

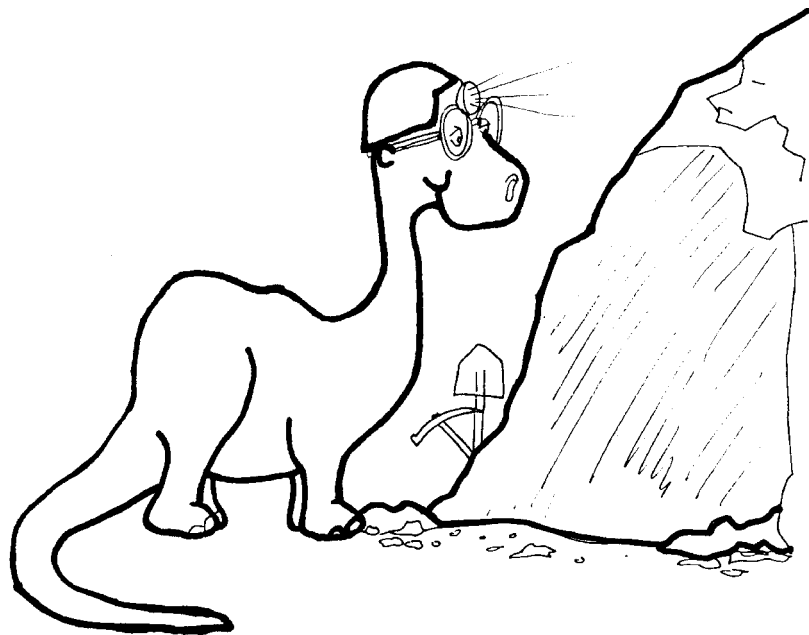


# Rock Cycle

Understanding the Earth's Crust



## FOURTH GRADE WORKBOOK



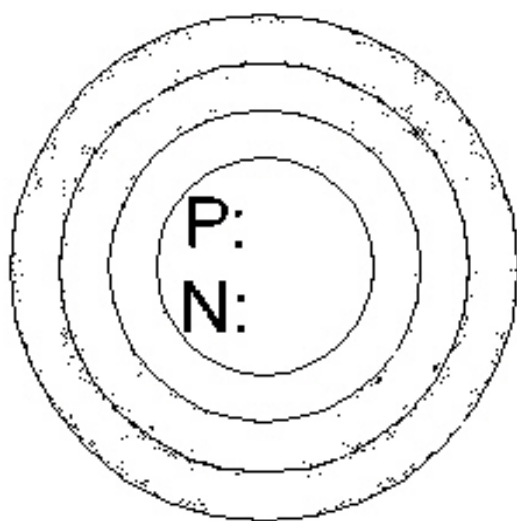
students \_\_\_\_\_

## ROCK CYCLE - CHEMISTRY (4) PRE

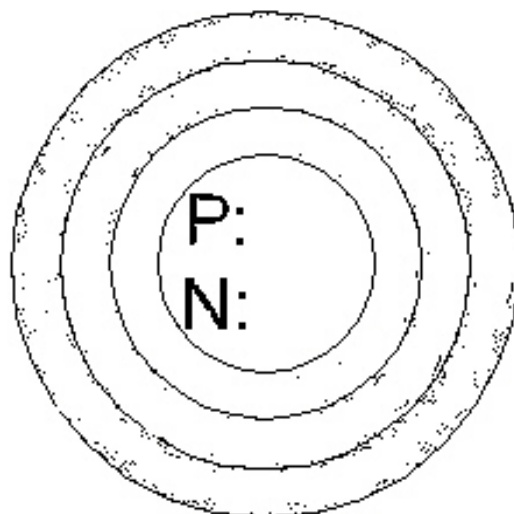
Draw the number of electrons in the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> orbitals around the nucleus of sodium and chlorine.

Protons equal the Atomic Number. Neutrons are the Atomic Mass - Atomic Number. Remember the first orbital has 2 electrons maximum, the 2<sup>nd</sup> has 8 electrons, and the 3<sup>rd</sup> has 8 maximum.

How can the sodium and the chlorine “bond” to create a stable molecule of sodium chloride (halite)?



**SODIUM (Na)**



**CHLORINE (Cl)**

Name: Sodium  
Symbol: Na  
Atomic Number: 11  
Atomic Mass: 23

Name: Chlorine  
Symbol: Cl  
Atomic Number: 17  
Atomic Mass: 35

**ROCK CYCLE - CHEMISTRY (4)**  
**LAB**

**PROBLEM:** Are all types of commercially used salt (halite), cubic?

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

**PROCEDURE:** You have 6 samples of salt from the Cargill Salt Company in Newark, California. They commercially produce salt for food, animals, and water conditioning.

Look at the following examples of salt under a microscope. Draw the shapes you see. State what commercial purpose you think each type may have.

<b>MILL FEED</b>	<b>BLENDING</b>
<b>GRANULATED</b>	<b>PELLETS</b>
<b>MEDIUM</b>	<b>BAKERS</b>

**CONCLUSION:** Which samples maintain the cubic shape? Why might some samples not have a cubic shape?

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\_\_\_\_\_

**ROCK CYCLE - MINERALS (4A)**  
**LAB**

**MINERAL CARDS**

<p>FLUORITE (Ca, F)</p> <ol style="list-style-type: none"><li>1. Describe the shape.</li><li>2. Describe the color.</li></ol>	<p>QUARTZ (Si, O)</p> <ol style="list-style-type: none"><li>1. Describe the color.</li><li>2. Describe the shape.</li><li>3. Can you scratch it with a nail?</li></ol>
<p>GYPSUM (Ca, S, O)</p> <ol style="list-style-type: none"><li>1. Describe the shape.</li><li>2. Can you scratch it with your fingernail?</li></ol>	<p>PYRITE (Fe, S)</p> <ol style="list-style-type: none"><li>1. Describe the shape.</li><li>2. Describe the density.</li><li>3. What other mineral looks like pyrite?</li></ol>
<p>MICA (Mg, Fe, Al, Si, O)</p> <ol style="list-style-type: none"><li>1. Describe shape.</li><li>2. Describe color.</li></ol>	<p>CALCITE (Ca, C, O)</p> <ol style="list-style-type: none"><li>1. Describe the shape.</li><li>2. What happens when you put calcite on top of a letter?</li></ol>
<p>FELDSPAR (K, Ca, Na, Si, O)</p> <ol style="list-style-type: none"><li>1. Describe shape.</li><li>2. Will a nail scratch feldspar?</li></ol>	<p>GALENA (Pb, S)</p> <ol style="list-style-type: none"><li>1. How does galena feel?</li><li>2. Describe color.</li></ol>
<p>ULEXITE (B, O)</p> <ol style="list-style-type: none"><li>1. Describe ulexite on a picture?</li><li>2. Describe color.</li></ol>	<p>HEMATITE (Fe, O)</p> <ol style="list-style-type: none"><li>1. Describe color.</li><li>2. Describe density.</li></ol>

**ROCK CYCLE - MINERALS (4A)**  
**LAB**

**PROBLEM:** Do minerals have key characteristics that help to identify them?

**PREDICTION:**

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**PROCEDURE:** Examine and describe each of the following minerals. Answer the questions at each station.

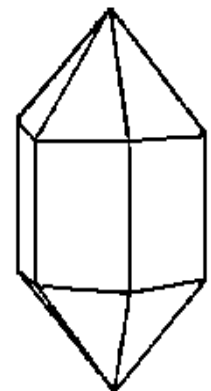
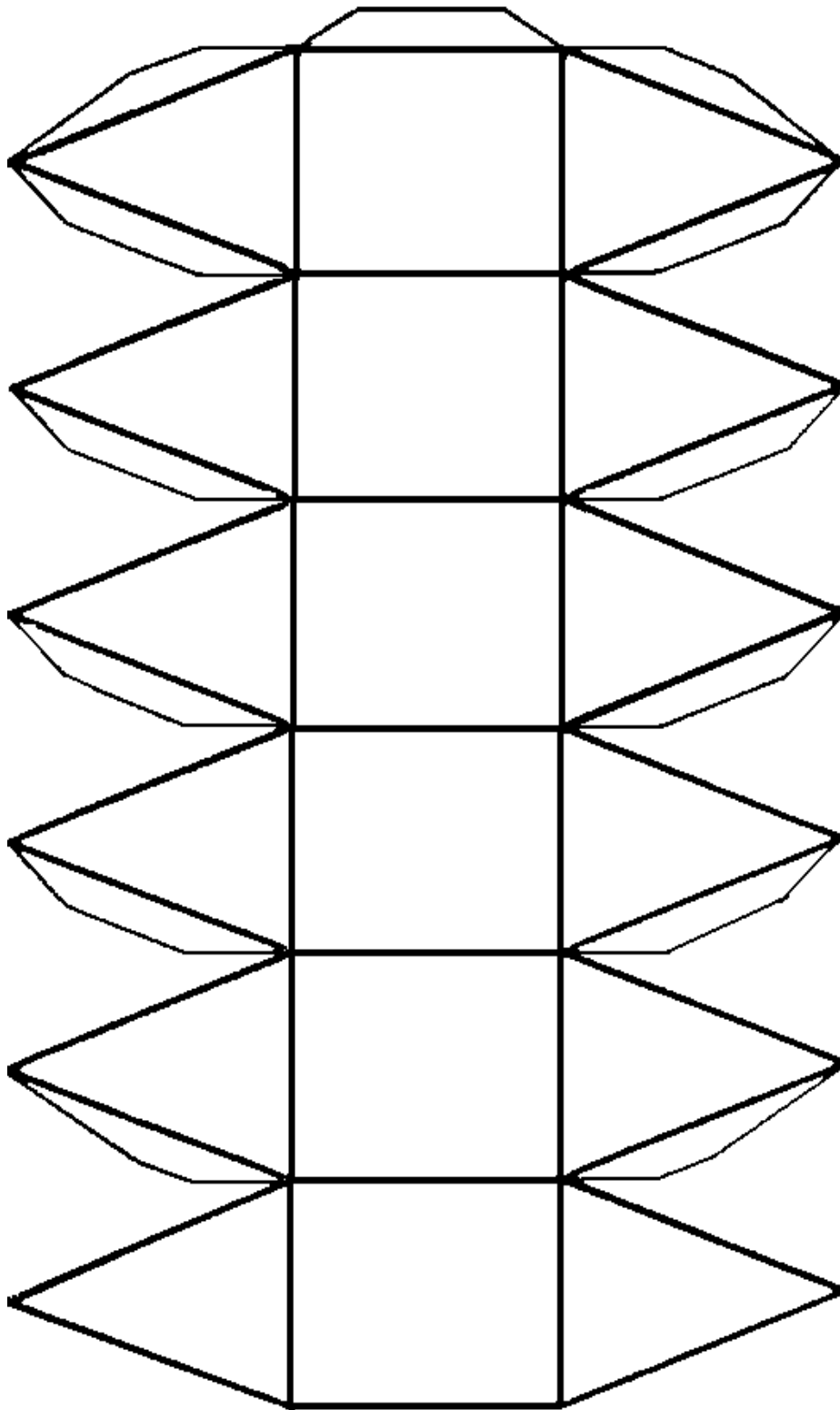
	OBSERVATIONS AND ANSWERS
1. QUARTZ	
2. FLUORITE	
3. PYRITE	
4. GYPSUM	
5. CALCITE	
6. MICA	
7. GALENA	
8. FELDSPAR	
9. HEMATITE	
10. ULEXITE	

**CONCLUSION:** What types of characteristics should you look for in a mineral?

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**ROCK CYCLE - MINERALS (4B)**  
**PRE LAB**



**Quartz**

## ROCK CYCLE - MINERALS (4B) LAB

**PROBLEM:** Can the shape of a mineral in its crystal form help identify that mineral in a rock?

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

**EXPERIMENT:** You have different mineral crystals at your lab table. Draw the shape of the mineral crystals and then look at the associated rocks on the display table. Try matching the minerals with the rock specimens that contain them.

MINERAL NAME	DRAW SHAPE	DESCRIBE MINERALS
QUARTZ		
HALITE		
GYPSUM		
CALCITE		
FELDSPAR		

**CONCLUSION:** Which mineral shapes helped identify the minerals? Which did not? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

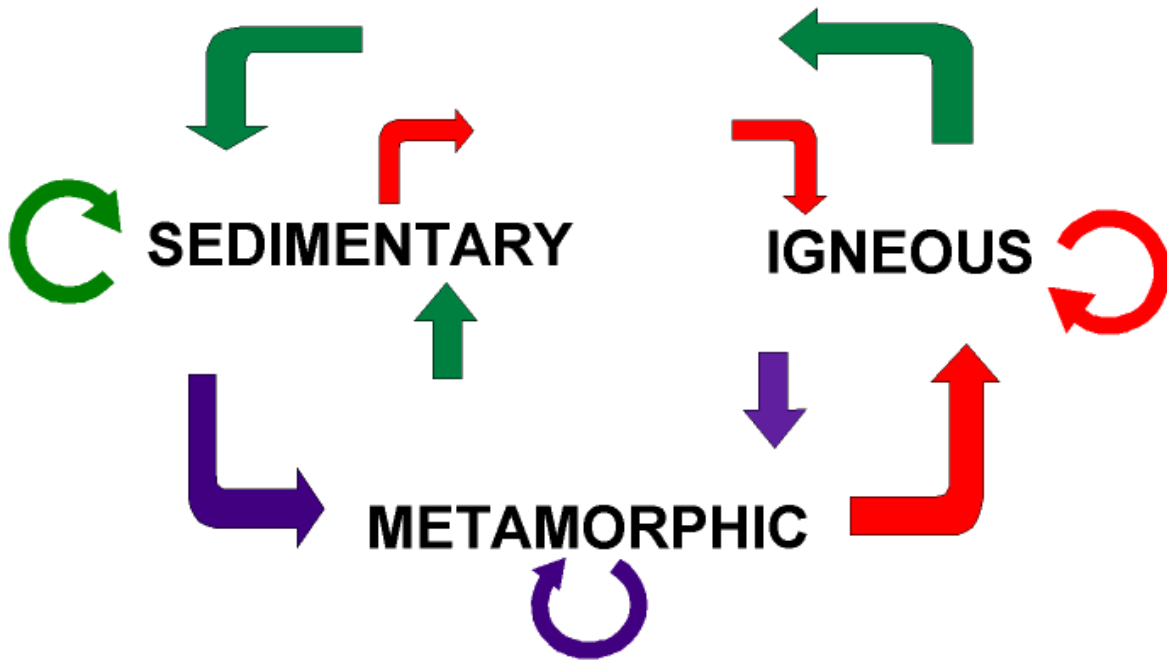
**ROCK CYCLE - MINERALS (4B)**  
**POST LAB**

<b>BIRTH STONES BY MONTH</b>				
<b>MONTH</b>	<b>GEM</b>	<b>COLOR</b>	<b>HARDNESS</b>	<b>MINED</b>
January	garnet	red, brown, yellow	6.5-7.5	Russia, N.Y.
February	amethyst (quartz)	purple	7	Russia, Brazil
March	aquamarine (beryl)	green, blue	7.5-8	U.S.
April	diamond	colorless, pale yellow	10	Africa, Russia
May	emerald	deep green	7	Russia, Zimbabwe
June	pearl	white	N/A	oysters
July	ruby	red	9	India
August	peridot	green	6.5-7	Burma
September	sapphire (corundum)	blue	9	India
October	opal	iridescent	5-6	Hungary, Mexico
November	topaz	yellow	8	Russia, Brazil
December	turquoise	blue	6	U.S.



**ROCK CYCLE - ROCKS (4A)**  
**PRE LAB**

Can you write in the missing portions of the Rock Cycle in the diagram below?



Describe the rock cycle in a paragraph.


**ROCK CYCLE - ROCKS (4A)**  
**LAB**

**PROBLEM:** What characteristics are useful in identifying the major types of rocks?

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

**EXERCISE:** Using your rock kit and the code described by your instructor, arrange the rocks into 3 groups. Try to determine which characteristics are common to each group. List these characteristics [Hint: hard, soft, breakable, flat, sandy, heavy, crystals, color, etc.].

IGNEOUS	CHARACTERISTICS
GRANITE	
OBSIDIAN	
BASALT	
SCORIA	
METAMORPHIC	CHARACTERISTICS
MARBLE	
SCHIST	
SERPENTINITE	
SEDIMENTARY	CHARACTERISTICS
SHALE	
SANDSTONE	
CONGLOMERATE	
MUDSTONE (FOSSILS)	

**CONCLUSION:** What are some identifying characteristics of igneous rocks? Of metamorphic rocks? Of sedimentary rocks?

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**ROCK CYCLE - ROCKS (4B)**  
**LAB**

**PROBLEM:** Can you determine the size, shape, and source rock of different sands?

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

**PROCEDURE:** You have sand samples from different locations. Try to determine which minerals, rocks, or other items are in the samples. Look at the display of rocks for clues. Use a microscope or magnifying glass to help you look at the samples.

LOCATION	SIZE	ROUNDNESS	DRAW GRAINS
PALM SPRINGS, CA parent rock:			
RODEO BEACH, CA parent rock:			
CLEONE, CA parent rock:			
MONTEREY, CA parent rock:			
NEW YORK, NEW YORK parent rock:			
SAN FRANCISCO, CA parent rock:			

**CONCLUSION:** Which rocks can you identify?

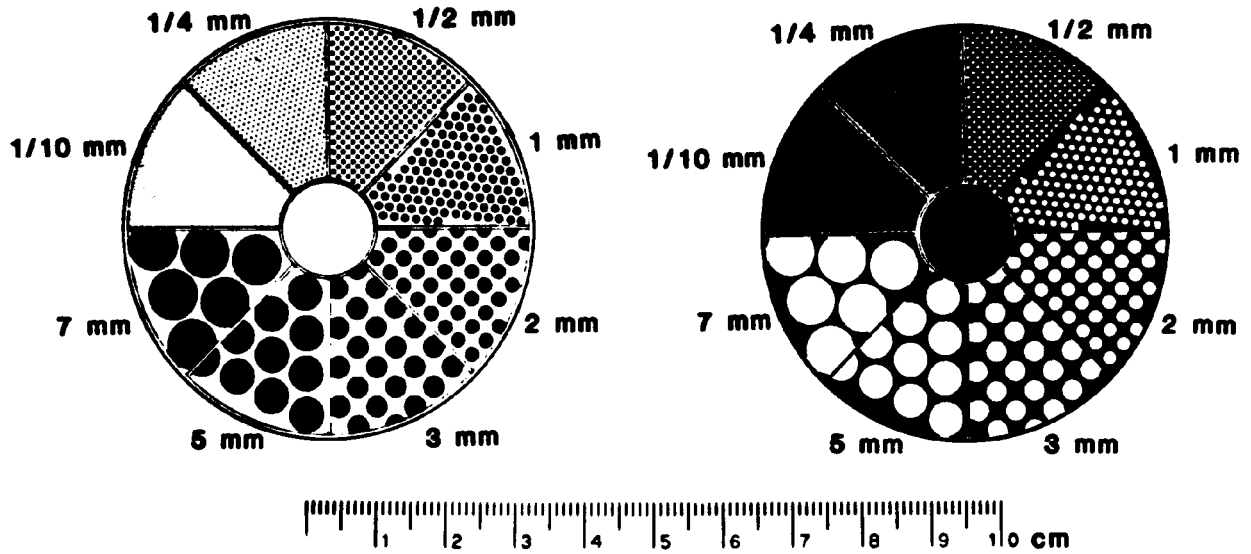
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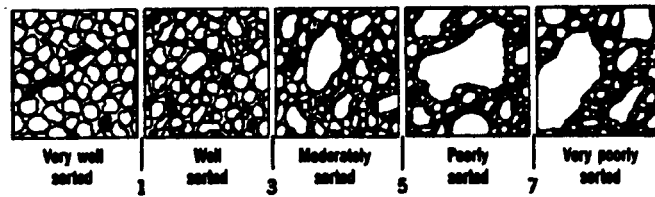
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ROCK CYCLE - ROCKS (4B)  
LAB

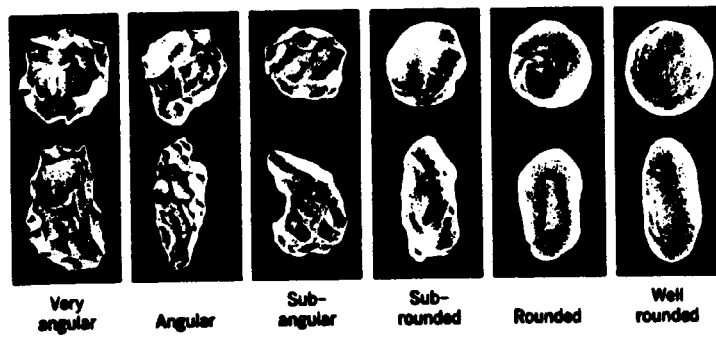
SAND CHART



sorting



roundness



**ROCK CYCLE - ROCKS (4B)**  
**POST LAB**

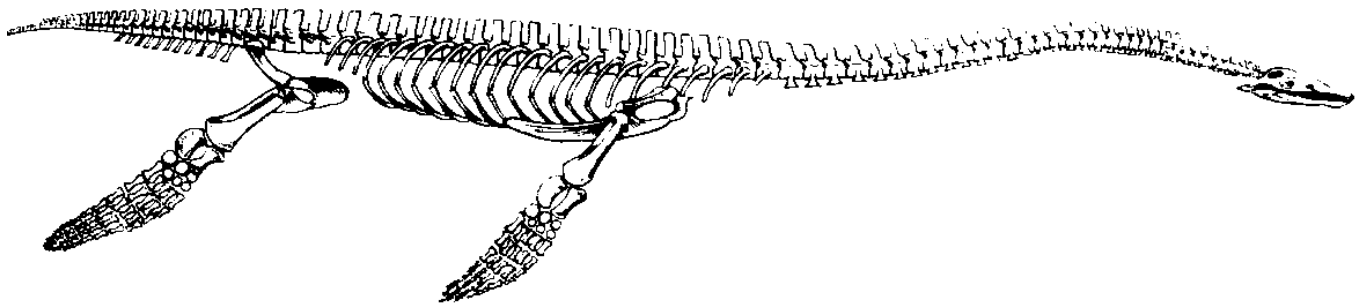
**WHY ARE ROCKS ROUNDED?**

Billy found these pebbles along a river. Some were very rounded and others were not. He put them in order from angular to rounded. Can you think of the reason why this can happen and why they can be found together?

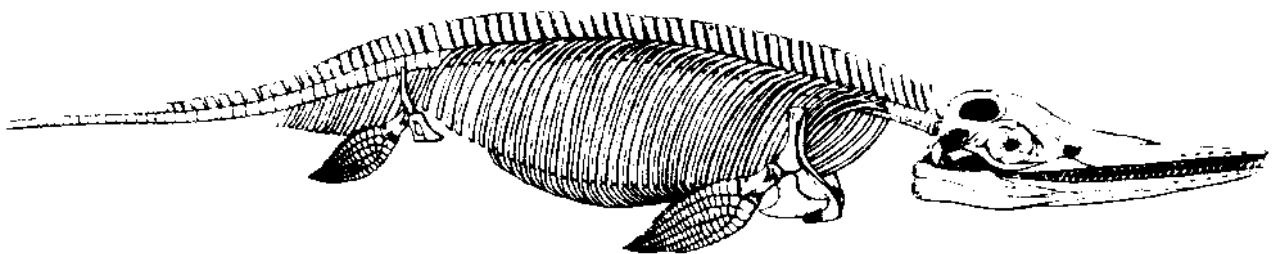



**ROCK CYCLE - PAST LIFE (4)**  
**PRE LAB**

Can you guess what kind of animal this used to be? Draw a picture of what you think it looked like when it was alive. Did it have feathers, skin, or fur? Was it red, yellow or green?



*Pleiosaurus dolichodeirus*



*Ichthyosaurus communis*

**ROCK CYCLE - PAST LIFE (4)  
LAB**

**PROBLEM:** Do present day organisms help us understand fossils?

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

**EXERCISE I.** You have 3 samples of present day organisms in your packet. Draw each specimen in the space provided and try to figure out what the organism is. You may want to consult reference books to help identify them. Record what part of the organism you think each sample is, and why.

**EXERCISE II.** Try to figure out the fossil counterpart of the present day organism. Draw each specimen in the space provided next to the present-day counterpart.

<b>EXERCISE 1 PRESENT</b>	<b>EXERCISE 2 FOSSIL COUNTERPART</b>

**CONCLUSION:** How does a present day organism help us understand a fossil?

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