**Chemistry**

 Structure of an atom

 Differences among elements, compounds, and mixtures

 Mixtures may be heterogeneous or homogeneous

 All atoms and molecules are perpetually in motion and how that motion affects changes of state

 There is a relationship between phase of matter and density

 How the periodic table is organized and how to use the periodic table in order to obtain information about the atom of an element

 How the periodic table of elements is an arrangement of elements according to their properties

 The information in the periodic table is based on the observations of many scientists over a long period of time

Chemical symbols show the atoms of the elements composing a substance

Chemical formulas are constructed from the symbols of the elements composing the substances

Atoms are composed of 3 subatomic particles – protons, neutrons, and electrons

How to differentiate between physical and chemical properties

 Physical and chemical properties can be used to identify substances

 Matter can undergo physical and chemical changes

 A chemical equation can be used to represent a chemical reaction has occurred

 Many substances dissolve in water

Solutions can be basic, acidic, or neutral, depending on the concentration of hydrogen ions in the solution

 All organisms on Earth use energy derived from resources from the environment

 Some resources are renewable others are nonrenewable

 Humans affect the natural resources we depend on for survival

**Microbiology**

 Microbiology explores microscopic organisms including viruses, parasites, bacteria, protozoa, and some fungi

 A disease outbreak happens when a disease occurs in greater number than expected in a community or region

 Epidemic and pandemic are similar terms that refer to the spread of infectious diseases among a population

 Food provides molecules that serve as fuel and building material for all organisms

 Cells carry on the many functions to sustain life

 Matter is transferred among organisms in an ecosystem when organisms eat or are eaten by other organisms

 In plants and animals molecules from food react with oxygen to provide energy

 Plants use energy from the light to make sugars from carbon dioxide

 Minerals and other nutrients from the soil are not food (they don’t provide energy), but they are needed for plants to make complex molecules from the sugar they make

Atoms that make up the organisms in an ecosystem are cycled repeatedly between living and nonliving parts of the ecosystem

 A balanced diet combined with regular exercise aid in overall general health

 For the body to use food it must first be digested into molecules that are absorbed and transported to cells

 If one consumes more calories than are used the excess is stored and weight is gained

**Hydrosphere**

 Water is the most common substance on the surface of the Earth

 Water is the only substance that occurs naturally as a solid, a liquid, and a gas

 Water is referred to as ‘the universal solvent’ because so many other substances dissolve in it

 The oceans are salty because of dissolved chemicals eroded from the Earth’s crust and washed into the sea

 Hydrothermal vents are recently-discovered features on the crest of oceanic ridges that release minerals into the oceans

 The oceans are an integral component of the world’s climate

 The water cycle is the continuous movement of water in and around the Earth

 A river basin is the portion of land drained by a river and its tributaries

 The ocean is a dynamic system in which many chemical, biological, and physical changes are taking place

 Estuaries are areas where fresh and salt water mix, producing variations in salinity and high biological activity

 Oceans are home to some of the most diverse life on earth

 In the ocean there are innumerable food chains overlapping and intersecting to create complex food webs

 Winds have a powerful effect on the oceans and are an important force in ocean currents

 Seawater has many different gasses dissolved in it, especially nitrogen, oxygen, and carbon dioxide

 The ocean is on of Earth’s most valuable natural resources

 The deep ocean has long been of interest to scientists

 The health of a water system is determined by the balance between physical, chemical, and biological variables.

 The temperature of water in rivers and lakes determines the kinds of organisms that can survive there

 Measuring dissolved oxygen is an important factor in determining water quality

 pH is a measure of how acidic or basic water is

 Nitrogen and phosphorous are essential plant nutrients

 Turbidity is a measure of how clear water is

 Water quality can also be assessed by using bio indicators

 Clear water may contain odorless, tasteless, and colorless harmful contaminants

 Water is essential to life

 Ecosystems are complex, interactive systems that include both biotic and abiotic components of an environment

 Ecosystems are dynamic in nature; their characteristics can vary over time.

 Populations can be described by their size, density, or distribution.

 Organisms in an ecosystem constantly interact and compete with each other for limited resources

 The sun is the ultimate source of energy

 The flow of energy can be shown with a food chain, food web, or food pyramid.

**Geologic Time**

 Fossils provide important evidence of how life and environmental conditions have changed

 A fossil is the preserved remains of an organism that lived in the past

 There are different types of fossils based on how they were formed

 A geologic time scale is a record of the major events and diversity of life forms present in Earth’s history

 Millions of fossils have been collected and studied

 Various models, diagrams, and pictures can be used to illustrate the vastness of time involved in geologic time and to show the diversity of life evident across geologic time.

 Relative age means the age of one object compared to the age of another object

 Geologists use radiometric dating to estimate the age of rocks and fossils contained in the rocks

 A variety of artifacts are used to determine the geological history of the Earth, as well as how life forms have changed over time

 Sedimentary rocks make up 75% of rocks on the Earth’s surface

 A fault is a break in the rocks that make up the Earth’s crust that is formed due to the movement of rock

 Life on Earth, as well as the shape of Earth’s surface, has a history of change that is called evolution.

 The evidence that organisms and landforms change over time is scientifically described using the Theory of Evolution, the Plate Tectonics Theory, and the Law of Superposition.

 Biological evolution accounts for the diversity of species developed through gradual processes over many generations

 Fossils can be compared to one another and to living organisms according to their similarities and differences

 Most species that have lived on Earth are now extinct

 Biological classification is a system which is used to organize and codify all life on Earth

 Within every population, variation exists within the inherited traits of the individuals

 In any particular environment, the growth and survival of organisms depend on the physical conditions

 Individual organisms with certain traits are more likely than others to survive, reproduce and pass these “favorable” traits to their offspring