

MINERALS, ROCKS, VOLCANOES AND EARTHQUAKES

UNIT OVERVIEW

Earth Science at its greatest. Students explore the fascinating world of geology, learning everything from the causes of earthquakes and volcanoes to how to make a fossil.

Part I of the unit uses notes photocopied onto overhead transparencies to give students most of the knowledge-based material in the unit. The activities and worksheets included follow closely with the material in the notes. Part II - "Optional Activities" adds flexibility to the unit and suggests assignments which can be coordinated with the main lesson topics, used as enrichment or used at the end of the unit as fun, culminating activities.

PART I - LESSON TOPICS AND STUDENT ASSIGNMENTS

1. **The Earth - From Core to Crust** (1 Class) - Students learn the composition of the earth including the core, mantle and crust then complete a "**Geology Wordsearch**".
2. **Plate Tectonics** (2 Classes) - Students develop an understanding of plate tectonics (continental drift), supporting evidence and do a worksheet, "**The Break-up of Pangea**".
3. **Earthquakes** (2 Classes) - Students understand the causes of earthquakes and write a "**Newspaper Story**" reporting a major earthquake.
4. **Volcanoes** (2-3 Classes) - Students learn about the causes and types of volcanoes. Students complete a map activity, "**Locating Volcanoes and Earthquakes**", and a colouring activity entitled "**Three Types of Volcanoes**".
5. **Mountain Building** (1 Class) - Students discover how plate tectonics relates to mountain building and complete a pictogram activity entitled "**Between A Rock And A Hard Place**".
6. **Minerals** (1 Class) - Students learn the definition of a mineral, some common types of minerals and study crystals in the activity, "**Grow Your Own Crystals**".
7. **Rocks** (2 Classes) - Students learn about the three main types of rocks and complete two activities - "**Rock and Mineral Identification**" and "**Crossword Puzzle**".
8. **Review and Exam** (2 Classes) - Students complete a "**Review**" worksheet and write an exam.

TYPES OF VOLCANOES

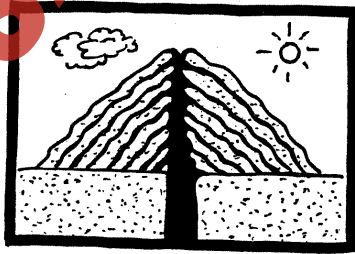
1. Shield Volcanoes

- not explosive (hot "runny" lava)
- gentle slopes
- made up almost entirely of lava
- Hawaii is an example



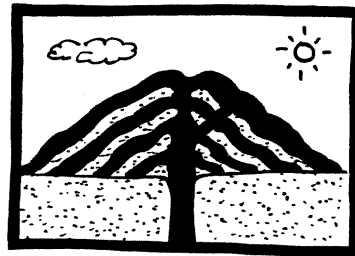
2. Cinder Cones

- made mostly of ash and cinders
- only a little lava
- explosive
- steep sides



3. Strato Volcanoes (Composite Cone)

- very explosive
- steep sides
- a layercake volcano
- half cinders, half lava in layers
- Mt. St. Helens is an example



Volcanoes with hot lava do not explode and have gentle sides like the island of Hawaii. Volcanoes with cooler, thicker lava tend to get plugged and the pressure builds until there is a great explosion. One volcano called Krakatoa, exploded in 1883 killing 36,000 people and was so loud you could hear it 4000 kilometers away!

THE BREAK-UP OF PANGEA

NAME: _____

1. The idea that the continents were joined at one time and are moving slowly apart is called Plate _____.
2. List three things that tell us that the plates are moving.
 - 1) _____
 - 2) _____
 - 3) _____
3. The following four pictures show the break up of Pangea. Colour Canada pink and India green in all four pictures.

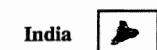
1. 250 million years ago.

2. 150 million years ago.



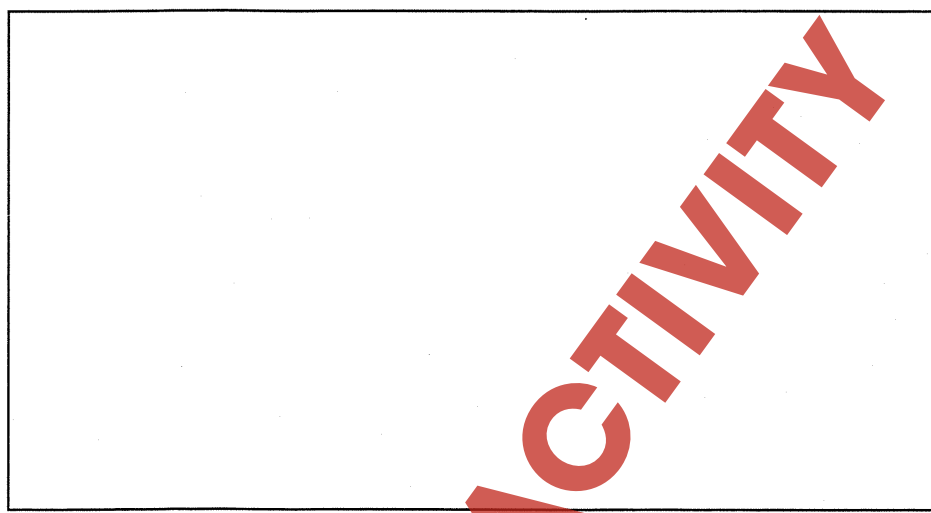
3. 100 million years ago.

4. Today.



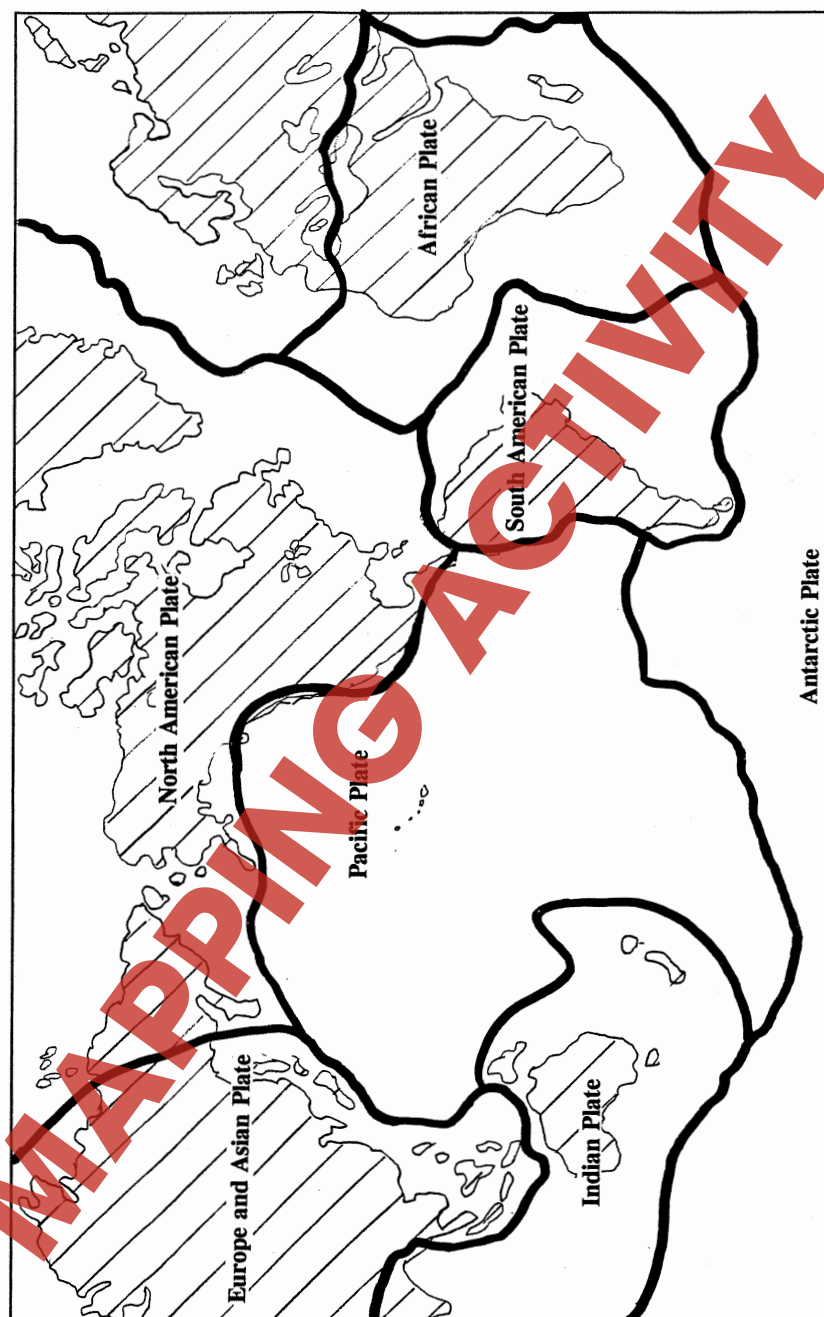
4. What do the pictures show? (A.I.F.S.)

EARTHQUAKE ROCKS CITY!!!



REPORTER: _____

LOCATING VOLCANOES AND EARTHQUAKES



ROCK AND MINERAL IDENTIFICATION

NAME: _____

Instructions

Use the chart below to describe and name some different rocks and minerals.

Sample Number	Rock or Mineral (R or M)	Colour	Hardness Soft Med. Hard	General Description	Igneous Sedimentary Metamorphic (I, S or M)	Name
example	R	Black	Medium	It is rough to touch and dull with little holes and pits.	I	Basalt
#1						
#2						
#3						
#4						
#5						
#6						
#7						
#8						

GEOLOGY CROSSWORD

NAME: _____



ACROSS

1. A thin, cold layer of rock that we live on.
3. This surrounds the core and is made up of magma.
6. Sharp, pointy lava that hurts your feet when you walk on it.
7. This scale is used to measure earthquakes.
9. A large wave created by an underwater earthquake.
10. Given off when a volcano erupts.
12. The black, flaky mineral in granite.
13. The white mineral in granite.
14. A machine that detects and measures earthquakes.
16. Melted rock that comes out of a volcano.
17. A layercake volcano is called a _____ volcano.
19. Layered rocks.
21. This might be found near the "Ring of Fire".
22. When the continents were joined into one supercontinent they were called this.
25. Ropy lava.
26. Something that forms crystals and is found in nature.
28. A kind of sedimentary rock that teachers use way too much.

DOWN

1. The solid, center part of the earth made of nickel and iron.
2. The idea that the continents are moving is called plate _____.
3. Melted rock that flows like hot plastic and is found in the mantle.
4. Sharp, pointy lava that hurts your feet when you walk on it.
5. Geology is the study of this.
8. This can occur when plates rub against each other.
11. A black rock used to make blackboards in the olden days. (also Fred Flinstone's boss)
15. Changed rocks.
18. A rock made up of quartz, mica and feldspar.
20. Do you like school?
23. A type of metamorphic rock used to make sinks and bathtubs.
24. A gentle sloped volcano is called a _____ volcano. (Hawaii is an example)
27. This style of music has to do with geology.

GEOLOGY REVIEW

NAME: _____

1. Match

- | | |
|--|---------------------|
| a) central, solid part of earth | ___ Pangea |
| b) thin, outer part of earth on which we live | ___ core |
| c) another name for continental drift | ___ rock |
| d) a large wave made by an undersea earthquake | ___ seismograph |
| e) contains two or more minerals | ___ plate tectonics |
| f) detects earthquakes | ___ crust |
| g) supercontinent | ___ magma |
| h) melted rock that comes out of a volcano | ___ tsunami |
| i) melted rock underground | ___ cinder cone |
| j) a volcano made mostly of ash and cinders | ___ lava |
| k) a volcano made mostly of lava (gentle sides) | ___ strato volcano |
| l) an explosive volcano (steep sides) | ___ quartz |
| m) ropy lava | ___ mica |
| n) sharp, pointy lava | ___ aa |
| o) a natural substance that has crystals | ___ marble |
| p) quartz + mica + feldspar is this rock | ___ granite |
| q) black, flaky mineral in granite | ___ chalk |
| r) white, hard mineral in granite | ___ mineral |
| s) metamorphic rock used to make sinks | ___ shield volcano |
| t) sedimentary rock used to write on blackboards | ___ pahoehoe |

GEOLOGY EXAM

NAME: _____

100

1. Match

/10

- | | |
|---|--------------------|
| a) contains two or more minerals | ___ Pangea |
| b) detects earthquakes | ___ crust |
| c) supercontinent | ___ magma |
| d) melted rock that comes out of a volcano | ___ seismograph |
| e) melted rock underground | ___ cinder cone |
| f) a volcano made mostly of ash and cinders | ___ lava |
| g) ropy lava | ___ aa |
| h) sharp, pointy lava | ___ pahoehoe |
| i) thin, outer part of the earth on which we live | ___ rock |
| j) a gentle-sided volcano made up almost entirely of lava | ___ shield volcano |

2. Describe three ways that we know the plates are moving? (A.I.F.S.)

/4

3. List three things that come out of volcanoes.

/4

1. _____

2. _____

3. _____

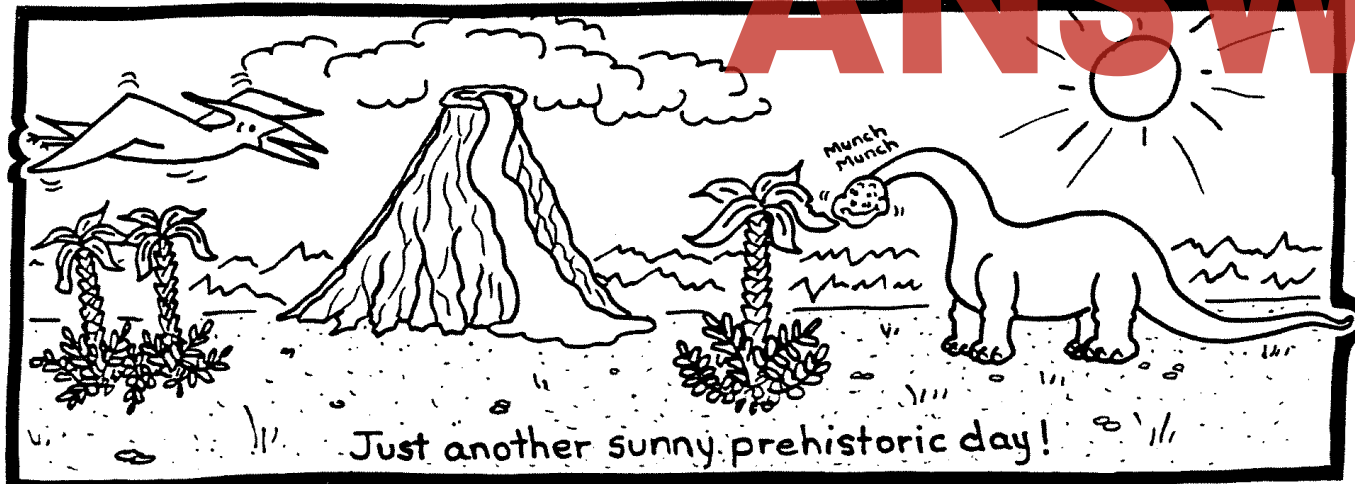
GEOLOGY WORDSEARCH - HARD VERSION

NAME: _____

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

Find These Words:

- | | | |
|----------|-----------------|-------------|
| CORE | PANGEA | QUARTZ |
| CRUST | PLATE TECTONICS | MICA |
| MANTLE | SEISMOGRAPH | FELDSPAR |
| EARTH | RICHTER SCALE | GRANITE |
| GEOLOGY | TSUNAMI | CRYSTAL |
| MAGMA | VOLCANO | SEDIMENTARY |
| LAVA | ASH | IGNEOUS |
| AA | MINERAL | MARBLE |
| PAHOEHOE | ROCK | SLATE |
| CHALK | METAMORPHIC | CINDER |



Answer Key for: GEOLOGY (Easy)

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

Answer Key for: GEOLOGY (Hard)

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