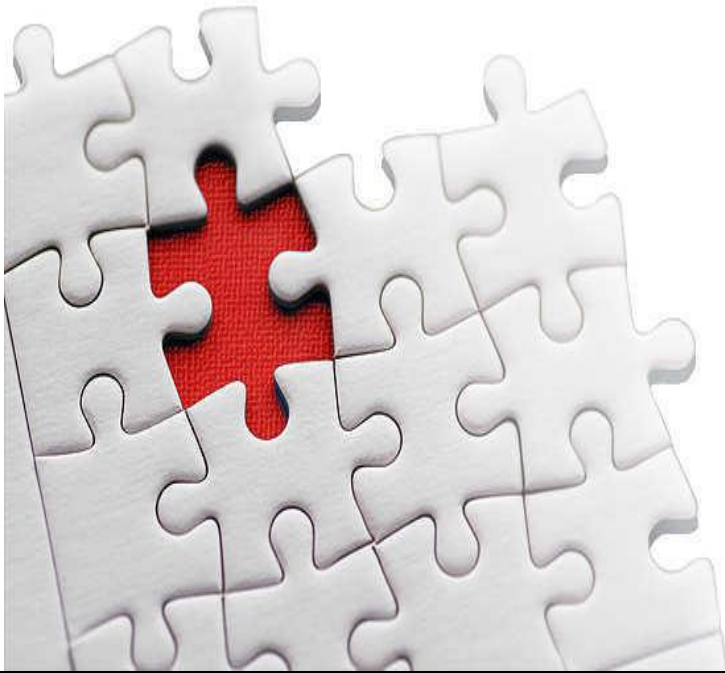


THE GEOLOGY TOPICS UNIT

Name:

Due:

- ◇ How can puzzle pieces be connected to your knowledge of the theory of continental drift and plate tectonics?
- ◇ Make sure to draw or describe some evidence of continental drift.



Please draw the Supercontinent Pangea in the box below. A current day map is provided to assist you.



Warning! This is a five part question. Check \diamond when complete.

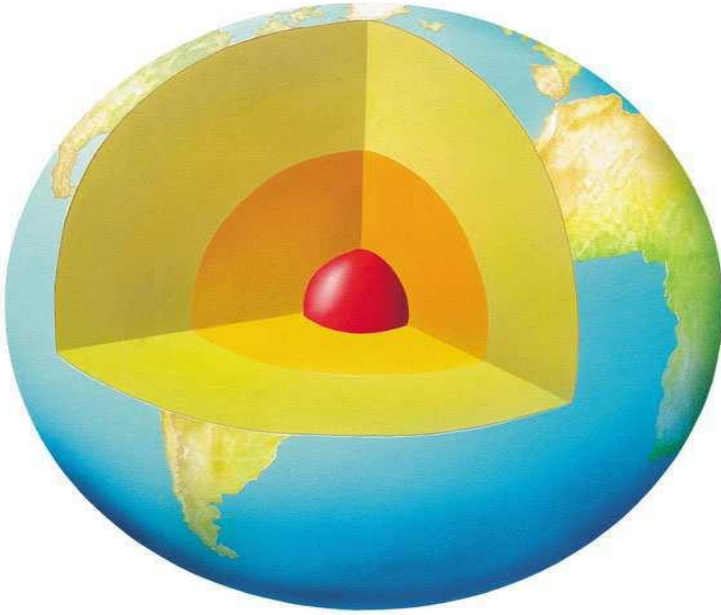
\diamond Label the picture below with the correct layers of the earth.

\diamond Include what each layer is composed of.

\diamond Include information about how temperature and density change.

\diamond Show with lines the electromagnetic field created by the core.

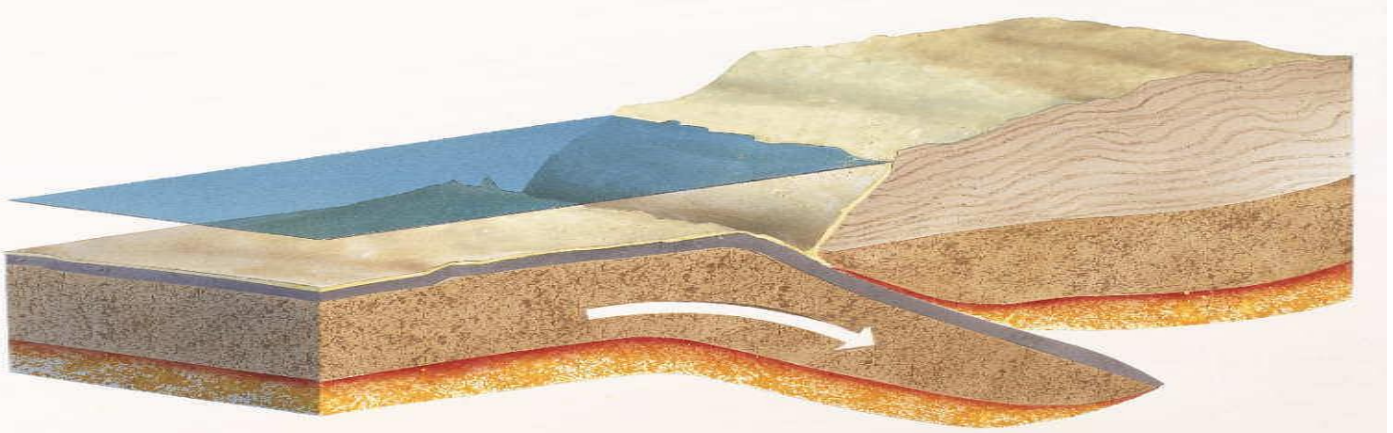
\diamond How do we know all this?



Please draw and describe an example of convection, conduction, and radiation in the boxes below. Make sure that the meaning of the word is very clear.

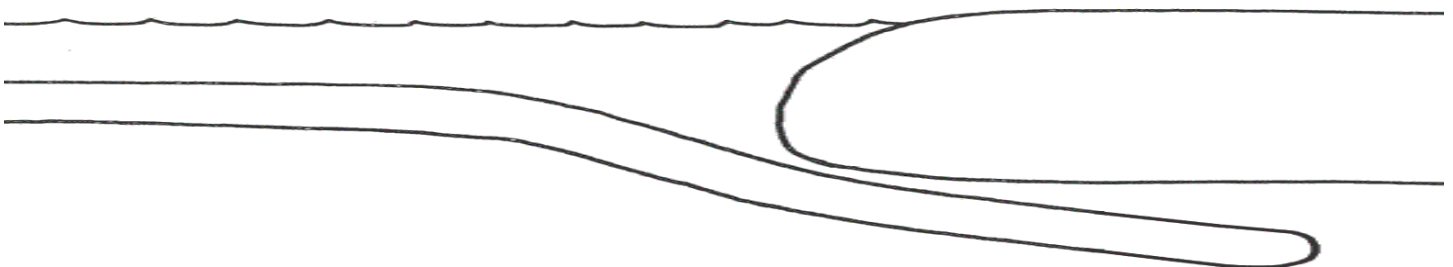
Convection	Conduction	Radiation

- ◇ Please label the zone below.
- ◇ What types of crust do we see?
- ◇ What are they made of?

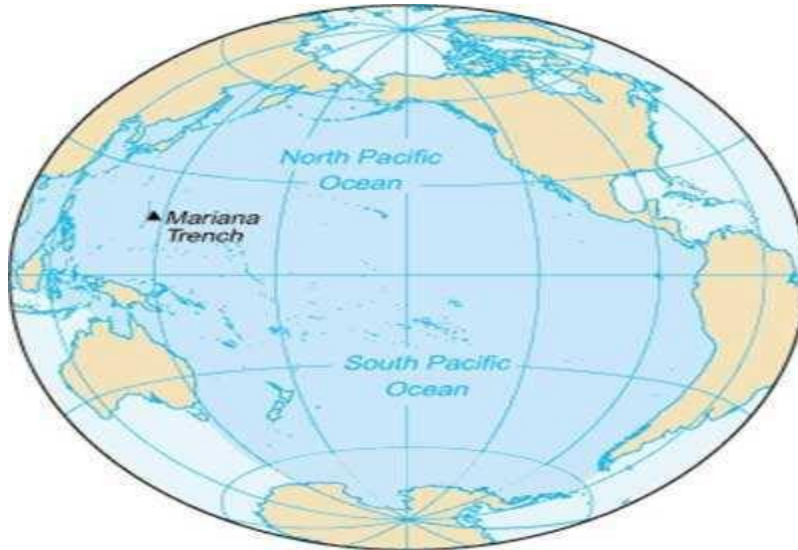


- ◇ Please draw a divergent ocean boundary
- ◇ What causes continental drift?
- ◇ Show how convection current causes the plates to move apart.

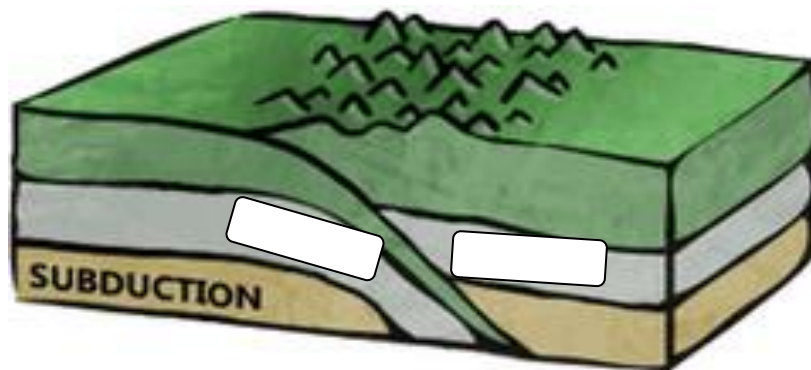
- ◇ Please label the boundary below
- ◇ Use arrows to show the movement of plates.
- ◇ How do volcanoes and Mountains form as a result (Think water and Carbon Cycle?)
- ◇ Please label the trench



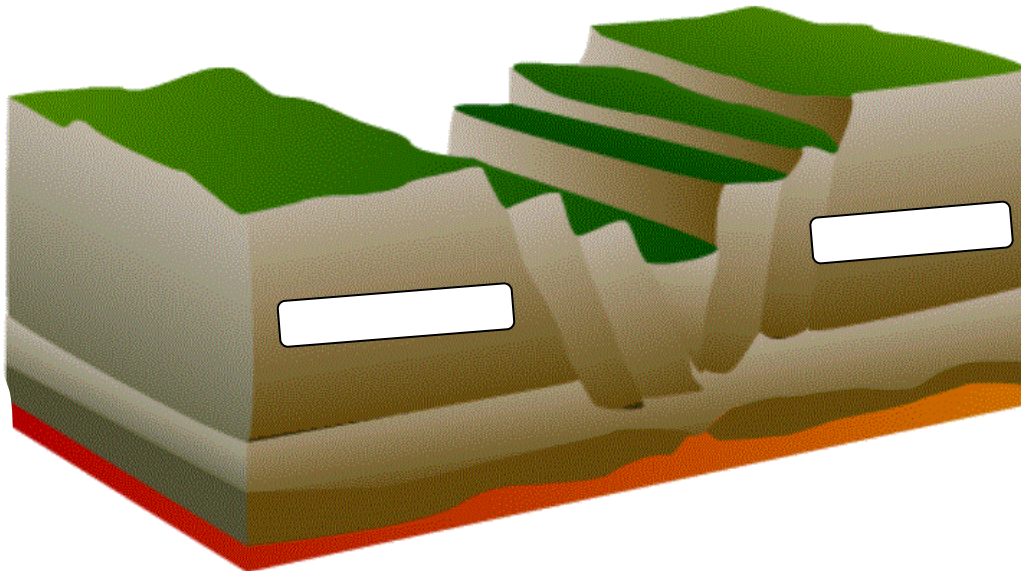
- ◇ What is the Ring of Fire?
- ◇ Using bright colors please draw the Ring of Fire.
- ◇ Make a reference to any volcanic island chains.



- ◇ Name this type of plate boundary.
- ◇ Draw arrows in the box with the direction the plates are moving.
- ◇ Describe what these plates are made of.
- ◇ Make reference to some specific plate on planet earth.



- ◇ Please name the boundary below.
- ◇ Show arrows in the direction the plates are moving.
- ◇ Describe what these plates are made of.
- ◇ Make reference to some specific plates.



Quiz Wiz 1-10 Name the Plate Boundary

Word Bank

Divergent Boundaries

-Oceanic Oceanic

-Continental

Continental

Convergent Boundaries

-Oceanic Continental

-Oceanic Oceanic

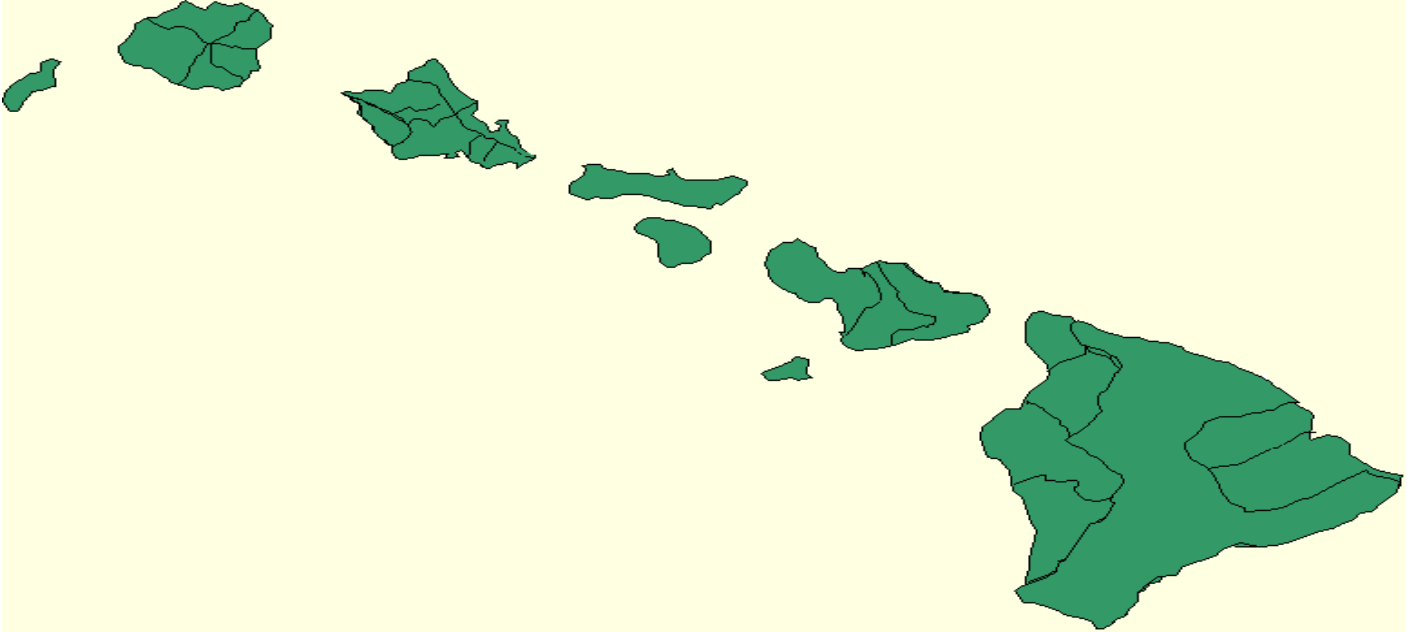
-Continental

Continental

Transform Fault Boundary

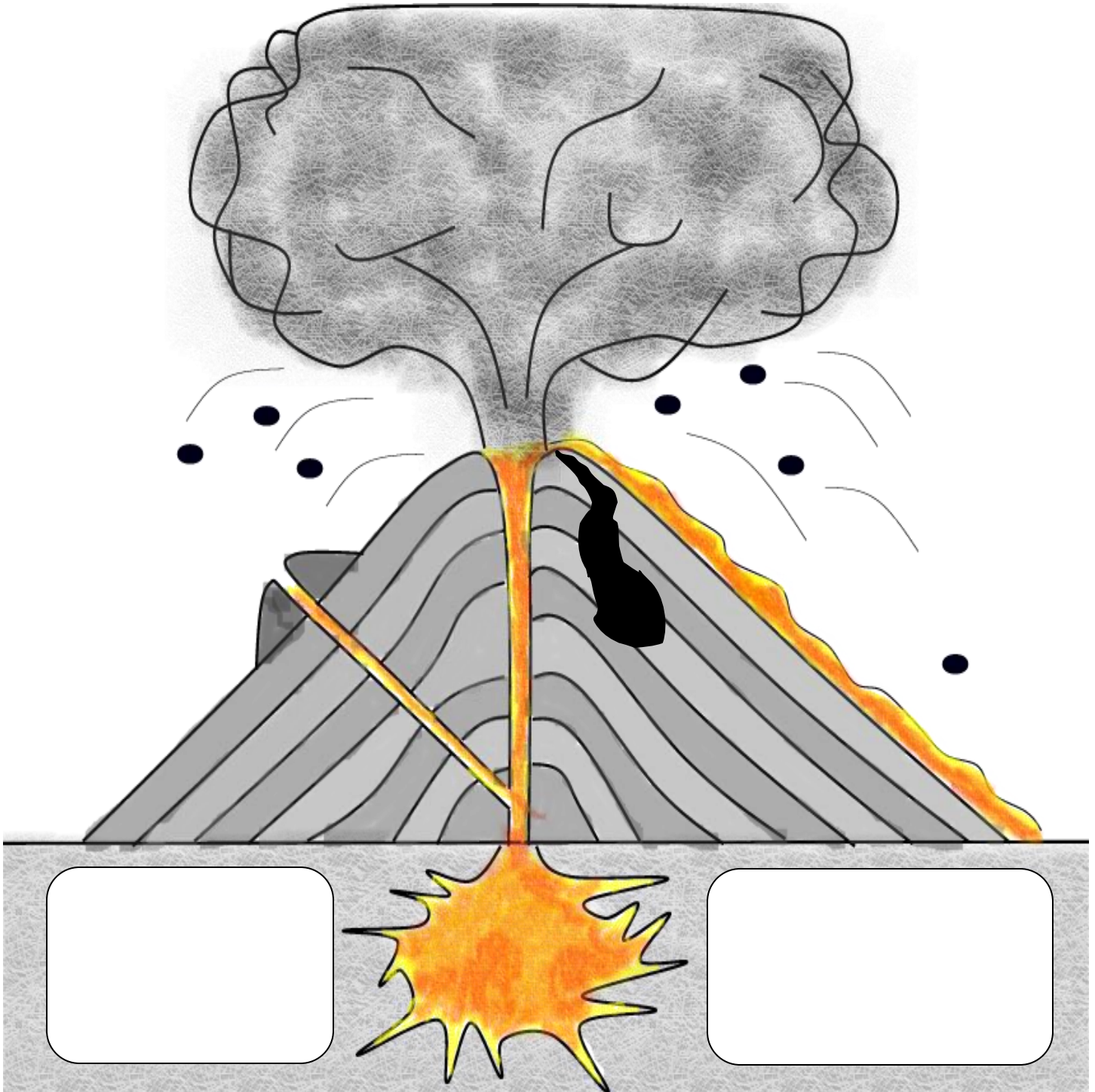
1)	2)	3)
4)	5)	6)
7)	8)	9)
10)	*11)	

- ◇ Describe the process that formed the Hawaiian Islands.
- ◇ Draw an arrow showing the direction of the Pacific Plate.
- ◇ Which islands are the oldest, and which are the youngest?



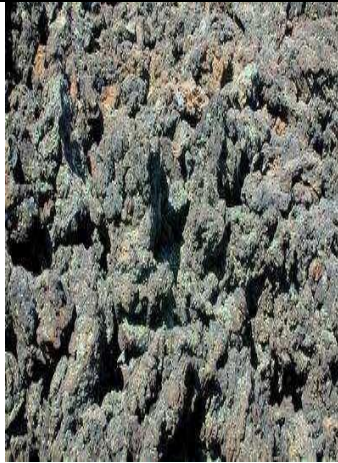
Are volcanoes good or bad? _____

◇ Please describe the volcano in the space below. A strong answer will label correct features, dangers, and provide information about the composition of its magma, and other necessary information covered in class.



Don't forget about water vapor and other gases such as carbon dioxide that are critical in the formation of less dense magma that rises to the surface after subduction.

Please name the types of lava shown in the examples below.

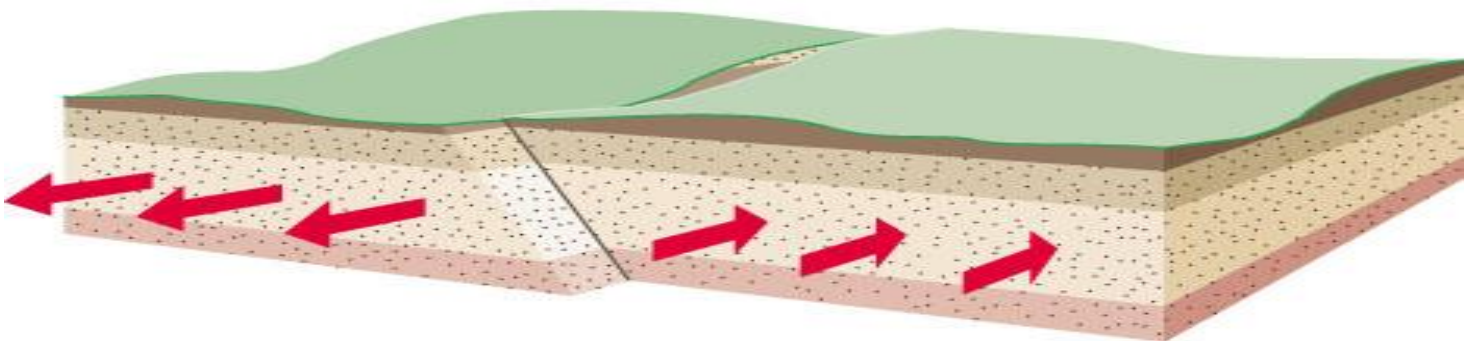
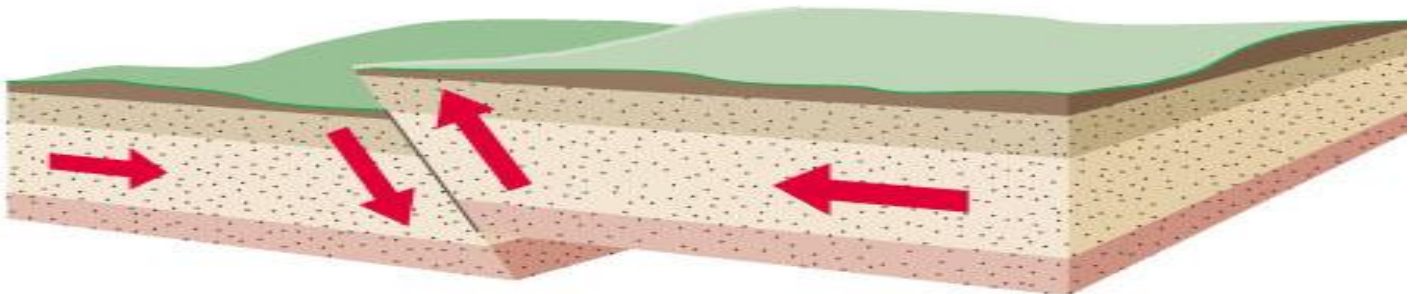
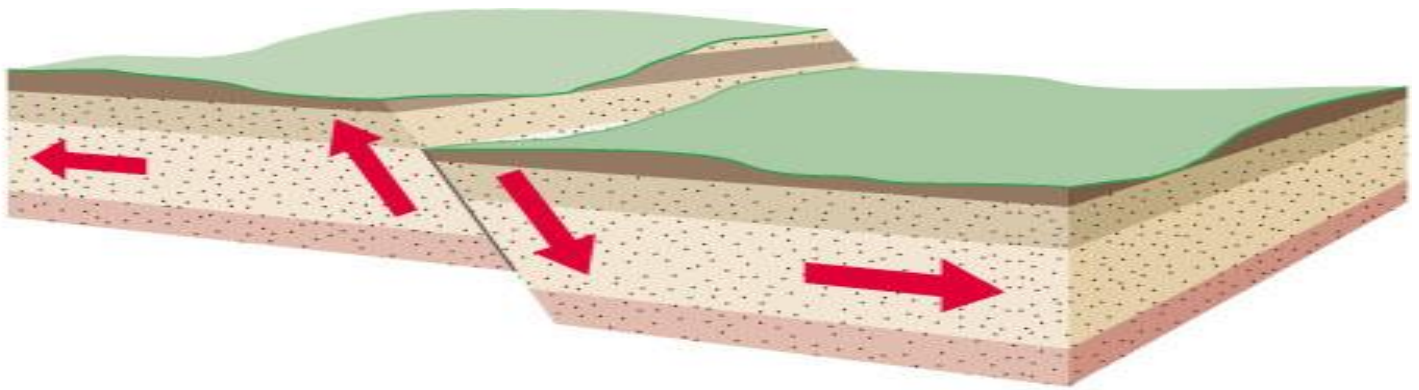


◇ What can you tell me about the five fluids below? Think viscosity!



What causes an earthquake? _____

◇ Please label the three types of faults below. Make sure to also include the force associated with each one. (Compression, Tension, and Shearing)



◇ Describe this picture in the box below.

◇ Can you make reference to its shape ☺ / ☹ (Age at core?)



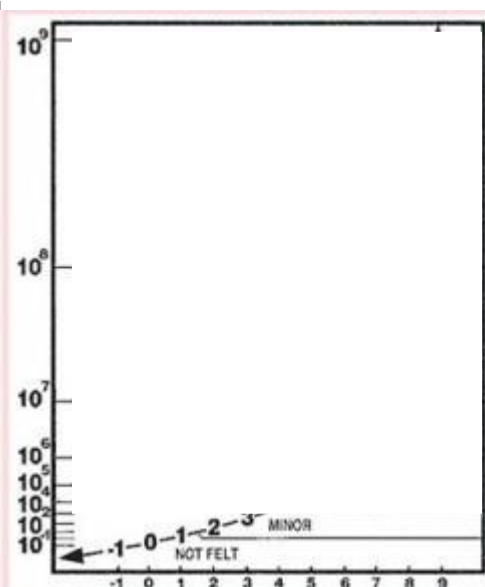
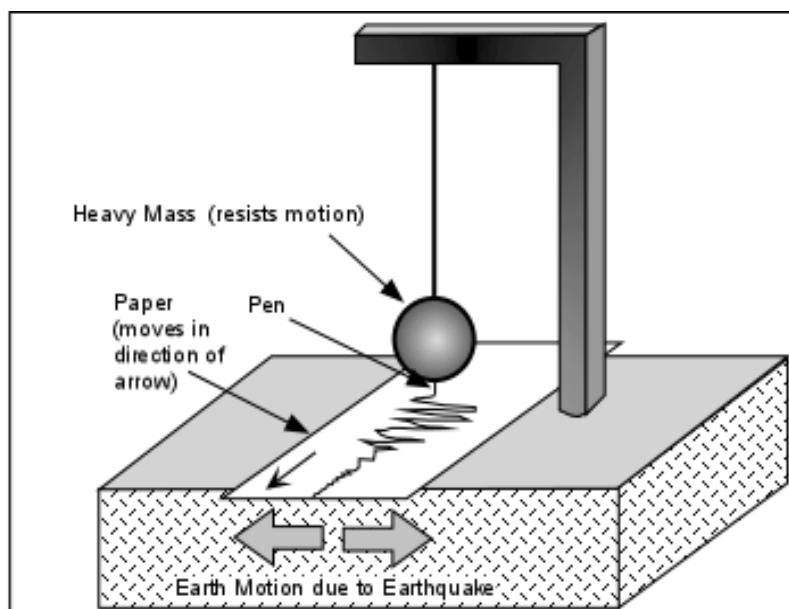
◇ What is the device below?

◇ How does it work?

◇ How is it measured?

◇ Finish the graph that shows how it is measured

◇ Where are the P waves and S waves below?

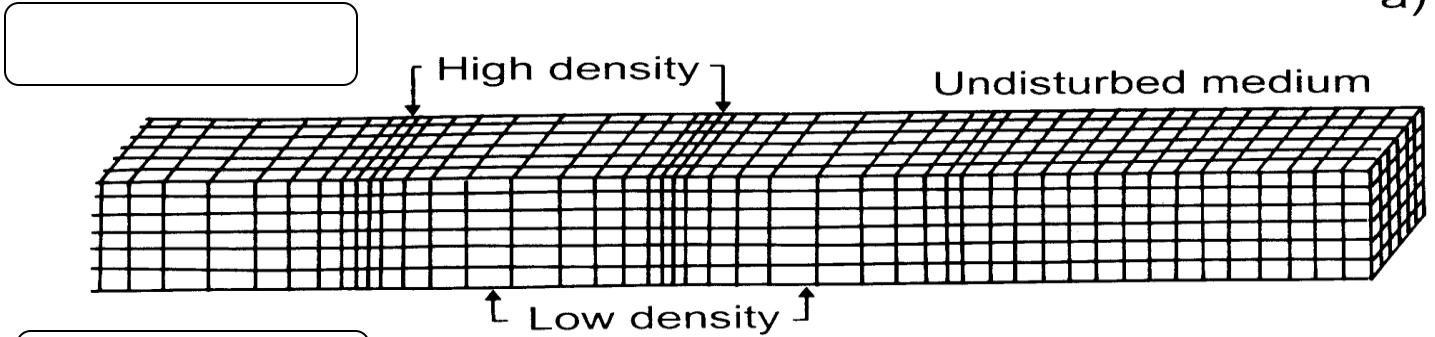


Which picture is an S-Wave and which is a P-Wave?

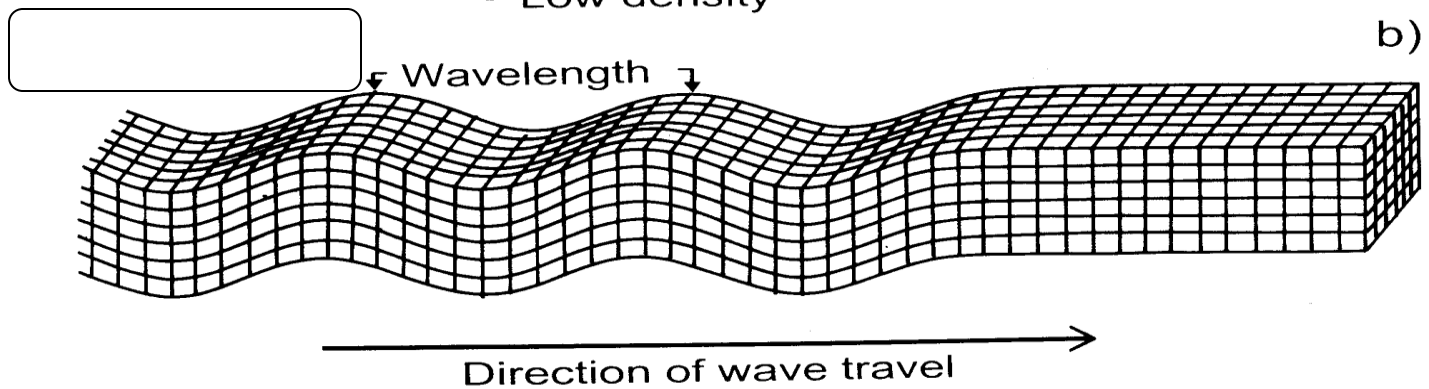
Which one is Longitudinal _____? and which one is Transverse _____?

Which one causes the most damage _____? Which one will arrive first _____?

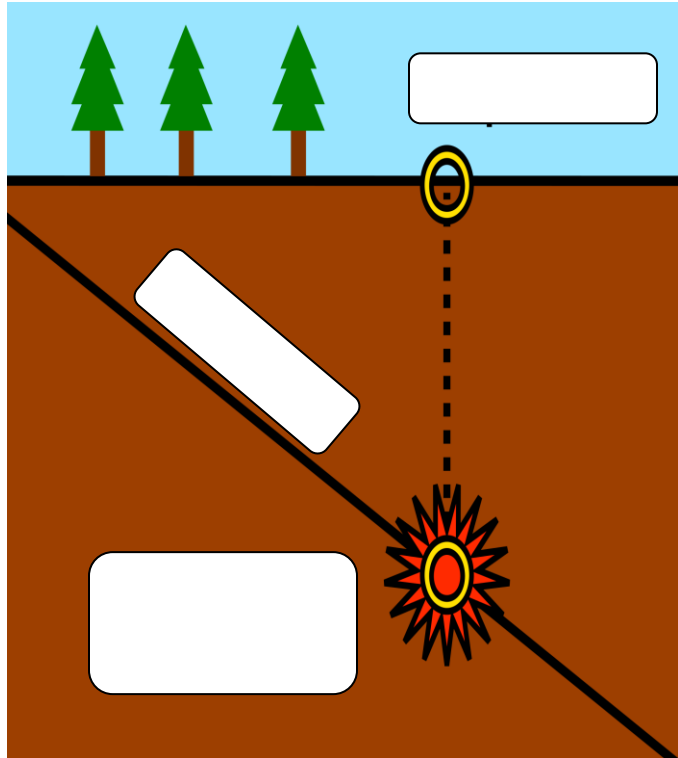
a)



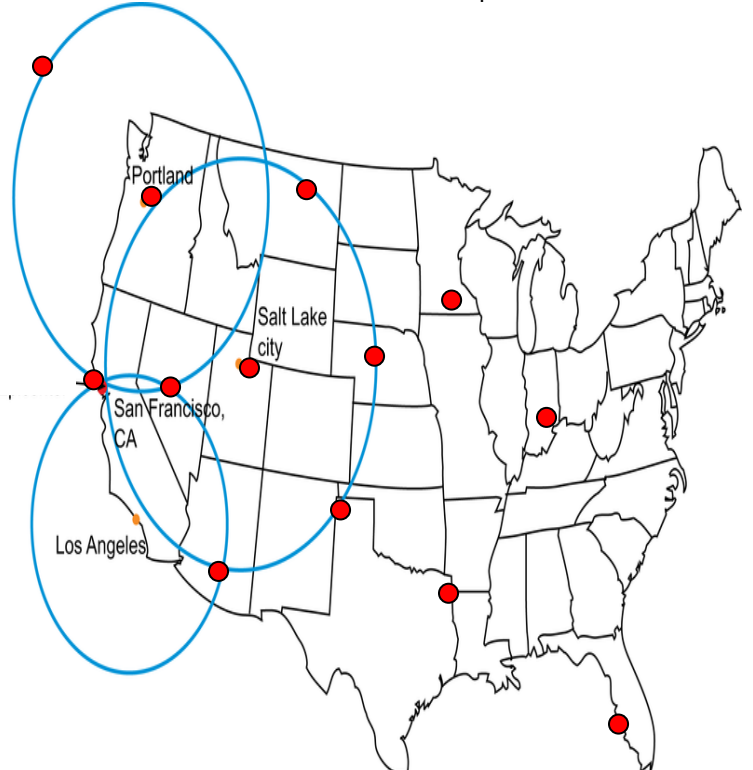
b)



Please label the sketch below.

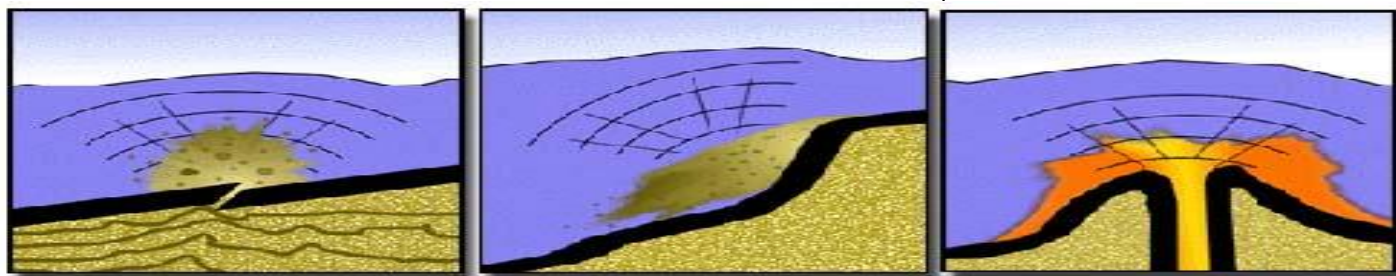


In what US state was the earthquake?



[illegible]

Please describe the three causes of a tsunami beneath each picture.

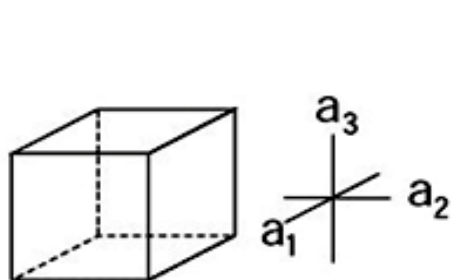


What are three warning signs that a tsunami may be coming?

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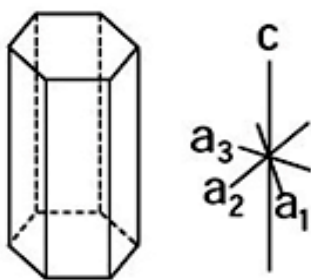
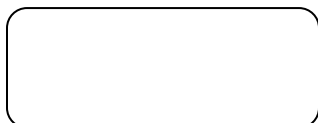
Which picture is a mineral? **Explain** why next to each image.





$$a_1 = a_2 = a_3$$

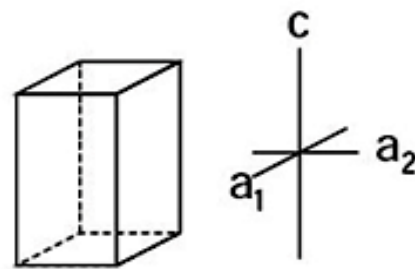
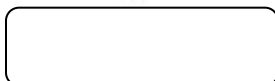
$$\text{all angles } 90^\circ$$



$$a_1 = a_2 = a_3 \neq c$$

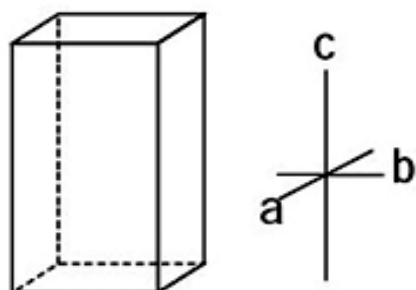
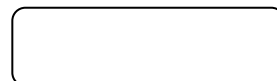
$$\text{angles } a_{1-3} \text{ to } c = 90^\circ$$

$$\text{angles between } a \text{ axes} = 120^\circ$$



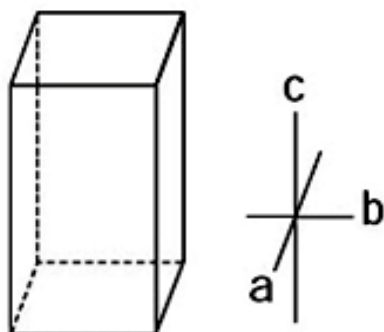
$$a_1 = a_2 \neq c$$

$$\text{all angles } 90^\circ$$



$$a \neq b \neq c$$

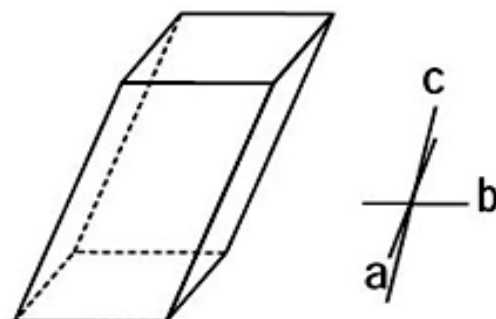
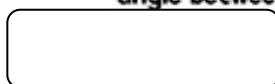
$$\text{all angles } 90^\circ$$



$$a \neq b \neq c$$

$$\text{angle between } a \& b \text{ and } b \& c = 120^\circ$$

$$\text{angle between } c \& a > 90^\circ$$



$$a \neq b \neq c$$

$$\text{all angles } \neq 90^\circ$$



Name four types of crystals based on their properties / chemical bonds? Additional information and or examples are welcome.

--	--	--	--

Use the common mineral properties scheme below to help answer some of the questions on the next page.

LUSTER	HARD- NESS	CLEAVAGE FRACTURE	COMMON COLORS	DISTINGUISHING CHARACTERISTICS	USE(S)	COMPOSITION*	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 ₃ O 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 ₂ O ₃	Hematite
Nonmetallic luster	1	✓	white to green	greasy feel	ceramics, paper	Mg ₃ Si ₄ O 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 •2H ₂ O	Selenite gypsum
	2–2.5	✓	colorless to yellow	flexible in thin sheets	paint, roofing	KAl ₃ Si ₃ O 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) ₃ AlSi ₃ O 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) ₂ O 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) ₃ Si ₆ O ₂₂ (OH) ₂	Amphibole (commonly hornblende)
	6	✓	white to pink	cleaves in 2 directions at 90°	ceramics, glass	KAlSi ₃ O ₈	Potassium feldspar (commonly orthoclase)
	6	✓	white to gray	cleaves in 2 directions, striations visible	ceramics, glass	(Na,Ca)AlSi ₃ O ₈	Plagioclase feldspar
	6.5	✓	green to gray or brown	commonly light green and granular	furnace bricks, jewelry	(Fe,Mg) ₂ SiO 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 ₃ Al ₂ Si ₃ O ₁₂	Garnet

*Chemical symbols:

Al = aluminum
C = carbon
Ca = calcium

Cl = chlorine
F = fluorine
Fe = iron

H = hydrogen
K = potassium
Mg = magnesium

Na = sodium
O = oxygen
Pb = lead

S = sulfur
Si = silicon
Ti = titanium

✓ = dominant form of breakage

Use the common mineral properties scheme below to help you answer some of the questions below.

Name a few minerals that have metallic luster?	Name a few minerals that don't have metallic luster?
Name some minerals with hardness above 5 on the Moh's Hardness scale?	Name two minerals that exhibit cleavage, and two that exhibit fracture?
Name one easily scratched mineral?	
What is one use for the mineral gypsum?	What's Pyroxene made of? Is it a silicate or non-silicate mineral?
What chemical elements is Pyrite made from?	What mineral has a double refractive property and rhombohedral cleavage?
<p>I am...</p> <ul style="list-style-type: none"> – Colorless Crystal, Perfect box – Transparent to translucent – Colorless streak – Hardness of 2.5 – No smell – Melts ice <u>very fast</u> – Soluble in water – Low density – Perfect cleavage <ul style="list-style-type: none"> • 90 degree cleavage 	<p>• I am...</p> <ul style="list-style-type: none"> – Colorless to metallic brown – Transparent – Colorless streak – Hardness of 2.5 – No smell – Slow – Insoluble in water – Low density – Perfect cleavage Thin, flat sheets, pieces

♦ Mineral Identification Quiz

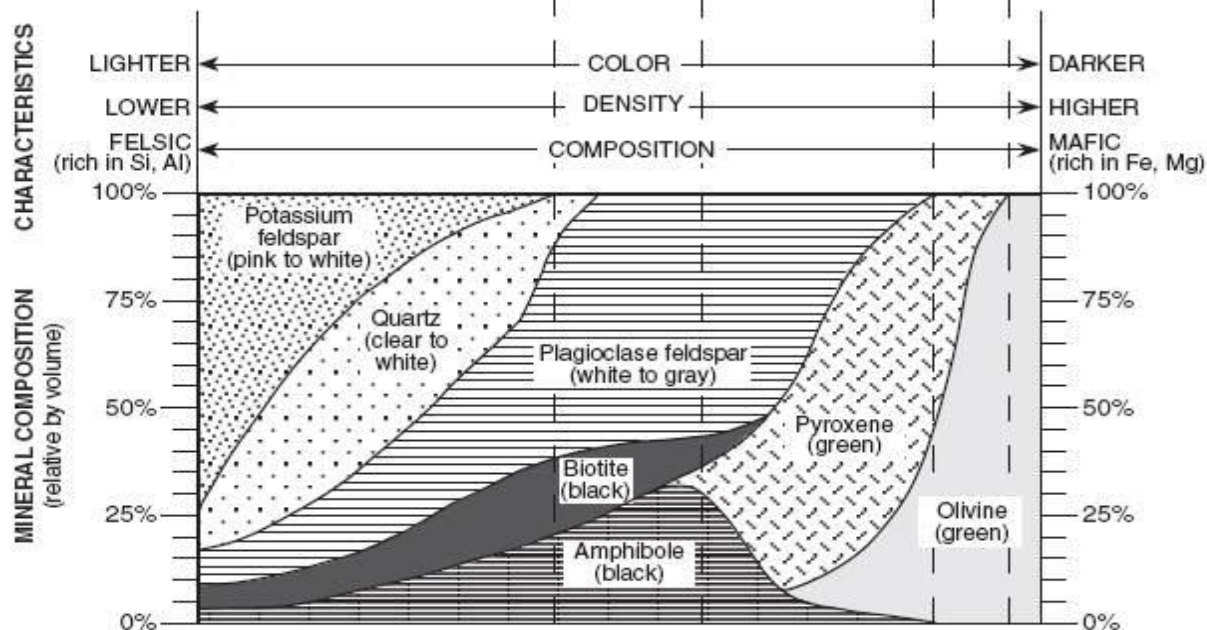
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18 A.) B.)	19	20

Bonus:

Use the scheme for Igneous Rock Identification to describe **Granite** and a very dark piece of **Basalt**.

Scheme for Igneous Rock Identification

Scheme for Igneous Rock Identification										CRYSTAL SIZE	TEXTURE	
IGNEOUS ROCKS	ENVIRONMENT OF FORMATION		EXTRUSIVE (Volcanic)	Obsidian (usually appears black)		Basaltic glass				non-crystalline	Glassy	Non-vesicular
				Pumice		Scoria						Vesicular (gas pockets)
	Vesicular rhyolite		Vesicular andesite	Vesicular basalt				less than 1 mm	Fine	Non-vesicular		
	Rhyolite		Andesite	Basalt								
	INTRUSIVE (Plutonic)		Granite	Diorite	Diabase		Peridotite	Dunite	1 mm to 10 mm		Coarse	
					Gabbro							
			Pegmatite								10 mm or larger	Very coarse



Please answers from the scheme for Igneous Rock Identification to describe Granite and a very dark piece of Basalt.



FAB _____



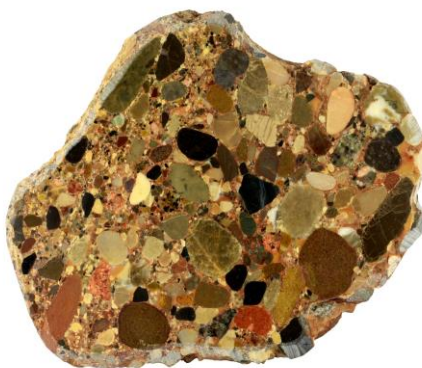
_____ MAN

INORGANIC LAND-DERIVED SEDIMENTARY ROCKS					
TEXTURE	GRAIN SIZE	COMPOSITION	COMMENTS	ROCK NAME	MAP SYMBOL
Clastic (fragmental)	Pebbles, cobbles, and/or boulders embedded in sand, silt, and/or clay	Mostly quartz, feldspar, and clay minerals; may contain fragments of other rocks and minerals	Rounded fragments	Conglomerate	
			Angular fragments	Breccia	
	Sand (0.006 to 0.2 cm)		Fine to coarse	Sandstone	
	Silt (0.0004 to 0.006 cm)		Very fine grain	Siltstone	
	Clay (less than 0.0004 cm)		Compact; may split easily	Shale	
CHEMICALLY AND/OR ORGANICALLY FORMED SEDIMENTARY ROCKS					
TEXTURE	GRAIN SIZE	COMPOSITION	COMMENTS	ROCK NAME	MAP SYMBOL
Crystalline	Fine to coarse crystals	Halite	Crystals from chemical precipitates and evaporites	Rock salt	
		Gypsum		Rock gypsum	
		Dolomite		Dolostone	
Crystalline or bioclastic	Microscopic to very coarse	Calcite	Precipitates of biologic origin or cemented shell fragments	Limestone	
Bioclastic		Carbon	Compacted plant remains	Bituminous coal	

Please use the sedimentary rock identification scheme to describe...

Dolostone


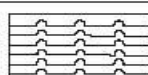



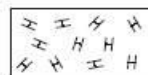
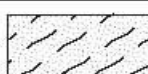
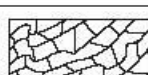







◇ Please use the Metamorphic identification Scheme to describe the three metamorphic rocks below.

Scheme for Metamorphic Rock Identification

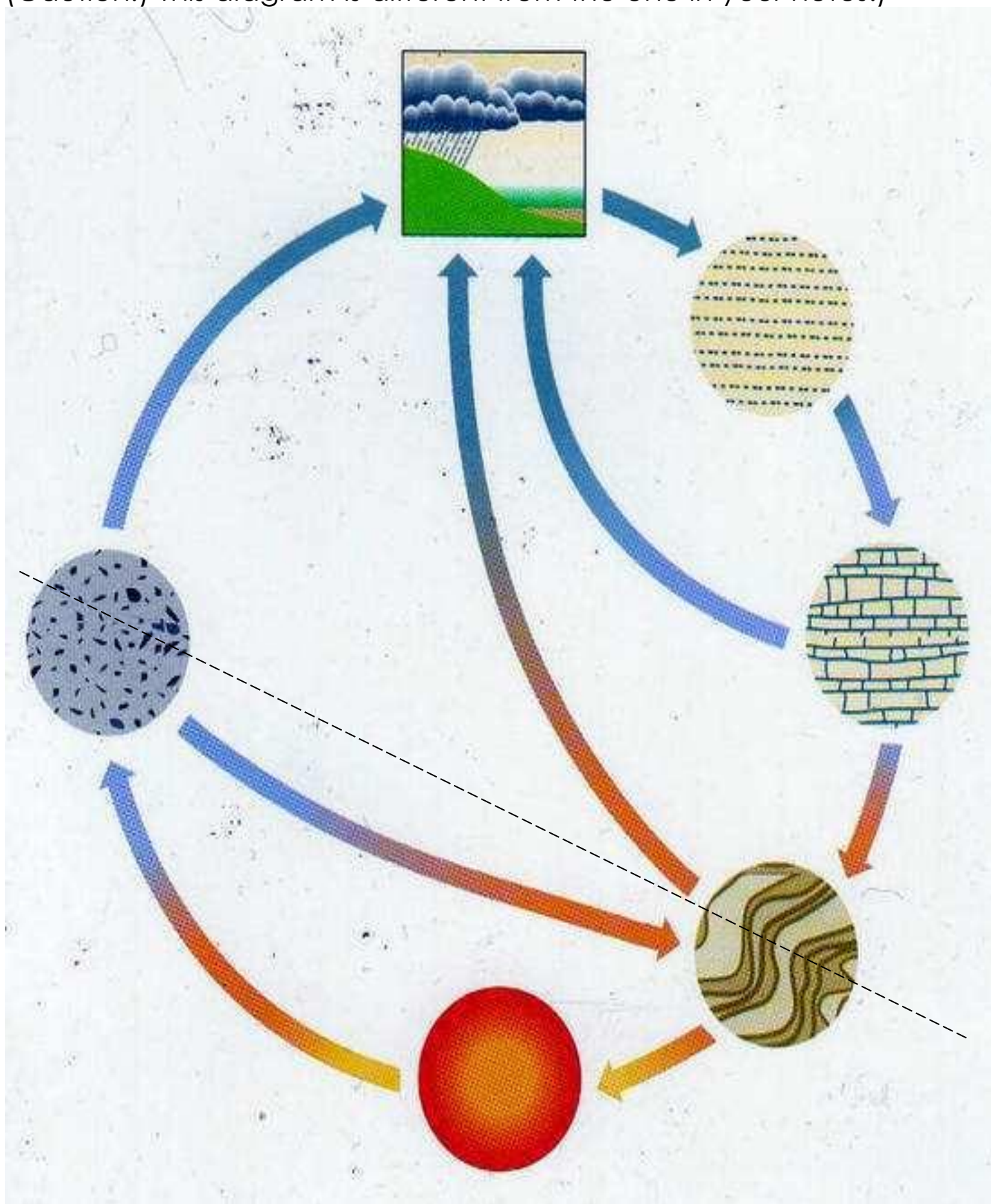
TEXTURE		GRAIN SIZE	COMPOSITION	TYPE OF METAMORPHISM	COMMENTS	ROCK NAME	MAP SYMBOL
FOLIATED	MINERAL ALIGNMENT	Fine	MICA QUARTZ FELDSPAR AMPHIBOLE GARNET PYROXENE	Regional (Heat and pressure increases) ↓	Low-grade metamorphism of shale	Slate	
		Fine to medium			Foliation surfaces shiny from microscopic mica crystals	Phyllite	
	BAND-ING	Medium to coarse			Platy mica crystals visible from metamorphism of clay or feldspars	Schist	
					High-grade metamorphism; mineral types segregated into bands	Gneiss	
NONFOLIATED		Fine	Carbon	Regional	Metamorphism of bituminous coal	Anthracite coal	
		Fine	Various minerals	Contact (heat)	Various rocks changed by heat from nearby magma/lava	Hornfels	
		Fine to coarse	Quartz	Regional or contact	Metamorphism of quartz sandstone	Quartzite	
			Calcite and/or dolomite		Metamorphism of limestone or dolostone	Marble	
		Coarse	Various minerals		Pebbles may be distorted or stretched	Metaconglomerate	



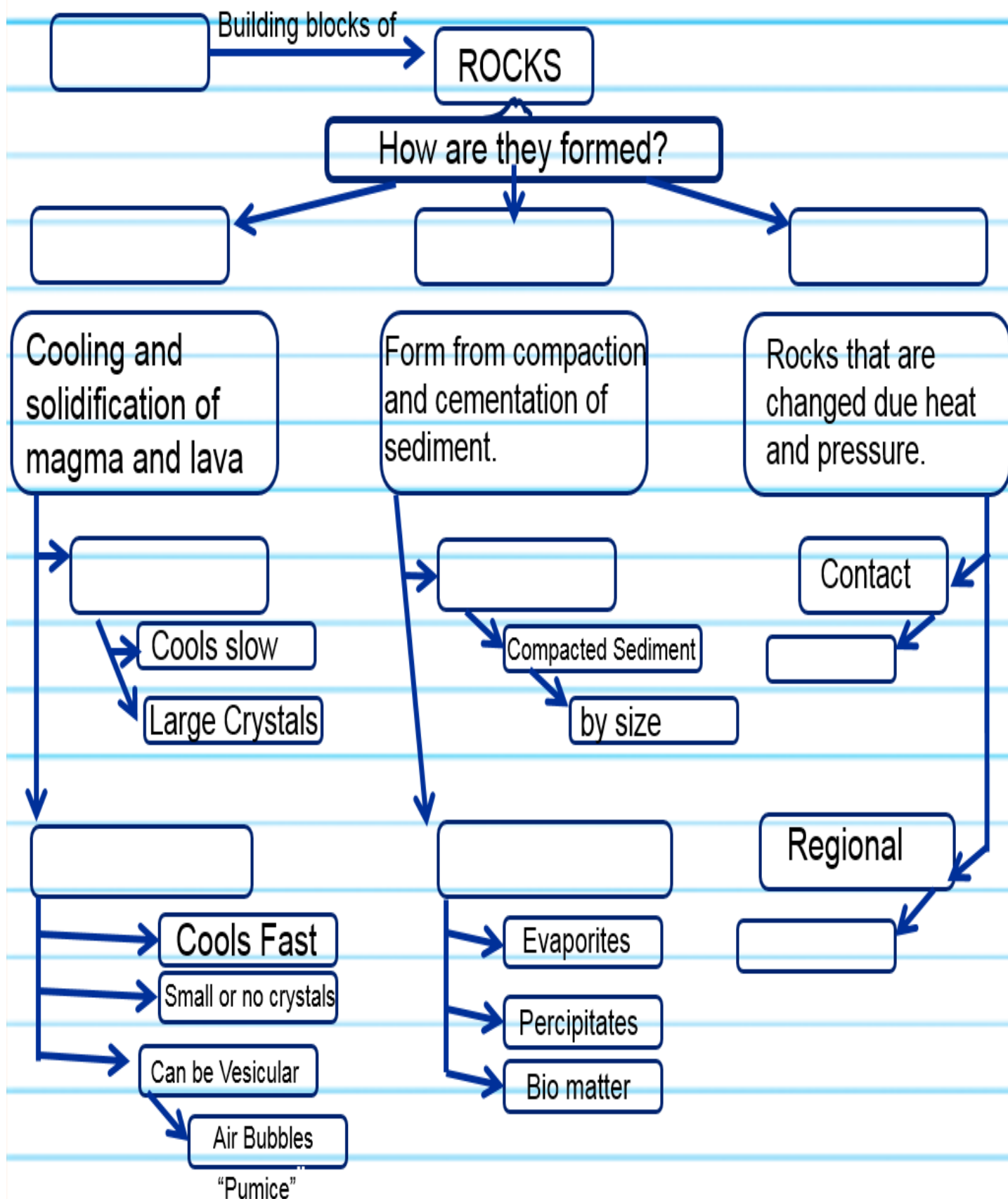




Use your notes on the rock cycle to label the following diagram
(Caution!) This diagram is different from the one in your notes.)



Please fill in the blanks below to complete your types of rocks flow chart.



Please use posters created by other students to describe four rocks in the spaces below. Please provide at least three facts describing information about each rock

Name: • • •	Name: • • •
Name: • • •	Name: • • •

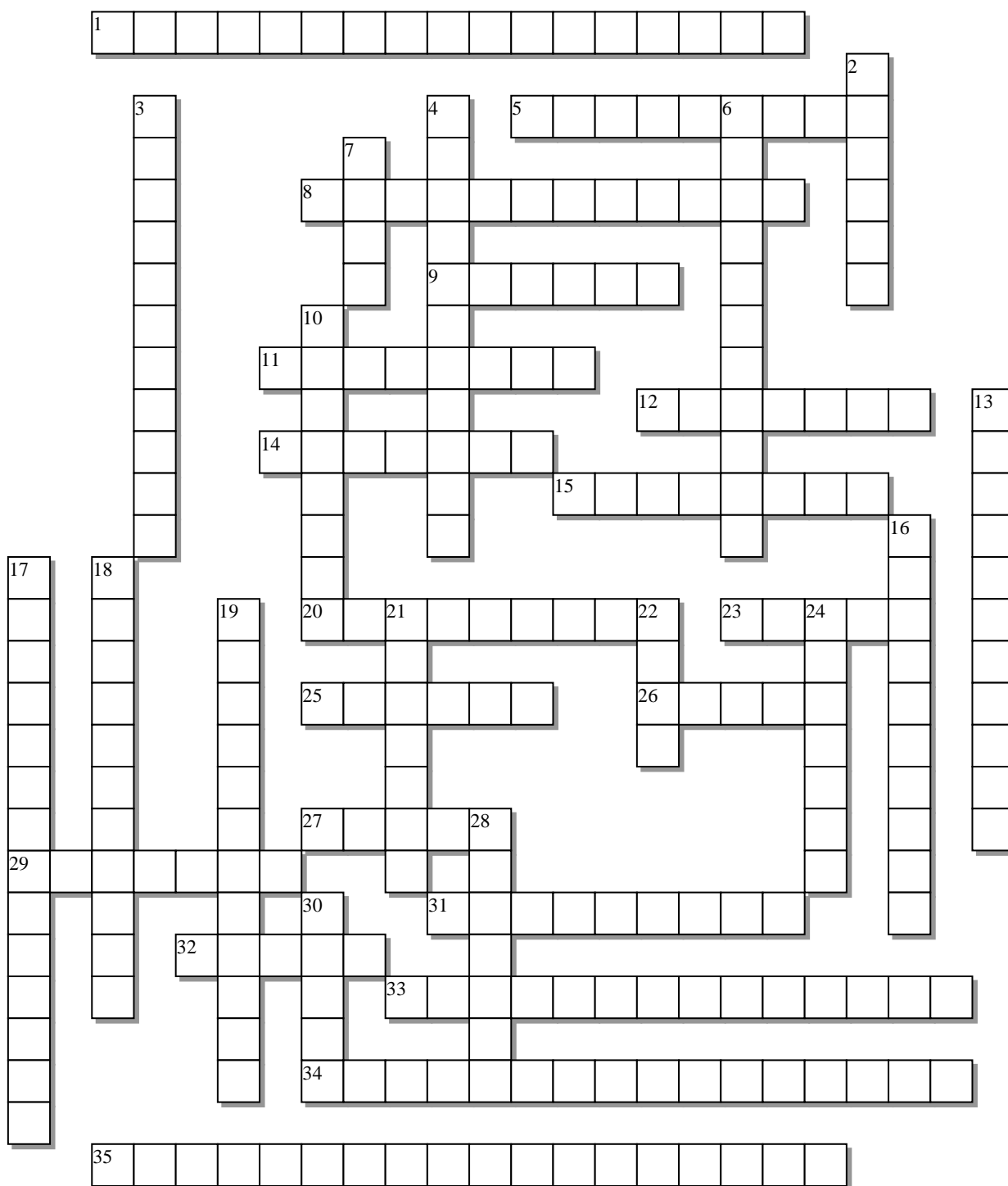
Igneous, Sedimentary, or Metamorphic Quiz

1	2	3	4
5	6	7	8
9	10	*11	*12-See Sample

Rock Identification Quiz

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
*21	*22		

Geology Topics Crossword



Across:

- 1 - Boundary when two plates move apart from each other
 5 - Made of Solid Iron and Nickel

Down:

- 2 - Type of lava high in silicates (Explosive!)
 3 - Rock that changed forms due to

- 8 - A mega continent before Pangea.
- 9 - Between Crust and Outer Core
- 11 - How easily a mineral can be scratched
- 12 - Natural inorganic (non-living) solids that join together (crystals) to make unique compositions.
- 14 - An opening in the Earth's crust through which molten magma and gases erupt
- 15 - Another mega continent before Pangea.
- 20 - The point on the Earth's surface that is directly above the hypocenter or focus
- 23 - A flow of volcanic ash and water
- 25 - The "Super Continent"
- 26 - Outer layer of the Earth
- 27 - Break / crack where movement occurs
- 29 - Large crater caused by the violent explosion of a volcano that collapses into a depression
- 31 - Made of Liquid Iron and Nickel
- 32 - Type of Crust made of mostly Basalt
- 33 - Where two plates are sliding horizontally past one another.
- 34 - The gradual movement of the continents across the Earth.
- 35 - Boundary when one plates collides and is forced under the other.
- extreme temperature and pressure
- 4 - Limestone is an example of this type of rock
- 6 - Type of Crust made of mostly Granites
- 7 - Collision of crust bends rock layers "stress"
- 10 - Name for Basaltic lava (Flows Easily)
- 13 - An instrument used to measure the shaking caused by an earthquake
- 16 - Shaking of the Earth's crust from a sudden release of energy.
- 17 - The Earth's crust and upper mantle are broken into sections called plates. These plates float on the mantle like rafts (moving very slowly)
- 18 - A group of volcanic islands formed from ocean crust convergence.
- 19 - Scale for measuring earthquake magnitude
- 21 - Type of rock when molten Earth is cooled
- 22 - Mass or grouping of minerals
- 24 - A location above an upwelling of magma from the mantle.
- 28 - An ocean wave generated by a submarine earthquake, volcano or landslide
- 30 - Type of lava high in basalts (Flows)

Possible Answers:

Archipelago, Caldera, Continental, ContinentalDrift, ConvergentBoundary, Crust, DivergentBoundary, Earthquake, Epicenter, Fault, Felsic, Fold, Gondwanaland, Hardness, HotSpot, Igneous, InnerCore, Lahar, Laurasia, Mafic, Mantle, Metamorphic, Mineral, Ocean, OuterCore, Pahoehoe, Pangea, PlateTectonics, Richter Scale, Rock, Sedimentary, Seismograph, Transform Fault, Tsunami, Volcano

EARTH SYSTEM HISTORY

Name: _____

Due: _____

◇ This photograph best represents what Principle?

◇ Please explain using some of the fossils on the right.

Please circle the fossil that is older based on this principle



or



or



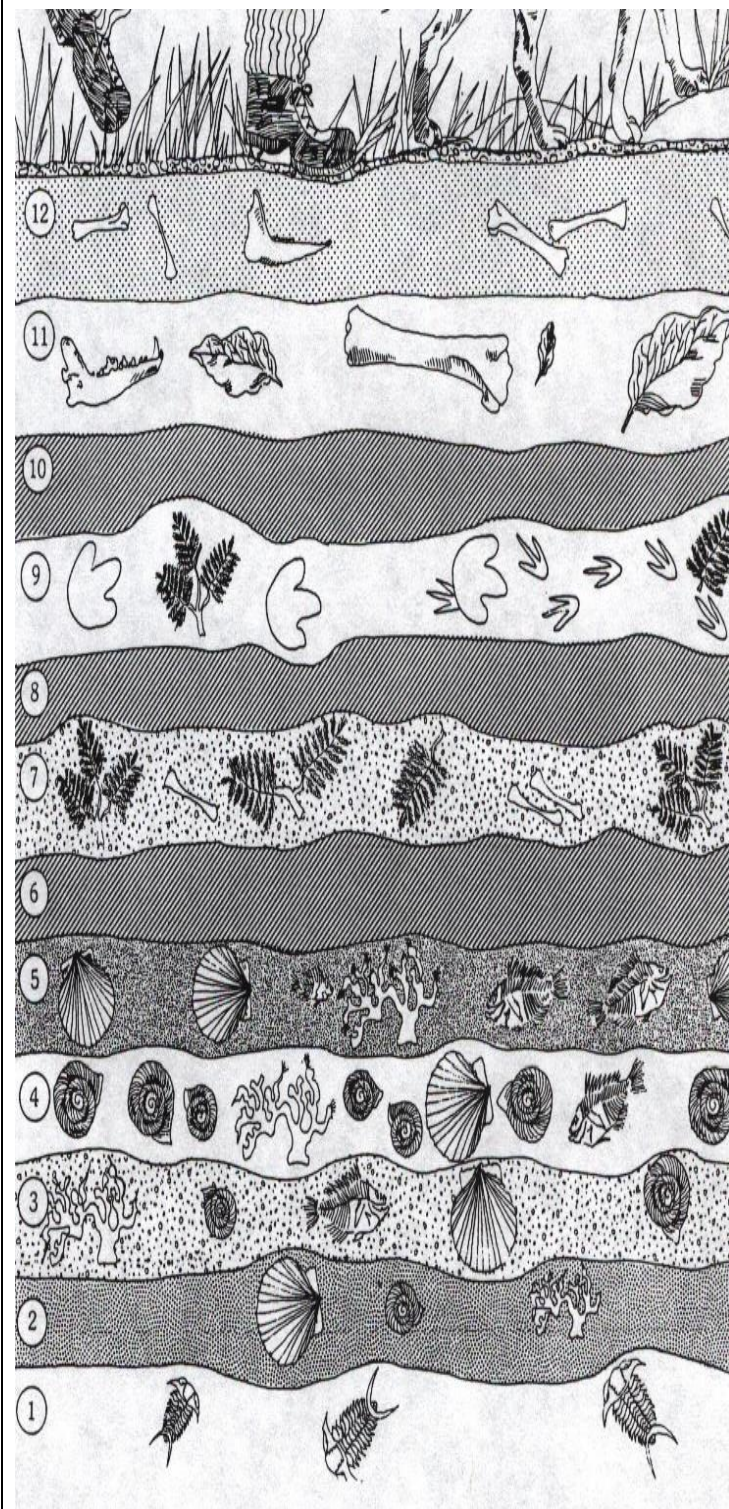
or



or



What happened at #10? _____



Please record the name of time periods from earliest to latest in their chronological order below. Use the boxes beneath to group them according to Era

H A D E A N				C A M B R I A N						T R I A S S I C				Q U A R T E R N A R Y
----------------------------	--	--	--	--------------------------------------	--	--	--	--	--	--------------------------------------	--	--	--	---

Eon Eon Eon Period Period Period Period Period Period Period Period Period Period Period

Precambrian Super-Eon			

Many aspects of science including earth system history have _____, _____, and _____ components.

_____ - Laws of nature do not change over time.


What percentage of all species that ever lived still exist today?
_____ (Caution! Re-read Question)

Research one organisms that has gone extinct. Draw a quick sketch, its name, and some relevant information.

Please use the line below as the history of the earth from 4.6 billion years ago until present. Record the events on the left in the correct order and space them accordingly along the timeline.

- ◇ Moon Forms
- ◇ Earliest Life Begins
- ◇ Human Civilization
- ◇ Earliest Mammals
- ◇ First Insects
- ◇ First Multicellular Life
- ◇ Carbon Swamps
- ◇ First Flowering Plants
- ◇ Computer Age
- ◇ Dinosaurs Rule
- ◇ K-T Mass Extinction
- ◇ Earliest Humans
- ◇ Age of Exploration
- ◇ Formation of the Earth
- ◇ Age of Fish
- ◇ Last Ice Age
- ◇ Age of Marine Invertebrates
- ◇ First Human Hominid
- ◇ Hadean
- ◇ Cenozoic
- ◇ Proterozoic
- ◇ Mesozoic
- ◇ Paleozoic
- ◇ Archean
- ◇ Today

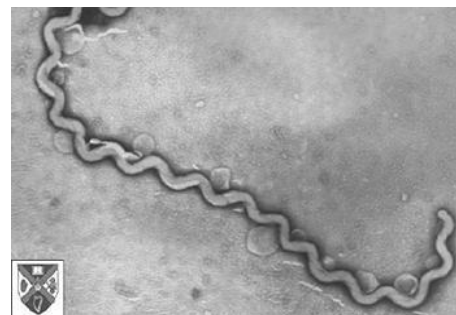
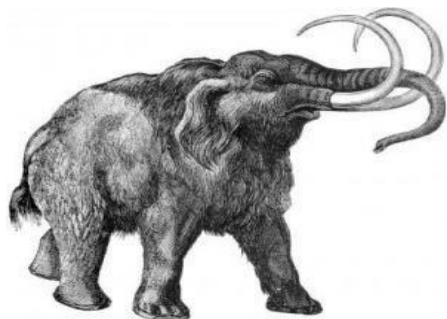


Include a  when an extinction event occurs. There have been a few.

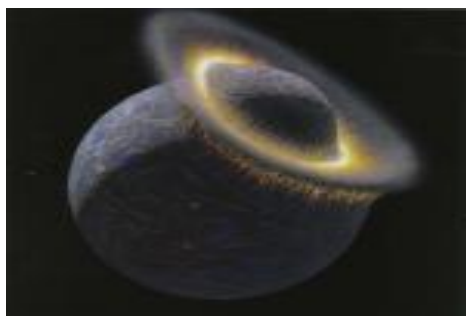
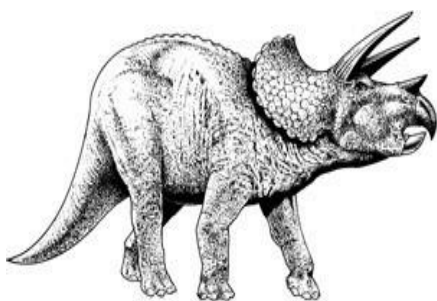
Start

End

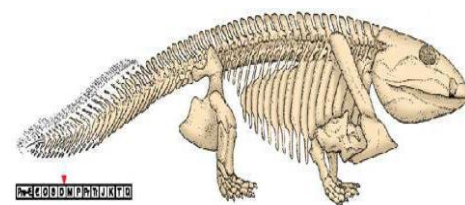
Please look at the pictures below and describe the best time period that each picture represent. Record some information about each photograph as well.



First evidence of life



Not K-T Mass Extinction



First Amphibian

GEOLOGIC TIME SCALE						
Time Units of the Geologic Time Scale				Development of Plants and Animals		
Eon	Era	Period	Epoch			
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01	Earliest <i>Homo sapiens</i>	
			Pleistocene	1.6		
		Tertiary	Pliocene	5.3	Earliest hominids	
			Miocene	23.8		
			Oligocene	33.7	"Age of Mammals"	
			Eocene	55		
			Palaeocene	65		
	Mesozoic	Cretaceous	145	"Age of Reptiles"	Extinction of dinosaurs and many other species	
		Jurassic	208		First flowering plants	
		Triassic	248		First birds Dinosaurs dominant First mammals	
	Palaeozoic	Carboniferous	Permian	286	"Age of Amphibians"	Extinction of trilobites and many other marine animals
			Pennsylvanian	320		First reptiles
			Mississippian	360		Large coal swamps Amphibians abundant
		Devonian	410	"Age of Fishes"	First amphibians	
			Silurian		438	First insect fossils Fishes dominant
			Ordovician	505	"Age of Invertebrates"	First land plants First fishes Trilobites dominant
		Cambrian		545		First organisms with shells
		Vendian	650	"Soft-bodied faunas"	Abundant Ediacaran faunas	
		Proterozoic	2500	Collectively called Precambrian comprises about 87% of the geological time scale		
Archean	First one-celled organisms Age of oldest rocks					
Hadean						
	4600 Ma				Origin of the earth	

