

**USD 203 Piper Curriculum
Science**

Grade 8

Standard	Benchmark	Knowledge Base Indicators
1--Science as Inquiry	The student will develop the abilities to do scientific inquiry and develop an understanding of scientific inquiry.	
▲ Recommended High School Assessed Indicator	1--Scientific Inquiry	Demonstrate abilities necessary to do the processes of scientific inquiry.
		1.1.1. Actively engages in asking and evaluating research questions.
		1.1.2. ▲ Actively engages in investigations, including developing questions, gathering and analyzing data, and designing and conducting research.
		1.1.3. ▲ Actively engages in using technological tools and mathematics in their own scientific investigations.
		1.1.4. ▲ Actively engages in conducting an inquiry, formulating and revising his or her scientific explanations and models (physical, conceptual or mathematical) using logic and evidence, and recognizing that potential alternative explanations and models should be considered.
		1.1.5. Actively engages in communicating and defending the design, results, and conclusion of his/her investigation.
2A--Physical Science, Chemistry	The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	
	1--Structures of Atom	Understand the structure of the atom.
		2A.1.1. ▲ Understands atoms, the fundamental organizational unit of matter, are composed of subatomic particles, organized in a small, dense, positively charged nucleus (containing protons and neutrons which determines the atomic mass) and surrounded by a negatively charged electron cloud (containing electrons, which determines the size of the atom).
2B--Physical Science, Physics	The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	
	1--Force and Motion	Understand the relationships between force and motion.
		2B.1.1. ▲ Understands Newton's Laws and the kinematic variables of time, position, velocity, and acceleration can be used to describe the position and motion of particles.
3--Life Science	The student will develop an understanding of the cell, molecular basis of heredity, biological evolution, interdependence of organisms, matter, energy, and organization in living systems, and the behavior of organisms.	
	4--Organism Interdependence	Understand the interdependence of organisms and their interaction with the physical environment.
		3.4.1. ▲ Understands atoms and molecules on the Earth cycle among the living and non living components of the biosphere.
		3.4.2. Understands energy is received, transformed and expended in ecosystems.
		3.4.3. ▲ Understands the distributions and abundance of organisms and populations in ecosystems are limited by the carrying capacity.
		3.4.4. Understands organisms cooperate and compete in complex, interdependent relationships.
		3.4.5. Understands human beings live within and impact ecosystems.
	5--Living Systems	Develop an understanding of matter, energy, and organization in living systems.
		3.5.1. Understands living systems require a continuous input of energy to maintain their chemical and physical organization.
		3.5.2. ▲ Understands the Sun is the primary source of energy for life through the process of photosynthesis.

**USD 203 Piper Curriculum
Science**

Grade 8

Standard	Benchmark	Knowledge Base Indicators
		3.5.3. ▲ Understands food molecules contain biochemical energy, which is then available for cellular respiration.
4--Earth and Space Science	The student will develop an understanding of energy in the Earth system, geochemical cycles, the formation and organization of the Earth system, the dynamics of the earth/moon/sun system, and the organization and development of the universe.	
	1--Dynamic Earth	Develop an understanding of the sources of energy that power the subsystems and cycles of dynamic Earth: the geosphere, hydrosphere, atmosphere, and biosphere.
		4.1.1. Understands constructive and destructive processes dynamically reshape the surface of the Earth.
		4.1.2. ▲ Understands the theory of the plate tectonics explains that internal energy drives the Earth's ever changing structure.
		4.1.3. Understands that the ultimate source of atmospheric and oceanic energy comes from the Sun. Energy flow determines global climate and weather which is influenced by geographic features, cloud cover, and the Earth's rotation.
		4.1.4. Understands the processes of water cycling through surface water, ground water, and the atmosphere.
	2--Earth Origin	Develop an understanding of the origin and development of the dynamic Earth system.
		4.2.1. ▲ Understands geological time is used to understand the Earth's past.
	3--Solar System	Develop an understanding of dynamics of our solar system.
		4.3.1. Understands gravitational attraction of objects in the solar system keeps solar objects in orbit.
		4.3.2. ▲ Understands the relationship between the Earth, Moon, and Sun explains the seasons, tides and moon phases.
		4.3.3. Understands the relative sizes and distances of objects in the solar system.
		4.3.4. Understands the Sun, Earth, and other objects in the solar system formed from a nebular cloud of dust and gas.
	4--Organization of Universe	Develop an understanding of the organization of the universe and its development.
		4.4.1. ▲ Understands stellar evolution.
		4.4.2. ▲ Understands the current scientific explanation of the origin and structure of the universe.
		4.4.3. Understands how the tools of astronomy have revolutionized the study of the universe.
5--Science and Technology	The student will develop understandings about the relationship between science and technology.	
	1--Technology as Applied Science	Develop an understanding that technology is applied science.
		5.1.1. ▲ Understands technology is the application of scientific knowledge for functional purposes.
		5.1.2. Understands creativity, imagination, and a broad scientific knowledge base are required to produce useful results.
		5.1.3. Understands science advances new technologies. New technologies open new areas for scientific inquiry.
6--Science in Personal and Environmental Perspectives	The student will develop an understanding of personal and community health, population growth, natural resources, environmental quality, natural and human-induced hazards, and science and technology in local, national, and global settings.	
	1--Health	Develop an understanding of the overall functioning of human systems and their interaction with the environment in order to understand specific mechanisms and processes related to health issues.
		6.1.1. Understands some chemical and physical hazards and accidents can be avoided through safety education.
		6.1.2. ▲ Understands the severity of disease symptoms is dependent on many factors.

**USD 203 Piper Curriculum
Science**

Grade 8

Standard	Benchmark	Knowledge Base Indicators	
		6.1.3. Understands informed personal choices concerning fitness and health involve an understanding of chemistry and biology.	
		6.1.4. Understands selection of foods and eating patterns determine nutritional balance which affects emotional and physical well-being.	
	2--Population Growth	Demonstrate an understanding of population growth.	
		6.2.1. Understands the rate of change in populations is determined by the combined effects of birth, death, emigration, and immigration.	
		6.2.2. Understands a variety of factors influence birth rates and fertility rates.	
		6.2.3. Understands populations have limits to growth.	
	3--Environmental Quality	Understand that human populations use natural resources and influence environmental quality.	
		6.3.1. ▲ Understands natural resources from the lithosphere and ecosystems are required to sustain human populations.	
		6.3.2. Understands Earth does not have infinite resources.	
	4--Hazards	Understand the effect of natural and human-influenced hazards.	
		6.4.1. Understands that natural processes on the Earth may be hazardous for humans.	
		6.4.2. Understands there is a need to assess potential risk and danger from natural and human-induced hazards.	
	5--Society	Develop an understanding of the relationship between science, technology, and society.	
			6.5.1. Understands progress in science and technology can be affected by social issues and challenges. Science and technology indicate what can happen, not what should happen.
	7--History and Nature of Science	The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	
	1--Human Endeavor	Develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe.	
		7.1.1. Demonstrates an understanding of science as both vocation and avocation.	
		7.1.2. ▲ Explains how science uses peer review, replication of methods, and norms of honesty.	
		7.1.3. Recognizes the universality of basic science concepts and the influence of personal and cultural beliefs that embed science in society.	
		7.1.4. Recognizes that society helps create the ways of thinking (mindsets) required for scientific advances, both toward training scientists and educating a populace to utilize benefits of science (e.g., standards of hygiene, attitudes toward forces of nature, etc.).	
		7.1.5. Understands there are many issues which involve morals, ethics, values or spiritual beliefs that go beyond what science can explain, but for which solid scientific literacy is useful.	
		7.1.6. Recognizes society's role in supporting topics of research and determining institutions where research is conducted.	
	2--Scientific Knowledge	Develop an understanding of the nature of scientific knowledge.	
		7.2.1. Understands scientific knowledge describes and explains the natural world. Scientific knowledge is provisional and is subject to change as new evidence becomes available.	
		7.2.2. Understands scientific knowledge begins with empirical observations, which are the data (also called facts or evidence) upon which further scientific knowledge is built.	
		7.2.3. Understands scientific knowledge consists of hypotheses, inferences, laws, and theories.	

**USD 203 Piper Curriculum
Science**

Grade 8

Standard	Benchmark	Knowledge Base Indicators
		7.2.4. Understands a testable hypothesis or inference must be subject to confirmation by empirical evidence.
	3--History	Understand science from historical perspectives.
		7.3.1. Demonstrates an understanding of the history of science.
		7.3.2. Demonstrates a knowledge that scientific method historically proceeded from an inductive approach rather than a deductive approach.