Minerals

NAME: _____

KICK OFF ACTIVITY	☐ Classification of Minerals **(Pg. 2)**

MUST DO ALL

THE FOUNDATION	☐ Minerals Reading with Questions **(Pg. 3-7)** ☐ Properties of Common Minerals Reading **(Pg. 8-9)** **OR** Prop. of Common Minerals Video **(On Mr. White's Website)** ☐ Properties of Common Minerals Question Sheet **(Pg. 10-11)** ☐ Mineral Characteristics and ID Video **(On Mr. White's Website)**
HANDS-ON	☐ Mineral Identification Lab **(Pg. 12-16)**

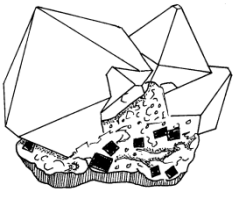
DO AT LEAST 2

TUNE-UP ACTIVITIES	☐ Crossword Puzzle **(Pg. 17)** ☐ Flashcard Matching ☐ Minerals Review Sheet **(Pg. 18-19)** ☐ Online Mineral Review Games **(Complete 2 Different Games)** ☐ Mineral Review Videos **(On Mr. White's Website)**

If you don't get 100% - do more tune-ups!!!

CHECK FOR UNDERSTANDING QUIZZES	**SCORE:** Quiz 1 _____ Quiz 2 _____ Quiz 3 _____ ***You must get a 100% on a quiz to move on to extension activities.** ***A 100% on a quiz will earn you a grade of 80% for the workbook.**

EXTENSION ACTIVITIES	☐ Life Gem **(Pg. 20)** **10 pts.** ☐ Mineral Lab Extension **(Pg. 21-23)** **10 pts** ☐ Regents Diagrams - What are they telling me? **(Pg. 24-26)** **5 pts.** ☐ Mineral Groups **(Pg. 27)** **5 pts.**



Classification of Minerals

1. **What properties did you use to classify (group) the mineral samples?**

2. **What property did you find the most useful? _____**

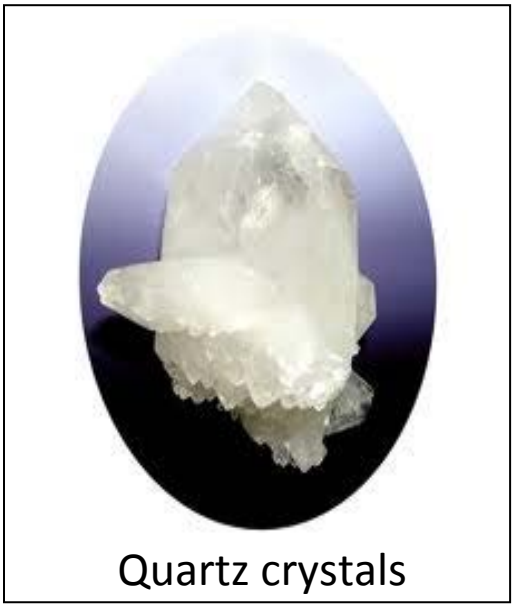
3. **What property was the least useful? _____**

Minerals Reading

Minerals are an important part of our every-day lives. In fact, practically every manufactured product that you might use in a typical day contains materials made from minerals.

What is a Mineral?

A **mineral** is a naturally occurring, solid, inorganic substance that has a definite chemical composition and crystal structure. For an Earth material to be considered a mineral, it must have the following characteristics:


Quartz crystals

1. Minerals are **naturally occurring –** they are not made by humans.

2. Minerals are **solids –** they are not liquids or gases at room temperature.

3. Minerals have an **ordered atomic arrangement** -- the chemical elements that make up each mineral are arranged in a particular way - this is why minerals 'grow' as crystals. Each mineral has a unique internal arrangement of atoms and crystal structure.

4. Minerals have a **definite chemical composition (make-up) –** each one is made of a particular mix of chemical elements.

5. Minerals are **inorganic –** they have never been alive and are not made from plants or animals.

QUESTIONS:

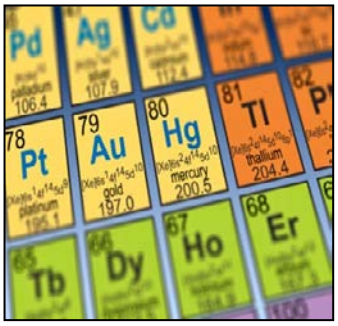
1. Based on the 5 characteristics of minerals, describe why the following examples are **NOT** minerals:

   a. Paper:_____
   _____

   b. Ice:_____
   _____

2. Graphite and Diamond are both made up of the same element - Carbon. However, they are identified as different minerals. Why?
   _____
   _____
   _____

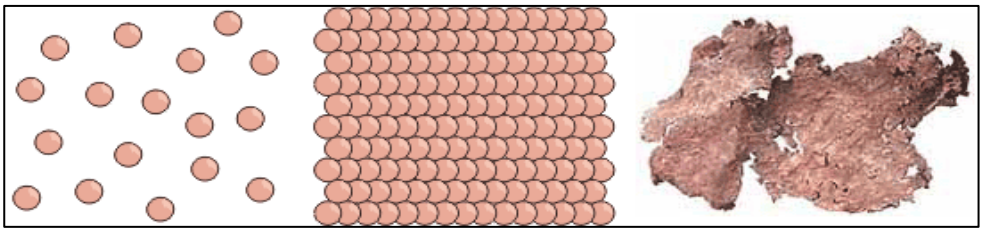
The tricky bits… atoms, elements and the rest.



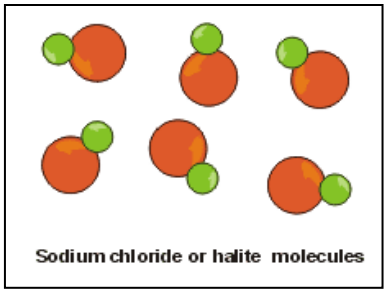
Minerals are made up of chemical elements. A chemical element is a substance that is made up of only one kind of atom. Have you heard of oxygen, hydrogen, iron, aluminum, gold and copper? These are all chemical elements.

But what is an atom?

An **atom** is the smallest unit of any chemical element. They are the building blocks that make up each chemical element, and are far too small to see with the naked eye. Imagine a small piece of copper, for example. Even the tiniest piece of copper is made up of billions and billions of copper atoms.



Billions and billions of copper atoms stack together to form a piece of copper.



Each mineral has a **fixed chemical composition** (It is always made of the same elements). Some minerals are made up of just one chemical element - they contain only one type of atom. Native copper is made up of copper atoms only. Most minerals are chemical **compounds** - they **contain atoms of more than one chemical element.** For example the mineral halite (salt) is a made up of the elements sodium (Na) and chlorine (Cl).

All the properties of a mineral - its crystal shape, hardness, color, luster - depend on which **chemical elements it is made of** and **how the atoms of these elements are arranged inside it** (internal arrangement of atoms).

QUESTIONS:

1. What is a chemical element? Define and give an example.

   _____

   _____

2. What is a chemical compound? Define and give an example.

   _____

   _____

3. What determines the properties of a mineral?

   _____

   _____

How Minerals Form

Minerals form nearly everywhere on Earth under different conditions. There are three major processes by which minerals form: **crystallization from magma, precipitation, and formation from hydrothermal solutions.** For example, minerals called silicates often form deep in the crust or mantle where temperatures and pressures are very high—crystallization from magna. Most of the minerals known as carbonates form in water at or near Earth's surface when existing minerals are exposed to weathering—precipitation.

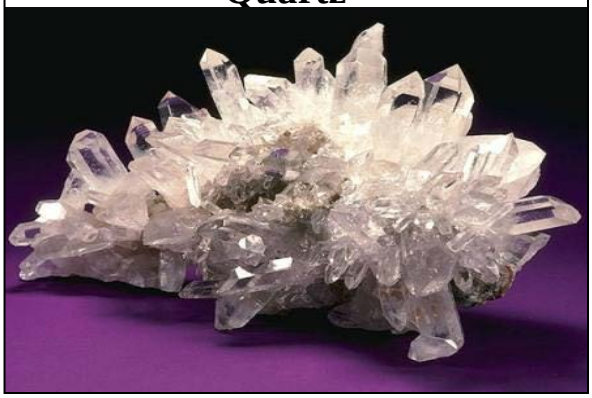
Hornblende

Crystallization from magma: Magma is molten (melted/liquid) rock. It forms deep within Earth. As magma cools, elements combine to form minerals such as feldspar and hornblende. The first minerals to crystallize from magma are usually those rich in iron, calcium, and magnesium.

Halite

Precipitation: The water in Earth's lakes, rivers, ponds, oceans, and beneath its surface contains many dissolved substances. If this water evaporates, some of the dissolved substances can react to form minerals. The minerals are left behind, or precipitated, out of the water. Two common minerals that form in this way are halite (salt) and calcite.

Quartz



Hydrothermal solutions: A hydrothermal solution is a very hot mixture of water and dissolved substances. Hydrothermal solutions have temperatures between about 100ºC and 300ºC. When these solutions come into contact with existing minerals, chemical reactions take place to form new minerals. Also, when hydrothermal solutions cool, some of the elements in them combine to form minerals such as quartz and pyrite.

QUESTIONS:

1. How is the process of forming minerals from magma different from the formation of minerals through the process of precipitation?

   _____

   _____

Mineral Properties

Have you ever heard of fools gold? It looks like gold, but it is another mineral. Many people have been fooled by it. Unfortunately, it is worth far less than gold.

Many minerals have "look-alikes." That is why scientists have come up with different properties and tests to identify minerals. Some properties are more reliable than others when identifying minerals. The properties of minerals are:

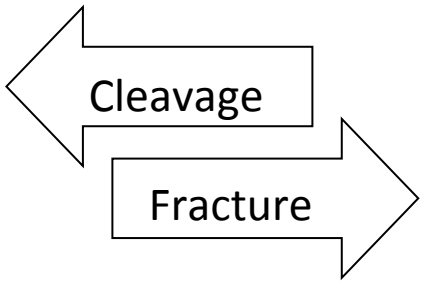
Color: Most minerals cannot be identified by color alone. Many minerals, such as gold and pyrite, have the same color. Other minerals, such as quartz, have many different colors.

Streak: When you rub a mineral on a piece of tile, it may leave a streak of powder. Streak is the color of the powder left by the mineral. The color of a mineral's streak is very important. A mineral may have different colors, but it always leaves the same color streak. For example, hematite can be silver or red, but it will always leave a red-brown streak.

Luster: The way a mineral reflects light is called its luster. Luster can be metallic or nonmetallic. Minerals with metallic luster shine like polished metals. Those with nonmetallic luster have no metallic shine.

Hardness: The hardness of a mineral is its resistance to being scratched. To find out how hard a mineral is, we test it against other minerals of known hardness. Minerals are often compared to the hardness of glass which is 5.5. If a mineral scratches glass, it has a hardness greater than 5.5. If it does not scratch glass, it has a hardness less than 5.5.

Cleavage and Fracture: The way a mineral breaks can also be used to identify the mineral. Some minerals split along smooth, flat surfaces. These minerals are said to have **cleavage**. Other minerals break into pieces with uneven (jagged) surfaces. These minerals are said to have **fracture.**



Special Properties: Some minerals have **special properties** that can be used to identify them. For example, calcite will bubble when a drop of hydrochloric acid is placed on it. The mineral halite tastes salty, magnetite is magnetic, and talc feels slippery.

QUESTIONS FOR MINERAL PROPERTIES:

1. Why is it not possible to identify minerals using color alone?

   _____
   _____
   _____

2. Why is streak a good property to use when identifying a mineral?

   _____
   _____
   _____

3. How will a mineral with a metallic luster look different from a mineral with non-metallic luster?

   _____
   _____

4. What is a mineral's "hardness?"

   _____
   _____

5. How would you determine the hardness of a mineral by using a piece of glass?

   _____
   _____

6. What is the difference between a mineral that has cleavage and one that has fracture?

   _____
   _____
   _____
   _____

Properties of Common Minerals Reading (ESRT Pg. 16)

Mineralogists have identified over 3,000 minerals, but only 100 minerals are common and only about ten elements make up most minerals. So, how do we identify minerals? By testing their physical and chemical properties. These tests might include the mineral's appearance, the crystal shape, luster, hardness, streak, acid test, their form of breakage – cleavage or fracture, and at times how the mineral feels or smells. These properties and others, along with the mineral composition (what it is made up of) can be found in the Properties of Common Minerals Chart in the Earth Science Reference Tables.

THE CHART: MATCH THE NUMBERS BELOW WITH THE NUMBERS ON THE NEXT PAGE

1. The twenty-one minerals in the chart are classified first by their **luster –** the way it reflects light. This classification, metallic or nonmetallic, is given on the far left of this chart. (See #1 on the chart)

2. The next identifying property is **hardness**, based on a scale of 1 to 10. (See #2 on the chart)

3. Following this is whether the mineral shows **cleavage** or **fracture**. If the mineral shows at least one smooth face (side) it has cleavage. (See #3 on the chart)

4. Common **color** is also given, but we need to be careful since many minerals show more than one color due to impurities within the mineral. (See #4 on the chart)

5. The **Distinguishing Characteristics** column gives additional information about the mineral. Look in this column for unusual properties. (See #5 on the chart)

6. The **Uses(s)** column is how man has found a use for a particular mineral. (See #6 on the chart)

7. a.) The **Composition** column shows the element or chemical formula for the mineral. (See #7a on the chart) b.) Use the bottom of this chart to identify any chemical symbols you need help with. (See #7b on the chart)

8. In the **Mineral Name** column locate Potassium Feldspar, it also goes by the name orthoclase. Two other minerals are shown to be identified by other names. (See #8 on the chart)

Properties of Common Minerals

1 LUSTER	2 HARD-NESS	3 CLEAVAGE	3 FRACTURE	4 COMMON COLORS	5 DISTINGUISHING CHARACTERISTICS	6 USE(S)	7a COMPOSITION*	8 MINERAL NAME
Metallic luster	1–2	✔		silver to gray	black streak, greasy feel	pencil lead, lubricants	C	**Graphite**
	2.5	✔		metallic silver	gray-black streak, cubic cleavage, density = 7.6 g/cm^3	ore of lead, batteries	PbS	**Galena**
	5.5–6.5		✔	black to silver	black streak, magnetic	ore of iron, steel	Fe_3O_4	**Magnetite**
	6.5		✔	brassy yellow	green-black streak, (fool's gold)	ore of sulfur	FeS_2	**Pyrite**
Either	5.5 – 6.5 or 1		✔	metallic silver or earthy red	red-brown streak	ore of iron, jewelry	Fe_2O_3	**Hematite**
Nonmetallic luster	1	✔		white to green	greasy feel	ceramics, paper	$Mg_3Si_4O_{10}(OH)_2$	**Talc**
	2		✔	yellow to amber	white-yellow streak	sulfuric acid	S	**Sulfur**
	2	✔		white to pink or gray	easily scratched by fingernail	plaster of paris, drywall	$CaSO_4 \cdot 2H_2O$	**Selenite gypsum**
	2–2.5	✔		colorless to yellow	flexible in thin sheets	paint, roofing	$KAl_3Si_3O_{10}(OH)_2$	**Muscovite mica**
	2.5	✔		colorless to white	cubic cleavage, salty taste	food additive, melts ice	NaCl	**Halite**
	2.5–3	✔		black to dark brown	flexible in thin sheets	construction materials	$K(Mg,Fe)_3AlSi_3O_{10}(OH)_2$	**Biotite mica**
	3	✔		colorless or variable	bubbles with acid, rhombohedral cleavage	cement, lime	$CaCO_3$	**Calcite**
	3.5	✔		colorless or variable	bubbles with acid when powdered	building stones	$CaMg(CO_3)_2$	**Dolomite**
	4	✔		colorless or variable	cleaves in 4 directions	hydrofluoric acid	CaF_2	**Fluorite**
	5–6	✔		black to dark green	cleaves in 2 directions at 90°	mineral collections, jewelry	$(Ca,Na)(Mg,Fe,Al)(Si,Al)_2O_6$	**Pyroxene** (commonly augite)
	5.5	✔		black to dark green	cleaves at 56° and 124°	mineral collections, jewelry	$CaNa(Mg,Fe)_4(Al,Fe,Ti)_3Si_6O_{22}(O,OH)_2$	**Amphibole** (commonly hornblende)
	6	✔		white to pink	cleaves in 2 directions at 90°	ceramics, glass	$KAlSi_3O_8$	**Potassium feldspar** (commonly orthoclase)
	6	✔		white to gray	cleaves in 2 directions, striations visible	ceramics, glass	$(Na,Ca)AlSi_3O_8$	**Plagioclase feldspar**
	6.5		✔	green to gray or brown	commonly light green and granular	furnace bricks, jewelry	$(Fe,Mg)_2SiO_4$	**Olivine**
	7		✔	colorless or variable	glassy luster, may form hexagonal crystals	glass, jewelry, electronics	SiO_2	**Quartz**
	6.5–7.5		✔	dark red to green	often seen as red glassy grains in NYS metamorphic rocks	jewelry (NYS gem), abrasives	$Fe_3Al_2Si_3O_{12}$	**Garnet**

*Chemical symbols:

Al = aluminum	Cl = chlorine	H = hydrogen	Na = sodium	S = sulfur	7b
C = carbon	F = fluorine	K = potassium	O = oxygen	Si = silicon	
Ca = calcium	Fe = iron	Mg = magnesium	Pb = lead	Ti = titanium	

✔ = dominant form of breakage

Properties of Common Minerals Question Sheet

1. Part of a gemstone's value is based on the way a gemstone shines in reflected light. The way a mineral reflects light is described as the mineral's

   (1) frature (3) luster
   (2) hardness (4) streak 1 _____

2. Which mineral will scratch glass (hardness = 5.5), but not pyrite?

   (1) gypsum (3) orthoclase
   (2) fluorite (4) quartz 2 _____

3. The table below shows the hardness of four common materials.

Hardness of Four Materials

Material	Hardness
human fingernail	2.5
copper penny	3.0
window glass	4.5
steel nail	6.5

   Which statement best describes the hardness of the mineral dolomite?

   (1) Dolomite can scratch window glass, but cannot be scratched by a fingernail.
   (2) Dolomite can scratch window glass, but cannot be scratched by a steel nail.
   (3) Dolomite can scratch a copper penny, but cannot be scratched by a fingernail.
   (4) Dolomite can scratch a copper penny, but cannot be scratched by a steel nail. 3 _____

4. Which mineral leaves a green-black powder when rubbed against an unglazed porcelain plate?

   (1) galena (3) hematite
   (2) graphite (4) pyrite 4 _____

5. Which mineral scratches dolomite and is scratched by olivine?

   (1) galena (3) potassium feldspar
   (2) quartz (4) muscovite mica 5 _____

6. Which statement about the minerals plagioclase feldspar, gypsum, biotite mica, and talc can best be inferred from the chart?

   (1) These minerals have the same chemical and physical properties.
   (2) These minerals have different chemical properties, but they have similar physical properties.
   (3) These minerals have different physical and chemical properties, but they have identical uses.
   (4) The physical and chemical properties of these minerals determine how humans use them. 6 _____

7. Carbonate minerals bubble with acid because they have CO_3 as part of their chemical composition. Which minerals will react with acid because they are carbonates?

   (1) talc and halite
   (2) fluorite and hematite
   (3) calcite and dolomite
   (4) quartz and pyroxene 7 _____

8. Which home-building material is made mostly from the mineral gypsum?

(1) plastic pipes
(2) window glass
(3) drywall panels
(4) iron nails 8 _____

9. The internal atomic structure of a mineral most likely determines the mineral's

(1) hardness, cleavage, and crystal shape
(2) origin, exposure, and fracture
(3) size, location, and luster
(4) color, streak, and age 9 _____

10. The accompanying table shows some observed physical properties of a mineral. Based on these observations, the elements that make up this mineral's composition are

Physical Property	Observation
color	white
hardness	scratched by the mineral calcite
distinguishing characteristic	feels greasy
cleavage/fracture	shows some definite flat surfaces

(1) sulfur and lead
(2) sulfur, oxygen, and hydrogen
(3) oxygen, silicon, hydrogen, and magnesium
(4) oxygen, silicon, aluminum, and iron 10_____

"Herkimer Diamonds"

Gem-quality "Herkimer Diamonds" are hexagonal-shaped quartz crystals found in some of the surface bedrock of Herkimer, New York. The oldest of these gemstones are believed to be approximately 500 million years old. These quartz crystals are magnificent works of nature that have a natural diamond like geometric shape formed when the quartz crystallized. Natural "Herkimer Diamonds" were not cut or shaped by humans. Due to their appearance, "Herkimer Diamonds" are commonly used in jewelry. These quartz crystals are not true diamonds.

Mineral Characteristics of "Herkimer Diamonds" (Quartz) and True Diamonds

Mineral	Color	Chemical Composition	Luster	Hardness	Dominant Form of Breakage
"Herkimer Diamond" (quartz)	Colorless or variable	SiO_2	Glassy	7	Fracture
True diamond	Colorless or variable	C	Glassy	10	Cleavage

11. List two mineral characteristics that differ between "Herkimer Diamonds" and true diamonds.

1) _____

2) _____

Photographs of "Herkimer Diamonds" (Quartz)

12. State one use for "Herkimer Diamonds" (quartz), other than their use in jewelry.

_____

_____

Mineral Identification Lab

Introduction: Minerals are the naturally occurring inorganic solid elements and mixtures from which rocks are made. Minerals have physical properties determined by their chemical composition and internal arrangement of atoms. Minerals can be identified by well-defined properties, such as cleavage, fracture, color, density, hardness, streak, luster, crystal shape, and reaction with acid.

Materials: mineral samples, streak plate, glass plate, mineral ID flowchart

Procedure:

1. Identify the luster of **mineral 1** (metallic or nonmetallic) and record it in the data table.

2. Determine if **mineral 1** shows cleavage or fracture and record it in the data table.

3. Gently rub **mineral 1** on the streak plate to determine the streak color. Record it in the data table.

4. Rub mineral 1 across the glass plate. Glass has a hardness of 5.5. If the mineral **doesn't scratch** the glass it is considered "**soft**" (hardness of less than 5.5). If it **does scratch** the glass, it is considered "**hard**" (hardness of greater than 5.5). Record the hardness in the data table.

5. Use the **Mineral Identification Flowchart** to determine the name of the mineral. Record it in the data table. Repeat this process for the remaining mineral samples.

The following is a list of ways that you can **improve** your science lab write-ups. *Check off when completed.*

___ I used complete sentences when appropriate.
___ I answered all questions with complete ideas.
___ I am neat, including using a pencil to erase mistakes.
___ I reviewed the lab to make sure all questions are answered correctly.
___ I asked the teacher for help when needed.

Mineral Identification Flowchart

Luster	Cleavage or Fracture	Streak	Hardness	Mineral Name
Metallic	Cleavage	Color	Soft	**Galena**
			Hard	NONE
		Colorless or white	Soft	NONE
			Hard	NONE
	Fracture	Color	Soft	**Hematite**
			Hard	**Pyrite**
		Colorless or white	Soft	NONE
			Hard	NONE
Nonmetallic	Cleavage	Color	Soft	**Biotite Mica**
			Hard	NONE
		Colorless or white	Soft	**Halite**
			Hard	NONE
	Fracture	Color	Soft	**Sulfur**
			Hard	NONE
		Colorless or white	Soft	NONE
			Hard	**Olivine**

Mineral Identification Data Table

Mineral 1	Breakage	Streak	Hardness
Luster ☐ Metallic ☐ Nonmetallic	☐ Cleavage ☐ Fracture	☐ Color ☐ White or Colorless	☐ Doesn't scratch glass (soft) ☐ Scratches glass (hard)

Mineral Name: _____

Mineral 2	Breakage	Streak	Hardness
Luster ☐ Metallic ☐ Nonmetallic	☐ Cleavage ☐ Fracture	☐ Color ☐ White or Colorless	☐ Doesn't scratch glass (soft) ☐ Scratches glass (hard)

Mineral Name: _____

Mineral 3	Breakage	Streak	Hardness
Luster ☐ Metallic ☐ Nonmetallic	☐ Cleavage ☐ Fracture	☐ Color ☐ White or Colorless	☐ Doesn't scratch glass (soft) ☐ Scratches glass (hard)

Mineral Name: _____

Mineral 4	Breakage	Streak	Hardness
Luster ☐ Metallic ☐ Nonmetallic	☐ Cleavage ☐ Fracture	☐ Color ☐ White or Colorless	☐ Doesn't scratch glass (soft) ☐ Scratches glass (hard)

Mineral Name: _____

Mineral 5	Breakage	Streak	Hardness
Luster ☐ Metallic ☐ Nonmetallic	☐ Cleavage ☐ Fracture	☐ Color ☐ White or Colorless	☐ Doesn't scratch glass (soft) ☐ Scratches glass (hard)

Mineral Name: _____

Mineral 6	Breakage	Streak	Hardness
Luster ☐ Metallic ☐ Nonmetallic	☐ Cleavage ☐ Fracture	☐ Color ☐ White or Colorless	☐ Doesn't scratch glass (soft) ☐ Scratches glass (hard)

Mineral Name: _____

Mineral 7	Breakage	Streak	Hardness
Luster ☐ Metallic ☐ Nonmetallic	☐ Cleavage ☐ Fracture	☐ Color ☐ White or Colorless	☐ Doesn't scratch glass (soft) ☐ Scratches glass (hard)

Mineral Name: _____

Make sure to complete the lab questions on the next page!!!

Lab Questions:

1. Both Sulfur and Galena are softer than glass. Using just the minerals, how can you determine which of the two minerals is harder.

   _____

   _____

   _____

2. Describe why Galena breaks along flat surfaces (cleavage) while Pyrite breaks along uneven surfaces (fracture)?

   _____

   _____

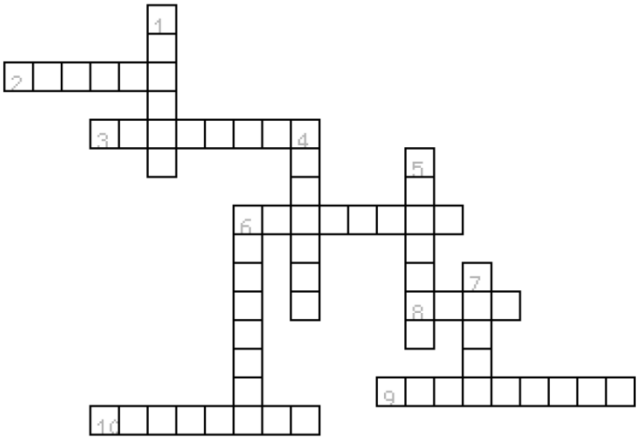
   _____

3. Using page 16 of the ESRT, what is the best physical property that could be used to identify the difference between Selenite Gypsum and Potassium Feldspar.

   _____

   _____

   _____



Down

1. the color of the powder left by a mineral

4. substance that is made up of only one kind of atom

5. naturally occurring, solid, inorganic substance that has a definite shape and chemical composition

6. when a mineral splits along smooth, flat surfaces

7. most unreliable physical property used to identify minerals

Across

2. the way a mineral reflects light

3. when a mineral breaks into pieces with uneven, jagged surfaces

6. contains atoms of more than one element

8. smallest unit of any chemical element

9. has never been alive and is not made from plants or animals

10. a mineral's resistance to being scratched

C	Z	S	D	H	A	R	D	N	E	S	S
O	E	S	T	H	J	I	Z	J	H	V	P
L	H	B	Y	R	F	X	P	T	U	C	C
O	B	B	R	V	E	X	N	B	C	K	O
R	I	V	H	M	D	A	L	Y	L	J	M
V	L	F	H	A	Q	A	K	C	E	P	P
I	M	U	R	Q	T	F	X	H	A	J	O
N	Y	I	M	A	Y	O	I	C	V	I	U
O	P	Q	N	G	C	F	M	T	A	E	N
R	E	L	H	E	F	T	X	G	G	W	D
G	D	U	T	L	R	N	U	H	E	U	V
A	D	S	L	G	S	A	N	R	X	B	B
N	U	T	D	L	T	M	L	L	E	F	I
I	O	E	O	P	Z	Y	P	Z	F	R	X
C	H	R	L	E	L	E	M	E	N	T	A

Minerals Review Sheet

Mineral Characteristics

1. What are the 5 characteristics of a mineral?

   - _____
   - _____
   - _____
   - _____
   - _____

Mineral Properties

2. Is the following sentence **true** or **false**? Circle T or F.

   Because color is **unique** to all minerals, it is **always** useful in mineral identification. (T / F)

3. What is a mineral's **cleavage**?

   _____

   _____

4. When a mineral **breaks unevenly** it shows _____.

5. What is a mineral's **luster**?

   _____

   _____

6. Type of **luster** that makes minerals look like **metals**:

   a. earthy b. nonmetallic

   c. metallic d. glassy

7. The **hardest** mineral shown in the table to the right is:
    a. talc
    b. diamond
    c. topaz
    d. quartz

8. Which mineral is **harder** than **apatite**?
    a. talc
    b. calcite
    c. fluorite
    d. orthoclase

9. Which mineral can scratch topaz?
    a. gypsum
    b. apatite
    c. calcite
    d. corundum

Index Mineral	Scale	Common Objects
Diamond	10	
Corundum	9	
Topaz	8	
Quartz	7	Steel file (6.5)
Orthoclase	6	
Apatite	5	Glass (5.5)
Fluorite	4	Knife blade (5.1) Wire Nail (4.5) Penney (3.5)
Calcite	3	Fingernail (2.5)
Gypsum	2	
Talc	1	

10. **Streak** is the color of a mineral's _____.

11. Which **property** could you use to tell the **difference** between **talc** and **graphite**? (Page 16: reference tables)
    a. hardness
    b. luster
    c. feel
    d. smell

12. What two things determine the properties a mineral will have?

    a. _____
    _____

    b. _____
    _____

***LifeGem*® Extension Activity**

To Start: To learn more about *diamonds*, do a little research. What is a diamond? What are the "**4Cs**" of diamonds? Specifically, what does "**carat**" mean for diamonds?

To Continue: Open *www.lifegem.com*. Browse the website to view information about the product *LifeGem*® makes. Answer the questions below by clicking on the correct links at the top of the page.

Questions:

1. Click on the *TOURS & THE PROCESS* link and find the 4 steps for creating a *LifeGem*® diamond. In the space below, write a summary of how a *LifeGem*® diamond is created in a laboratory. *Be specific, writing the titles of the steps will not be enough!*

2. Is a *LifeGem*® diamond a true mineral based on the definition you learned in class? Explain your answer.

Use the *PRICES* link to determine the price of the following diamonds:

3. 0.15 carat yellow diamond: _____
4. 100 milligram blue diamond: _____ (*Hint: What is the weight of one carat?)*
5. 300 milligram red diamond: _____ (*Hint: What is the weight of one carat?)*

Click on the *WHY CHOOSE A LIFEGEM* link. Read this page and then answer question 6.

6. This is an Earth Science topic that can have an emotional impact in real life. Do you agree or disagree with the product that *LifeGem*® is producing? Why or why not?

Mineral Lab Extension

Introduction: Minerals are the naturally occurring inorganic solid elements and mixtures from which rocks are made. Minerals have physical properties determined by their chemical composition and internal arrangement of atoms. Minerals can be identified by well-defined properties, such as cleavage, fracture, color, density, hardness, streak, luster, crystal shape, and reaction with acid.

Materials: ESRT, minerals, streak plate, glass plate, magnet, nail, penny, mineral hardness flowchart

Procedure:

1. Use your ESRT and tools to identify the minerals in this lab.

Mineral #	Color	Luster (Metallic/ Nonmetallic)	Hardness #	Breakage (Cleavage/ Fracture)	Streak Color	Mineral Name
1						
2						
3						
4						
5						
6						

DON'T FORGET TO ANSWER THE QUESTIONS ON PAGE 23!

MINERAL HARDNESS FLOWCHART

Use this page to help you test the hardness of a mineral!

1. It **can** be scratched by a fingernail → Hardness = less than 2.5

   Or

   It **cannot** be scratched by a fingernail → go to #2

---

2. It **cannot** scratch a penny → Hardness = (3.0 - 3.5)

   Or

   It **can** scratch a penny → go to #3

---

3. It **can** be scratched by an iron nail → Hardness = (4.0 – 4.5)

   Or

   It **cannot** be scratched by a nail → go to #4

---

4. It **cannot** scratch glass → Hardness = (5.0)

   Or

   It **can** scratch the glass → Hardness = (≥ 5.5)

Mineral Lab Extension Challenge Questions:

1. Suppose you were contracted to manufacture a protective lead vest to be worn in hospitals by patients receiving x-rays. Which mineral would you need to obtain (get) in order to start manufacturing?

2. Quartz is one of the main components of beach sand in New England. What property of Quartz allows it to survive transport by rivers over long distances?

3. Which mineral from among those you've observed would not hold up well to acid rain?

4. Use the chart of densities below to answer the following questions.

Mineral	Density
Diamond	3.5
Flourite	3.2
Quartz	2.7
Halite	2.2

a) A colorless mineral has been found with a mass of 10.8g and a volume of 4ml. According to the chart above, what is this mineral?

Identity of Mineral 1: _____

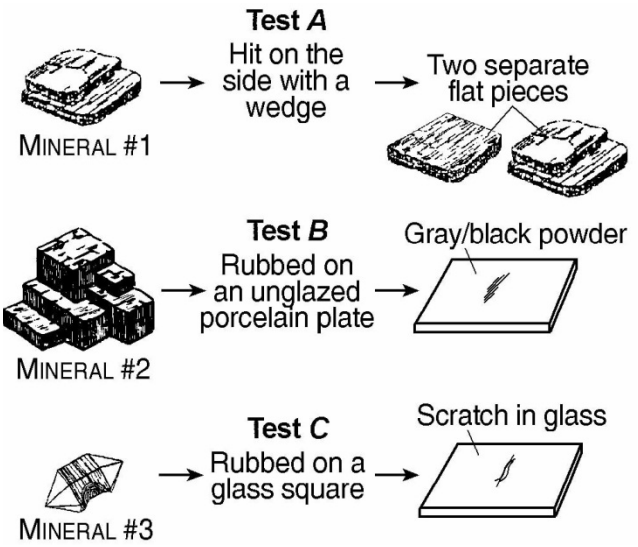
b) A sample of Halite has a volume of 12 cm3. What is its mass?
_____

c) If a diamond has a mass of 6g what is its volume? _____

Regents Diagrams - What are they telling me?

For each of the following diagrams, give an explanation of what you think the diagram is showing. Then write one question the regents exam might ask you based on the diagram.

Diagram #1



Explanation:_____

_____

_____

_____

_____

Question:

_____

_____

Diagram #2:

Mineral	Density (g/cm3)
Cinnabar	8.2
Magnetite	5.2
Quartz	2.7
Siderite	3.9

Explanation:_____

_____

_____

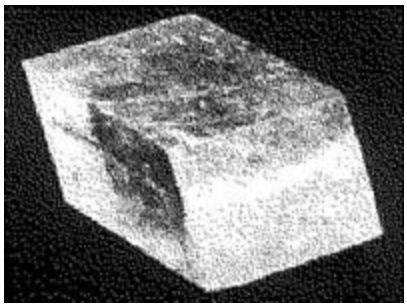
_____

Question:

_____

_____

Diagram #3



Explanation:_____

_____

_____

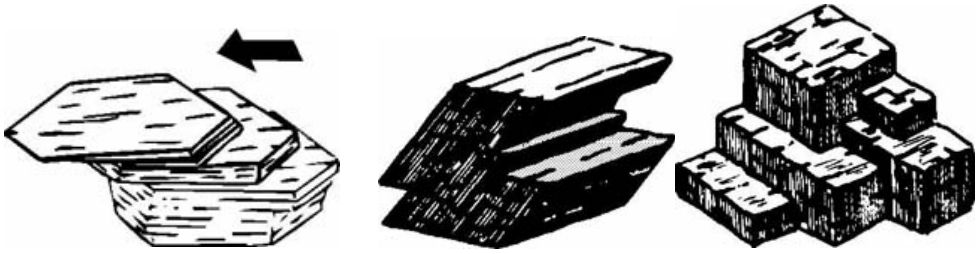
_____

Question:

_____

_____

Diagram # 4



Explanation:_____

_____

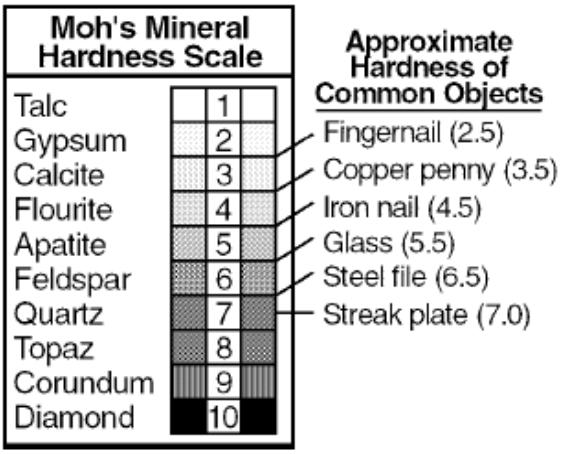
_____

Question:

_____

_____

Diagram #5



Explanation:_____

_____

_____

Question:

_____

_____

Mineral Groups Extension Activity

Directions: Use the Earth Science textbook to group each of the minerals located on page 16 of the ESRT into the correct mineral group below.

Silicates	Carbonates
Oxides	Sulfates
Halides	Native Elements