

SI Geology - Full Discipline Demo

Building a Planet

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Geology - Full Discipline Demo
Course	SI Geology - Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

Match the type of rock to its description.

Igneous Rocks

Metamorphic Rocks

Sedimentary Rocks

Formed when one type of rock transforms as a result of intense heat and/or pressure

Formed when fragments of other rocks, plants, or animals are compacted and cemented together

Formed when magma or lava cools and solidifies

1

2

3

Correct answers:

- 1 Metamorphic Rocks 2 Sedimentary Rocks 3 Igneous Rocks

Classify the following statements as true or false.

⚡ Basalt is the most abundant element in the oceanic crust.	
⚡ Continental crust has a higher abundance of heavier elements, such as iron and magnesium.	
⚡ Oxygen is the most abundant element in the crust.	
⚡ The density of the continental crust is greater than the density of the oceanic crust.	
⚡ The outermost layer of the earth is the crust.	
⚡ There are two types of crust: terrestrial crust and oceanic crust.	
True	False
1	2

Correct answers:

1 Basalt is the most abundant element in the oceanic crust.

Oxygen is the most abundant element in the crust.

The outermost layer of the earth is the crust.

2

Continental crust has a higher abundance of heavier elements, such as iron and magnesium.

The density of the continental crust is greater than the density of the oceanic crust.

There are two types of crust: terrestrial crust and oceanic crust.

Exploration

Oceanic crust is characterized by a higher abundance of heavier elements.

- ☒ True ✓
- ☐ False

____ rocks are formed when magma or lava cools and solidifies.

- ☐ Sedimentary
- ☐ Metamorphic
- ☒ Igneous ✓

A sedimentary rock exposed to heat and pressure will form ____.

- ☐ magma
- ☒ metamorphic rock ✓
- ☐ igneous rock
- ☐ sediments

The continental crust is formed primarily of ____.

- ☐ sandstone
- ☐ scoria
- ☐ basalt
- ☒ granite ✓

Exercise 1

What is the average density of Unknown Rock 1?

What is the average density of Unknown Rock 2?

Why is it necessary to take the average of multiple trials to determine the density of the unknown rock samples?

Compare the average density of Unknown Rock 1 and Unknown Rock 2 to the information in the table below. Which material matches the closest to Unknown Rock 1? Unknown Rock 2?

Earth Material	Density (g/cm ³)
Continental Crust	2.7
Oceanic Crust	2.9
Mantle	3.3
Water	1.0

Data Table 1: Unknown Rock 1 Density Measurements
(SAMPLE ANSWER BELOW)

Measurement	Sample 1	Sample 2	Sample 2
Mass (M) (g)	Student data will vary. 40.3	40.8	40.4
Initial Volume (V0) (ml)	200	200	200
Final Volume (V1) (ml)	215	215	215
Rock Volume (V) (ml)	15	15	15

Data Table 2: Unknown Rock 2 Density Measurements
(SAMPLE ANSWER BELOW)

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Measurement	Sample 1	Sample 2	Sample 2
Mass (M) (g)	Student data will vary. 46.8	47.1	47.3
Initial Volume (V0) (ml)	200	200	200
Final Volume (V1) (ml)	216	216	216
Rock Volume (V) (ml)	16	16	16

Data Table 3: Densities of Unknown Rocks
(SAMPLE ANSWER BELOW)

Unknown Rock	Sample	Density (g/cm ³)
Unknown Rock 1	Sample 1	Student data will vary. 2.69
Unknown Rock 1	Sample 2	2.72
Unknown Rock 1	Sample 3	2.69
Unknown Rock 2	Sample 1	2.93
Unknown Rock 2	Sample 2	2.94
Unknown Rock 2	Sample 3	2.96

Exercise 2

Describe one possible journey to get the rock shown below (schist) in the rock cycle interactive animation, starting from sediment. List each stage and the action taken along your paths.



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Data Table 4: Rock Cycle Path
(SAMPLE ANSWER BELOW)

Path #	Cycle Stage	Action Chosen	Result
<i>Example</i>	<i>Sediment</i>	<i>Cooling</i>	<i>No Change</i>
1	Sediment	Heat/Pressure	Metamorphic Roc
2	Metamorph. Rock	Melting	Magma/Lava

3	Magma/Lava	Cooling	Igneous Rock
4	Igneous Rock	Cooling	No Change
5	Igneous Rock	Erosion	Sediment
6	Sediment	Compress	Sediment. Rock
7	Sediment. Rock	Heat/Pressure	Metamorph. Roc
8	Metamorph. Rock	Cooling	No Change
9	Metamorph. Rock	Erosion	Sediment
10	Sediment	Melting	Magma/Lava

Competency Review

Sediments that undergo compacting and cementing will form ____ .

- ☐ metamorphic rocks
- ☐ igneous rocks
- ☐ magma
- ☒ sedimentary rocks ✓

The density of oceanic crust is ____ that of continental crust.

- ☒ greater than ✓
- ☐ equal to
- ☐ less than

An unknown rock has a mass of 32.4 g and a volume of 12 mL. What is the density of the unknown rock?

- ☐ 3.7 g/cm³
- ☐ 2.9 g/cm³
- ☒ 2.7 g/cm³ ✓
- ☐ 1.9 g/cm³

An unknown rock has a mass of 32.4 g and a volume of 12 mL. Based on this data, what type of crustal rock is the unknown?

- ☐ Oceanic crust
- ☒ Continental crust ✓
- ☐ Terrestrial crust
- ☐ There is not enough information to determine the type of crustal rock.

Continental crust has a high abundance of lighter elements, including sodium and calcium.

- ☒ True ✓
- ☐ False

Metamorphic rock that undergoes ____ becomes magma, which can then become ____ rock after cooling.

- ☐ melting; sedimentary
- ☒ melting; igneous ✓
- ☐ weathering; sedimentary
- ☐ compacting; igneous

Oceanic crust will sink below continental crust at plate boundaries due to differences in density.

- ☒ True ✓
- ☐ False

Weathering and erosion leads to the formation of ____.

- ☒ sediments ✓
- ☐ metamorphic rocks
- ☐ igneous rocks
- ☐ magma

Extension Questions

You are evaluating three rock samples: granite, shale and schist.

- **Classify the three rocks as igneous, metamorphic or sedimentary.**

- **Describe the pathways that would be taken to transition from:**
 - **Granite to Shale**

 - **Schist to Granite**

 - **Shale to Schist**

(SAMPLE ANSWER BELOW)

Granite is an igneous rock, shale is a sedimentary rock, and schist is a metamorphic rock.

Granite forms from magma in the Earth's crust. It can be brought to the surface, where it is exposed to weathering and erosion to form sediments. As the sediment is buried, it becomes compacted and cemented, forming shale.

Schist can become granite via melting to become magma. As the magma cools, it will solidify into an igneous rock, such as granite.

Shale can become schist through an increase in temperature and pressure through metamorphism. This will result in the formation of a metamorphic rock, such as schist.