# SI Geology - Full Discipline Demo

### Minerals - No Materials

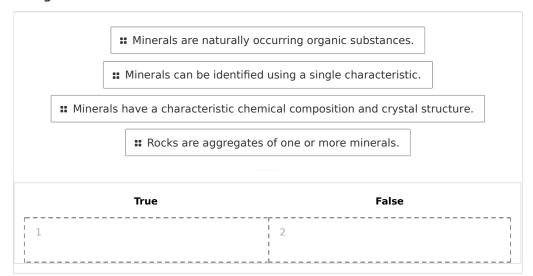
## Final Report - Answer Guide

InstitutionScience Interactive UniversitySessionSI Geology - Full Discipline DemoCourseSI Geology - Full Discipline Demo

**Instructor** Sales SI Demo

## Test Your Knowledge

#### Categorize each statement as true or false.



#### Correct answers:

 ${\mathbb 1}$  Minerals have a characteristic chemical composition and crystal structure.

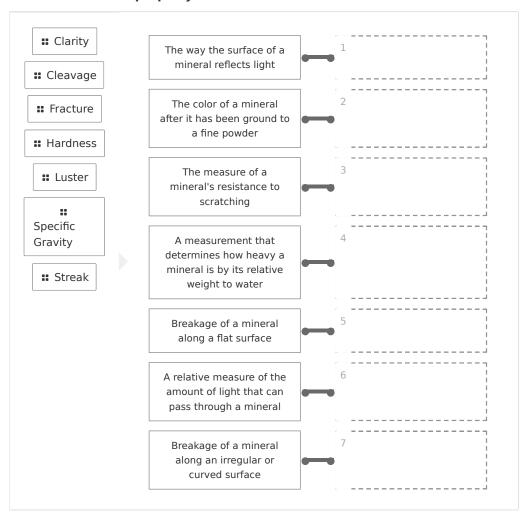
Rocks are aggregates of one or more minerals.

2 Minerals are naturally occurring organic substances.

Minerals can be identified using a single characteristic.



#### Match the mineral property to its definition.



#### Correct answers:

- 1 Luster 2 Streak 3 Hardness 4 Specific Gravity 5 Cleavage
- <sup>6</sup> Clarity <sup>7</sup> Fracture

## **Exploration**

IA	inerals have a characteristic chemical composition and a Structure	•
	O crystalline	<b>✓</b>
	organic	
	<ul><li>effervescent</li></ul>	
	<ul><li>translucent</li></ul>	
W	/hat is the luster of a nonmetallic mineral that is described as iridescen	t?
	<ul><li>vitreous</li></ul>	
	pearly	<b>~</b>
	<ul><li>adamantine</li></ul>	
	○ silky	
M	linerals with high hardness have weaker atomic bonds.	
	○ True	
	○ False	<b>~</b>
	occur as a result of parallel planes of weakness between repeating,	
p	arallel layers of atoms in a crystal.	
	Cleavage planes	
	Cleavage directions	
	Cleavage surfaces	<b>~</b>
	<ul> <li>Conchoidal fractures</li> </ul>	
	pecific gravity is a unitless measurement that determines how heavy a nineral is by its relative weight to water.	
	○ True	<b>~</b>
'	○ False	



## Exercise 1

Which mineral sample had the highest specific gravity? What does this tell you about the lements or compounds that make up this mineral?
Why is it helpful to know the specific gravity of an unknown mineral?
low would a mineral's specific gravity be affected if the mineral contained impurities (i.e., ther elements not normally part of a mineral's atomic structure)?

Data Table 1: Specific Gravity of the Mineral Samples  $({\sf SAMPLE}\ {\sf ANSWER}\ {\sf BELOW})$ 

Sample	Dry Mass (g)	Total Volume (mL)	Mineral Volume (mL)	Specific Gravity
1	16.1	205-206	5-6	3.22-4.03
2	15.0	205-206	5-6	2.5-3.0
3	16.7	206-207	6-7	2.39-2.78
4	39.1	208-209	8-9	4.34-4.89
5	19.0	206-207	6-7	2.71-3.17
6	21.9	208-209	8-9	2.43-2.74
7	47.9	209-210	9-10	4.79-5.32
8	18.9	208-209	8-9	2.1-2.36
9	19.8	207-208	7-8	2.48-2.83
10	14.9	207	7	2.13
11	32.8	206-207	6-7	4.69-5.47

12 1.0	200	0.30-0.35	2.86-3.33	
--------	-----	-----------	-----------	--

## Exercise 2

Which mineral sample had the highest specific gravity? What does this tell you about the elements or compounds that make up this mineral?
Why is it helpful to know the specific gravity of an unknown mineral?
How would a mineral's specific gravity be affected if the mineral contained impurities (i.e., other elements not normally part of a mineral's atomic structure)?
List three possible sources of error in this exercise. How would each source or error impact your final specific gravity calculation?



-	ysical prop the minera	perty or combinatio	n of pr	operties w	ere the mo	st helpful in help	oing you
	listed in Da	ies of gold listed in t ata Table 2. What pro					
		Property		Nati	ve Gold		
		Luster		М	etallic		
		Color/Clarity	/	Yellov	v/opaque		
		Streak		Y	ellow		
		Hardness		2.	5-3.0		
		Cleavage	Ab	sent (ducti	le and malle	eable)	
		Specific Gravit	ty	:	19.3		
		on nickname for Mir mon nickname for N		-	-		
	eta Table 2	: Mineral Properties					
Sample	Luster	Color/Clarity	Streak	Hardness	Cleavage	Specific Gravity	Magnetic
L	Vitreous	Red or brown/opaque to	White	7.0	Uneven fracture	3.22-4.03	No



2

None

7.0

Conchoidal 2.5-3.0

fracture

No

translucent

gray/transparent

Vitreous or White, pink,

greasy

		or translucent					
3	Vitreous	Pink or orange- brown/opaque	White	6.0	2 at 90°	2.39-2.78	No
4	Metallic	Brassy yellow/opaque	Dark gray or black	6.0 or 6.5	Uneven fracture	4.34-4.89	No
5	Vitreous	Dark green or black/opaque	White or pale gray	5.5	2 not at 90°	2.71-3.17	No
6	Vitreous or pearly	Colorless, white, or gray/opaque	White	6.0	2 at 90°	2.43-2.74	No
7	Metallic	Silver, gray, or black/opaque	Red- brown	6.0	Uneven fracture	4.79-5.32	No
8	Dull/earthy	White or tan/opaque	White	1.0-2.0	Absent	2.1-2.36	No
9	Vitreous or iridescent	Colorless or white/transparent or translucent	White	3.0	3 not at 90°	2.48-2.83	No
10	Vitreous	Colorless or white/transparent or translucent	White	2.5	3 at 90°	2.13	No
11	Metallic	Silver, gray, or black/opaque	Dark gray	6.0	Uneven fracture	4.69-5.47	Yes
12	Vitreous	Dark brown/translucent to opaque	Gray- brown	2.5 or 3.0	One excellent	2.86-3.33	No

# Data Table 3: Mineral Identification (SAMPLE ANSWER BELOW)

Sample	Mineral Name
1	Garnet Schist
2	Milky Quartz
3	Potassium Feldspar
4	Pyrite
5	Amphibole
6	Plagioclase Feldspar
7	Hematite
8	Kaolinite
9	Calcite
10	Halite
11	Magnetite
12	Biotite



# Competency Review

being evaluated?	
O Color	
<ul><li>Luster</li></ul>	
Clarity	✓
Hardness	
Which characteristic does not describe a mineral?	
Characteristic chemical compound	
Organic Organic	<b>~</b>
Crystalline structure	
Naturally occurring	
The color and streak of a mineral are always the same.	
O True	
○ False	<b>✓</b>
•	
A mineral that splits into parallel sheets would exhibit what type of cleavage?	
Rhombohedral cleavage	
Cubic cleavage	
Prismatic cleavage	
Basal cleavage	<b>~</b>



A mineral has a dry mass of 30.1 g and a volume of 7.30 mL. What is the specific gravity of the mineral?	
○ 4.12	<b>~</b>
○ 7.30	
5.77	
○ 3.48	
If a mineral scratches a copper penny, but not an iron nail, it has a hardness	
<ul><li>between 5.5 and 6.5</li></ul>	
<ul><li>less than 2.5</li></ul>	
between 3.5 and 4.5	<b>~</b>
<ul><li>greater than 7</li></ul>	
Minerals containing will effervesce when exposed to acid.	
<ul> <li>sodium chloride</li> </ul>	
calcium carbonate	<b>~</b>
calcium chloride	
iron	
is a metallic mineral that is magnetic and exhibits uneven fracture a dark gray streak.	ind
O Pyrite	
<ul><li>Hematite</li></ul>	
<ul> <li>Amphibole</li> </ul>	
Magnetite	<b>~</b>



A mineral displays a dull/earthy luster, a white streak and a hardness of $<$ 2.5. What is the identity of this mineral?				
Potassium Feldspar				
Plagioclase Feldspar				
○ Kaolinite	<b>✓</b>			
Garnet				
Specific gravity has units of g/mL.				
O True				
○ False	<b>~</b>			

## **Extension Questions**

Marble is a rock that is composed primarily of the carbonate minerals calcite ( $CaCO_3$ ) and dolomite (Ca,Mg)( $CO_3$ )<sub>2</sub>). Why do you think people who care for outdoor monuments and sculptures made of marble are concerned about acid rain? (SAMPLE ANSWER BELOW)

Calcite effervesces (degrades) when exposed to acid. Therefore, acid rain will cause marble to weather or degrade over time. Long term, this may result in the destruction of the historic monuments/sculptures.

