

Schmoker 8th Grade Science Syllabus

This is a general overview of the topics we will study in 8th grade science this year. 8th grade science focuses on Earth Science topics, primarily **Geology**, **Oceanography**, **Astronomy**, and **Meteorology**. In addition we review and extend knowledge and proficiency in **Metric Measurement** skills, **Density**, and **Matter**. Throughout the year we will also integrate Physical and Life science topics as they apply to Earth Science, and use Math and Language skills to further our studies and understanding of Earth Systems.

[2020 Colorado Academic Standards: Science 6 - 12](#)

To see what assignments we are working on each day or week, refer to the [class calendar](#) on my science home page (<http://bit.ly/schmoker>.)

1st Quarter Topics:

- **Metric Measurement**

- Properties that we commonly measure in science:
 - Linear (length)
 - Mass / weight (and knowing the difference)
 - Area
 - Volume
- Tools we commonly use to measure these properties:
 - Ruler / Meter Stick
 - Balance / Scale (and knowing the difference)
 - Graduated Cylinder
 - Water Displacement
- Use of Metric System:
 - Basic units for different types of measurements
 - Powers of ten to modify units
 - Metric prefixes
 - Abbreviations
 - Unit conversions using powers of 10 (decimal point shift)
- General Considerations
 - Proper tool selection
 - Measuring vs. Calculating vs. Estimating
 - Accuracy
 - Significant Digits / Rounding
 - Application throughout year in other units

- **Matter**

- Density as a property of matter

- How to apply metric measurement skills to determine density
- How to estimate density
- How density differences affect different Earth systems
- Earth Materials
 - Rocks (general definition and observations)
 - Minerals (general definition and observations)
 - Common elements in Earth Systems (Lithosphere, Atmosphere, Hydrosphere)
 - Atomic model of matter
 - Molecules (general definition and examples)
 - Atoms (general definition and examples)
 - Parts of an atom and importance to behavior
 - Protons
 - Electrons
 - Neutrons
 - Compounds & Elements
 - Definitions, Examples
 - Chemical Formulas, Reactions, and Equations
 - Periodic Table of the Elements
 - History of Discovery

● **Geology: Minerals**

- Minerals as Building Blocks of Rocks
- Definition and Examples
- Mineral Properties
- Mineral Identification
 - Using physical properties and a key to ID a substance
- Mineral Uses
- Renewable vs. Nonrenewable Resources

2nd Quarter Topics:

● **Geology: Rocks**

- Rock Cycle
 - Processes that create, change, and/or destroy rocks in the Earth's crust
 - Cooling & Crystallization
 - Weathering, Erosion and Deposition
 - Compaction and Cementation (Lithification)
 - Metamorphism (sufficient heat & pressure to change rocks without melting.)
 - Melting
 - Elements of the Rock Cycle:
 - Magma / Lava

- Igneous Rocks
- Sediments
- Sedimentary Rocks
- Metamorphic Rocks
- Rock Identification using physical properties and keys

• **Geology: Earth History**

- Methods to Date Rocks & Fossils:
 - Relative Age Dating
 - Law of Superposition
 - Law of Original Horizontality
 - Cross-cutting Relationships
 - Law of Uniformitarianism
 - Index Fossil Dating
 - Radiometric Dating
- Geologic Time
 - Division of Geologic Time into Epochs, Eras, and Periods
 - Names and order of 4 Epochs and the Eras & Periods Within Them
 - Geologic Timeline
 - True durations of Epochs, Eras, and Periods visible and comparable to each other.
 - Visualizing major events along Earth's geologic timeline
- Fossils
 - Fossilization Methods
 - Cast / Mold
 - Petrification
 - Carbon Film
 - Actual Remains
 - Trace Fossils
 - Fossil ID
 - Identifying fossils using observation and research skills
 - Conceptualizing evolutionary change over geologic time

3rd Quarter Topics:

• **Geology: Plate Tectonics**

- Structure of the Earth
 - Characteristics of Inner Core, Outer Core, Mantle, Asthenosphere, and Lithosphere (Crust)
 - Methods to determine size, composition, and temperature of these layers

- Convective motion of Mantle as a driving mechanism for tectonic motion and hotspot magma upwelling
- Evidence for Plate Tectonics
 - Global Pattern of Earthquakes
 - Earthquake Hazards
 - Earthquake Preparedness
 - Global Pattern of Volcanoes
 - Hotspots as Indicators of Plate Motion
 - Volcanic Hazards
 - Volcano Preparedness
 - Fossil Distribution Evidence
 - Paleo-glacial Deposit Evidence
 - Ocean Crust Age & Paleomagnetism Evidence
 - Current GPS Measurement of Continental Movement
- Mapping Major Tectonic Plates
 - History of Continental Drift Theory
 - Names & Locations of Major Tectonic Plates
 - Boundary Types Between Tectonic Plates
 - Convergent
 - Divergent
 - Transform
 - Passive
 - Features & Hazards associated with each Boundary Type
 - Relative Motion of Major Plates

• Oceanography

- Bathymetry
 - Ocean bottom Features
 - Names, Characteristics, and Formation Processes
 - Continental Shelf
 - Continental Slope
 - Abyssal Plain / Oceanic Basin
 - Deep-sea Trench
 - Seamount
 - Island
 - Mid-Ocean Ridge / Rise
 - Methods to Measure Depth and Map Sea Floor
 - Historic
 - Sonar / Multibeam Sonar
 - Seafloor Mapping
 - Sea-floor Profile
 - 3-D Bathymetric Chart

- Oceanic Circulation
 - Types, Characteristics, and Mechanisms of Ocean Currents
 - Surface Currents
 - Types, Names, and Causes
 - Influences on Climate
 - Influences on Ocean Ecosystems
 - Deep-sea / Density Currents
 - Thermohaline Circulation
 - Influences on Global Heat Budget
 - Influences on Nutrient Cycling
 - Turbidity Currents
 - Causes
 - Influence on Sediment Distribution in Ocean Basins
 - Methods to Measure Ocean Currents
 - Buoys
 - Serendipitous Events (cargo spills, shipwreck drifting, etc.)
 - Trace Element Studies
 - Remote Sensing (Satellites)
- Tides
 - Causes & Timing of Tides
 - Orbital motions of the Earth, Moon, and Sun
 - Positioning of the Earth, Moon, and Sun that lead to Spring and Neap Tides
 - Effects of Tides on Ocean Ecosystems and Human Coastal Activities
- Waves
 - Characteristics of Waves
 - Wavelength
 - Wave Period & Wave Frequency
 - Wave Height
 - Factors affecting Ocean Wave Production
 - Waves as agents of coastal Weathering, Erosion, and Deposition
- Ocean Water Chemistry
 - Global Distribution of Water
 - Water Cycle
 - % in Ocean, Frozen, and on Continents
 - Saline vs. Brackish vs. Fresh Water
 - Salinity
 - Abundance of Elements in Ocean Water
 - Methods to measure and calculate salinity
 - Water Column Profiling
 - Commonly Measured Water Column Factors
 - Salinity
 - Temperature

- Depth
- Others such as pH, Alkalinity, Chlorophyll Fluorescence, Dissolved Oxygen & CO₂
- Tools of Physical Oceanography
 - CTD
 - Niskin Bottle Rosette
 - McClain Pumps
 - Sonar (Traditional, Multibeam, Side-scanning)
 - Seismic Profiling
 - Coring Methods
 - Dredging Methods
 - Trawling Methods
 - Oceanographic Moorings & Buoys

4th Quarter Topics:

● Astronomy

- Solar System
 - Earth in Space
 - Planets: Terrestrial vs. Gas Giants
 - Dwarf Planets
 - Asteroids
 - Moons
 - Comets
 - Meteoroids
- Stars
 - The Sun
 - Sunspots & Solar Cycle
 - Space Weather
 - Stellar Classification (HR Diagram)
 - Types of Stars
 - Characteristics of Star Types
 - Remote measurement of Temperature & Luminosity
 - Stellar Cycles
 - Formation, Lives, and Deaths of Stars
 - Implications for Element Synthesis
 - Development of interesting objects such as White Dwarfs, Neutron Stars, and Stellar Black Holes
- Galaxies
 - Types of Star Systems in Galaxies
 - Types and Sizes of Galaxies
 - Spiral Galaxies
 - Elliptical Galaxies

- Irregular Galaxies
- The Milky Way
 - Galaxy we live in
 - Characteristics and Observation History
- Mechanisms holding Galaxies Together
 - Supermassive Black Holes
 - Dark Matter
 - Dark Energy
- Clusters/Groups of Galaxies
 - Interactions between Galaxies
 - Examples such as Local Group containing Milky Way
- The Universe
 - Size & Structure of the Universe
 - Big Bang Theory and Expansion of the Universe
- Observing Technologies
 - Telescopes
 - Optical
 - Infrared
 - Ultraviolet
 - Radio
 - Space Telescopes
 - Nature of Light and Spectroscopy
 - History of Astronomical Observation

• Meteorology

- Structure and Composition of the Atmosphere
 - Major Atmospheric Gases and their Roles
 - Atmospheric Layers & Characteristics
 - Troposphere
 - Stratosphere
 - Mesosphere
 - Thermosphere
- Energy in the Atmosphere
 - Heat Transfer Methods
 - Radiation
 - Conduction
 - Convection
 - Atmospheric Energy Budget
- Weather
 - Weather Factors
 - Weather Maps
 - Weather Hazards

- Climate
 - Climate Factors
 - Climate Types
 - Evaluating Paleoclimate
 - Climate Proxies
 - Ice Cores
 - Dendrochronology (Tree Rings)
 - Coral Growth Cores
 - Pollen Analysis
 - Lake and Ocean Core Analysis
 - Fossil Community Analysis
 - Evaluating Current Climate Change
 - Atmospheric Composition Change
 - CO₂ Increase & Sources
 - Other Greenhouse Gas Increases & Sources
 - Data suggesting Change
 - Atmospheric Temperature Records
 - Sea Surface Temperature Records
 - Sea Level Measurements
 - Sea Ice Measurements
 - Glacial Ice Measurements
 - Personal Choices
 - Climate Controversies
 - Future Scenarios
 - Steps to Take