

Richmond Public Schools
Department of Curriculum and Instruction
Curriculum Pacing And Resource Guide – Unit Plan



Course Title/ Course #: Earth Science 1 Resources

Unit Title/ Marking Period # (MP): Earth Resources ES.6a-d, ES.8a-d

Start day:

Meetings (Length of Unit):

<i>Desired Results ~ What will students be learning?</i>	
<u>Standards of Learning/ Standards</u>	
ES. 6	The student will investigate and understand the differences between renewable and nonrenewable resources. Key concepts include a) fossil fuels, minerals, rocks, water, and vegetation; b) advantages and disadvantages of various energy sources; c) resources found in Virginia; and d) environmental costs and benefits.
ES.8	The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. Key concepts include a) processes of soil development; b) development of karst topography c) relationships between groundwater zones, including saturated and unsaturated zones, and the water table; d) identification of sources of fresh water including rivers, springs, and aquifers, with reference to the hydrologic cycle;
<u>Essential Understandings/ Big Ideas</u>	
ES. 6	The concepts developed in this standard include the following: ○ Resources are limited and are either renewable or nonrenewable.

- There are advantages and disadvantages to using any energy source.
- Virginia has many natural resources.
- Modern living standards are supported by extensive use of both renewable and nonrenewable resources.
- Extraction and use of any resource carries an environmental cost that must be weighed against economic benefit.
- Renewable resources can be replaced by nature at a rate close to the rate at which they are used. Renewable resources include vegetation, sunlight, and surface water.
- Nonrenewable resources are replenished very slowly or not at all. Nonrenewable resources include coal, oil, and minerals.
- Fossil fuels are nonrenewable and may cause pollution, but they are relatively cheap and easy to use once they are extracted.
- In Virginia, major rock and mineral resources include coal for energy, gravel and crushed stone for road construction, silica for electronics, zirconium and titanium for advanced metallurgy, and limestone for making concrete.
- Clean water resources, while renewable, are directly impacted by human activity through extraction and pollution.

ES. 8

The concepts developed in this standard include the following:

- Soil is formed from the weathering of rocks and organic activity and is composed of loose rock fragments and clay derived from weathered rock mixed with organic material.
- Karst topography is developed in areas underlain by carbonate rocks, including limestone and dolomite.
- Karst topography includes features like caves and sinkholes and forms when limestone is slowly dissolved away by slightly acidic groundwater. Where limestone is abundant in the Valley and Ridge province of Virginia, karst topography is common
- Permeability is a measure of the ability of a rock or sediment to transmit water or other liquids. Water does not pass through impermeable materials. A substantial amount of water is stored in permeable soil and rock underground.
- Earth’s fresh water supply is finite. Geological processes, such as erosion, and human activities, such as waste disposal, can pollute water supplies.
- Water is continuously being passed through the hydrologic cycle. Fresh water is necessary for survival and most human activities.

Key Essential Skills and Knowledge

ES. 6

In order to meet this standard, it is expected that students will

- analyze the formation of fossil fuels in terms of the rock cycle and Plate Tectonics Theory,
- analyze how Virginia’s production and use of various natural resources has changed over time.
- evaluate Virginia’s potential as a producer of renewable energy sources.
- assess the role of fossil fuels and renewable energy sources in the future and compare and contrast the environmental benefits and costs among the various options.

- analyze the advantages and disadvantages of various energy sources.
- analyze a range of emerging energy and mineral resources in Virginia in terms of costs and benefits.
- determine the sources of clean water in their community and analyze consumption and supply data.

ES. 8

In order to meet this standard, it is expected that students will

- interpret a simple groundwater diagram showing the zone of aeration, the zone of saturation, the water table, and an aquifer
- interpret a simple hydrologic cycle diagram, including evaporation, condensation, precipitation, and runoff.
- locate the major Virginia watershed systems on a map (Chesapeake Bay, Gulf of Mexico, and North Carolina sounds).
- analyze the formation of karst in terms of rock type, solubility and permeability, uplift, the water table, and chemical and physical weathering.
- analyze the presence of groundwater in various types of rock terrains, including areas found in each of the physiographic provinces of Virginia.
- analyze the relationship between salt-water intrusion in the ground water in certain areas of eastern Virginia and buried crater structures.

Vocabulary

ES. 6

acid rain	anthracite	composting	fossil fuel		
conservation	landfill	hazardous waste	recyclable	biomass	energy
hydroelectric	smog				
renewable	non-renewable	coal	natural gas		
combustion	carbon	geothermal	pollution	advantage	
natural resource	disadvantage	economics			

ES. 8

aquifer	horizon	sinkholes	water cycle
artesian well	humus	water diversion	soil
caves	impermeable	soil profile	water table
chemical	leeching	springs	weathering
Chemical change	oxidation	stalactites	well
dam	permeable	pollution	
Groundwater			

Assessment Evidence ~ What is evidence of mastery? What did the students master & what are they missing?

Assessment/ Evidence

Evidence of mastery: Students will display mastery by consistently scoring at a “C” or above on all assessments. Success and mastery will also be shown by increasing scores from the beginning of the unit to the end of the unit. Overall mastery of the content and targeted objectives will be assessed during final unit assessment.

Assessment Methods:

- Teacher created IA Test/Quiz
- Group Discussions
- Predict and Explain Assessments- students apply principles and evidence
- Research Reports & Presentations
- Visual Displays- Concept maps, Diagrams, Models

Possible learning Gaps/Misconceptions

ES. 6

- Students believe energy is associated only with humans or movement.
- Students tend to associate energy only with living things, in particular with growing, fitness, exercise, and food.
- In addition to not readily understanding the conservation of energy, students do not understand that once energy is converted, it is not necessarily in a usable form.
- Students can name several renewable resources, but have little understanding of them

ES.8

- Groundwater primarily exists as vast subterranean rivers, lakes and seas (difficulty of conceiving of water flow through 'solid' rock, as well as older cosmologies, Hollywood movies and familiarity with surface water flow).
- In contrast, the idea that groundwater only exists within pores of rock (some underground rivers and lakes really do exist and in many areas are more important than matrix flow!)
- Groundwater and spring waters are pure, naturally filtered water systems (filtering emphasized in some texts & common literature, as well as Madison Avenue advertising).
- There is no real connection between groundwater and surface water systems.
- Groundwater is largely paleo-water from earlier periods in Earth's history (emphasized in many textbooks and focus on aquifers problems where this is true to some extent).
- Lakes and rivers contain more freshwater than groundwater systems do.
- Caves extend deep within the Earth (legacy of older cosmology and popular literature).

Learning Plan ~ What are the strategies and activities you plan to use

Learning Experiences/ Best Practice

ES. 6

- Have student to analyze the formation of fossil fuels in terms of the rock cycle and Plate Tectonics Theory, and relate the formation of fossil fuels to ancient biologic and atmospheric conditions and changes and locations within Virginia.
- Have students to analyze how Virginia's production and use of various natural resources has changed over time. Define and cite differences over time especially in the last 150 years.
- Have students to evaluate Virginia's potential as a producer of renewable energy sources.
- Have students to assess the role of fossil fuels and renewable energy sources in the future and compare and contrast the environmental benefits and costs among the various options.
- Have students to analyze the advantages and disadvantages of various energy sources.
- Have students to analyze a range of emerging energy and mineral resources in Virginia in terms of costs and benefits.
- Have students to determine the sources of clean water in their community and analyze consumption and supply data.

ES. 8

- Have students to interpret a simple groundwater diagram showing the zone of aeration, the zone of saturation, the water table, and an aquifer.
- Have students to interpret a simple hydrologic cycle diagram, including evaporation, condensation, precipitation, and runoff.

- Have students to locate the major Virginia watershed systems on a map (Chesapeake Bay, Gulf of Mexico, and North Carolina sounds).
- Have students to analyze the formation of karst in terms of rock type, solubility and permeability, uplift, the water table, and chemical and physical weathering.
- Have students to analyze the presence of groundwater in various types of rock terrains, including areas found in each of the physiographic provinces of Virginia.
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Technology Integrations

Web Resources

[Energy resources teach in a cup](#)

[Porosity](#)

[Porosity and permeability activity](#)

[Porosity activity](#)

[Aquifer depletion](#)

[Water deficits](#)

[Water pollution for kids](#)

[DDT and *Silent Spring*](#)

[Exxon Valdez oil spill](#)

[Everglades phosphorus pollution](#)

[Algal growth lab](#)

[Lesson National Groundwater Association](#)

[Karst Resourceser packet](#)

[Energy resource student packet](#)

[Energy resource worksheet student](#)

Meaningful Watershed Education Experiences (MWEE)

[What's a Watershed?Part A: Make a Watershed Model, Part B: Explore Your Watershed in Google Earth](#)

[Math and Science center-Virginia Watersheds lesson](#)

[Chesapeake Bay/ Learn the issues](#)

Resources

Sample Lesson Plans (VDOE)

[Permeability and Porosity](#)[Deep currents and Landforms](#)

[Hydrologic cycle](#)

[Greenhouse Gas Modeling Activity](#)

Cross Curricular Connection

English- Student will create brochures to share with their classmates on the practical uses of gemstones and ores found in Virginia.

English:

Write and illustrate a children's story for 8-10 year olds about life in the year 2100. It should describe life without fossil fuels and should identify the energy sources used in everyday life as well as some type of conservation measures.

Discuss what is happening with our world energy supply from fossil fuels and other non-renewable resources. (Examples: fossil fuels are being dangerously depleted, the rich countries receive a larger share of the energy and are more wasteful with it, wars are developing; e.g., the Gulf War, scientists and engineers are researching and developing renewable energy sources, etc.)

English (Presentation)- Student may bring in articles from magazine and newspapers concerning global warming and/or the Greenhouse Effects and share with the class.