

Geothermal Energy: Volcanoes

Physical Science EMPACTS Project for Preschool-
4th grade

Group: Ibett Cardona, Kristi Glass, Amanda Wheeler, Josh Farmer, Odie English and Drew Hill
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Students of various elementary grade levels will gain an in depth understanding about geothermal energy and its involvement with volcanoes. Included in this lesson plan are various grade appropriate activities/worksheets.

Geothermal Energy: Volcanos

Time: Approximately 2 lessons – 30-45 minutes each.

Key Vocabulary:

Crust

Energy

Steam

Volcano

Temperature

Hot

Geothermal

Greenhouse Gases

Earth Magma

Heat pump

Materials:

For Classroom -

Computer with internet

For Student -

Crayons

Pencils

Worksheets (included)

*Note – Computer with internet can be used per student – if available.

Concept: Students shall gain knowledge of geothermal energy and its components. The student will comprehend and process the needed vocabulary to complete this section. Each student will also be able to complete the recommended work that accompanies this lesson. Each lesson has been planned to accommodate curriculum frameworks, science section, of Arkansas Frameworks and where possible, Common Core Standards.

Arkansas Framework/Common Core Standards: C.1.PS.1 Compare and contrast chemical and physical properties of matter, including but not limited to flammability, reactivity, density, buoyancy, viscosity, melting point and boiling point. P.5.PS.1 Distinguish among thermal energy, heat, and temperature. NS.9.PS.1 Explain why science is limited to natural explanations of how the world works. NS.9.PS.2 Compare and contrast hypotheses, theories, and laws. NS.11.PS.5 Research historical events in physical science. NS.11.PS.6 Research current events and topics in physical science.

For a more on Arkansas Frameworks or Common Core Standards visit:

http://www.arkansased.org/public/userfiles/Learning_Services/Curriculum%20and%20Instruction/Frameworks/Science/physical_sci_9_12_050508.pdf

<http://www.corestandards.org/>

Background:

An informational PowerPoint is included with this lesson plan. The PowerPoint may be used to brief the teacher as well as to educate students in appropriate grades, 4-8.

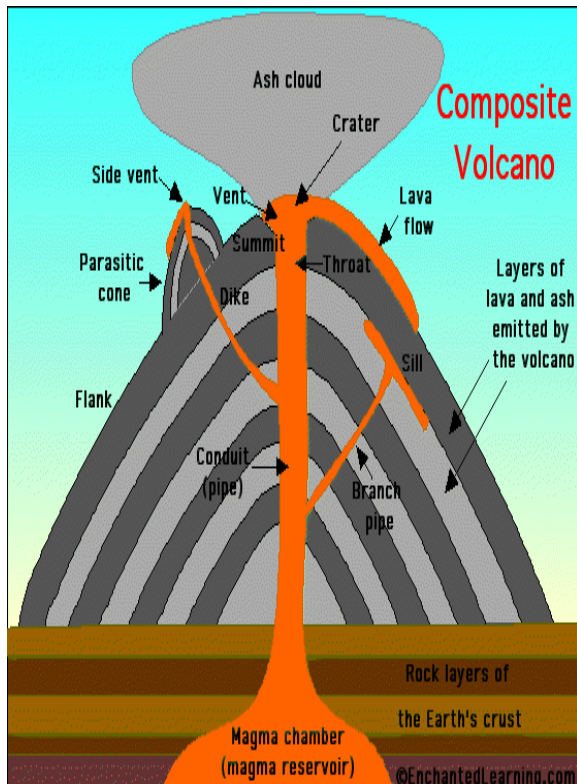
Example of included information:

Geothermal Energy is the energy stored inside of the earth.

Thermal energy is the energy that determines the temperature of an object. "Geo" meaning Earth.

The thermal energy inside the Earth was created when the Earth was first made, and is produced by the radioactive decay of minerals.

The difference between the temperature of the Earth's crust and core is called the Geothermal Gradient.



Procedure:

Lesson to be taught by teacher and followed with activities.

Make copies of included activities:

- Grades Pre-school – 1st grade
 - Coloring Page
- Grades 2nd - 5th grade
 - "Geothermal Energy and Volcanoes" word search
- Grades 4th through 8th
 - Matching vocabulary

Additional Activities/Experiments:

"Inside of a Volcano"

This activity consists of a teacher-led demonstration for the whole class in which layers of sand and wax in a beaker of water are used to model how igneous rocks form both underground and at the surface.

<http://www.rsc.org/education/teachers/resources/jesei/volcano/index.htm>

Supplies:

- one 500 cm³ or 600 cm³ Pyrex™ beaker
- Bunsen burner
- heat proof mat
- tripod
- gauze
- safety screen
- red candle wax
- washed sand (sand can be washed by putting some in a bucket and using rubber tubing to run water run into the bucket and allowing the water to overflow into a sink until it runs clear)

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(Procedure's Cont'd)

SAFETY:

- Wear eye protection.
- potential hazard is a cracked beaker, when some localized spillage of hot wax occurs.



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Lesson Reflection:

Ask students to identify the layers of the Earth's crust.

- Outer Core
- Inner Core
- Mantle

Make sure students know how geothermal energy and volcanoes are related.

- Geothermal comes from the heat within the earth (mantle). The heat then heats up the outer layers, resulting in volcanoes, hot springs, geysers. You see the results of the geothermal energy NOT the energy itself.

Assessment:

Forms of the included worksheets may be used as a form of assessment. Additional spelling tests, labeling and vocabulary may also be created.

Write the letter of the correct match next to each problem.

- | | | |
|-------|------------------|---|
| 1. | Crust | a. power derived from the utilization of physical or chemical resources, esp. to provide light and heat or to work machines. |
| <hr/> | | |
| 2. | Energy | b. hot fluid or semifluid material below or within the earth's crust from which lava and other igneous rock is formed by cooling |
| <hr/> | | |
| 3. | Steam | c. the planet on which we live; the world |
| <hr/> | | |
| 4. | Volcano | d. the vapor into which water is converted when heated, forming a white mist of minute water droplets in the air |
| <hr/> | | |
| 5. | Temperature | e. a mountain or hill, typically conical, having a crater or vent through which lava, rock fragments, hot vapor, and gas are being or have been erupted from the earth's crust. |
| <hr/> | | |
| 6. | Hot | f. the degree or intensity of heat present in a substance or object, esp. as expressed according to a comparative scale and shown by a thermometer or perceived by touch |
| <hr/> | | |
| 7. | Geothermal | g. of, relating to, or produced by the internal heat of the earth. |
| <hr/> | | |
| 8. | Greenhouse Gases | h. a gas that contributes to the greenhouse effect by absorbing infrared radiation, carbon dioxide and chlorofluorocarbons |
| <hr/> | | |
| 9. | Earth | i. form into a hard outer layer |
| <hr/> | | |
| 10. | Magma | j. having a high degree of heat or a high temperature |
| <hr/> | | |

KEY:

Write the letter of the correct match next to each problem.

- | | | | |
|-------|---|------------------|---|
| 1. | i | Crust | a. power derived from the utilization of physical or chemical resources, esp. to provide light and heat or to work machines. |
| <hr/> | | | b. hot fluid or semifluid material below or within the earth's crust from which lava and other igneous rock is formed by cooling |
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| <hr/> | | | c. the planet on which we live; the world |
| 3. | d | Steam | |
| <hr/> | | | d. the vapor into which water is converted when heated, forming a white mist of minute water droplets in the air |
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| 6. | j | Hot | |
| <hr/> | | | g. of, relating to, or produced by the internal heat of the earth. |
| 7. | g | Geothermal | |
| <hr/> | | | h. a gas that contributes to the greenhouse effect by absorbing infrared radiation, carbon dioxide and chlorofluorocarbons |
| 8. | h | Greenhouse Gases | |
| <hr/> | | | i. form into a hard outer layer |
| 9. | c | Earth | |
| <hr/> | | | |

10.

b

Magma

j. having a high degree of heat or a high temperature

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NAME: _____ DATE: _____



www.AtoZTeacherStuff.com

Geothermal Energy and Volcanoes

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

CRUST
TEMPERATURE
GEOTHERMAL
HOT
STEAM
EARTH
THERMAL
ENERGY
VOLCANO
HEATPUMP
MAGMA

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Did you know that the center of the earth is very, very hot? The ancient Romans used to frequent hot springs that are heated by this deep energy. Energy can also be produced from this heat. This energy source is utilized through geothermal heat pumps and geothermal electrical plants. Geothermal heat pumps are used for heating and cooling buildings, and are the most efficient and common use of geothermal energy.