

## Earth Science Pacing Guide – 4 X 4 Block Schedule

Week	Standard	Day	Activity/Lab
	<b>Unit 1: Introduction</b>		Earth Science – What, Why?
1	Investigation and Experimentation 1: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for this understanding this concept and addressing the content in the other four strands, students should develop their own questions and perform investigations.	1	Class Expectations – Performance, behavior, concepts, skills Lab safety What is Earth Science? Why study Earth Science?
	Observing, measuring, analyzing data	2	Globe Fearon Handbook A
	How do you conduct a scientific investigation? Scientific Method/Lab Reports	3	Globe Fearon Handbook B
		4	Safety and Measurement Quiz
	<b>Unit 2 - Astronomy – What place does the earth occupy in our solar system, our galaxy, and our local group of galaxies? What structures do we see in the universe? What is the life cycle (including physics and chemistry of fusion and radiation pressure) of stars, including our sun? How have the Sun and Earth changed over time? How do we know?</b>		Week 2 – Formation and Change over time Week 3 – Stars and Sun Week 4 – Solar System Week 5 – The Young Earth  Movies: Nye Sun Nye Planets Nye Outer Space Nye Meteors and Comets National Geographic Asteroids
2	2b. <i>Students know</i> galaxies are made of billions of stars and comprise most of the visible mass of the universe. <b>How and when did the universe form? What is a galaxy?</b>	1 &	Question: What things make up the universe? Activity: Modeling the expanding universe. If we can measure how fast the universe is expanding, we can “run it backwards” to see what

		2	happened in the past. Powers of 10 website. Read 18-10. Lab: Counting galaxies Homework: Holt chapt 30-4, pg 793
2	2d. <i>Students know</i> that stars differ in their life cycles and that visual, radio, and X-ray telescopes may be used to collect data that reveal those differences. <b>What is the life cycle of a star and how do we know?</b>	3 & 4	Question: What is a star? Read 18-1 Make a spectroscope page 439 Read 18-2 Exit slip: checking concepts Question: Do you think all stars are the same? Read 18-4 Activity: building math skills, page 443 Read 18-5 Activity: Thinking critically, page 445 Homework: Holt 30-2
2	1e. <i>Students know</i> the Sun is a typical star and is powered by nuclear reactions, primarily the fusion of hydrogen to form helium. <b>Where do the Sun and most other stars get their energy?</b>	5	Question: What kind of star is the sun? Read 18-6 Review Universe, galaxies, and stars Quiz: 5 questions
3	2c. <i>Students know</i> the evidence indicating that all elements with an atomic number greater than that of lithium have been formed by nuclear fusion in stars. <b>Where do all elements (other than hydrogen and helium from the Big Bang) form?</b>	1 & 2 & 3	Question: Where does almost all of the energy on Earth come from? Read 18-8 Read chapter 2-1 Activity: Draw atoms Go back to 18-8, Checking concepts
3	2a. <i>Students know</i> the solar system is located in an outer edge of the disc-shaped Milky Way galaxy, which spans 100,000 light years.	4	Question: Where is Earth located in the universe? Read 17-1, 3, 4, 5 Holt chapter 27.1, Group Activity – Spinning Nebula

	<b>What place does our galaxy occupy in the universe?</b>		
3	1b. <i>Students know</i> the evidence from Earth and moon rocks indicates that the solar system was formed from a nebular cloud of dust and gas approximately 4.6 billion years ago. <b>When did the Solar System form?</b>	5	Graphic page 686-687 Graphic Organizer – Chain of Events chart Quiz – Formation of the solar system
4	1a. <i>Students know</i> how the differences and similarities among the sun, the terrestrial planets, and the gas planets may have been established during the formation of the solar system. <b>How did the solar system form?</b>	1 & 2	Holt 27.3 and 27.4 C&C 17-5, 6, 8, 9
4	1c. <i>Students know</i> the evidence from geological studies of Earth and other planets suggest that the early Earth was very different from Earth today. <b>How has Earth changed over time?</b>		Chapter 17 for week 4
5	1d. <i>Students know</i> the evidence indicating that the planets are much closer to Earth than the stars are. <b>How do we know the planets are closer to Earth than the stars?</b>		Read 16.6 Activity: Observing parallax, pg 393
5	1f. <i>Students know</i> the evidence for the dramatic effects that asteroid impacts have had in shaping the surface of planets and their moons and in mass extinctions of life on Earth. <b>What affects do asteroids have on Earth and Moon?</b>		
			Week 6 – Global Energy Budget Week 7 – Biogeochemical Cycles

	<b>Unit 3: Energy in Earth's Systems– How do energy and resources move through Earth's systems?</b>		Movies: Nye Water Cycle Nye Lakes and Ponds Nye Energy Nye Heat Nye Pollution Solutions
6	1e. <i>Students know</i> the Sun is a typical star and is powered by nuclear reactions, primarily the fusion of hydrogen to form helium. <b>What is the source of energy for the sun?</b>	GF 18 H29	Introduce fusion as the source of energy. Structure of sun and fusion process. <ul style="list-style-type: none"> <li>• <a href="http://www.eo.ucar.edu">www.eo.ucar.edu</a></li> <li>• GF 18-8</li> </ul>
6	4a. <i>Students know</i> the relative amount of incoming solar energy compared with Earth's internal energy and the energy used by society. <b>What is Earth's main source of energy?</b>		GF 11-3
6	4b. <i>Students know</i> the fate of incoming solar radiation in terms of reflection, absorption, and photosynthesis. <b>What forms of energy are radiated by the sun? What happens to the sun's energy when it hits Earth?</b>		Graphic Organizer – percentages of where the sun's energy goes
6	5a. <i>Students know</i> how differential heating of Earth results in circulation patterns in the atmosphere and oceans that globally distribute the heat. <b>How does differential heating impact Earth?</b>		Notes on conduction, convection, and radiation Change of phase lab (melt ice lab) temperature of soil and water lab GF 11-3 & 11-4
7	7a. <i>Students know</i> the carbon cycle of photosynthesis and respiration and the nitrogen cycle. <b>How does carbon move from</b>		15.1 Globe Fearon (nitrogen and carbon cycle)

	<b>the atmosphere to the biosphere?</b>		
7	7b. <i>Students know</i> the global carbon cycle: the different physical and chemical forms of carbon in the atmosphere, oceans, biomass, fossil fuels, and the movement of carbon among these reservoirs. <b>Does the total amount of carbon on earth ever change?</b>		15.1 Globe Fearon (nitrogen and carbon cycle)
7	7c. <i>Students know</i> the movement of matter among reservoirs is driven by Earth's internal and external sources of energy. <b>Could the carbon cycle continue to run without energy?</b>		15.2 Globe Fearon – resources water cycle – 212/291 Notebook 122 Notebook 25.1 Demo water pollution
	<b>Unit 4: Earth's Atmosphere - How is the atmosphere structured and how has it changed over time?</b>		Week 8 – Structure of the atmosphere Week 9 – Composition of the atmosphere  Movies: Nye Pressure An Inconvenient Truth BBC – The Weather (Wind)
8	8a. <i>Students know</i> the thermal structure and chemical composition of the atmosphere. <b>What are the layers of the atmosphere?</b>		Foldable – layers of the atmosphere GF 11.1 and 11.2 Demo air pressure: paint stir stick and cup of water with card
8	8b. <i>Students know</i> how the composition of Earth's atmosphere has evolved over geologic time and know the effect of outgassing, the variations of carbon dioxide concentration, and the origin of atmospheric oxygen. <b>Where did the carbon dioxide in Earth's atmosphere come from and where</b>		Read section 22.3 Lab: Evolution of Earth's Atmosphere

	<b>did the oxygen in Earth's atmosphere come from?</b>		
8	8c. <i>Students know</i> the location of the ozone layer in the upper atmosphere, its role in absorbing ultraviolet radiation, and the way in which this layer varies both naturally and in response to human activities. <b>What is the ozone layer and where is it located?</b>		
9	5c. <i>Students know</i> the origin and effects of temperature inversions. <b>What is a temperature inversion?</b>		Lab 11.1 – Temperature Inversion
9	5a. <i>Students know</i> how differential heating of Earth results in circulation patterns in the atmosphere and oceans that globally distribute the heat. <b>How does differential heating effect the atmosphere?</b>		TWE 275 activity – combine with Lab 14.1 (temperature of soil vs water – test soil, asphalt, etc at varying heights.) Lab: What's the Matter with Air? Read sec 11-4 (GF) Demo: heat and spiral cut paper Dew and humidity pg 283 & 279 Problem solving lab 283
9	5b. <i>Students know</i> the relationship between the rotation of Earth and the circular motions of ocean currents and air in pressure centers. <b>What is the Coriolis effect and how does it affect the atmosphere?</b>		Lab 12.1 – Modeling the Coriolis effect
9	4c. <i>Students know</i> the different atmospheric gases that absorb the Earth's thermal radiation and the mechanism and significance of the greenhouse effect. <b>What is the greenhouse effect?</b>		Minilab 376 – greenhouse effect
	<b>Unit 5: Climate and Oceanography- What are the key elements of the ocean systems</b>		Week 10 – Weather and climate Week 11 – Climate

	<b>and what forces control them? How do the ocean and atmosphere interact to create our weather and climate?</b>		Week 12 - Oceanography Movies: Nye Oceans Nye Ocean Exploration
10	6a. <i>Students know</i> weather (in the short run) and climate (in the long run) involve the transfer of energy into and out of the atmosphere. <b>How are weather and climate similar and different?</b>		Wind (GF) sec 11.7 & 11.8 Climatograms
10	6c. <i>Students know</i> how Earth's climate has changed over time, corresponding to changes in Earth's geography, atmospheric composition, and other factors, such as solar radiation and plate movement. <b>What factors affect Earth's climate cycles?</b>		Modeling 373 Lab 24.1 – Cenozoic Ice Sheets and Plant Distribution Global warming pg 380
11	6b. <i>Students know</i> the effects on climate of latitude, elevation, topography, and proximity to large bodies of water and cold or warm ocean currents. <b>What are 5 main factors that influence an area's climate?</b>		Geolab 292 – Temperature/Pressure Relationships Geolab 378 – Microclimates
11	5e. <i>Students know</i> rain forests and deserts on Earth are distributed in bands at specific latitudes. <b>What are the main climates zones and why would deserts and rain forests occur at specific latitudes?</b>		Lab 14.2 – Classifying Climate Foldable - Global Wind Systems 302/269 Refer to climatograms
12	5d. <i>Students know</i> properties of ocean water, such as temperature and salinity, can be used to explain the layered structure of the oceans, the generation of horizontal and vertical ocean currents, and the geographic distribution of marine organisms. <b>How do</b>		Lab 15.1 – Ocean Surface Temperature Minilab 394 – make sea water Problem solving 401 – tide chart graphing Vocab Tic-tac-toe

	<b>temperature and salinity affect the ocean? How do the oceans affect climate?</b>		
	<b>Unit 6: Plate Tectonics – How do Earth’s structures change over time?</b>		Week 13 – Seafloor features Week 14 – Plate Boundaries and Rocks Week 15 - Earthquakes Week 16 - Volcanoes Movies: Layers of the Earth Nye Earthquakes Volcanoes powder keg National Geographic IMAX volcanoes of the deep
13	3a. <i>Students know</i> features of the ocean floor (magnetic patterns, age, and sea-floor topography) provide evidence of plate tectonics. <b>What is seafloor spreading and what features are formed?</b>		Lab 17.1 – magnetism Lab 17.2 – subduction zone Geolab pg 464 HW: Notebook 190 Igneous rock worksheet
14	3b. <i>Students know</i> the principal structures that form at the three different kinds of plate boundaries. <b>What structures form at plate boundaries?</b>		Minilab pg 456 Notebook 195-196 Notebook 215-216
14	3c. <i>Students know</i> how to explain the properties of rocks based on the physical and chemical conditions in which they formed, including plate tectonic processes. <b>At which type of plate boundary would you expect to find each type of rock – igneous, sedimentary, and metamorphic?</b>		Minilab 108 Lab 5.2 Minilab 126 Lab 6.1 Lab 6.2 Geolab 464 Demo convection with fish tank Vocab foldable
15	3d. <i>Students know</i> why and how earthquakes occur and the scales used to measure their		Problem Solving Lab 502 Geolab 516



	intensity and magnitude. <b>What are the three earthquake scales and how are they different?</b>		Minilab 508 HW: Notebook 221 Lab 17.2 Read Section 5.7 & 5.8 (GF) HW: pg 514 & Notebook 225
16	3e. <i>Students know</i> there are two kinds of volcanoes: one kind with violent eruptions producing steep slopes and the other kind with voluminous lava flows producing gentle slopes. <b>What are the 2 main types of volcanoes and how are they different?</b>		Minilab pg 474 Lab 18.2 – Volcanic eruption Demo viscosity HW: Notebook 210
	<b>Unit 7: California Geology –How do Earth’s processes impact California?</b>		WebQuest: A New Improved California
17/18	9a. <i>Students know</i> the resources of major economic importance in California and their relation to California’s geology. <b>What are California’s most important geologic resources?</b>		Webquest See California section of text  NOTE: Jose Otero, seismologist, will do demos in class <a href="mailto:jdotero@ucsd.edu">jdotero@ucsd.edu</a> or sifo.ucsd.edu
	9b. <i>Students know</i> the principal natural hazards in different California regions and the geologic basis of those hazards. <b>What and where are California’s geologic hazards?</b>		Webquest
	9c. <i>Students know</i> the importance of water to society, the origins of California’s fresh water, and the relationship between supply and need. <b>Where are California’s water resources and needs, and how is this</b>	1	Webquest

**Culminating activity/webquest:**

**Possible agents of change**

- Asteroid impact
- Volcanic eruption
- Ice sheet comes loose
- Plate tectonics (plates coming together)
- PT – mountain building

**Poster/storyboard/movie/comic book for 5<sup>th</sup> grade audience**