Ganado Unified School District (Science/4th Grade)

PACING Guide SY 2015 - 2016

Timeline & Resources	AZ College and Career Readiness Standard	Essential Question (HESS Matrix)	Learning Goal	Vocabulary (Content/Academic)
1st Quarter **August 2015 to October 2015**	**Getting Ready for Science**			
Resources: ~Student Edition ~Teacher's Editions **Activity Resources:** ~Materials Kit ~Grab'Go Activity Bags ~Activity Flipcharts **Instructional Resources:** ~Reading Essentials ~Leveled Readers and Teacher's Guide Key Resources: ~Building Skills Reading & Writing Book ~Building Skills Activity Lab Book ~Building Skills Math Book ~Building Skills Visual Literacy Book ~Building Skills Assessment Book **Supporting Resources:** ~Vocabulary Cards	Be a Scientist: ~The Scientific Method ~Focus on Skills ~Safety Tips **Strand 1**: **<u>Inquiry Process</u>** **Concept 1**: Observations, Questions, and Hypotheses **PO 1**. Differentiate inferences from observations. **PO 2.** Formulate a relevant question through observations that can be tested by an investigation. **PO 3**. Formulate predications in the realm of science based on observed cause and effect relationships. PO 4. Locate information (e.g., book, article, website) related to an investigation. **Concept 2:** Scientific Testing (Investigating and Modeling) PO 1. Demonstrate safe behavior and appropriate procedures (e.g., use and care of	○ What do Scientists do? ○ How do Scientists test their hypotheses? ○ How do Scientists analyze data? ○ How do Scientists draw conclusions? ○ Which inquiry skill do you use now? ○ Why is *classify* an important inquiry skill? ○ Why is *make a model* an important inquiry skill? ○ Which inquiry skill helps us to understand and analyze the information we learn?	○ Identify the steps in the Scientific Method. ○ Learn how scientists form and test a hypothesis. ○ Understand and use Inquiry Skills. ○ Identify the reasons why safety procedures are important.	○ Scientific Method ○ variable ○ hypothesis ○ experiment ○ independent variable ○ controlled variable ○ data ○ Inquiry Skills ○ observe ○ form a hypothesis ○ communicate ○ classify ○ use numbers ○ make a model ○ use variables ○ interpret data ○ measure ○ predict ○ infer ○ experiment ○ rules

~Key Concept Cards ~School to Home Activities Book ~Transparencies for Visual Literacy Book ~English Language Learner Teacher's Guide ~The Human Body and Teacher's Guide ~Technology-A Closer Look Book and Teacher's Guide Technology Support: ~Interactive Whiteboard Ready **Technology for the Student:** Practice & Activities: ~Science in Motion ~Operation: Science Quest CD-ROM ~Student Works Plus CD-ROM ~Puzzle Maker CD-ROM ~Science Songs Audio CD Science Activity DVD **Technology for the Teacher**: Planning & Instruction: ~Teacher Works Plus CD-ROM ~Professional Development DVD ~Classroom Presentation Toolkit CD-ROM ~Exam View Assessment Suite CD-ROM **Website:** www.macmillanmh.com	technology, materials, and organisms) in all science inquiry. PO 2. Plan a simple investigation that identifies the variable to be controlled. PO 3. Conduct controlled investigations (e.g., related to erosion, plant life cycles, weather, magnetism) in life, physical, and earth and space sciences. PO 4. Measure using appropriate tools (e.g., ruler, scale, balance) and units of measure (i.e., metric, U.S. customary). PO 5. Record data in an organized and appropriate format (e.g., t-chart, table, list, written log). **Concept 3:** Analysis and Conclusions PO 1. Analyze data obtained in a scientific investigation to identify trends. PO 2. Formulate conclusions based upon identified trends in data. PO 3. Determine that data collected is consistent with the formulated question. PO 4. Determine whether the data supports the prediction for an investigation. PO 5. Develop new questions and predictions based upon the data collected in the investigation. **Concept 4:** Communication PO 1. Communicate verbally or in writing the results of an inquiry. PO 2. Choose an appropriate graphic representation for collected data: Bar graph, line graph, Venn diagram, and model PO 3. Communicate with other groups or individuals to compare the results of a common investigation. **Strand 2: <u>History and Nature of Science</u>** **Concept 1:** History of Science as a Human Endeavor	○ What kinds of rules do you have at home? ○ Why do people make rules? ○ Why do you need to be careful when doing science activities? ○ How do each of these rules help you to stay safe?		○ safety tip ○ dispose ○ safety goggles ○ electrical equipment ○ experiment

	PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Margaret Mead [anthropologist], supports Strand 4; Nikola Tesla [engineer, inventor] supports Strand 5; Michael Faraday [scientist], supports Strand 5; Benjamin Franklin [scientist], supports Strand 5). PO 2. Describe science-related career opportunities. **Concept 2:** Nature of Scientific Knowledge PO 1. Explain the role of experimentation in scientific inquiry. PO 2. Describe the interaction of components in a system (e.g., flashlight, radio) PO 3. Explain various ways scientists generate ideas (e.g., observation, experiment, and collaboration, theoretical and mathematical models). **Strand 3: <u>Science in Personal and Social Perspectives</u>** **Concept 1:** Changes in Environments PO 1. Describe how natural events and human activities have positive and negative impacts on environments (e.g., fire floods, pollution, dams). PO 2. Evaluate the consequences of environmental occurrences that happen either rapidly (e.g., fire, flood, tornado) or over a long period of time (e.g., drought, melting ice caps, greenhouse effect, erosion). **Concept 2:** Science and Technology in Society PO 1. Describe how science and technology (e.g., computers, air conditioning, and medicine) have improved the lives of many people.			

	PO 2. Describe benefits (e.g., easy communications, rapid transportation) and risks (e.g., pollution, destruction of natural resources) related to the use of technology. PO 3. Design and construct a technological solution to a common problem or need using common materials.			
1st Quarter **August 2015 to October 2015**	**Life Science** **Unit A: Living Things** **Chapters 1 and 2**			
Resources: ~Student Edition ~Teacher's Editions **Activity Resources:** ~Materials Kit ~Grab'Go Activity Bags ~Activity Flipcharts **Instructional Resources:** ~Reading Essentials ~Leveled Readers and Teacher's Guide Key Resources: ~Building Skills Reading & Writing Book ~Building Skills Activity Lab Book ~Building Skills Math Book ~Building Skills Visual Literacy Book ~Building Skills Assessment Book **Supporting Resources:** ~Vocabulary Cards ~Key Concept Cards ~School to Home Activities Book ~Transparencies for Visual Literacy Book	**Chapter 1: Kingdoms of Life** Lesson 1- Cells Lesson 2- Classifying Living Things Lesson 3- The Plant Kingdom Lesson 4- How Seed Plants Reproduce Chapter 1 Review & Test Preparation •	○ How are living things organized? ○ How are living things grouped? ○ What are plants? ○ How do seed plants grow and reproduce?	○ Summarize five functions of living things. ○ Compare plant and animal cells. ○ Define and compare the kingdoms of living things. ○ Describe different types of microorganisms. ○ Describe the functions of roots, stems, and leaves. ○ Explain the processes of photosynthesis and respiration. ○ Describe pollination in flowering plants. ○ Explain the life cycle of a flowering plant.	○ oxygen ○ Cell ○ organism ○ tissue ○ organ ○ organ system ○ trait ○ kingdom ○ root ○ root hair ○ stem ○ photosynthesis ○ stomata ○ transpiration ○ respiration ○ spore ○ seed ○ reproduction ○ ovary ○ pollination ○ fertilization ○ germination ○ life cycle

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	Chapter 2: The Animal Kingdom Lesson 1- Animals without Backbones Lesson 2- Animals with Backbones Lesson 3- Systems in Animals Lesson 4- Animal Life Cycles Chapter 2 Review & Test Preparation	○ How do animals compare? ○ Which animals have backbones? ○ How do systems help animals survive?	○ Define animal and list the basic needs and characteristics of animals. ○ Summarize the characteristics of	○ vertebrate ○ sponge ○ cnidarian ○ mollusk ○ echinoderm ○ endoskeleton ○ arthropod

		How do animals grow and reproduce?	groups of invertebrates. ○ Define vertebrates and describe their characteristics. ○ Describe the seven groups of vertebrates. ○ Identify seven organ systems of animals. ○ Summarize the structures and functions of the seven organ systems. ○ Compare incomplete metamorphosis to complete metamorphosis. Summarize how traits are passed from parent to offspring?	○ exoskeleton ○ vertebrate ○ warm-blooded ○ cold-blooded ○ amphibian ○ reptile ○ bird ○ mammal ○ skeletal system ○ muscular system ○ nervous system ○ respiratory system ○ circulatory system ○ excretory system ○ digestive system ○ life cycle ○ life span ○ metamorphosis ○ clone ○ heredity ○ inherited behavior ○ instinct ○ learned behavior
	Life Science **Unit B: Ecosystems** **Chapters 3 and 4**			
	Chapter 3: Exploring Ecosystems Lesson 1- Introduction to Ecosystems Lesson 2- Biomes Lesson 3- Relationships in Ecosystems Chapter 3 Review & Test Preparation	○ How do the parts of an ecosystem interact? ○ How do ecosystems compare? ○ How do organisms get energy?	○ Identify abiotic and biotic factors in an ecosystem. ○ Describe ecosystems, communities, and populations. ○ Define a biome. ○ Describe Earth's six main biomes. ○ Explain how energy is cycled through an ecosystem.	○ biotic factor ○ abiotic factor ○ ecosystems ○ habitat ○ population ○ community ○ biome ○ grassland ○ deciduous forest ○ tropical forest ○ desert ○ taiga

			○ Describe food webs and give examples of predator-and-prey relationships.	○ tundra ○ producer ○ decomposer ○ food chain ○ food web ○ competition ○ energy pyramid
	Chapter 4: Surviving in Ecosystems Lesson 1- Animal Adaptations Lesson 2- Plants and Their Surroundings Lesson 3- Changes in the Ecosystems Chapter 4 Review & Test Preparation	○ How do animals survive in their environments? ○ How do plants survive in their environments? ○ How can changes in an environment affect the organisms that live there?	○ Define adaptation and give example of how adaptations help animals to survive in their habitats. ○ Define and describe the types of symbiotic relationships. ○ Describe ways in which plants respond to their environments. ○ Describe plant adaptations. ○ Describe how living and nonliving things cause ecosystems to change. ○ Understand that changes to ecosystems affect living organisms.	○ adaptation ○ hibernate ○ camouflage ○ mimicry ○ stimulus ○ tropism ○ accommodation ○ endangered ○ extinct
	Strand 4: Life Science **Concept 1:** Characteristics of Organisms PO 1. Compare structures in plants (e.g., roots, stems, leaves, flowers) and animals (e.g., muscles, bones, nerves) that serve different functions in growth and survival. PO 2. Classify animals by identifiable group characteristics: • vertebrates – mammals, birds, fish, reptiles, amphibians • invertebrates – insects, arachnids ***Concept 2:*** *Life Cycles* *No performance objectives at this grade level.*			

	Concept 3: Organisms and Environments PO 1. Describe ways various resources (air, water, plants, animals, soil) are utilized to meet the needs of a population. PO 2. Differentiate renewable resources from nonrenewable resources PO 3. Analyze the effect that limited resources (natural gas, minerals) may have on an environment. PO 4. Describe ways in which resources can be conserved (by reducing, reusing, recycling, find substitutes) **Concept 4:** Diversity, Adaptation, and Behavior PO 1. Recognize that successful characteristics of populations are inherited traits that are favorable in a particular environment. PO 2. Give examples of adaptations that allow plants and animals to survive. • camouflage – horned lizards, coyotes • mimicry – Monarch and Viceroy butterflies • physical – cactus spines • Mutualism – species of acacia that harbor ants, which repel other harmful insects.			
2nd Quarter **October 2015 to December 2015**	**Earth and Space Science** **Unit C: Earth and Its Resources** **Chapters 5 and 6**			
Resources: ~Student Edition ~Teacher's Editions **Activity Resources:** ~Materials Kit ~Grab'Go Activity Bags ~Activity Flipcharts **Instructional Resources:** ~Reading Essentials	**Chapter 5: Shaping Earth** Lesson 1- Earth Lesson 2- The Moving Crust Lesson 3- Weathering and Erosion Lesson 4- Changes Caused by the Weather Chapter 5 Review & Test Preparation	○ What are Earth's features above the ground and below the ground? ○ How can Earth's crust change? ○ What forces shape and changes Earth's landform?	○ Identify Earth's landforms and the features of the ocean floor. ○ Describe the layers of Earth ○ Describe how the movement of plates builds mountains and	○ crust ○ mantle ○ outer core ○ inner core ○ fault ○ plateau ○ fold ○ mountain ○ earthquake

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Planning & Instruction: ~Teacher Works Plus CD-ROM ~Professional Development DVD ~Classroom Presentation Toolkit CD-ROM ~Exam View Assessment Suite CD-ROM **Website:** www.macmillanmh.com				
	Chapter 6: Saving the Earth's Resources Lesson 1- Minerals and Rocks Lesson 2- Soil Lesson 3- Resources from the Past Lesson 4- Water Lesson 5- Pollution and Conservation Chapter 6 Review and Test Preparation	○ Why are there so many different kinds of rock? ○ How does soil differ from place to place? ○ What are fossils and fossil fuel? ○ How do people obtain and use water? ○ How can people reduce pollution and conserve resources?	○ Describe the properties used to identify and classify minerals. ○ Compare the three types of rocks. ○ Describe the different layers of soil and how they form. ○ Define the texture, porosity and permeability of soil. ○ Describe the different kinds of fossils, the ways they form, and how they provide evidence of Earth's past. ○ Explain why fossil fuels are a valuable and nonrenewable resource. ○ Explain how the water cycle renews Earth's freshwater. ○ Identify the effects of pollution to land, water, and air.	○ mineral ○ igneous rock ○ sedimentary rock ○ relative age ○ metamorphic rock ○ rock cycle ○ resource ○ humus ○ horizon ○ soil profile ○ topsoil ○ subsoil ○ pore spaces ○ porous ○ permeability ○ fossil ○ amber ○ mold ○ cast ○ imprint ○ fossil fuel ○ nonrenewable resource ○ renewable resource ○ soil water ○ groundwater ○ watershed ○ reservoir

			○ Describe ways to reduce pollution and conserve resources.	○ well ○ runoff ○ irrigation ○ environment ○ pollution ○ acid rain ○ conservation ○ compost ○ reduce ○ reuse ○ recycle
	Earth and Space Science **Unit D: Weather and Space** **Chapters 7 and 8**			
	Chapter 7: Weather and Climate Lesson 1- Air and Weather Lesson 2- The Water Cycle Lesson 3- Tracking the Weather Lesson 4- Climate Chapter 7 Review and Test Preparation	○ How can you tell that air is around you? ○ How is water recycled? ○ How do fronts and air masses change the weather? ○ Why do weather patterns change?	○ Define the atmosphere as a mixture of different gases. ○ Describe four properties of weather that can be measured and the tools used to measure them. ○ Sequence the steps of the water cycle. ○ Identify and describe types of clouds and precipitation. ○ Explain how air masses form and identify the types of weather they cause. ○ Forecast the weather by interpreting data on a weather map. ○ Define and give examples of climate ○ Explain the main factors that determine climate.	○ atmosphere ○ temperature ○ humidity ○ air pressure ○ thermometer ○ wind vane ○ barometer ○ rain gauge ○ evaporation ○ water vapor ○ condensation ○ cloud ○ freeze ○ precipitation ○ water cycle ○ melt ○ air mass ○ front ○ warm front ○ cold front ○ stationary front ○ forecast ○ climate ○ current

	Chapter 8: The Solar System and Beyond Lesson 1- Earth and Sun Lesson 2- Earth and Moon Lesson 3- The Solar System Lesson 4- Stars and Constellation Chapter 8 Review and Test Preparation	○ Why does it seem that the Sun is moving? ○ What can we learn about the Moon? ○ How does Earth compare with other objects in the solar system? ○ How do stars appear in the sky?	○ Explain how Earth's rotation causes the cycle of day and night. ○ Explain why the Sun's apparent motion in the sky differs from season to season. ○ Explain why the Moon is covered with craters. ○ Identify the causes of the Moon's phases ○ Define and describe the solar system. ○ Discuss the properties of the inner and outer planets. ○ Explore stars, including their composition, appearance, and distance from Earth. ○ Identify the characteristics of the Sun and its importance to life on Earth.	○ rotation ○ axis ○ revolution ○ orbit ○ crater ○ phase ○ lune eclipse ○ solar eclipse ○ solar system ○ planet ○ gravity ○ telescope ○ comet ○ asteroid ○ meteor ○ meteorite ○ star ○ constellation
	Strand 6: Earth and Space Science **Concept 1:** Properties of Earth Materials No performance objectives at this grade level. **Concept 2:** Earth's Processes and Systems PO 1. Identify the Earth processes that cause erosion. PO 2. Describe how currents and wind cause erosion and land changes. PO 3. Describe the role that water plays in the following processes that alter the Earth's surface features: • erosion • deposition • weathering			

	PO 4. Compare rapid and slow processes that change the Earth's surface, including: • rapid – earthquakes, volcanoes, floods • slow – wind, weathering PO 5. Identify the Earth events that cause changes in atmospheric conditions (e.g., volcanic eruptions, forest fires). PO 6. Analyze evidence that indicates life and environmental conditions have changed (e.g., tree rings, fish fossils in desert regions, ice cores). **Concept 3:** Changes in the Earth and Sky PO 1. Identify the sources of water within an environment (e.g., ground water, surface water, atmospheric water, glaciers) PO 2. Describe the distribution of water on the Earth's surface. PO 3. Differentiate between weather and climate as they relate to the southwestern United States. PO 4. Measure changes in weather (e.g., precipitation, wind speed, barometric pressure). PO 5. Interpret the symbols on a weather map or chart to identify the following: • temperatures • fronts • precipitation PO 6. Compare weather conditions in various locations (e.g., regions of Arizona, various U.S. cities, coastal vs interior geographical regions).			
3rd Quarter **January 2016 to March 2016**	**Physical Science** **Unit E: Matter** **Chapters 9 and 10**			
Resources: ~Student Edition ~Teacher's Editions	**Chapter 9: Properties of Matter** Lesson 1- Describing Matter Lesson 2- Measurement	○ How do we explain what matter is?	○ Define and describe the three states of matter.	○ matter ○ property ○ mass

Activity Resources: ~Materials Kit ~Grab'Go Activity Bags ~Activity Flipcharts **Instructional Resources:** ~Reading Essentials ~Leveled Readers and Teacher's Guide Key Resources: ~Building Skills Reading & Writing Book ~Building Skills Activity Lab Book ~Building Skills Math Book ~Building Skills Visual Literacy Book ~Building Skills Assessment Book **Supporting Resources:** ~Vocabulary Cards ~Key Concept Cards ~School to Home Activities Book ~Transparencies for Visual Literacy Book ~English Language Learner Teacher's Guide ~The Human Body and Teacher's Guide ~Technology-A Closer Look Book and Teacher's Guide Technology Support: ~Interactive Whiteboard Ready **Technology for the Student:** Practice & Activities: ~Science in Motion ~Operation: Science Quest CD-ROM	Lesson 3- Classifying Matter Chapter 9 Review and Test Preparation	○ What tools can you use to study matter? ○ What is matter made of? ○	○ Compare and contrast properties of matter. ○ Describe some properties of matter that can be measured. ○ Measure properties of matter using correct units. ○ Explore how matter is classified. ○ Explain how elements are organized in the periodic table.	○ volume ○ buoyancy ○ solid ○ liquid ○ gas ○ metric system ○ length ○ area ○ density ○ weight ○ gravity ○ element ○ atom ○ metal ○ Periodic table

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	Chapter 10: Matter and Its Changes Lesson 1- How Matter Can Change Lesson 2- Mixtures Lesson 3- Compounds Chapter 10 Review and Test Preparation	○ How can you change matter? ○ How can mixtures be separated? ○ What happens when matter goes through a chemical change?	○ Comprehend that a change of state is a physical change. ○ Differentiate between physical change and chemical change. ○ Explain that mixtures are combinations of matter. ○ Describe ways of separating mixtures. ○ Describe how compounds form and their physical properties. ○ Compare and contrast acids and bases.	○ physical change ○ change of state ○ evaporation ○ rust ○ chemical change ○ tarnish ○ mixture ○ solution ○ alloy ○ filter ○ filtration ○ distillation ○ compound ○ acid ○ base
	Physical Science **Unit F: Forces and Energy** **Chapters 11 and 12**			

	Chapter 11: Forces Lesson 1- Motion and Forces Lesson 2- Changing Motion Lesson 3- Work and Energy Lesson 4- Simple Machines Chapter 11 Review and Test Preparation	○ How do objects move? ○ How can pushes and pulls affect the way objects move? ○ How are energy and work related? ○ How do simple machines make work easier?	○ Explain how motion, speed, velocity, and acceleration are related. ○ Summarize the forces that act on a moving object, including friction and gravity. ○ Demonstrate a basic understanding of how forces affect motion. ○ Explain how friction affects motion. ○ Define work and energy. ○ Compare and contrast potential and kinetic energy. ○ Identify the different kinds of simple machines. ○ Explain how simple machines work together to make compound machines.	○ speed ○ velocity ○ force ○ acceleration ○ inertia ○ friction ○ gravity ○ balanced forces ○ unbalanced forces ○ newton ○ work ○ energy ○ potential energy ○ kinetic energy ○ simple machine ○ lever ○ load ○ effort ○ force ○ inclined plane ○ compound machine
	Chapter 12: Energy Lesson 1- Heat Lesson 2- Sound Lesson 3- Light Lesson 4- Electricity Lesson 5- Magnetism and Electricity Chapter 12 Review and Test Preparation	○ What is heat? ○ How can you make sounds? ○ How does light behave? ○ How does electricity affect your life? ○ How are electricity and magnetism related?	○ Explain that heat flows from warmer materials to cooler materials. ○ Describe and define conduction, convection, and radiation. ○ Explain how sound is produced and how it travels through a medium. ○ Identify the characteristics of sound, including	○ heat ○ conduction ○ convection ○ radiation ○ insulator ○ conductor ○ vibration ○ sound wave ○ echo ○ wavelength ○ frequency ○ pitch ○ amplitude ○ volume ○ prism

			frequency, pitch, volume, and echoes. ○ Demonstrate that light travels in a straight line. ○ Describe ways light can be absorbed, reflected, and refracted by objects. ○ Describe the characteristics of electrically charged objects. ○ Explain the difference between static and current electricity. ○ Describe a magnetic field and the effect of distance on magnetic force. ○ Understand how an electromagnet, an electric motor, and a generator work.	○ electromagnetic spectrum ○ refraction ○ reflection ○ transparent ○ translucent ○ opaque ○ static electricity ○ discharge ○ circuit ○ current electricity ○ series circuit ○ parallel circuit ○ attract ○ repel ○ pole ○ magnetic field ○ electromagnet ○ motor ○ generator
	Strand 5: Physical Science **Concept 1:** Properties of objects and materials No performance objectives at this grade **Concept 2**: Position and motion of objects No performance objectives at this grade level. **Concept 3:** Energy and Magnetism PO 1. Demonstrate that electricity flowing in circuits can produce light, heat, sound, and magnetic effects. PO 2. Construct series and parallel electric circuits. PO 3. Explain the purpose of conductors and insulators in various practical applications. PO 4. Investigate the characteristics of magnets (e.g., opposite poles attract, like			

	pole repel, the force between two magnet poles depends on the distance between). PO 5. State cause and effect relations between magnets and circuitry.			
4th Quarter **March 2016 to May 2016**	**AIMS Test Preparation and Administration**