LAB-AIDS
Experiencing Science

SCIENCE LAB NOTEBOOK

Roger Groom
7th Grade Science
Mr. Groom / P_
2019-2020

Books On-Line Login Information

Username Should have this filled in

Password w/ personalized login

Chromebook # ___

METRIC UNITS TO U.S. CUSTOMARY UNITS

Metric Units		Factor	Convert	U.S. Customary Units
LENGTH				
millimeters (mm)	X	0.039	=	inches (in)
meters (m)	X	3.28	=	feet (ft)
meters (m)	X	1.09	=	yards (yd)
kilometers (km)	X	0.621	=	miles (mi)
VOLUME				
milliliters (mL)		0.034	=	fluid ounces (fl oz)
liters (L)	X	0.264	=	gallons (gal)
cubic meters (m3)	X	35.314	=	cubic feet (ft3)
cubic meters (m3)	X	1.307	=	cubic yards (yd3)
MASS				
grams (g)	X	0.035	=	ounces (oz)
kilograms (kg)	X	2.202	=	pounds (lb)
TEMPERATURE				
Celsius (°C)		1.8(C) + 32	=	Fahrenheit (°F)

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LAB-LOG

ACTIVITY Title Page for Geological Processes | Date 8/30 | Page 1

GEOLOGICAL PROCESSES
Big Ideas & Essential Questions

Big Ideas	Essential Questions
Geological processes cause gradual and sudden changes to Earth's surface. *(Stability and Change)* The Earth's surface has changed over geological time. *(Cause and Effect)* Different kinds of rocks and natural resources form as a result of geological processes. *(Energy and Matter; Flows, Cycles, and Conservation)*	• What causes volcanic eruptions and earthquakes, and is one likely to occur where you live? • How can we use technology to monitor the movement of Earth's surface? • How do natural hazards, like volcanoes, earthquakes, and landslides, affect the people who live near them? • How do changes on Earth's surface affect the availability of natural resources?

ACTIVITY Learning Targets | Date 8/30 | Page 2

for Geological Processes

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Name: Geological Processes Learning Targets

Activity 1: Storing Nuclear Waste

- Content: I can explain what nuclear waste is, and the challenges associated with storing it long term.
- Practice: I can construct an argument about where to store nuclear waste supported by evidence, and identify trade-offs.
- Crosscut: I can use patterns I found in maps to decide where to store nuclear waste.

Activity 2: Investigating Groundwater

- Content: I can explain how groundwater can be stored in an aquifer.
- Practice: I can conduct an investigation to learn about how water interacts with different earth materials.
- Crosscut: I can use a model to determine cause and effect relationships between earth materials and how water is stored underground.

Activity 3: Hazards Caused by Water

- Content: I can explain the cause and effect of landslides.
- Practice: I can analyze images and video to look for similarities and differences.
- Crosscut: I can describe how using a model allows scientists to learn about topics that are challenging because of their scale.

Activity 4: Hazards Caused by Earthquakes and Volcanoes

- Content: I can describe hazards caused by earthquakes and volcanoes, such as ground shaking, landslides, ash fall, and volcanic gasses.
- Practice: I can critically read a scientific text to obtain information.
- Crosscut: I can explain some of the effects of earthquakes and volcanoes on people.

Activity 5: Monitoring Volcanic Eruptions

- Content: I can infer the types of rock formed from different types of volcanic eruptions.
- Practice: I can model how the amount of gas in magma affects volcanic eruptions.
- Crosscut: I can use a model to determine how the contents of a volcanic eruption affect the rocks created.

Activity 6: Mapping Locations of Earthquakes

- Content: I can describe how GPS works.
- Practice: I can use and create a model of the locations of earthquakes and volcanoes.
- Crosscut: I can identify patterns in the locations of earthquakes and volcanoes.

Activity 7: Observing Earth's Moving Surface

- Content: I can explain how GPS is used to show direction and speed of movement of tectonics plates, or parts thereof, over time.
- Practice: I can analyze graphical GPS time series plots to determine overall speed and direction of plate movement.
- Crosscut: I can look for and interpret patterns within GPS time series.

Activity 8: Beneath Earth's Surface

- Content: I can describe the layers of the Earth.
- Practice: I can critically read a scientific text to obtain information.
- Crosscut: I can create a diagram of Earth's layers that is to scale.

Activity 9: Modeling Earthquakes

- Content: I can describe how the movement of plates causes earthquakes.
- Practice: I can use a model to learn about the causes of earthquakes.
- Crosscut: I can describe the causes and effects of earthquakes.

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ACTIVITY	Date	Page
Paper Pocket for G.P.	8/30	3

Contents:

Grade/Missing Work Observations

ACTIVITY: Intro for GP | Date: 8/30 | Page 4

LAB-LOG

Q: What is a rock?

A:

Q: Why are rocks useful?

A:

My Rock

LaB-LOG

ACTIVITY 1: Storing Nuclear Waste | Date 9/4 | Page 5

~~WR~~ Warm-up?

Where do you think the electricity that runs these lights comes from?

Vocabulary

Nuclear Waste: Leftover radioactive material produced by nuclear reactors or nuclear weapon production.

Analysis Questions (#1, 2, 4)

#1

~~OR~~ Warm-up?

Where do you think this is?

Name

Activity 1 AQ

ANALYSIS

1. Do you think that storing nuclear waste in one or two sites deep in the ground would be better than the current situation where nuclear waste is stored at the sites where it is produced? Explain by
   a. stating your decision.
   b. supporting your decision with as many pieces of evidence as you can. **Evidence** is factual information or data that support or refute a claim
   c. discussing the trade-offs of your decision. A **trade-off** is a desirable outcome given up to gain another desirable outcome.
2. What other information would you like to have before you make a decision about where to store nuclear waste? Be sure to explain how this information would be helpful.
3. Choose one of the recommended actions you described on Student Sheet 1.1. Are there any disadvantages associated with taking this action? Explain why or why not.

4. As you learned in this activity, advances in technology often lead to advances in science. Sometimes they also lead to new challenges.
   a. In what ways has the development of nuclear energy led to advances as well as challenges for society?
   b. What other developments in technology have led to advances as well as challenges for people?

Name: _____ ACT 1: STORING NUCLEAR WASTE

Period: BACKGROUND INFORMATION AND STORAGE CONSIDERATIONS

Where is nuclear waste generated?

Waste comes from . . .	nuclear power plants, medical facilities, and research & tech facilities
Most waste created by . . .	power plants
Comes in these forms:	highly radioactive solids of metal, ceramic or glass
Length of time radioactive:	at least 250,000 years

How are people protected from nuclear waste?

Dangerous if it gets into . . .	air or water
Containers are special because . . .	prevent leakage, resist impact, high temps, & corrosive chemicals
Containers at risk from . . .	water damage

How much waste comes from nuclear power plants?

% of energy from nuclear reactors in the US:	~20% .99 power plants
Amount of waste predicted by the year 2050:	140,000 metric tons

How is nuclear waste stored now?

# of sites in # of states:	stored @ 75 sites in 33 states
Waste stored in _____ that helps to . . .	deep pools of water to cool it & protect workers
Amount currently stored above ground:	15,000 metric tons

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Q: W

A:

Q: W

A:

My Roc

STUDENT SHEET 1.1

CONSIDERING WHERE TO STORE NUCLEAR WASTE

Considerations	Recommended action	Explanation
proximity to pop. centers		
proximity to where produced		
proximity to water		
landslide risk?		
proximity to aquifers		
proximity to EQ & volcanoes		

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Vocabulary

Groundwater: water that goes beneath Earth's surface.

Data from Investigation

material in tube	observations B4 H_2O	prediction	observations after H_2O
sand			

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ACTIVITY 2, continued | Date 9/16 | Page 7

Vocabulary, continued

Sediments: parts of rocks, shells, and dead organisms worn down into small pieces, usually by force of water.

Sedimentary rock: when sediments settle on top of each other, layers are formed that are pressed and glued together over long periods of time to become hardened rock. This process is called **lithification**.

Litho, or Lith- = stone/rock

Rock observation chart

Tub #	Key features	Sedimentary Rock type

* Relate key features to lithification demo!

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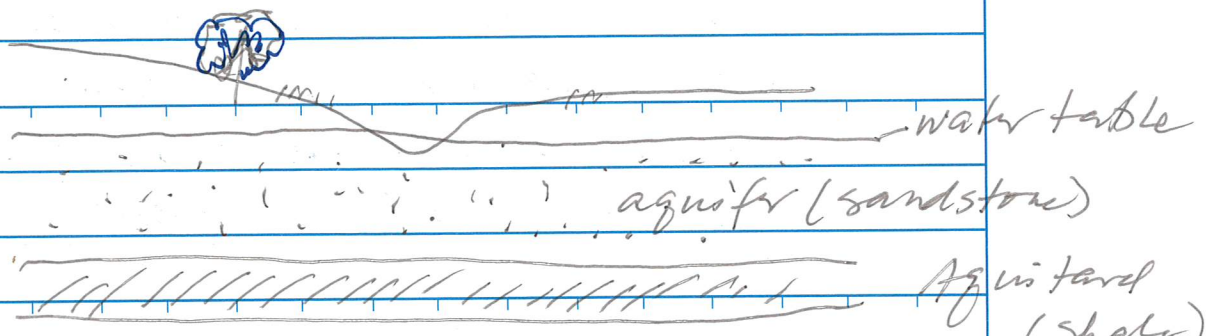
Vocabulary

Aquifer: a permeable rock layer that allows groundwater to flow through it.

Aquitard: a rock layer that restricts or inhibits the flow of groundwater



Analysis Questions (#1-3)

Rules

1. RQIA
2. Full Sentences
3. skip lines

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ACTIVITY 2, continued | Date 9/18 | Page 9

Groom AQ

Describe how the lithification bread model demonstrates how sedimentary rocks are formed.
- include the different materials used in your discussion, and what they represented.

Diagram of process

ANALYSIS

1. **Sediments** are parts of rocks, shells, and dead organisms that have been worn down into small pieces, mostly by the effects of water. The earth materials you used in the activity—sand and clay—are sediments. Sediments settle on top of each other. The layers they form are pressed and glued together. Over long periods of time, these layers of hardened sediment form **sedimentary rock.**
   a. What do you think happens when water flows from Earth's surface into a shale rock layer, which is made of clay sediments?
   b. What do you think happens when water flows from Earth's surface into a sandstone rock layer, which is made of sand sediments?
2. An **aquifer** is a rock layer that allows groundwater to flow through it. An **aquitard** is a rock layer that restricts the flow of groundwater.
   a. Draw a diagram to show how you would use the materials from this activity (clay, sand, water, and a plastic tube) to build a model of an aquifer.
   b. How would your placement of the earth materials in the tube allow water to flow and collect in an aquifer?
   c. Which earth material would be considered an aquitard?
3. The world's aquifers store much more freshwater underground than is stored in all the lakes and rivers on Earth's surface. Aquifers are sources of drinking water for many people. Add the consideration "location of aquifers" in a new row on Student Sheet 1.1, "Considering Where to Store Nuclear Waste." In the second column, write the recommended action you would take in regard to this consideration. Explain why you recommend taking this action when deciding where to store nuclear waste.

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Warm up?

What are some natural hazards you have heard of or experienced?

Vocabulary:

Natural hazard - a natural event that may negatively affect people and the environment.

Landslide: flow of rock, soil, and other materials down a slope.

Analysis Questions (#1, 2)

ANALYSIS

1. Think about what you learned from watching the video. How did using a model help scientists understand what happens during a landslide?
2. Why might it be important to consider landslide risk when deciding where to store nuclear waste? Use evidence from the activity to support your ideas.

ACTIVITY 3: Modeling Landslides | Date 9/18 | Page 10

LaB-Lo

warm up?
What are some natural hazards you have heard

Name: _____

Period: _____

ACT 3: MODELING LANDSLIDES
ANTICIPATION GUIDE

Before starting the activity, mark whether you agree (+) or disagree (—) with each statement below.

After completing the activity, mark whether you agree (+) or disagree (—) with each statement below. Under each statement, explain how the activity gave evidence to support or change your ideas.

BEFORE	AFTER	
_____	_____	1. When scientists conduct an experiment, they change one thing and observe if the change has an effect.
_____	_____	2. If a landslide is going to happen, it will happen as soon as rain starts falling on the ground.
_____	_____	3. Landslides are too big and happen too fast for scientists to be able to study them.

Name: _____ Activity 3: Modeling Landslides
Period: Killer Landslides Video

NOVA Killer Landslides: https://www.youtube.com/watch?v=CmlrqnXu76A

1. How much rainfall had occurred in the area before the landslide?
2. What time did the landslide occur?
3. How many homes were destroyed?
4. How deep were some homes buried in the mud?
5. What is raw slope left behind after a landslide called?
6. What type of camera do they use to discover (alive) bodies?
7. What was the name of the first person rescued by helicopter?
8. How high was the slope in Oso and how far did it slide?
9. The Oso landslide came down in two pieces, the lower half and the (not the bottom half) ___
10. What is a known first indicator of a landslide?
11. When were glaciers last in the Oso region?
12. What is the average Pacific Northwest rainfall on the western slopes of the Cascades?
13. What is porosity?

ACTIVITY 4: Natural Hazards | Date 9/19 | Page 11

Caused by EQs & Volcanoes

Warm up

What do you know about EQ? What about volcanoes? Jot down a few things.

Vocabulary

Earthquake: a sudden release of energy in Earth's interior, which can cause shaking @ the surface.

Volcano: an opening in Earth's surface through which lava, gas, and ash escape from magma underground.

Magma: hot liquid-ish rock under Earth's surface.

ACT 4 VIDEO QUESTIONS Name Per.

Name_____ Date_____

STUDENT SHEET 4.1

DIRECTED READING TABLE: NATURAL HAZARDS CAUSED BY EARTHQUAKES AND VOLCANOES

mitigation

	What was the natural hazard?	What caused this natural hazard?	What were the effects?	How can the damage from this hazard be minimized?
Haiti (2010)				
Nepal (2015)				
Mt. St. Helens (1980)				
Mammoth Mountain				

ACT 4 VIDEO QUESTIONS Name _____ Per. _____

Name Sample student response Date _____

STUDENT SHEET 4.1

DIRECTED READING TABLE: NATURAL HAZARDS CAUSED BY EARTHQUAKES AND VOLCANOES

	What was the natural hazard?	What caused this natural hazard?	What were the effects?	How can the damage from this hazard be minimized?
Haiti (2010)	*Ground-shaking*	*Earthquake*	*The ground-shaking during the earthquake caused buildings to collapse. Many were damaged beyond repair.*	*Buildings can be designed and built to stay up during an earthquake. Building codes should be enforced.*
Nepal (2015)	*Landslide*	*Earthquake*	*The earthquake triggered many landslides, one of which destroyed an entire village.*	*Slopes can be monitored for ground-shaking, which will help scientists better predict when these events will happen.*
Mt. St. Helens (1980)	*Ash fall*	*Volcanic eruption*	*The ash fell on a town far from the eruption site, which caused damage to roads and buildings, and created health problems for people.*	*People can have emergency kits to use if the ash fall keeps them inside for long periods of time.*
Mammoth Mountain	*Volcanic gas*	*Volcanic eruption*	*Trees are killed due to the volcanic gases emitted from underground.*	*Areas where gas is emitted from the soil can be monitored for the amount of carbon dioxide in the air.*

ACT 4 VIDEO QUESTIONS — Name _____ Per. _____

UNDERSTANDING VOLCANIC HAZARDS — Today's Date _____

The 7 main types of volcanic hazards are:

- Ash Falls
- ~~Hot ash~~ flows Mudflows
- Volcanic Landslides
- Volcanic Tsunamis
- Hot Ash Flows
- Volcanic gases
- Lava flows

Ash Falls:

Heavier fragments fall closer to volcano.

What are some problems of ash falling back to the ground?

- heavy, can ruin buildings
- communication
- energy generators
- driving difficult
- crops & H_2O damaged
- irritates lungs/eye
- aircraft damage

Ash Flows (pyroclastic flows):

These can move very fast. They usually travel down slopes/valleys on mountains but spread out when they get to the bottom of the valley.

A couple examples of devastating pyroclastic flows include . . . St. Pierre near Mt. Pele, Mt. St. Helens, Mt. Chichon 29,000 people died

Mudflows (also called Lahars):

These can move as fast as 35 miles per hour.

They can carry large boulders or logs/houses

Example in Nevada Del Ruiz, Columbia: It rushed down to Armero, 50 kms away. How many people died? more than 20,000.

Volcanic Landslides:

This hazard become well known after Mt. St. Helens.

Another example: Mt. Shasta which was 10 times larger than Mt. St. Helens.

Volcanic Tsunamis:

Underwater landslides on volcanoes can produce tsunamis.

Lava Flows:

Lava flows on steep ground can travel as fast as 30 kilometers per hour, and as they hit flatter ground, they spread out and usually travel less than 1 kilometer per hour.

People are less in danger but homes/roads can easily be destroyed.

Nam
Perio

NOVA

1. H

2. V

3. H

4. H

5. W

6. W

7. W

8. H

9. Tl
hi

10. W

11. W

12. W

13. W

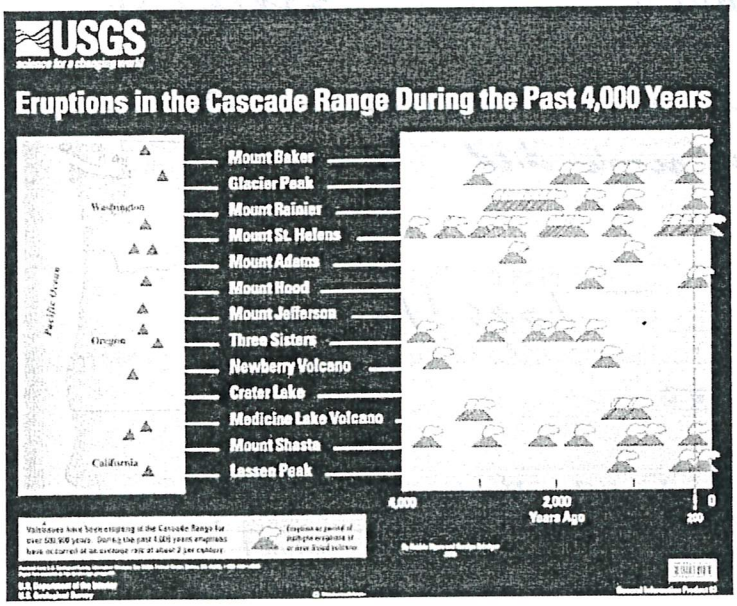
Volcanic Gases:

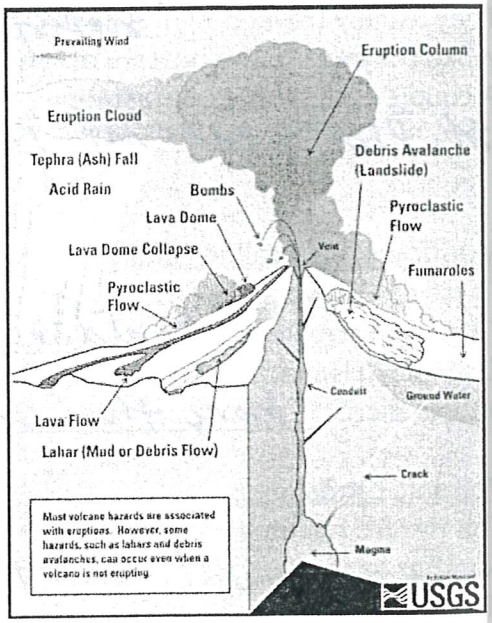
Usually the gas is ~~carbon~~ H_2O.
Other volcanic gases that are dangerous are carbon dioxide, and sulfur gases & flourine
CO_2 can travel down near the ground (because it's heavier than air) and killed over 1,000 people in Lake Nyos in Africa. (1986)

Reducing Volcanic Risks

3 main things:

-
-
-





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Analysis Questions (#1, 2)

ANALYSIS

1. Look back at the facts about natural hazards caused by earthquakes and volcanoes from Student Sheet 4.1. Which of these natural hazards do you think presents the least challenge for the safe storage of nuclear waste underground? Explain your answer, making sure to use evidence to support your ideas.

2. Add the consideration "natural hazards caused by earthquakes and volcanoes" in a new row on Student Sheet 1.1, "Considering Where to Store Nuclear Waste." In the second column, write the recommended action you would take in regard to this consideration. Explain why you recommend taking this action when deciding where to store nuclear waste.

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ACTIVITY 5: Modeling Volcanic Eruptions | Date 9/25 | Page 13

Warm-up?

TRUE or ~~FALSE~~? All volcanic eruptions look the same. Provide evidence to support your answer.

Draw a volcano.

Vocabulary

Lava: Magma that flows over Earth's surface.

Intrusive igneous rock: formed when magma cools and solidifies.

Extrusive igneous rock: formed when lava cools & solidifies.