

# Spring 2013 Student Performance Analysis with Instructional Guidance

## Earth Science Standards of Learning



Presentation may be paused and resumed  
using the arrow keys or the mouse.

# Measurements and calculation using the most appropriate tools

## SOL ES.1

The student will plan and conduct investigations in which  
a) volume, area, mass, elapsed time, direction, temperature, pressure, distance, density, and changes in elevation/depth are calculated utilizing the most appropriate tools;

# Instructional Guidance ES.1a

## Measurements and Calculation Using the Most Appropriate Tools

Enhanced Scope and Sequence Lesson: “Analyzing  
Your School’s Quadrangle”

[http://www.doe.virginia.gov/testing/sol/standards\\_docs/science/2010/lesson\\_plans/earth\\_sci/sci\\_investigation/sess\\_ES-1acd\\_1.pdf](http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/earth_sci/sci_investigation/sess_ES-1acd_1.pdf)

# Instructional Guidance for ES.1a Measurements and Calculation Using the Most Appropriate Tools

John doe  
Earth Science Practice Items (2010) 5denc... X Exit

Help

Directions: Type your answer in the box. Your answer must be in decimal form.

A mineral with a hardness of 6 and a white streak has been found in igneous rocks near Richmond. If the mineral sample has a volume of  $3.1 \text{ cm}^3$  and a mass of  $8.37 \text{ g}$ , what is the density of the mineral?

**Answer:  $2.7 \text{ g/cm}^3$**

Flag for Review Question 24 of 27 Section 1 Section Review Previous Next

# Measurements and calculation using the most appropriate tools (ES 1.a)

Table of Geologic Time

Era	Period	Years Before the Present
Cenozoic	Quaternary	recent – 2 million
	Tertiary	2 – 65 million
Mesozoic	Cretaceous	65 – 136 million
	Jurassic	136 – 190 million
	Triassic	190 – 225 million
Paleozoic	Permian	225 – 280 million
	Carboniferous	280 – 345 million
	Devonian	345 – 395 million
	Silurian	395 – 430 million
	Ordovician	430 – 500 million
	Cambrian	500 – 570 million
Precambrian		570 million – 4.6 billion

Rocks found on land are up to 3.8 billion years old, but those in the ocean are no more than 180 million years old. Using the information shown, during which era could parts of the ocean floor have formed?

- a) Triassic
- b) Paleozoic
- c) Precambrian
- d) Mesozoic**

# The Rock Cycle ES.5

## SOL ES.5

The student will investigate and understand the rock cycle as it relates to the origin and transformation of rock types and how to identify common rock types based on mineral composition and textures. Key concepts include

- a) igneous rocks;
- b) sedimentary rocks; and
- c) metamorphic rocks.

# Instructional Guidance for ES.4a

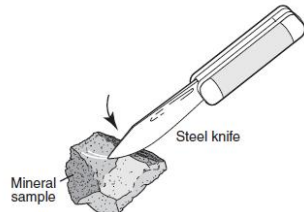
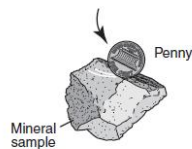
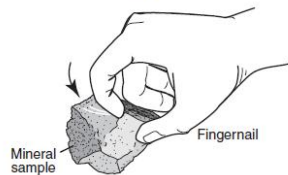
## Mineral Identification (in support of rock cycle ES.5)

### SOL ES.4a

The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. Key concepts include-

a) hardness, color and streak, luster, cleavage, fracture, and unique properties.

Testing a Mineral



The diagram shows a test for which mineral property? **Hardness**



**Calcite**

Public Domain:  
<http://geomaps.wr.usgs.gov/parks/rxmin/mineral.html>

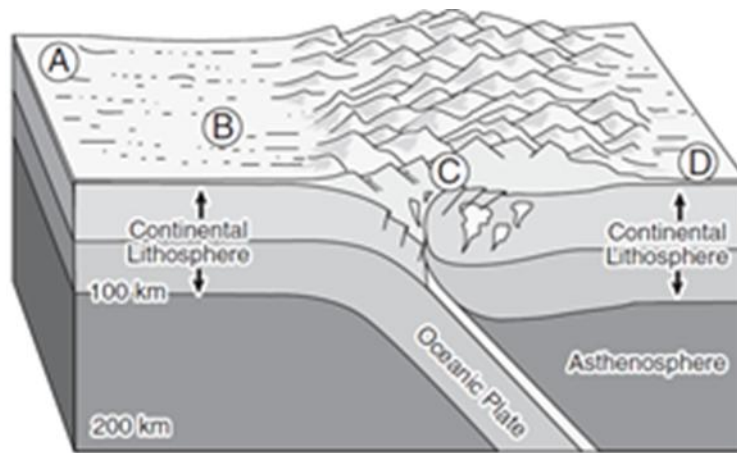


**Streak Test**

Photo by: Amelia Nuckolls, Galax VA

# The Rock Cycle (ES.5)

Students need additional practice with items that assess the composition of Earth materials.



At which location are metamorphic rocks most likely to be found?

- A. Location A
- B. Location B
- C. Location C
- D. Location D



# The Rock Cycle (ES.5)

**1. Heat and pressure can transform igneous rock into metamorphic rock. What processes can transform igneous rock into sedimentary rock?**

- A. Heat and pressure
- B. Rifting and subduction
- C. Erosion and sedimentation
- D. Evaporation and condensation

**2. Igneous rocks are formed by-**

- A. heat and pressure on existing rocks
- B. evaporation of water, leaving solids behind
- C. cooling and hardening of molten rock
- D. layers of mud on the bottom of a lake

# Instructional Guidance for ES.5

## The Rock Cycle

See the Enhances Scope and Sequence Lesson titled, “Three Types of Rocks.”

[http://www.doe.virginia.gov/testing/sol/standards\\_docs/science/2010/lesson\\_plans/earth\\_sci/earth\\_materials\\_processes/ess\\_ES-5abc.pdf](http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/earth_sci/earth_materials_processes/ess_ES-5abc.pdf)

# Plate Tectonics

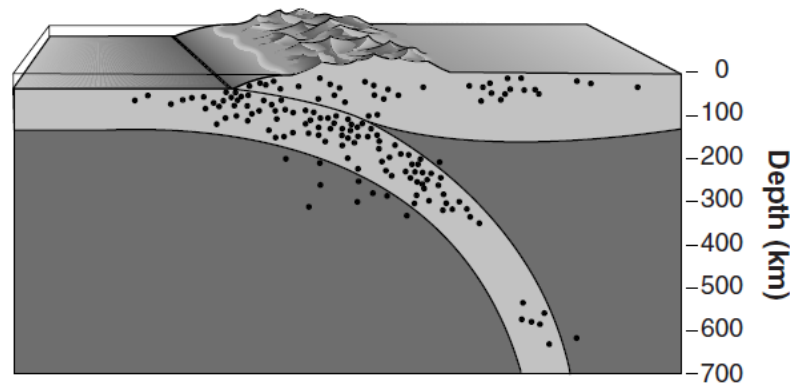
## SOL ES.7

The student will investigate and understand geologic processes including plate tectonics. Key concepts include:

- a) geologic processes and their resulting features; and
- b) tectonic processes.

# Plate Tectonics (ES.7b)

## Locations of Earthquake Origins



Each dot on the diagram marks the origin of an earthquake. The area with the highest concentration of earthquake origins marks-

- A. a line of Earth's magnetic field
- B. a seam of soft rock, such as limestone
- C. the path of the subducting tectonic plate
- D. the location of a developing igneous intrusion

# Evidence for Changes in Atmospheric Composition Over Time

## SOL ES.11

The student will investigate and understand the origin and evolution of the atmosphere and the interrelationship of geologic processes, biologic processes, and human activities on its composition and dynamics. Key concepts include

- a) **scientific evidence for atmospheric composition changes over geologic time;**

# Instructional Guidance for ES.11a

## Evidence for Changes in

## Atmospheric Composition Over Time

Students need additional practice identifying biosphere and atmosphere system interactions and the origins of the atmosphere.

**Which element in Earth's atmosphere is essential for human life and is extremely rare or nonexistent in the atmospheres of other planets in our solar system?**

- A. Carbon dioxide
- B. Hydrogen
- C. Nitrogen
- D. Oxygen

**A volcanic eruption can affect the atmosphere by-**

- A. reducing the amount of water vapor in the atmosphere
- B. adding large quantities of several gases, such as sulfur dioxide, to the atmosphere
- C. clearing away nearby clouds, increasing the amount of sunshine
- D. increasing the amount of oxygen due to escaping gases

# Practice Items

**This concludes the student performance information for the spring 2013 Earth Science SOL test.**

**Additionally, test preparation practice items for Earth Science can be found on the Virginia Department of Education Web site at:**

**[http://www.doe.virginia.gov/testing/sol/practice\\_items/index.shtml#science](http://www.doe.virginia.gov/testing/sol/practice_items/index.shtml#science)**

## Contact Information

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