

SCIENCE - Grade 8

Christ Lutheran School, Costa Mesa, CA

Revised 2008

Goal: The students will develop an appreciation and understanding of God's creation, focusing on Physical Science, through hands-on scientific activities and projects. They will keep a science notebook with questions, predictions, observations, and conclusions.

Objectives:

Motion

1. The students will be able to explain that the velocity of an object is the rate of change of its position.

- Position is defined in relation to some choice of a standard reference point and a set of reference directions.
- Average speed is the total distance traveled divided by the total time elapsed and the speed of an object along the path traveled can vary.
- Learn to solve problems involving distance, time, and average speed.
- The velocity of an object must be described by specifying both the direction and the speed of the object.
- Changes in velocity may be due to change in speed, direction, or both.

Materials: *Science Voyages: Glencoe Science (California Edition)*, Glencoe/McGraw-Hill, 2001, Internet.

Forces

1. The students will be able to explain how unbalanced forces cause changes in velocity.

- A force has both direction and magnitude.
- When an object is subject to two or more forces at once, the result is the cumulative effect of all the forces.
- When the forces on an object are balanced, the motion of the object does not change.
- 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.
- When the forces on an object are unbalanced, the object will change its velocity (speed up, slow down or change direction).

- The greater the mass of an object, the more force is needed to achieve the same rate of change in motion.

Materials: *Science Voyages: Glencoe Science (California Edition)*, Glencoe/McGraw-Hill, 2001, Internet.

Structure of Matter

1. The students will be able to understand that 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.

- Understand the structure of the atom and know that it is composed of protons, neutrons, and electrons.
- Compounds are formed by combining two or more different elements and compounds have properties that are different from their constituent elements.
- Atoms and molecules form solids by building up repeating patterns, such as the crystal structure of NaCl.
- The states of matter (solid, liquid, gas) depend on molecular motion.
- 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; in gases the atoms and molecules are free to move independently, colliding frequently.
- Use the periodic table to identify elements in simple compounds.

Materials: *Science Voyages: Glencoe Science (California Edition)*, Glencoe/McGraw-Hill, 2001.

Reactions

1. The students will be able to explain that chemical reactions are processes in which atoms are rearranged into different combinations of molecules.

- Reactant atoms and molecules interact to form products with different chemical properties.
- 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.
- Chemical reactions usually generate heat or absorb heat.
- Physical processes include freezing and boiling, in which a material changes form with no chemical reaction.
- Determine whether a solution is acidic, basic, or neutral.

Materials: *Science Voyages: Glencoe Science (California Edition)*, Glencoe/McGraw-Hill, 2001, Internet.

Periodic Table

1. The students will be able to explain that the organization of the periodic table is based on the properties of the elements and reflects the structure of atoms. The periodic table helps to explain God's grand design for creation such as order, intricacy, reactivity, and care.

- Relate the position of an element in the Periodic Table to its atomic number and atomic mass.
- Identify regions corresponding to metals, semi-metals, nonmetals, alkali metals, alkaline earth metals, transition metals, halogens, and inert gases.
- 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. The nucleus is much smaller in size than the atom yet contains most of its mass.
- Substances can be classified by their properties, including their melting point, temperature, density, hardness, and thermal and electrical conductivity.

Materials: *Science Voyages: Glencoe Science (California Edition)*, Glencoe/McGraw-Hill, 2001, Internet.

Investigation and Experimentation

1. The students will be able to demonstrate their understanding of God's miraculous creation by developing their own questions and performing scientific investigations.

- Plan and conduct a scientific investigation to test a hypothesis.
- Evaluate the accuracy and reproducibility of data.
- Use simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including $\text{speed}=\text{distance}/\text{time}$, $\text{density}=\text{mass}/\text{volume}$, $\text{force}=\text{pressure} \times \text{area}$, $\text{volume}=\text{area} \times \text{height}$).

Materials: *Science Voyages: Glencoe Science (California Edition)*, Glencoe/McGraw-Hill, 2001, Internet.