

Environmental Foundations – Grade 9

PACING SCHEDULE

Investigating Our Environment – Patterns, Cycles, and Systems

STANDARDS ADDRESSED	QUARTER 1: THE HISTORY AND NATURE OF SCIENCE AND REVIEW OF PRIOR TOPICS	APPROXIMATE TIME REQUIRED
I.A.1 – 5	UNIT I - Review of Previously Learned Material, and Overview of Prior Content, Skills, and Processes of Science ✎ Observation skills/inferences/assumptions ✎ Explore/refine senses ✎ Nature of Science: <ul style="list-style-type: none"> • Define terms • Technology, criteria • Vocabulary • Ethics, Branches of science ✎ Review math, literacy, lab, affective, inquiry skills	1.5 weeks
	UNIT II - Place in the World ✎ Investigation A - Patterns related to the STUDENT <ul style="list-style-type: none"> • Fingerprints, graphs of features, etc. ✎ Investigation B - Patterns related to the CLASSROOM <ul style="list-style-type: none"> • Safety map, procedures • Seating, etc. ✎ Investigation C - Patterns related to the SCHOOL/COMMUNITY/CITY <ul style="list-style-type: none"> • STATE/COUNTRY/WORLD • Maps, satellite maps • Telephone prefixes, zip codes • River boundaries • Longitude/latitude, etc, 	1 week
	UNIT III - Science Topics ✎ Investigation A - Patterns in NATURE <ul style="list-style-type: none"> • Sunprint paper outdoors • Key of Minnesota leaves • Plot of grass, etc. ✎ Investigation B - Patterns in WEATHER <ul style="list-style-type: none"> • Cloud pictures • Weather phenomena • Journal entries from instruments over time ✎ Investigation C - Patterns in TIME <ul style="list-style-type: none"> • Rock stratigraphy, tree rings, moon phases, • metamorphosis of insects • radioactive decay activity, etc. ✎ Investigation D - Patterns related to FRESH WATER <ul style="list-style-type: none"> • Characteristics of water: phases, density, surface tension 	1.5 weeks
II.B.2, 5 III.C.4	UNIT IV - Forces and Energy ✎ Investigation A - Introduction to fossil fuels <ul style="list-style-type: none"> • Terms • Origins of • Distribution in world, US • Emissions – acid rain • Man made substitutes - Ethanol, Biodiesel ✎ Investigation B - Alternatives to fossil fuels - Solar, etc.	2 weeks
II.A.1- 9	UNIT V – Introduction to Patterns in Elements and Properties of Matter ✎ Investigation A - Introduction to pure elements <ul style="list-style-type: none"> • Intro to properties of matter-chemistry and physics • Intro to solutions, compounds, mixtures, pH • Intro to Periodic Table ✎ Investigation B - Introduction to the Model of the Atom: <ul style="list-style-type: none"> • Bohr model, • Particle model, • Periodicity 	2 weeks

STANDARDS ADDRESSED	QUARTER 2: PATTERNS, CYCLES, AND MODELS IN OUR ENVIRONMENT	APPROXIMATE TIME REQUIRED
II.B.1, 2, 3, 4	UNIT I - Introduction to Patterns of Compounds and Mixtures ✎ Investigation A – Physical and chemical changes <ul style="list-style-type: none"> • Chemical properties • Acids and bases. ✎ Investigation B - Chemical bonding, Words and symbols in reactions	2 weeks
III.A.1.1, 4, 5	UNIT II - Structure and Elements of the Earth ✎ Investigation A - Earth Elements: silicon, carbon, hydrogen, oxygen, iron, aluminum (Limited to the most abundant 20) ✎ Investigation B - Crystal growing, Mineral example sets, feldspar, mica, quartz ✎ Investigation C - Internal/external sources of Earth's energy	1.5 weeks
	UNIT III – Rock Cycle ✎ Investigation A - Minnesota rock types and samples, using three classes ✎ Investigation B - Erosion and weathering ✎ Investigation C - Soils/soil profiles	1.5 weeks
	UNIT IV – The Earth's Core ✎ Investigation A - Convection currents, density p.580 ✎ Investigation B – Primary and secondary waves p. 498, p.503	1 week
III.A.1.2, 3, 6	UNIT V - The Restless Earth ✎ Investigation A - Review the Plate Tectonics Theory – pp.443-447 <ul style="list-style-type: none"> • Continental drift (reading about evidence – review only) • Earthquakes, volcanoes, mountains (reading – review only) • Convection and density (review with lab[s]) • Seafloor spreading – (activity) – pp.448-454 ✎ Investigation B - The complete theory – (activity) – p.444	2 weeks

STANDARDS ADDRESSED	QUARTER 3: THE EARTH'S STRUCTURE AND RESTLESS HISTORY	APPROXIMATE TIME REQUIRED
II.C.1, 2, 3, 5	UNIT I – Patterns of Motion ✎ Investigation A - Introduction to: Newton's Laws ✎ Investigation B - Potential and kinetic energy ✎ Investigation C - Gravity, speed, and acceleration	2 weeks
II.D.1, 2, 3 III.A.1.2, 6	UNIT II – Earth History ✎ Investigation A - Earth History - Chapter 21, pp.552-575 <ul style="list-style-type: none"> • Ice cores (also later in glaciers) • Fossils, Geologic time – (two activities) – p. 553 • Rock formation correlations –(good paper/pencil activity) • Isotopes (virtual labs) ✎ Investigation B - Effects of biology on the atmosphere, <ul style="list-style-type: none"> • The biosphere, hydrosphere, and lithosphere 	2 weeks
III.B.3; III.C.1	UNIT III – Planets ✎ Investigation A - Tilt and rotation, seasons, day length, tides ✎ Investigation B - Life on other planets - p.359	1 week
III.A.1.4, 6	UNIT IV – Reshaping the Land ✎ Investigation A - Moving/running water ✎ Investigation B - Moving soil, wind erosion, and deposition ✎ Investigation C - Ice <ul style="list-style-type: none"> • Glaciers in Minnesota, the Midwest, and the world • Topography, ice cores • Landforms in Minnesota 	2 weeks
III.B.1, 2, 3	UNIT V – A Weather Review ✎ Investigation A - Air pressure, wind patterns, jet streams, fronts, highs, lows, severe weather ✎ Investigation B - Coriolus effect ✎ Investigation C - Carbon and Water cycles	1 week

STANDARDS ADDRESSED	QUARTER 4: MODELS AND SYSTEMS OF THE EARTH - CLIMATE, ECOSYSTEMS, AND THEIR IMPACT ON LIFE	APPROXIMATE TIME REQUIRED
III.B.2, 4	UNIT I – The Water Cycle ~ Investigation A - The composition and heating of the atmosphere Investigation B – The hydrosphere <ul style="list-style-type: none"> • Waves, ocean currents, the Gulf Stream • Effects on the world economy • Fresh water distribution in the world • Lake Superior and Minnesota water 	1 week
III.B.1 IV.F.1, 2	UNIT II – Climate ~ Investigation A - Climate classification around the world and the relationship of climate with weather; climate and the Earth's motion; energy transfer over time ~ Investigation B - Ecosystems defined <ul style="list-style-type: none"> • Minnesota ecosystems • Urban ecosystems 	1 week
IV.C.1, 2, 3 IV.F.1, 2, 3	UNIT III – Ecosystems ~ Investigation A - Matter and energy <ul style="list-style-type: none"> • Abiotic factors • Cycling • Populations • Carrying capacity • Biodiversity • Predation and competition ~ Investigation B - The movement of matter and energy in ecosystems <ul style="list-style-type: none"> • Trophic levels • Food webs, chains, and pyramids • The role of the Sun • Energy needed to sustain life 	2 weeks
IV.C.1	UNIT IV – Human Interaction with the Environment ~ Investigation A - Human interactions and their impact on the environment ~ Investigation B - Environmental issues: water, fossil fuels, conservation, pollution, poisons, solid waste, trade-offs, resource management, endangered species, etc	2 weeks
I.B.1-4	UNIT V – Conducting an Original Investigation on an Environmental Issue	2 weeks