

SCIENCE GUIDELINES

GRADE LEVEL SUBJECT AREA EXPECTATIONS DIOCESE OF FRESNO KINDERGARTEN

EXPECTATIONS FOR RELIGIOUS INTEGRATION AND ARTICULATION

I	R	M	
_____	_____	_____	All creation follows rules or principles established by God.
_____	_____	_____	All forms of life (human, plant, animal) deserve reverence, value and respect and are to be seen as a gift from God.
_____	_____	_____	We can use our senses to discover and appreciate God's creation.
_____	_____	_____	We should share the riches of God's gifts with others, particularly the hungry or thirsty.
_____	_____	_____	God's creation is good and we are called to care for the earth.

ACADEMIC GRADE LEVEL SUBJECT AREA EXPECTATIONS

Physical Sciences: Properties of materials can be observed, measured, and predicted.

I	R	M	
_____	_____	_____	Know that objects can be described in terms of the materials they are made of (e.g., clay, cloth, paper) and their physical properties (e.g., color, size, shape, weight, texture, flexibility, attraction to magnets, floating, sinking).
_____	_____	_____	Know that water can be a liquid or a solid and can be made to change back and forth from one form to the other.
_____	_____	_____	Know that water left in an open container evaporates (goes into the air) but water in a closed container does not.

Life Sciences: Different types of plants and animals inhabit the earth.

I	R	M	
_____	_____	_____	Observe and describe similarities and differences in the appearance and behavior of plants and animals (e.g., seed-bearing plants, birds, fish, insects).
_____	_____	_____	Know that stories sometimes give plants and animals attributes they do not really have.
_____	_____	_____	Identify major structures of common plants and animals (e.g., stems, leaves, roots, arms, wings, legs).

Earth Sciences: Earth is composed of land, air, and water.

I	R	M	
_____	_____	_____	Know the characteristics of mountains, rivers, oceans, valleys, deserts, and local landforms.
_____	_____	_____	Recognize that changes in weather occur from day to day and across seasons, affecting Earth and its inhabitants.
_____	_____	_____	Identify resources from Earth that are used in everyday life and understand that many resources can be conserved.

Investigation and

Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

I	R	M	
_____	_____	_____	Observe common objects by using the five senses.
_____	_____	_____	Describe the properties of common objects.
_____	_____	_____	Describe the relative position of objects by using one reference (e.g., above or below).
_____	_____	_____	Compare and sort common objects by one physical attribute (e.g., color, shape, texture, size, weight).
_____	_____	_____	Communicate observations orally and through drawings.

GRADE LEVEL SUBJECT AREA EXPECTATIONS
DIOCESE OF FRESNO
FIRST GRADE

EXPECTATIONS FOR RELIGIOUS INTEGRATION AND ARTICULATION

I	R	M	
_____	_____	_____	We must be good stewards of God’s creation. This means we care for animals and plants and take care to use them wisely and not wastefully.
_____	_____	_____	God created everything, including the earth, water and materials in different states—all reflect God’s goodness.
_____	_____	_____	We are responsible to care for the environment which provides a habitat for humans and all other creatures.
_____	_____	_____	Through our scientific discoveries, we can greater appreciate the creative genius of God.
_____	_____	_____	The weather helps God’s creation to survive and grow. Rain and sun help plants grow and bear fruit. The seasons provide rest for some animals.

ACADEMIC GRADE LEVEL SUBJECT AREA EXPECTATIONS

Physical Sciences: Materials come in different forms (states), including solids, liquids, and gases.

I	R	M	
_____	_____	_____	Know that solids, liquids, and gases have different properties.
_____	_____	_____	Recognize that the properties of substances can change when the substances are mixed, cooled, or heated.

Life Sciences: Plants and animals meet their needs in different ways.

I	R	M	
_____	_____	_____	State that different plants and animals inhabit different kinds of environments and have external features that help them thrive in different kinds of places.
_____	_____	_____	Recognize that both plants and animals need water, animals need food, and plants need light.
_____	_____	_____	Know animals eat plants or other animals for food and may also use plants or even other animals for shelter and nesting.
_____	_____	_____	Infer what animals eat from the shapes of their teeth (e.g., sharp teeth: eats meat; flat teeth: eats plants).

I	R	M	
_____	_____	_____	Can articulate that roots are associated with the intake of water and soil nutrients and green leaves are associated with making food from sunlight.

Earth Sciences: Weather can be observed, measured, and described.

I	R	M	
_____	_____	_____	Identify and use simple tools (e.g., thermometer, wind vane) to measure weather conditions and record changes from day to day and across the seasons.
_____	_____	_____	Know that the weather changes from day to day but that trends in temperature or of rain (or snow) tend to be predictable during a season.
_____	_____	_____	Understand that the sun warms the land, air, and water.

Investigation and Experimentation:

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

I	R	M	
_____	_____	_____	Draw pictures that portray some features of the thing being described.
_____	_____	_____	Record observations and data with pictures, numbers, or written statements.
_____	_____	_____	Record observations on a bar graph.
_____	_____	_____	Describe the relative position of objects by using two references (e.g., above and next to, below and left of).
_____	_____	_____	Make new observations when discrepancies exist between two descriptions of the same object or phenomenon.

GRADE LEVEL SUBJECT AREA EXPECTATIONS
DIOCESE OF FRESNO
SECOND GRADE

EXPECTATIONS FOR RELIGIOUS INTEGRATION AND ARTICULATION

I R M

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|-------|-------|-------|--|
| _____ | _____ | _____ | God has given us the intelligence to make useful machines and tools. |
| _____ | _____ | _____ | The reproductive cycles of plants and animals are part of God’s beautiful plan so that plants and animals can continue to exist. |
| _____ | _____ | _____ | Fossils tell us about the past, even about creatures that are not mentioned in the Bible, since the Bible is a book of faith and not of science. |
| _____ | _____ | _____ | The order and beauty of the universe point to the existence of an intelligent God who put His plans into existence. |
| _____ | _____ | _____ | We do not live forever on the earth. Our life continues spiritually in our life with Christ and physically through the following generations. |

ACADEMIC GRADE LEVEL SUBJECT AREA EXPECTATIONS

Physical Sciences: The motion of objects can be observed and measured.

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| _____ | _____ | _____ | Know the position of an object can be described by locating it in relation to another object or to the background. |
| _____ | _____ | _____ | Know an object’s motion can be described by recording the change in position of the object over time. |
| _____ | _____ | _____ | Know that the way to change how something is moving is by giving it a push or a pull. The size of the change is related to the strength, or the amount of force, of the push or pull. |
| _____ | _____ | _____ | Identify tools and machines that are used to apply pushes and pulls (forces) to make things move. |
| _____ | _____ | _____ | Understand that objects fall to the ground unless something holds them up. |
| _____ | _____ | _____ | Know that magnets can be used to make some objects move without being touched. |
| _____ | _____ | _____ | Know that sound is made by vibrating objects and can be described by its pitch and volume. |

Life Sciences: Plants and animals have predictable life cycles.

- | I | R | M | |
|-------|-------|-------|---|
| _____ | _____ | _____ | Know that organisms reproduce offspring of their own kind and that the offspring resemble their parents and one another. |
| _____ | _____ | _____ | Know that sequential stages of life cycles are different for different animals (e.g., butterflies, frogs, and mice, etc.). |
| _____ | _____ | _____ | Understand that many characteristics of an organism are inherited from the parents. Some characteristics are caused or influenced by the environment. |

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| _____ | _____ | _____ | Identify variations among individuals of one kind within a population. |
| _____ | _____ | _____ | Know that light, gravity, touch, or environmental stress can affect the germination, growth, and development of plants. |
| _____ | _____ | _____ | Associate flowers and fruits with plant reproduction. |

Earth Sciences: Earth is made of materials that have distinct properties and provide resources for human activities.

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| I | R | M | |
| _____ | _____ | _____ | Compare the physical properties of different kinds of rocks and know that rock is composed of different combinations of minerals. |
| _____ | _____ | _____ | Know that smaller rocks come from the breakage and weathering of larger rocks. |
| _____ | _____ | _____ | Can state that soil is made partly from weathered rock and partly from organic materials and that soils differ in their color, texture, capacity to retain water, and ability to support the growth of many kinds of plants. |
| _____ | _____ | _____ | Know that fossils provide evidence about the plants and animals that lived long ago and that scientists learn about the past history of earth by studying fossils. |
| _____ | _____ | _____ | Know that rock, water, plants, and soil provide many resources, including food, fuel, and building materials, that humans use. |

Investigation and

Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

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| I | R | M | |
| _____ | _____ | _____ | Make predictions based on observed patterns and not random guessing. |
| _____ | _____ | _____ | Measure length, weight, temperature, and liquid volume with appropriate tools and express those measurements in standard metric system units. |
| _____ | _____ | _____ | Compare and sort common objects according to two or more physical attributes (e.g., color, shape, texture, size, weight). |

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| _____ | _____ | _____ | Write or draw descriptions of a sequence of steps, events, and observations. |
| _____ | _____ | _____ | Construct bar graphs to record data, using appropriately labeled axes. |
| _____ | _____ | _____ | Use magnifiers or microscopes to observe and draw descriptions of small objects or small features of objects. |
| _____ | _____ | _____ | Follow oral instructions for a scientific investigation. |

GRADE LEVEL SUBJECT AREA EXPECTATIONS
DIOCESE OF FRESNO
THIRD GRADE

EXPECTATIONS FOR RELIGIOUS INTEGRATION AND ARTICULATION

- | I | R | M | |
|-------|-------|-------|--|
| _____ | _____ | _____ | God created all matter, and through human abilities, we can harness and utilize this matter prudently for the betterment of humanity. |
| _____ | _____ | _____ | Evolution of species is a theory, not a fact. In whatever ways life forms have evolved, God is the origin of all life and put into place certain rules or principles by which forms of life adapted and changed. |
| _____ | _____ | _____ | We respond to God’s creation with awe and admiration while we explore the interconnection between the forces of earth and its cycles. |

_____ God created natural methods for renewing our planet. There are truths to be discovered about God’s intentions for His universe.

ACADEMIC GRADE LEVEL SUBJECT AREA EXPECTATIONS

Physical Sciences: Energy and matter have multiple forms and can be changed from one form to another.

I	R	M	
_____	_____	_____	Know that energy comes from the Sun to Earth in the form of light.
_____	_____	_____	Understand that sources of stored energy take many forms, such as food, fuel, and batteries.
_____	_____	_____	Name machines and living things that convert stored energy to motion and heat.
_____	_____	_____	Can describe how energy can be carried from one place to another by waves, such as water waves and sound waves, by electric current, and by moving objects.
_____	_____	_____	Can state the three forms of matter: solid, liquid, and gas.
_____	_____	_____	Know that evaporation and melting are changes that occur when the objects are heated.
_____	_____	_____	Know that when two or more substances are combined, a new substance may be formed with properties that are different from those of the original materials.
_____	_____	_____	Know that all matter is made of small particles called atoms, too small to see with the naked eye.

I	R	M	
_____	_____	_____	Can state that people once thought that earth, wind, fire, and water were the basic elements that made up all matter. Science experiments show that there are more than 100 different types of atoms, which are presented on the periodic table of the elements.

Light has a source and travels in a direction.

I	R	M	
_____	_____	_____	Know sunlight can be blocked to create shadows.
_____	_____	_____	Know that light is reflected from mirrors and other surfaces.
_____	_____	_____	Know that the color of light striking an object affects the way the object is seen.
_____	_____	_____	Understand that an object is seen when light traveling from the object enters the eye.

Life Sciences: Adaptations in physical structure or behavior may improve an organism’s chance for survival. As a basis for understanding this concept:

I	R	M	
_____	_____	_____	Can articulate that plants and animals have structures that serve different functions in growth, survival, and reproduction.
_____	_____	_____	Can give examples of diverse life forms in different environments, (e.g., oceans, deserts, tundra, forests, grasslands, and wetlands, etc.).
_____	_____	_____	Know that living things cause changes in the environment in which they live: some of these changes are detrimental to the organism or other organisms, and some are beneficial.
_____	_____	_____	Can state that when the environment changes, some plants and animals survive and reproduce; others die or move to new locations.
_____	_____	_____	Know that some kinds of organisms that once lived on Earth have completely disappeared and that some of those resembled others that are alive today.

Earth Sciences: Objects in the sky move in regular and predictable patterns. As a basis for understanding this concept:

I	R	M	
_____	_____	_____	Can discuss that the patterns of stars stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons.
_____	_____	_____	Record the way in which the Moon's appearance changes during the four-week lunar cycle.
_____	_____	_____	Know that telescopes magnify the appearance of some distant objects in the sky, including the Moon and the planets. The number of stars that can be seen through telescopes is dramatically greater than the number that can be seen by the unaided eye.
_____	_____	_____	Know that Earth is one of several planets that orbit the Sun and that the Moon orbits Earth.
_____	_____	_____	Know that the position of the Sun in the sky changes during the course of the day and from season to season.

Investigation and

Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content on the other three strands, students should develop their own questions and perform investigations.

I	R	M	
_____	_____	_____	Repeat observations to improve accuracy and know that the results of similar scientific investigations seldom turn out exactly the same because of differences in the things being investigated, methods being used, or uncertainty in the observation.
_____	_____	_____	Differentiate evidence from opinion and know that scientists do not rely on claims or conclusions unless they are backed by observations that can be confirmed.
_____	_____	_____	Use numerical data in describing and comparing objects, events, and measurements.
_____	_____	_____	Predict the outcome of a simple investigation and compare the result with the prediction.
_____	_____	_____	Collect data in an investigation and analyze those data to develop a logical conclusion.

**GRADE LEVEL SUBJECT AREA EXPECTATIONS
DIOCESE OF FRESNO
FOURTH GRADE**

EXPECTATIONS FOR RELIGIOUS INTEGRATION AND ARTICULATION

I	R	M	
_____	_____	_____	All living and non-living creatures serve a purpose in God’s plan and each has a special place in creation. We continue to discover the truth and a better understanding of their roles.
_____	_____	_____	Evolution of species is a theory, not a fact. In whatever ways life forms have evolved, God is the origin of all life and put into place certain rules or principles by which forms of life adapted and changed.
_____	_____	_____	All creation (all the universe) is constantly changing and limited, but God is unchanging and eternal.
_____	_____	_____	All creatures bear a certain resemblance to God, especially humans, created in the image and likeness of God.

ACADEMIC GRADE LEVEL SUBJECT AREA EXPECTATIONS

Physical Sciences: Electricity and magnetism are related effects that have many useful applications in everyday life.

I	R	M	
_____	_____	_____	Design and build simple series and parallel circuits by using components such as wires, batteries, and bulbs.

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| _____ | _____ | _____ | Build a simple compass and use it to detect magnetic effects, including Earth's magnetic field. |
| _____ | _____ | _____ | Know that electric currents produce magnetic fields and know how to build a simple electromagnet. |
| _____ | _____ | _____ | Describe the role of electromagnets in the construction of electric motors, electric generators, and simple devices, such as doorbells and earphones. |
| _____ | _____ | _____ | Know that electrically charged objects attract or repel each other. |
| _____ | _____ | _____ | Discuss the facts that magnets have two poles (north and south), and that like poles repel each other while unlike poles attract each other. |
| _____ | _____ | _____ | Know that electrical energy can be converted to heat, light, and motion. |

Life Sciences: All organisms need energy and matter to live and grow.

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| I | R | M | |
| _____ | _____ | _____ | Know that plants are the primary source of matter and energy entering most food chains. |
| _____ | _____ | _____ | Understand that producers and consumers (herbivores, carnivores, omnivores, and decomposers) are related in food chains and food webs and may compete with each other for resources in an ecosystem. |
| _____ | _____ | _____ | Identify the decomposers, including many fungi, insects, and micro-organisms, that recycle matter from dead plants and animals. |

Living organisms depend on one another and on their environment for survival.

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| I | R | M | |
| _____ | _____ | _____ | Know that ecosystems can be characterized by their living and nonliving components. |
| _____ | _____ | _____ | Know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all. |
| _____ | _____ | _____ | Know that many plants depend on animals for pollination and seed dispersal, and animals depend on plants for food and shelter. |
| _____ | _____ | _____ | Can discuss the fact that most micro-organisms do not cause disease and that many are beneficial. |

Earth Sciences: The properties of rocks and minerals reflect the processes that formed them.

I	R	M
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| _____ | _____ | _____ | Differentiate among igneous, sedimentary, and metamorphic rocks by referring to their properties and methods of formation (the rock cycle). |
| _____ | _____ | _____ | Identify common rock-forming minerals (including quartz, calcite, feldspar, mica, and hornblende) and ore minerals by using a table of diagnostic properties. |

Waves, wind, water, and ice shape and reshape Earth's land surface.

- | I | R | M | |
|-------|-------|-------|---|
| _____ | _____ | _____ | Know that some changes in the earth are due to slow processes, (e.g., erosion, and some changes are due to rapid processes, e.g., landslides, volcanic eruptions, and earthquakes). |
| _____ | _____ | _____ | Describe natural processes, including freezing and thawing and the growth of roots, cause rocks to break down into smaller pieces. |
| _____ | _____ | _____ | Know that moving water erodes landforms, reshaping the land by taking it away from some places and depositing it as pebbles, sand, silt, and mud in other places (weathering, transport, and deposition). |

Investigation and

Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

- | I | R | M | |
|-------|-------|-------|---|
| _____ | _____ | _____ | Differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations. |
| _____ | _____ | _____ | Measure and estimate the weight, length, or volume of objects. |
| _____ | _____ | _____ | Formulate and justify predictions based on cause-and-effect relationships. |
| _____ | _____ | _____ | Conduct multiple trials to test a prediction and draw conclusions about the relationships between predictions and results. |
| _____ | _____ | _____ | Construct and interpret graphs from measurements. |
| _____ | _____ | _____ | Follow a set of written instructions for a scientific investigation. |

GRADE LEVEL SUBJECT AREA EXPECTATIONS
DIOCESE OF FRESNO
FIFTH GRADE

EXPECTATIONS FOR RELIGIOUS INTEGRATION AND ARTICULATION

I	R	M	
_____	_____	_____	God is responsible for the creation of all matter, even the smallest, unseen elements of matter. God is revealed to us through the complexity and magnificence of the macro-universe and the micro-universe.
_____	_____	_____	Students are led to realize and appreciate God’s infinite creation, the variety of life forms, and the balanced relationships between life forms and their surroundings. Life, which is the core of God’s creation, is to be respected and valued.
_____	_____	_____	God created balance in our world. Conservation, preservation and propagation are key facets of all life forms.
_____	_____	_____	Water is essential for the preservation of life. As faithful stewards of creation, we must take special care to avoid pollution of our streams, rivers, lakes, oceans and all water sources.

ACADEMIC GRADE LEVEL SUBJECT AREA EXPECTATIONS

Physical Sciences: Elements and their combinations account for all the varied types of matter in the world.

I	R	M	
_____	_____	_____	Can articulate that during chemical reactions the atoms in the reactants rearrange to form products with different properties.
_____	_____	_____	State that all matter is made of atoms, which may combine to form molecules.
_____	_____	_____	Know that metals have properties in common, such as high electrical and thermal conductivity. Some metals, such as aluminum (Al), iron (Fe), nickel (Ni), copper (Cu), silver (Ag), and gold (Au), are pure elements; others, such as steel and brass, are composed of a combination of elemental metals.
_____	_____	_____	Can state that each element is made of one kind of atom and that the elements are organized in the periodic table by their chemical properties.

_____ _____ _____ Know that scientists have developed instruments that can create discrete images of atoms and molecules that show that the atoms and molecules often occur in well-ordered arrays.

I	R	M	
_____	_____	_____	Differentiate between the chemical and physical properties of substances that are used to separate mixtures and compounds.
_____	_____	_____	Memorize the properties of solid, liquid, and gaseous substances, such as sugar (C ₆ H ₁₂ O ₆), water (H ₂ O), helium (He), oxygen (O ₂), nitrogen (N ₂), and carbon dioxide (CO ₂).
_____	_____	_____	Know that living organisms and most materials are composed of just a few elements.
_____	_____	_____	Memorize the common properties of salts, such as sodium chloride (NaCl).

Life Sciences: Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials.

I	R	M	
_____	_____	_____	Know that many multi-cellular organisms have specialized structures to support the transport of materials.
_____	_____	_____	Describe how blood circulates through the heart chambers, lungs, and body and how carbon dioxide (CO ₂) and oxygen (O ₂) are exchanged in the lungs and tissues.
_____	_____	_____	State the sequential steps of digestion and the roles of teeth and the mouth, esophagus, stomach, small intestine, large intestine, and colon in the function of the digestive system.
_____	_____	_____	Identify the role of the kidney in removing cellular waste from blood and converting it into urine, which is stored in the bladder.
_____	_____	_____	Explain how sugar, water, and minerals are transported in a vascular plant.
_____	_____	_____	Describe how plants use carbon dioxide (CO ₂) and energy from sunlight to build molecules of sugar and release oxygen.
_____	_____	_____	Describe the process by which plant and animal cells break down sugar to obtain energy, a process resulting in carbon dioxide (CO ₂) and water (respiration).

Earth Sciences: Water on Earth moves between the oceans and land through the processes of evaporation and condensation. As a basis for understanding this concept:

I	R	M
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| _____ | _____ | _____ | Know that most of Earth’s water is present as salt water in the oceans, which cover most of Earth’s surface. |
| _____ | _____ | _____ | Know that when liquid water evaporates, it turns into water vapor in the air and can reappear as a liquid when cooled or as a solid if cooled below the freezing point of water. |
| _____ | _____ | _____ | Know that water vapor in the air moves from one place to another and can form fog or clouds, which are tiny droplets of water or ice, and can fall to Earth as rain, hail, sleet, or snow. |
| _____ | _____ | _____ | Know that the amount of fresh water located in rivers, lakes, under-ground sources, and glaciers is limited and that its availability can be extended by recycling and decreasing the use of water. |
| _____ | _____ | _____ | Can explain the origin of the water used by the local community. |

Energy from the Sun heats Earth unevenly, causing air movements that result in changing weather patterns.

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|-------|-------|-------|--|
| _____ | _____ | _____ | Know that uneven heating of Earth causes air movements (convection currents). |
| _____ | _____ | _____ | Explain the influence that the ocean has on the weather and the role that the water cycle plays in weather patterns. |
| _____ | _____ | _____ | Can explain the causes and effects of different types of severe weather. |
| _____ | _____ | _____ | Demonstrate how to use weather maps and data to predict local weather and know that weather forecasts depend on many variables. |
| _____ | _____ | _____ | Can articulate that the Earth’s atmosphere exerts a pressure that decreases with distance above Earth’s surface and that at any point it exerts this pressure equally in all directions. |

The solar system consists of planets and other bodies that orbit the Sun in predictable paths.

- | I | R | M | |
|-------|-------|-------|---|
| _____ | _____ | _____ | Know that the Sun, an average star, is the central and largest body in the solar system and is composed primarily of hydrogen and helium. |
| _____ | _____ | _____ | Can identify that the solar system includes the planet Earth, the Moon, the Sun, eight other planets and their satellites, and smaller objects, such as asteroids and comets. |
| _____ | _____ | _____ | Know that the path of a planet around the Sun is due to the gravitational attraction between the Sun and the planet. |

Investigation and

Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in other three strands, students should develop their own questions and perform investigations.

I	R	M	
_____	_____	_____	Classify objects (e.g., rocks, plants, leaves) in accordance with appropriate criteria.
_____	_____	_____	Develop a testable question.
_____	_____	_____	Plan and conduct a simple investigation based on a student-developed question and write instructions others can follow to carry out the procedure.
_____	_____	_____	Identify the dependent and controlled variables in an investigation.
_____	_____	_____	Identify a single independent variable in a scientific investigation and explain how this variable can be used to collect information to answer a question about the results of the experiment.
_____	_____	_____	Select appropriate tools (e.g., thermometers, meter sticks, balances, and graduated cylinders) and make quantitative observations.
_____	_____	_____	Record data by using appropriate graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data.

I	R	M	
_____	_____	_____	Draw conclusions from scientific evidence and indicate whether further information is needed to support a specific conclusion.
_____	_____	_____	Write a report of an investigation that includes conducting tests, collecting data or examining evidence, and drawing conclusions.

GRADE LEVEL SUBJECT AREA EXPECTATIONS
DIOCESE OF FRESNO
SIXTH GRADE

EXPECTATIONS FOR RELIGIOUS INTEGRATION AND ARTICULATION

I	R	M	
_____	_____	_____	God does not cause humans to suffer due to natural disasters. Human suffering in these occurrences happens as a result of human decisions (where to live and work.)
_____	_____	_____	God has given us the intelligence and wisdom to harness the Forces of nature for good; however, due to our sinfulness, we can also use these forces for evil purposes.
_____	_____	_____	All creation is interrelated and so we must be careful in making changes for the sake of progress. God designed the “circle of life” and we must work to understand God’s plan and preserve the balance of nature.
_____	_____	_____	The beauty, harmony and order of the universe reflect the infinite beauty, harmony and order of the Creator.

ACADEMIC GRADE LEVEL SUBJECT AREA EXPECTATIONS

Focus on Earth Science

Plate Tectonics and

Earth's Structure: Plate tectonics accounts for important features of Earth's surface and major geologic events.

I	R	M	
_____	_____	_____	Show evidence that plate tectonics is derived from the fit of the continents; the location of earthquakes, volcanoes, and mid-ocean ridges; and the distribution of fossils, rock types, and ancient climatic zones.
_____	_____	_____	Describe the several layers of the earth: a cold, brittle lithosphere; a hot, convecting mantle; and a dense, metallic core.
_____	_____	_____	Know that lithospheric plates the size of continents and oceans move at rates of centimeters per year in response to movements in the mantle.
_____	_____	_____	Know that earthquakes are sudden motions along breaks in the crust called faults and that volcanoes and fissures are locations where magma reaches the surface.

I	R	M	
_____	_____	_____	Articulate that major geologic events, such as earthquakes, volcanic eruptions, and mountain building, result from plate motions.
_____	_____	_____	Explain major features of California geology (including mountains, faults, volcanoes) in terms of plate tectonics.
_____	_____	_____	Describe how to determine the epicenter of an earthquake and know that the effects of an earthquake on any region vary, depending on the size of the earthquake, the distance of the region from the epicenter, the local geology, and the type of construction in the region.

Shaping Earth's Surface:

Topography is reshaped by the weathering of rock and soil and by the transportation and deposition of sediment

I	R	M	
_____	_____	_____	Know that water running downhill is the dominant process in shaping the landscape, including California's landscape.
_____	_____	_____	Describe how rivers and streams are dynamic systems that erode, transport sediment, change course, and flood their banks in natural and recurring patterns.

_____ Know that beaches are dynamic systems in which the sand is supplied by rivers and moved along the coast by the action of waves.

_____ Describe how earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats.

Heat (Thermal Energy)

(Physical Science): Heat moves in a predictable flow from warmer objects to cooler objects until all the objects are at the same temperature.

I R M
_____ Explain how energy can be carried from one place to another by heat flow or by waves, including water, light and sound waves, or by moving objects.

_____ Know that when fuel is consumed, most of the energy released becomes heat energy.

_____ Describe how heat flows in solids by conduction (which involves no flow of matter) and in fluids by conduction and by convection (which involves flow of matter).

I R M
_____ Know that heat energy is also transferred between objects by radiation (radiation can travel through space).

Energy in the Earth

System: Many phenomena on Earth's surface are affected by the transfer of energy through radiation and convection currents.

I R M
_____ Identify the sun as the major source of energy for phenomena on Earth's surface; it powers winds, ocean currents, and the water cycle.

_____ Know that solar energy reaches Earth through radiation, mostly in the form of visible light.

_____ Can describe the convection process: how the earth's interior heat reaches the surface.

_____ Can describe how convection currents distribute heat in the atmosphere and oceans.

_____ Know that differences in pressure, heat, air movement, and humidity result in changes of weather.

Ecology

(Life Science): Organisms in ecosystems exchange energy and nutrients among themselves and with the environment.

I	R	M	
_____	_____	_____	Describe how energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organism to organism through food webs.
_____	_____	_____	Can articulate how matter is transferred over time from one organism to others in the food web and between organisms and the physical environment.
_____	_____	_____	Understand that populations of organisms can be categorized by the functions they serve in an ecosystem.
_____	_____	_____	Know that different kinds of organisms may play similar ecological roles in similar biomes.
_____	_____	_____	Explain how the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.

Resources: Sources of energy and materials differ in amounts, distribution, usefulness, and the time required for their formation.

I	R	M	
_____	_____	_____	Know that utility of energy sources is determined by factors that are involved in converting these sources to useful forms and the consequences of the conversion process.
_____	_____	_____	Know the different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water, wildlife, and forests, and know how to classify them as renewable or nonrenewable.
_____	_____	_____	Know the natural origin of the materials used to make common objects.

Investigation and

Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

I	R	M	
_____	_____	_____	Develop a hypothesis.
_____	_____	_____	Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
_____	_____	_____	Construct appropriate graphs from data and develop qualitative statements about the relationships between variables.

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| _____ | _____ | _____ | Communicate the steps and results from an investigation in written reports and oral presentations. |
| _____ | _____ | _____ | Recognize whether evidence is consistent with a proposed explanation. |
| _____ | _____ | _____ | Read a topographic map and a geologic map for evidence provided on the maps and construct and interpret a simple scale map. |

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|-------|-------|-------|--|
| I | R | M | |
| _____ | _____ | _____ | Interpret events by sequence and time from natural phenomena (e.g., the relative ages of rocks and intrusions). |
| _____ | _____ | _____ | Identify changes in natural phenomena over time without manipulating the phenomena (e.g., a tree limb, a grove of trees, a stream, a hillslope). |

GRADE LEVEL SUBJECT AREA EXPECTATIONS
DIOCESE OF FRESNO
SEVENTH GRADE

EXPECTATIONS FOR RELIGIOUS INTEGRATION AND ARTICULATION

I	R	M	
_____	_____	_____	Discovering and understanding the genetics and structure of plant, animal and human life is a good process. However, we must adhere to the teachings of the church when we choose to manipulate life and its structure.
_____	_____	_____	The applications of science must also follow moral guidelines, as stated in the teachings of the Church, so that life in all its forms is respected.
_____	_____	_____	Students will appreciate the interrelatedness, balance and complexity of human anatomy, created by a loving God who “knew me even in my mother’s womb.”
_____	_____	_____	All human life is sacred and must be protected from the moment of conception.
_____	_____	_____	Evolution of species is a theory, not a fact. In whatever ways life forms have come to be, God is the origin of all life and put into place certain rules or principles by which forms of life adapted and changed.

ACADEMIC GRADE LEVEL SUBJECT AREA EXPECTATIONS

Focus on Life Science

Cell Biology: All living organisms are composed of cells, from just one to many trillions, whose details usually are visible only through a microscope.

I	R	M	
_____	_____	_____	Know that cells function similarly in all living organisms.
_____	_____	_____	Can articulate the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.

_____	_____	_____	Identify the nucleus as the repository for genetic information in plant and animal cells.
_____	_____	_____	Describe how mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis.
_____	_____	_____	Explain how cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes.
I	R	M	
_____	_____	_____	Explain how cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes.
_____	_____	_____	Describe the development and differentiation of multi-cellular organisms.

Genetics:

A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences.

_____	_____	_____	
I	R	M	
_____	_____	_____	Describe the differences between the life cycles and reproduction methods of sexual and asexual organisms.
_____	_____	_____	Know that sexual reproduction produces offspring that inherit half their genes from each parent.
_____	_____	_____	Learn that an inherited trait can be determined by one or more genes.
_____	_____	_____	Can articulate how plant and animal cells contain many thousands of different genes and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive.
_____	_____	_____	Define DNA (deoxyribonucleic acid) as the genetic material of living organisms that is located in the chromosomes of each cell.

Evolution:

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

_____	_____	_____	
I	R	M	
_____	_____	_____	Can explain that both genetic variation and environmental factors are causes of evolution and diversity of organisms.
_____	_____	_____	Discuss the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution.
_____	_____	_____	Know how independent lines of evidence from geology, fossils, and comparative anatomy provide the bases for the theory of evolution.

_____ Construct a simple branching diagram to classify living groups of organisms by shared derived characteristics and how to expand the diagram to include fossil organisms.

I R M

_____ Know how extinction of a species occurs when the environment changes and that the adaptive characteristics of a species are insufficient for its survival.

Earth and Life History

(Earth Science): Evidence from rocks allows us to understand the evolution of life on Earth.

I R M

_____ Know Earth processes today are similar to those that occurred in the past and slow geologic processes have large cumulative effects over long periods of time.

_____ Explain how the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impacts of asteroids.

_____ Know that the rock cycle includes the formation of new sediment and rocks and that rocks are often found in layers, with the oldest generally on the bottom.

_____ Know that evidence from geologic layers and radioactive dating, indicates Earth is approximately 4.6 billion years old and that life on this planet has existed for more than 3 billion years.

_____ Examine how fossils provide evidence of life and how environmental conditions have changed.

_____ Can articulate how movements of Earth's continental and oceanic plates through time, with associated changes in climate and geographic connections, have affected the past and present distribution of organisms.

_____ Explain significant developments and extinctions of plant and animal life on the geologic time scale.

Structure and Function

in Living Systems: The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function.

I R M

_____ Describe how plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.

_____ Know that organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.

I	R	M	
_____	_____	_____	Describe how bones and muscles work together to provide a structural framework for movement.
_____	_____	_____	Examine how the reproductive organs of the human female and male generate eggs and sperm and how sexual activity may lead to fertilization and pregnancy.
_____	_____	_____	Know the function of the umbilicus and placenta during pregnancy.

I	R	M	
_____	_____	_____	Can describe the structures and processes by which flowering plants generate pollen, ovules, seeds, and fruit.
_____	_____	_____	Relate the structures of the eye and ear to their functions.

Physical Principles in Living Systems

(Physical Science): Physical principles underlie biological structures and functions.

I	R	M	
_____	_____	_____	Understand that visible light is a small band within a very broad electromagnetic spectrum.
_____	_____	_____	Know that for an object to be seen, light emitted by or scattered from it, must be detected by the eye.
_____	_____	_____	Know that light travels in straight lines if the medium it travels through does not change.
_____	_____	_____	Know how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.
_____	_____	_____	Know that white light is a mixture of many wavelengths (colors) and that retinal cells react differently to different wavelengths.
_____	_____	_____	Describe how light can be reflected, refracted, transmitted, and absorbed by matter.
_____	_____	_____	Know that the angle of reflection of a light beam is equal to the angle of incidence.
_____	_____	_____	Compare joints in the body (wrist, shoulder, thigh) with structures used in machines and simple devices (hinge, ball-and-socket, and sliding joints).
_____	_____	_____	Experience how levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.
_____	_____	_____	Describe how contractions of the heart generate blood pressure and that heart valves prevent backflow of blood in the circulatory system.

Investigation and

Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the

content in the other three strands, students should develop their own questions and perform investigations.

I	R	M	
_____	_____	_____	Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
_____	_____	_____	Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.
_____	_____	_____	Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
_____	_____	_____	Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure).
_____	_____	_____	Communicate the steps and results from an investigation in written reports and oral presentations.

GRADE LEVEL SUBJECT AREA EXPECTATIONS
DIOCESE OF FRESNO
EIGHTH GRADE

EXPECTATIONS FOR RELIGIOUS INTEGRATION AND ARTICULATION

I	R	M	
_____	_____	_____	Mystery is a real part of our existence. We do not fully understand all of the forces of nature, just as we do not fully understand the reality of God. Through study and reflection (and experimentation in the case of science), we slowly unravel some aspects of some mysteries.
_____	_____	_____	Regardless of the size of the universe, God is everywhere—in the furthest depths of the universe and in the smallest component of matter.
_____	_____	_____	The earth has a special place in the universe, not by virtue of its location or composition, but by the fact that God sent us Jesus so that we could know Him, love Him, and be with Him in eternity.
_____	_____	_____	There is, as of yet, no definitive proof of other forms of life in the universe. If such life exists, God is its source and God's love embraces all of creation.
_____	_____	_____	While we can discover the chemical and biological components of life, we must constantly understand that the life force comes from God, the Creator of all life.
_____	_____	_____	Our dominion over living and non-living creatures is limited by our concern for the welfare of others and of future generations.

ACADEMIC GRADE LEVEL SUBJECT AREA EXPECTATIONS

Focus on Physical Science

Motion: The velocity of an object is the rate of change of its position.

I	R	M	
_____	_____	_____	Prove that position is defined in relation to some choice of a standard reference point and a set of reference directions.
_____	_____	_____	Know that average speed is the total distance traveled divided by the total time elapsed and that the speed of an object along the path traveled can vary.
_____	_____	_____	Solve problems involving distance, time, and average speed.
_____	_____	_____	Show that the velocity of an object must be described by specifying both the direction and the speed of the object.
_____	_____	_____	speed, direction, or both.

I	R	M	
_____	_____	_____	Interpret graphs of position versus time and graphs of speed versus time for motion in a single direction.

Forces: Unbalanced forces cause changes in velocity.

I	R	M	
_____	_____	_____	Know that a force has both direction and magnitude.
_____	_____	_____	Understand that when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces.

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|-------|-------|-------|--|
| _____ | _____ | _____ | Show that 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. |
| _____ | _____ | _____ | Prove that when the forces on an object are unbalanced, the object will change its velocity (that is, it will speed up, slow down, or change direction). |
| _____ | _____ | _____ | Prove that the greater the mass of an object, the more force is needed to achieve the same rate of change in motion. |
| _____ | _____ | _____ | Know the role of gravity in forming and maintaining the shapes of planets, stars, and the solar system. |

Structure of Matter:

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.

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|-------|-------|-------|---|
| I | R | M | |
| _____ | _____ | _____ | Know the structure of the atom and know it is composed of protons, neutrons, and electrons. |
| _____ | _____ | _____ | Understand that compounds are formed by combining two or more different elements and that compounds have properties that are different from their constituent elements. |
| _____ | _____ | _____ | Show that atoms and molecules form solids by building up repeating patterns, such as the crystal structure of NaCl or long-chain polymers. |
| _____ | _____ | _____ | Know the states of matter (solid, liquid, gas) depend on molecular motion. |

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|-------|-------|-------|--|
| I | R | M | |
| _____ | _____ | _____ | Discuss 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. |
| _____ | _____ | _____ | Use the periodic table to identify elements in simple compounds. |

Earth in the Solar System

(Earth Science): The structure and composition of the universe can be learned from studying stars and galaxies and their evolution.

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| I | R | M | |
| _____ | _____ | _____ | Explain that galaxies are clusters of billions of stars and may have different shapes. |

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| _____ | _____ | _____ | Explain that the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, temperature, and color. |
| _____ | _____ | _____ | Know that astronomical units and light years are measures of distances between the Sun, stars, and Earth. |
| _____ | _____ | _____ | Describe how the stars are the source of light for all bright objects in outer space and that the Moon and planets shine by reflected sunlight, not by their own light. |
| _____ | _____ | _____ | Have knowledge of the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids. |

Reactions: Chemical reactions are processes in which atoms are rearranged into different combinations of molecules.

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| I | R | M | |
| _____ | _____ | _____ | Know that reactant atoms and molecules interact to form products with different chemical properties. |
| _____ | _____ | _____ | Know that 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. |
| _____ | _____ | _____ | Explain that chemical reactions usually liberate heat or absorb heat. |

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| I | R | M | |
| _____ | _____ | _____ | Know 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. |

Chemistry of Living Systems

(Life Science): Principles of chemistry underlie the functioning of biological systems.

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|-------|-------|-------|--|
| I | R | M | |
| _____ | _____ | _____ | Understand that carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living organisms. |
| _____ | _____ | _____ | Know that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur. |
| _____ | _____ | _____ | Explain 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. |

Periodic Table: The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms.

I	R	M	
_____	_____	_____	Identify regions corresponding to metals, nonmetals, and inert gases.
_____	_____	_____	Know that 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.
_____	_____	_____	Explain that substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity.

Density and Buoyancy:

All objects experience a buoyant force when immersed in a fluid.

I	R	M	
_____	_____	_____	Understand that density is mass per unit volume.

I	R	M	
_____	_____	_____	Calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume.
_____	_____	_____	Experiment to prove the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced.
_____	_____	_____	Predict whether an object will float or sink.

Investigation and

Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

I	R	M	
_____	_____	_____	Plan and conduct a scientific investigation to test a hypothesis.
_____	_____	_____	Evaluate the accuracy and reproducibility of data.
_____	_____	_____	Distinguish between variable and controlled parameters in a test.
_____	_____	_____	Recognize the slope of the linear graph as the constant in the relationship $y=kx$ and apply this principle in interpreting graphs constructed from data.
_____	_____	_____	Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.
_____	_____	_____	Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time, density = mass/volume, force = pressure \times area, volume = area \times height).

_____ _____ _____ Distinguish between linear and nonlinear relationships on a graph of data.