- 1.24 The students will be able to list the properties of acids and bases.
- 1.25 The students will be able to explain the scientific definition of work and calculate the work done by the six simple machines.
- 1.26 The students will be able to explain the difference between distance and displacement.
- 1.27 The students will be able to describe relative motion and give examples of how motion can be relative.
- 1.28 The students will be able to explain the concept of inertia and state the factors that affect inertia.
- 1.29 The students will be able to explain the similarities and differences among speed, velocity, and acceleration.
- 1.30 The students will be able to name and give examples of the three basic types of motion.

- 1.31 The students will be able to describe how scalar quantities differ from vector quantities.
- 1.32 The students will be able to explain what the subscript and coefficient numbers indicate in a compound.
- 1.33 The students will be able to balance chemical equations.
- 1.34 The students will be able to distinguish between ionic bonds and a covalent bond.
- 1.35 The students will be able to state the number and kind of atoms composing various compounds.
- 1.36 The students will be able to define the phases of matter.
- 1.37 The students will be able to distinguish between atomic number and atomic mass.
- 1.38 The students will be able to define isotope and describe the development of the periodic table of the elements.
- 1.39 The students will be able to describe how carbon is able to form a huge variety of compounds.
- 1.40 The students will be able to identify four forms of pure carbon.
- 1.41 The students will be able to list properties of organic compounds.
- 1.42 The students will be able to identify properties of hydrocarbons.
- 1.43 The students will be able to describe the kind of structure and bonding structures of hydrocarbons.
- 1.44 The students will be able to identify characteristics of substituted hydrocarbons, esters, and polymers.
- 1.45 The students will be able to explain how polymers form.
- 1.46 The students will be able to identify benefits and problems related to the use of synthetic polymers.
- 1.47 The students will be able to make a polymer.

- 1.48 The students will be able to list four main classes of organic compounds in living things.
- 1.49 The students will be able to explain how the organic compounds in living things differ from one another.

State Standard 2

Life Science: Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.

Classroom objectives

- 2.1 The students will be able to state more clearly their Christian values as related to sex and sexuality.
- 2.2 The students will be able to articulate the fact that sex, sexuality, and sexual intercourse are good gifts from our loving God intended to make our lives richer.
- 2.3 The students will be able to state the affect the law of unit characters, the law of dominance, the law of segregation, the law of incomplete dominance has on specific genetic outcomes.
- 2.4 The students will be able to explain the biological function of both the male and the female reproductive systems.
- 2.5 The students will be able to trace the path of blood through the circulatory system from a capillary back to that capillary.
- 2.6 The students will be able to list the various components of blood and explain the function of each.
- 2.7 The students will be able to name and locate 20 bones and 30 muscles of the human body.
- 2.8 The students will be able to list and describe the different kinds of joints and connective tissue that are part of the skeleton.
- 2.9 The students will be able to list the systems of the human body and give the function of each.

- 2.10 The students will be able to identify all the components of the respiratory, digestive, excretory, nervous, and endocrine systems and state their importance.
- 2.11 The students will be able to use proper lab procedures to dissect a grass frog.

State Standard 3

Earth and Space Science: Students know and understand the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space.

Classroom objectives

- 3.1 The students will be able to describe our Milky Way galaxy and how it compares to other galaxies in shape and size.
- 3.2 The students will be able to define Red shift, quasar, big bang, steady state theory, and oscillating theory.
- 3.3 The students will be able to state Kepler's three laws of planetary motion.
- 3.4 The students will be able to describe the life story of a star from birth to death.
- 3.5 The students will be able to explain Newton's law of gravity.
- 3.6 The students will be able to contrast mass and weight and define acceleration due to gravity.
- 3.7 The students will be able to identify the physical conditions of objects in space that make them different from the earth.
- 3.8 The students will be able to describe the various shapes of the galaxies, describe the Milky Way, explain what is meant by the "red shift", and report the theory of the Big Bang.
- 3.9 The students will be able to explain the difference between asteroid, meteor, meteorite, meteoroid, and comet.

- 3.10 The students will be able to recognize the sequence of events that have led up to our exploration of space and understand some of the practical applications of space technology to our everyday life.
- 3.11 The students will be able to list Kepler's laws of planetary motion, and also Newton's laws of motion as related to the universe.
- 3.12 The students will be able to list the planets in order from the sun outward and give a brief description of each planet.

School Standard 1

Students understand the processes of scientific investigation and design, conduct, communicate about and evaluate such investigations.

Classroom objectives

- 1.1 The students will be able to demonstrate safe laboratory procedures by conducting a variety of experiments in the laboratory.
- 1.2 The students will be able to form and write a hypothesis, collect data, analyze the data, and form a conclusion by conducting various laboratory experiments.
- 1.3 The students will be able to analyze data and make conclusions based of data collected from "hands on" experiments.
- 1.4 The students will be able to describe the steps in the scientific method

School Standard 2

Students know and understand interrelationships among science, technology and human activity and dhow they can affect the world.

Classroom objectives

- 2.1 The students will be able to describe the role energy plays in our lives and see the importance of conserving our natural energy resources.

School Standard 3

Students understand that science involves a particular way of knowing and understanding common connections among scientific disciplines.

Classroom objectives

- 3.1 The students will be able to access the Internet and be able to acquire reliable data and information concerning various topics of scientific study.
- 3.2 The students will be able to articulate both verbally and through writing how science information is disseminated throughout the world.
- 3.3 The students will be able to express how science information becomes scientific law.