

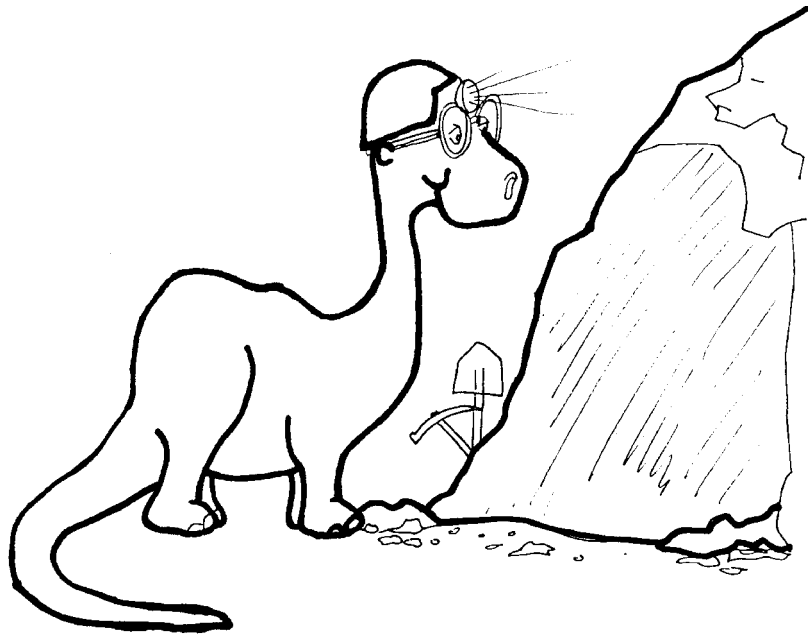


# Rock Cycle

Understanding the Earth's Crust



## SIXTH GRADE WORKBOOK



students \_\_\_\_\_

## ROCK CYCLE - CHEMISTRY (6)

### LAB

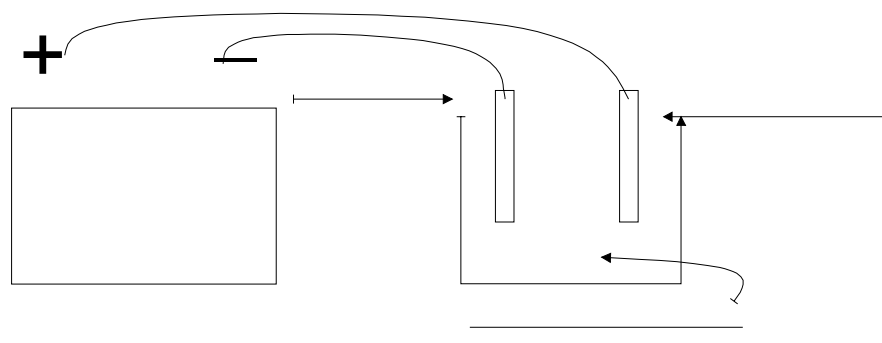
**PROBLEM:** Can atoms and molecules move?

**PREDICTION:** \_\_\_\_\_

#### PROCEDURE:

**MATERIALS:** beaker, 2 electrodes (one copper), items to plate, wire, battery, copper sulfate ( $\text{CuSO}_4$ ) solution

**EXERCISE I.** Set up the equipment as noted in the diagram. When dissolved in water, the copper sulfate ( $\text{CuSO}_4$ ) breaks down into copper ions ( $\text{Cu}^{2+}$ ) and sulfate ions ( $\text{SO}_4^{2-}$ ). When an electric current is applied to the solution, the  $\text{Cu}^{2+}$  ions in solution will travel to the negative (-) electrode. Label the diagram below.



+ hook up copper

- hook up zinc or whatever you want to plate

What is the chemical formula for copper sulfate?

\_\_\_\_\_

What does the copper sulfate break into when it is in the water?

**EXERCISE II.** Experiment with electroplating other items and record your observations.

item	observation - what happens?

**CONCLUSION:** How do the copper ions move?

\_\_\_\_\_  
\_\_\_\_\_

## Gemstones

### Silicate Gems



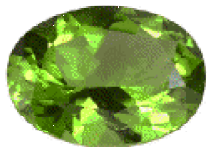
**Adventurine** - Quartz -  $\text{SiO}_2$



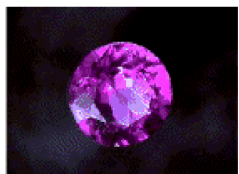
**Emerald** - Beryl  
 $\text{Al}_2\text{Be}_3(\text{Si}_6\text{O}_{18})$



**Agate** - Quartz -  $\text{SiO}_2$



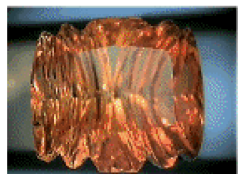
**Peridot** - Olivine  
 $(\text{Fe}, \text{Mg})_2\text{SiO}_4$



**Amethyst** - Quartz -  $\text{SiO}_2$



**Opal** - Opal  
 $\text{SiO}_2 \cdot n\text{H}_2\text{O}$



**Citrine** - Quartz  
-  $\text{SiO}_2$



**Almandite** - Garnet  
 $\text{Fe}_3\text{Al}_2(\text{SiO}_4)_3$



**Tiger Eye** - Quartz -  $\text{SiO}_2$

### Organic Gems



**Pearl** -  
obtained  
from a mollusk



**Amber** -  
a resin of fossil trees

### Other Gems



**Ruby** - Corundum  
 $\text{Al}_2\text{O}_3$



**Sapphire** - Corundum  
 $\text{Al}_2\text{O}_3$

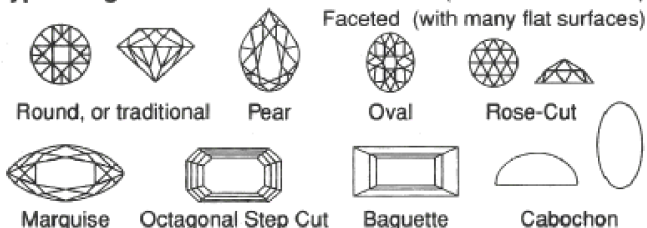


**Hematite** - Hematite  
 $\text{Fe}_2\text{O}_3$



**Diamond** - Diamond  
C

### Types of gem cuts



## ROCK CYCLE - MINERALS (6A)

### LAB

**PROBLEM:** Why is quartz found in many different colors?

**PREDICTION:** \_\_\_\_\_

**PROCEDURE:**

**Exercise I.** The bottle of food coloring that you have represents a "pure" form of one element. The following volumes of food coloring represent a "trace" amount. The water represents quartz and the food coloring represents another element.

1. What happens when you put 1 drop of food coloring into 200 ml of water?

\_\_\_\_\_

2. What happens when you put 4 drops of food coloring in the same 200 ml of water?

\_\_\_\_\_

**Exercise II.** The samples that you have are composed mainly of silicon dioxide. Can you figure out what is in the various samples? Use the hints below to help.  
rose color = titanium; purple or violet = iron; colorless = pure silicon dioxide; milky = fluid (not cause by an element); green = caused by small flakes of mica and hematite

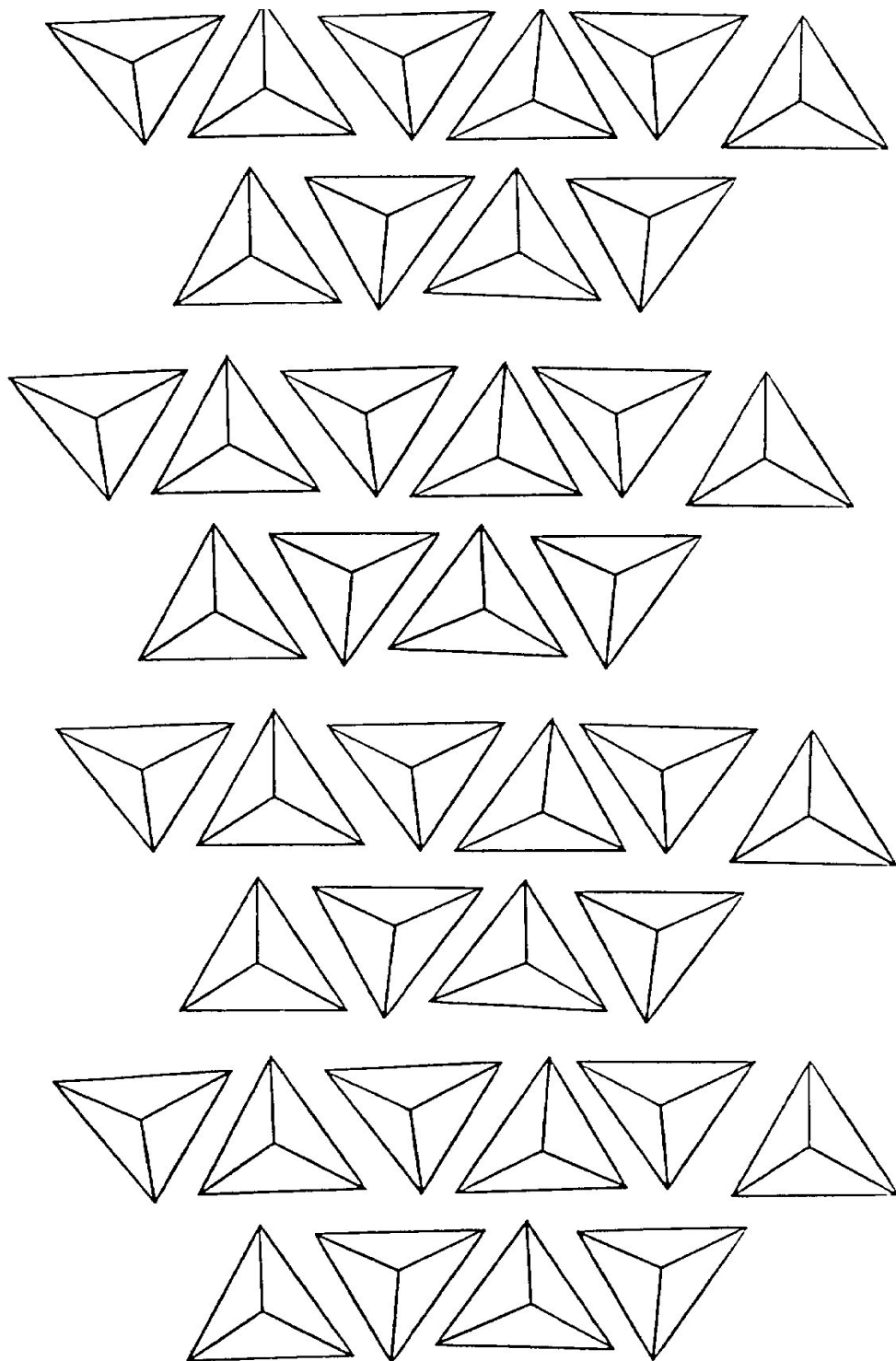
SAMPLE	CHARACTERISTICS
rose quartz	
adventurine	
crystal	
chert	
citrine	
amethyst	
milky quartz	
geode	
obsidian	
glass	
quartzite	
quartz sand	
quartz sandstone	

**CONCLUSION:** What is similar about the different forms of quartz you examined?  
What is different? \_\_\_\_\_

\_\_\_\_\_

**ROCK CYCLE - MINERALS (6A)**  
**POST LAB**

**SILICON TETRAHEDRON**



## ROCK CYCLE - MINERALS (6B)

### LAB

**PROBLEM:** How can properties of different minerals help predict the use of that mineral?

**PREDICTION:** \_\_\_\_\_

**PROCEDURE:** Write as many characteristics of a particular specimen as you can and predict possible uses of that mineral and why you think it might have that use.

MINERAL	HARDNESS	OTHER	POSSIBLE USES AND WHY
1. <b>KYANITE</b> $\text{Al}_2\text{SiO}_5$			
2. <b>FLUORITE</b> $\text{CaF}_2$			
3. <b>QUARTZ</b> $\text{SiO}_2$			
4. <b>PYRITE</b> $\text{FeS}_2$			
5. <b>GALENA</b> $\text{PbS}$			
6. <b>BORNITE</b> $\text{Cu}_5\text{FeS}_4$			
7. <b>HEMATITE</b> $\text{Fe}_2\text{O}_3$			
8. <b>COPPER</b> $\text{Cu}$			
9. <b>ULEXITE</b> $\text{NaCaB}_5\text{O}_9$			
10. <b>TOURMALINE IN LEPIDOLITE</b> Lepidolite $\text{K}_2\text{Li}_3\text{Al}_3$ ( $\text{AlSi}_3\text{O}_{10}$ )			

**CONCLUSION:** Can you tell if a mineral is useful just by looking at it?

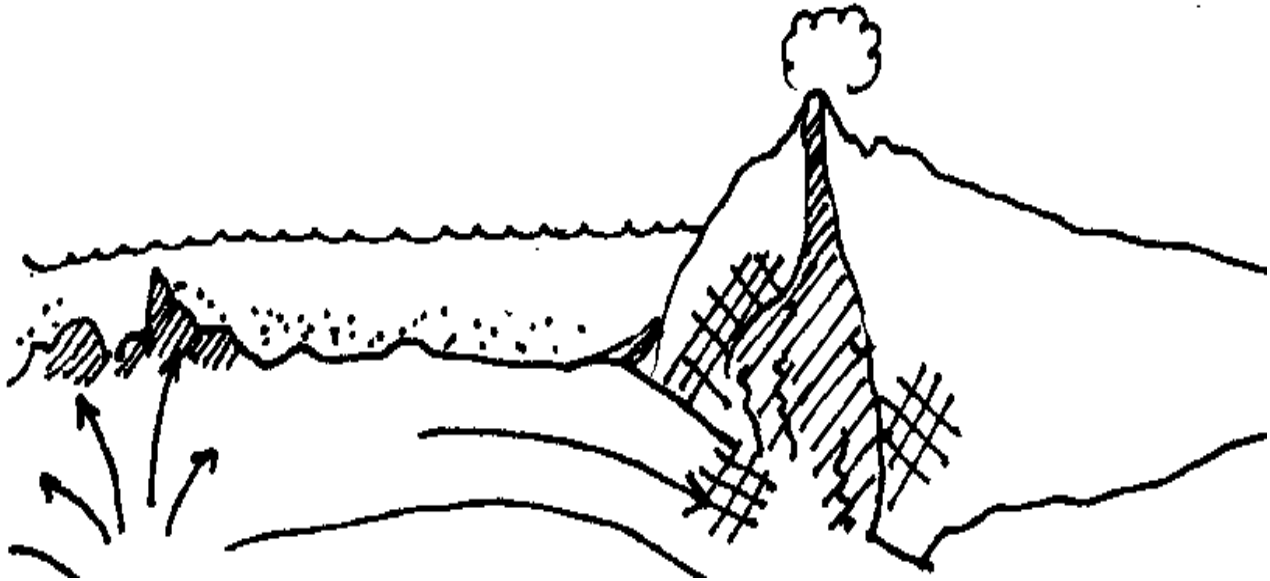
\_\_\_\_\_

## ROCK CYCLE - ROCKS (6A)

### PRE LAB

CAN YOU LOCATE WHERE ROCKS ARE FORMED?

Use red to designate IGNEOUS ROCKS, blue for SEDIMENTARY ROCKS, and green for METAMORPHIC ROCKS.



1. Igneous rocks are formed:

---

---

---

---

2. Sedimentary rocks are formed:

---

---

---

---

3. Metamorphic rocks are formed:

---

---

---

---

## ROCK CYCLE - ROCKS (6A)

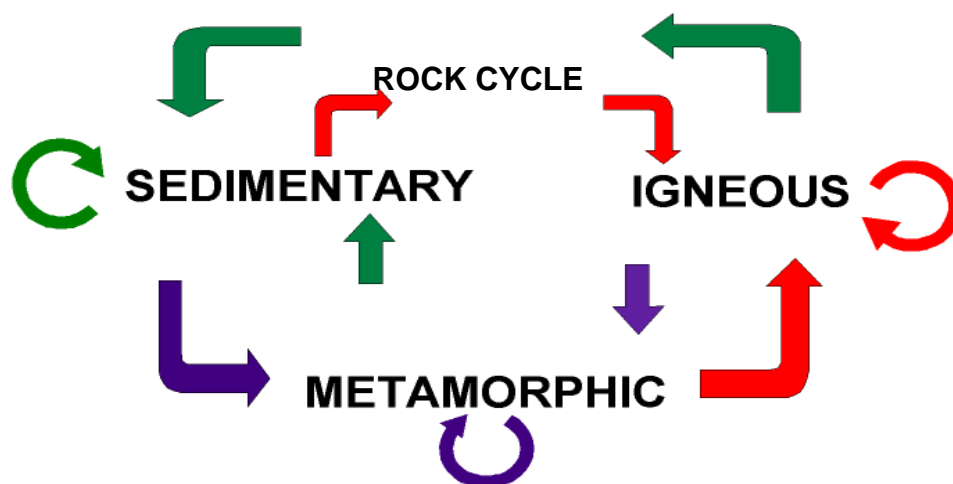
### LAB

**PROBLEM:** How are rocks formed on the crust of the Earth?

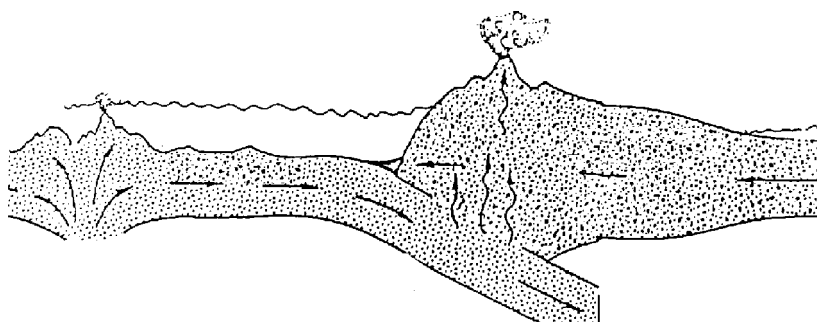
**PREDICTION:** \_\_\_\_\_

**PROCEDURE:** The rock cycle describes the processes by which rocks become other types of rocks by melting, erosion, and changes in temperature, and pressure in or on the Earth. Look at the rocks at the different stations around the room. Try to place the rocks in the correct positions in the two diagrams below: the rock cycle and the plate tectonic cycle. Use the symbols for each rock type on each diagram.

Rocks on display: pumice (**P**), sandstone (**SS**), conglomerate (**C**), granite (**G**), serpentinite (**Ser**), marble (**M**), mudstone with shells (**MS**), sand (**S**), obsidian (**O**), basalt (**B**), gneiss (**GN**), schist (**SC**)



### PLATE TECTONIC CYCLE



**CONCLUSION:** How are the plate tectonic and rock cycles related?

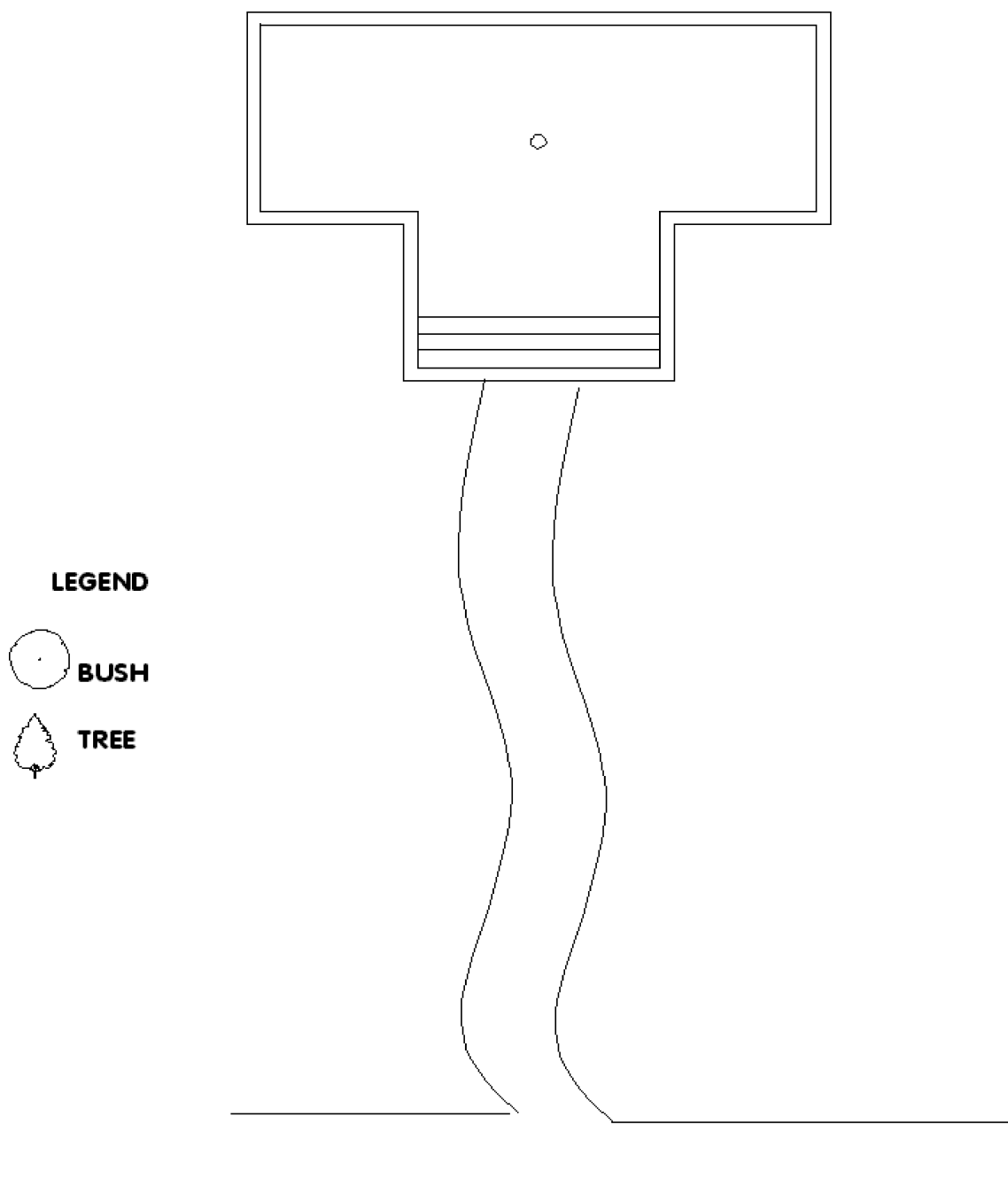
\_\_\_\_\_



## ROCK CYCLE - ROCKS (6B)

### PRE LAB

Design a landscape that would make this building look exciting. Use your imagination. Think of color, how people would walk from one door to another, and artistically pleasing situations. Use shrubs, trees, or flowers to help design the perfect place.



## ROCK CYCLE - ROCKS (6B)

### LAB

**PROBLEM:** What is the difference between cementation and adhesion?

**PREDICTION:** \_\_\_\_\_

**PROCEDURE:** Materials: plaster of Paris, spoon, water, mix bowl, concrete mix

Mix the following substances as listed on the graph below. After you mix each mixture, please clean your spoon and mixing bowl in a small tub of water. **DO NOT CLEAN IN THE SINK.** You will clog the drain because the cement will harden in water. Record your observations. You will need to finish your lab sheet after the concrete dries.

SPOONFULS	SUBSTANCE	WATER (spoonfuls)	OBSERVATIONS
1	PLASTER OF PARIS	1	
1	PLASTER OF PARIS	$\frac{1}{2}$	
1	PLASTER OF PARIS	$\frac{3}{4}$	
3	CONCRETE MIX	3	
1	FLOUR	$\frac{1}{2}$	

**CONCLUSION:** Which of the mixtures of plaster of Paris worked the best?

\_\_\_\_\_

Summarize the difference between adhesives and cements.

\_\_\_\_\_

\_\_\_\_\_

## ROCK CYCLE - PAST LIFE (6)

### LAB

**PROBLEM:** How can fossils be useful?

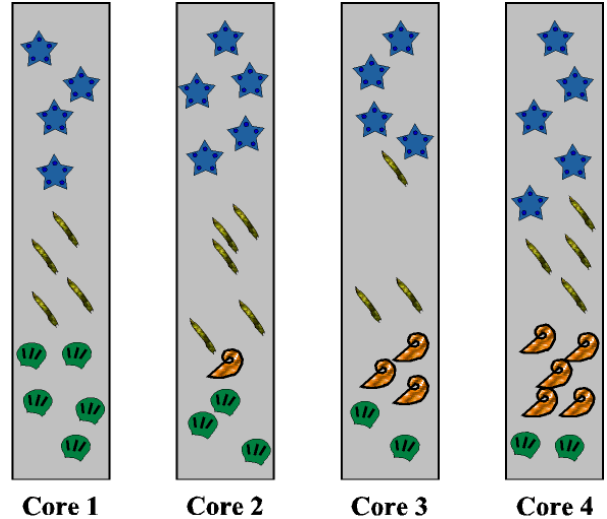
**PREDICTION:**\_\_\_\_\_

**EXERCISE I.** Below are four different well cores. Correlate between the cores using the fossils.

## EXERCISE II.

**MATERIALS:** prepared well cores

Look at the each core; notice that they contain fossils. Describe the key characteristics of each fossil. Match up the fossils between each core. Draw the four different cores and connect the "horizons" that are the same from one well core to another.

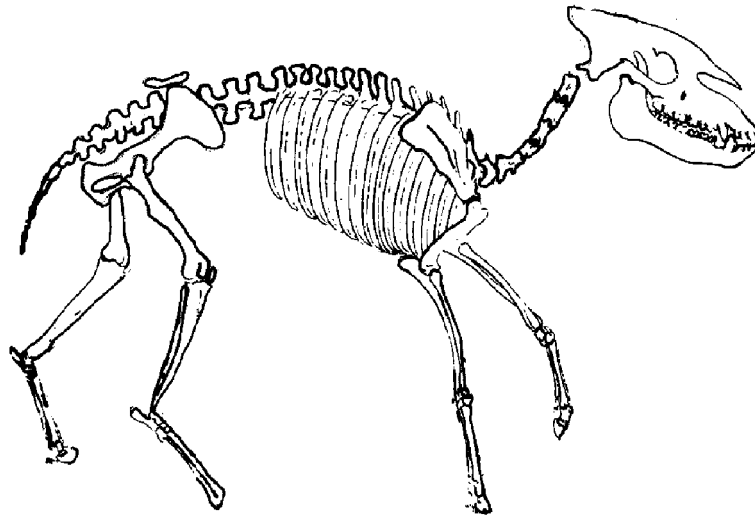


WELL CORE 1	WELL CORE 2	WELL CORE 3	WELL CORE 4









**CONCLUSION:** How do cores of the Earth help us to learn about the Earth?

**ROCK CYCLE - PAST LIFE (6)**  
**POST LAB**

WHAT DID I LOOK LIKE WHEN I WAS ALIVE?



I AM AN UNGULATE.

		BRAIN SIZE
EQUUS		
PLIOHIPPIUS		
MERCYCHIPPUS		
MESOHIPPUS		
HYRACOTHERIUM	