DOCUMENT RESUME

ED 436 373 SE 062 309

TITLE	I Invite You To Know the Earth I. Elementary School 2nd to 4th Grade Teacher's Guidebook [and] Text for Elementary School 2nd to 4th Grade.
INSTITUTION	United Nations Educational, Scientific, and Cultural Organization, Paris (France). Intergovernmental Oceanographic Commission.
REPORT NO	SC-96/WS/37; SC-96/WS/38
PUB DATE	1998-00-00
NOTE	46p.; For other documents in series, see SE 062 307 and SE 062 311.
AVAILABLE FROM	UNESCO, 1, rue Miollis, 75732 Paris Cedex 15, France.
PUB TYPE	Books (010) -- Guides - Classroom - Learner (051) -- Guides - Classroom - Teacher (052)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Earth Science; *Earthquakes; Elementary Education; Environmental Education; Natural Disasters; Oceanography; Plate Tectonics; Risk Management; *Safety Education; Science Activities; Science and Society; Science Instruction; *Seismology; Teaching Guides; *Volcanoes
IDENTIFIERS	*Earth; *Tidal Waves

ABSTRACT

This student text is designed for grades 2-4 and explores various earth science topics. A cartoon character named Tommy Tsumi explains earth facts and concepts throughout the text. Activities, materials, and learning objectives for each unit in the textbook are provided in the teacher's guide. Units in both include: (1) "What Does Our Earth Look Like?"; (2) "I Invite You to Know the Inside of the Earth"; (3) "Earthquakes and Tsunamis"; (4) "What is a Natural Hazard?"; and (5) "Basic Prevention Rules in Case of Natural Hazards". (WRM)

I Invite You to Know the Earth I

Elementary School 2nd to 4th Grade Teacher's Guidebook
and
Text for Elementary School 2nd to 4th Grade

I INVITE YOU TO KNOW THE EARTH I

ELEMENTARY SCHOOL 2nd. to 4th. GRADE
TEACHER'S GUIDEBOOK

SERVICIO HIDROGRAFICO Y OCEANOGRAFICO DE LA ARMADA DE CHILE
INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
INTERNATIONAL TSUNAMI INFORMATION CENTER

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I INVITE YOU TO KNOW THE EARTH I

TEACHER'S GUIDELINES BOOK

2nd to 4th Grade of Preparatory School

This textbook was written for children 7 to 9 years old have progressed beyond the initial stage of learning in which reading and writing are been developed and improved. In addition, physical development has increased, so fine motor skills are now present.

The text guide for the Preparatory School teacher is composed of objectives planned only by behavior and content, as well as several suggestions of activities focused to help accomplish those objectives. A list of necessary materials to perform such activities is also provided.

It is recommended that drawing observations be guided by the teacher with questions directing the act of learning. In Units 3 and 5 it is recommended that the teacher first talk with the parents and explain to them the desired objectives of the exercise.

UNIT I

"WHAT DOES OUR EARTH LOOK LIKE?"

OBJECTIVE: The student will be able to identify the shape of the earth, its poles, hemispheres and equator, through drawings and pictures.

SUGGESTED ACTIVITIES:

- Find out the names of the first astronauts to land on the moon.
- Draw the equator.
- Identify each hemisphere.
- Color each hemisphere.
- Name each pole.

MATERIALS:

- Textbook
- Colored pencils

OBJECTIVES:

1. The student will be able to recognize the proportions of water and land on our planet.

2. The student will be able to recognize the general geographic characteristics of the sea bottom.

3. The student will be able to identify the Pacific Ocean and describe its marine bottom through drawings, especially the concepts of submarine trench and ridge.

SUGGESTED ACTIVITIES:

- Color the oceans blue on the map.
- Cut out the name of the Pacific Ocean.
- Stick the name of the Pacific Ocean on the map.
- Answer questions.
- Cut out and stick names: submarine ridge, submarine trench.

MATERIALS:

- Textbook
- Drawings
- Colored pencils
- Glue

UNIT 2

"I INVITE YOU TO KNOW THE INSIDE OF THE EARTH"

OBJECTIVE: The student will be able to identify and compare the general characteristics of the layers of the earth, and identify the tectonic plates that form the earth's crust.

SUGGESTED ACTIVITIES:

- Using the drawing, mark the crust with a green pencil, the core with a red pencil, and the mantle with a brown pencil.
- Boil an egg, prick its shell and slice it, comparing the interior of the egg with the layers of the earth (it is recommended that this activity be performed in a group with the teacher directly supervising the slice of the boiled eggs).
- Answer the questions of the textbook.
- Cut out the pieces of the tectonic plates jiggzaw puzzle.
- Put the jiggzaw puzzle together.
- Locate your country on the map.
- Mark the borders of your country with a colored pencil.
- Color each plate a different color.
- Color the ocean.

MATERIALS:

- Textbook
- Colored pencils
- Boiled egg
- Knife
- Scissors
- Glue

OBJECTIVE: The student will be able to differentiate between a volcano and a mountain and recognize general characteristics of volcanoes and volcanic activity.

SUGGESTED ACTIVITIES:

- List similarities and differences between a mountain and a volcano.
- Cut out the names of the elements an erupting volcano throws out.
- Stick these elements in the drawing.
- Color plates.
- Color the outpouring of lava.

MATERIALS:

- Textbook
- Colored pencils
- Scissors and Glue

UNIT 3

"EARTHQUAKES AND TSUNAMIS"

OBJECTIVE: The student will be able to identify the differences between a minor and a major earthquake, and the function of a seismograph.

SUGGESTED ACTIVITIES:

- Write the differences between a minor and a major earthquake.
- Watch the students drawing. Comment.
- Comment on the function of a seismograph.

MATERIALS:

- Textbook
- Pencils

OBJECTIVE: The student will understand how a tsunami is generated and recognize its propagation capabilities and repercussions.

SUGGESTED ACTIVITIES (BY PREFERENCE)

Prefered activity (in a group)

- Put sand in a tray.
- Cover it with water.
- Blow over it making waves (this activity should be done by the teacher).

Alternate activity (in groups or individually)

- Draw and color the waves of the tsunami.
- Self evaluation.
- Watch drawing/coloring.
- Answer textbook questions.

MATERIALS:

- Tray about 10 centimeters deep
- Sand
- Water
- Hair dryer
- Colored pencils

UNIT 4

"NATURAL HAZARDS"

OBJECTIVE: The student will be able to identify some natural phenomena which are beneficial to man and some which are harmful (natural hazards).

SUGGESTED ACTIVITIES:

- Watch the drawing/coloring
- Answer the textbook questions
- Mark with an X each correct answer to the question

MATERIALS:

- Textbook
- Pencils

UNIT 5

"BASIC RULES OF NATURAL HAZARD PREVENTION"

OBJECTIVE: The student will be able to identify the basic rules of hazard prevention to follow in the event of a major earthquake, showing safe and dangerous places.

SUGGESTED ACTIVITIES:

- Color Tommy Tsumi at safe places in the pictures.
- Color Tommy Tsumi at dangerous places in the pictures.

OBJECTIVE: The student will be able to apply the basic security rules for a major earthquake in different situations and recognize the elements of a personal emergency bag.

SUGGESTED ACTIVITIES:

- Circle safe places with a green pencil.
- Circle dangerous places or actions you don't have to do with a red pencil.
- Cut out elements you would put in your emergency bag.
- Stick beside the emergency bag all elements you would put in your personal bag.

MATERIALS:

- Colored pencils
- Scissors
- Glue

OBJECTIVE: The student will be able to recognize the importance of preparing a family strategy in case of a tsunami.

SUGGESTED ACTIVITIES:

- Talk with parents or family and prepare a family strategy.
- Write the strategy down and discuss it in class.

MATERIALS:

- Textbook
- Pencils

UNIT 6

"SEISMICITY IN YOUR COUNTRY"

OBJECTIVE: The student will be able to recognize the seismic characteristics and places of the country.

SUGGESTED ACTIVITIES:

- Locate the places in your country where the most earthquakes occur.
- Put a sticker over those places.

MATERIALS:

- Map of your country
- Stickers

OBJECTIVE: The student will be able to identify and locate the relevant tectonic plate(s).

SUGGESTED ACTIVITIES:

- Locate the plate(s) which cause earthquakes in your country.
- Color the plate(s).

MATERIALS:

- Plate tectonics map
- Colored pencils

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I INVITE YOU TO KNOW THE EARTH I

TEXT FOR ELEMENTARY SCHOOL
2nd. to 4th. GRADE

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CONTENTS

I INVITE YOU TO KNOW THE EARTH I

TEXT FOR ELEMENTARY SCHOOL
2ND. TO 4TH. GRADE

ABOUT THE TEXTBOOK

This book is the result of both the implementation of Recommendation ITSU-XIII.3 of the Thirteenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific, and the work of several education experts. An ad-hoc Working Group headed by H. Gorziglia (Chile), revised the work done by the experts who were partially funded by the Intergovernmental Oceanographic Commission.

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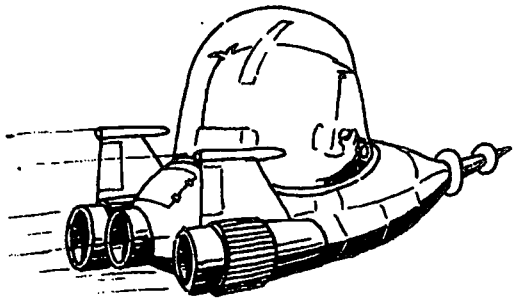
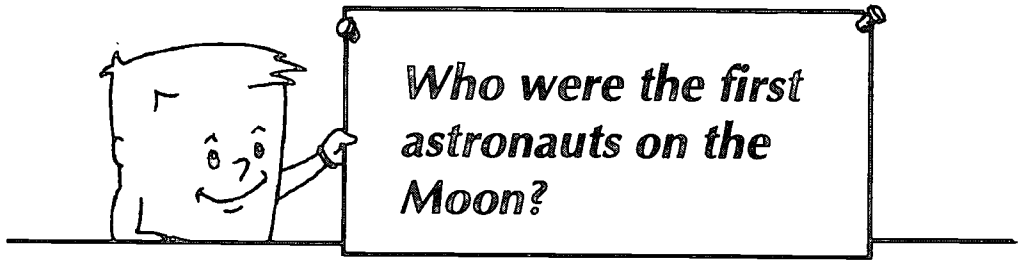
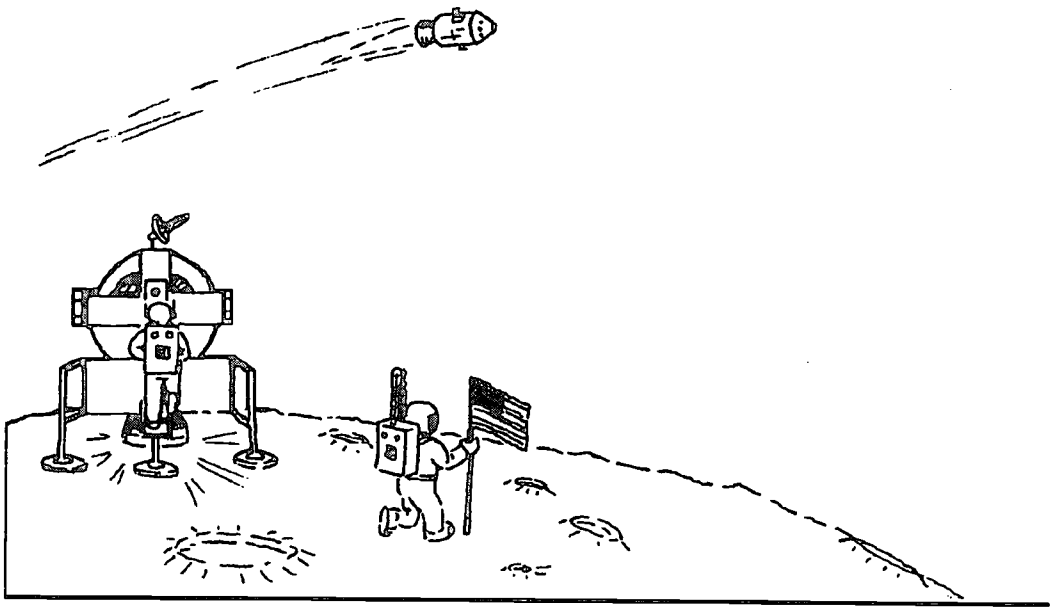
I INVITE YOU TO KNOW THE EARTH I



This picture shows the earth as seen by Tommy Tsumi. This is also how it looked to the astronauts who traveled to the moon. They noticed how friendly, yet isolated, the EARTH seemed.

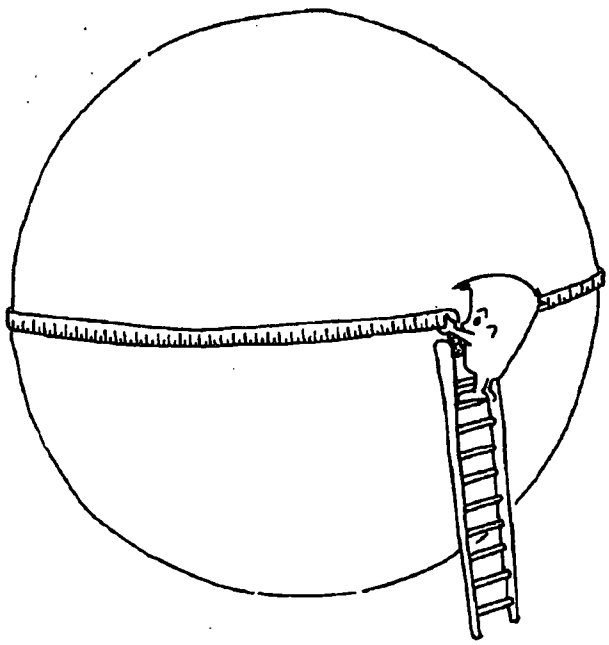

Who were the first astronauts on the Moon?



UNIT I

WHAT DOES OUR EARTH LOOK LIKE?

The earth is rounded, its shape is similar to a sphere, flattened at its ends (top and bottom). These ends are called POLES.



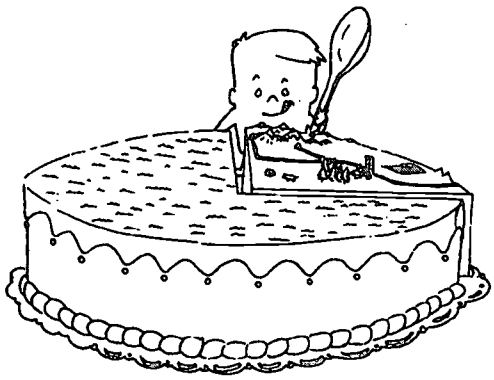
With your colored pencil draw a line dividing this sphere in two equal parts. That imaginary line is called the EQUATOR, dividing the earth in two equal parts called HEMISPHERES: the northern hemisphere and the southern hemisphere.

Color each hemisphere a different color and name both poles.

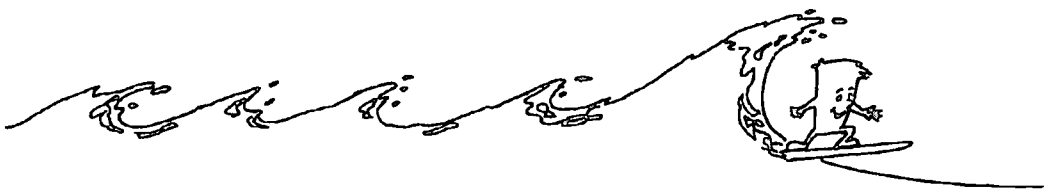
Did you find them?

As you can see, Tommy Tsumi measured the circumference of the earth, which for humans would be the waist, and found it is about 40,000 kilometers.

More than three quarters of the surface of our planet is covered by the water of the oceans.



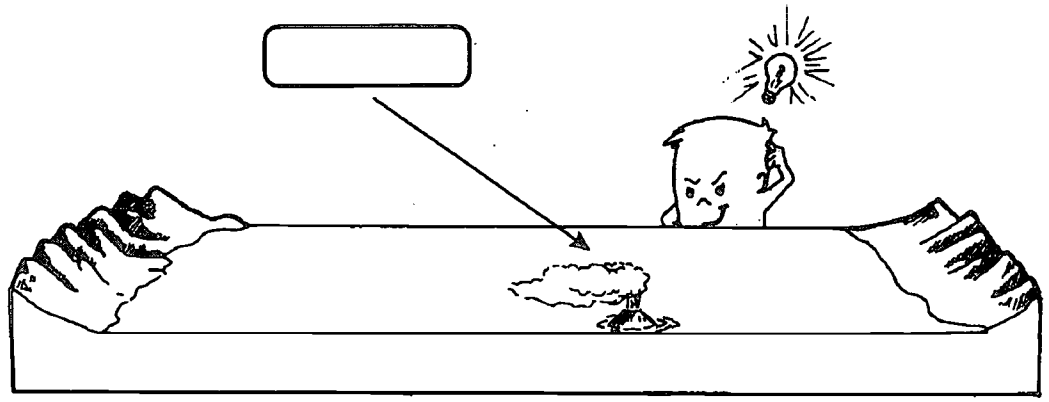
Use a blue pencil to color the white areas of this map.

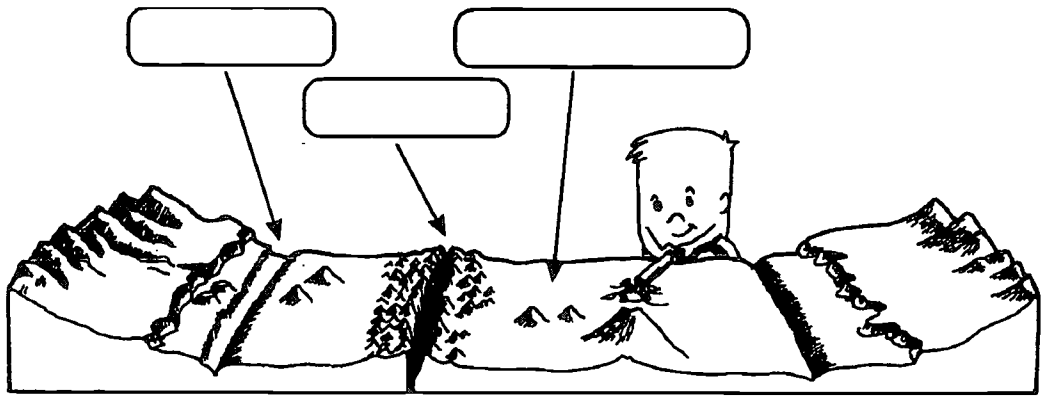


OCEANS ARE VERY LARGE AREAS OF WATER SEPARATING THE CONTINENTS

The ocean in the middle of the map is the PACIFIC OCEAN, it is the largest ocean in the world. The bottom of this ocean is surrounded mainly by ridges, deep trenches and several chains of islands forming arcs (because of this they are called **island arcs**).

CUT OUT FROM PAGE 31 THE MISSING NAMES AND STICK THEM IN THE RIGTH PLACE:





ANSWER

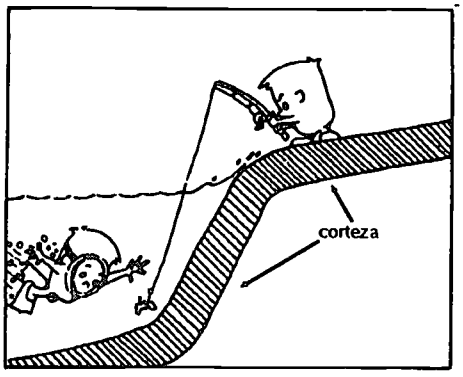
	YES	NO
Oceans cover three quarters of the earth's surface	☐	☐
The Pacific Ocean has submarine ridges	☐	☐
The islands are in the submarine trenches	☐	☐

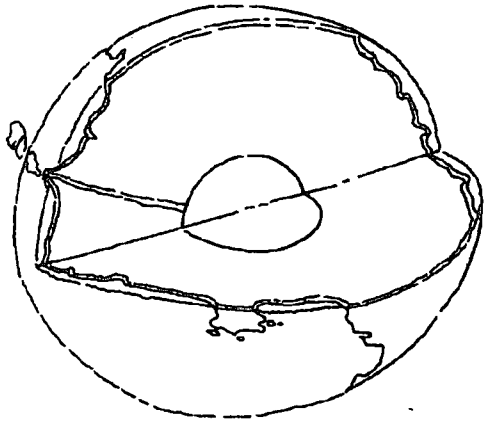
UNIT II

I INVITE YOU TO KNOW THE INSIDE OF THE EARTH

We have looked at the surface of the earth, but can you imagine what the interior of the earth looks like?

Until the beginning of seismology, the science that studies earthquakes, our knowledge about the interior of the earth rested on hypothesis only. Today, thanks to this science, we know what our planet is made of.





Mark the CRUST with a green line
Color the MANTLE with a brown pencil
Color the CORE with a red pencil

THE CRUST: is the layer upon which we live, composed of solid rock, it is rigid and for this reason it breaks; we will call it CONTINENTAL CRUST. There is also crust under the oceans, called OCEANIC CRUST.
The crust is broken at several places, each brake is a GEOLOGICAL FAULT.
THE MANTLE: is elastic, it bends but returns to its original shape.
THE CORE: is the central portion of the earth.

Divide a boiled egg with the eggshell in two. What happens?
Comparing the egg with the layers of the earth, indicate which layer of the earth corresponds to each part of the egg.

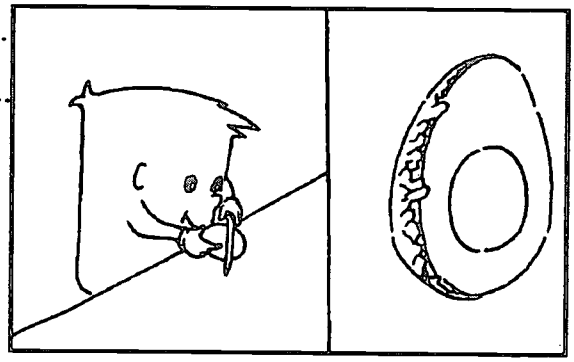
- The eggshell corresponds to .....
- The white of the egg corresponds to .....
- The yolk corresponds to .....

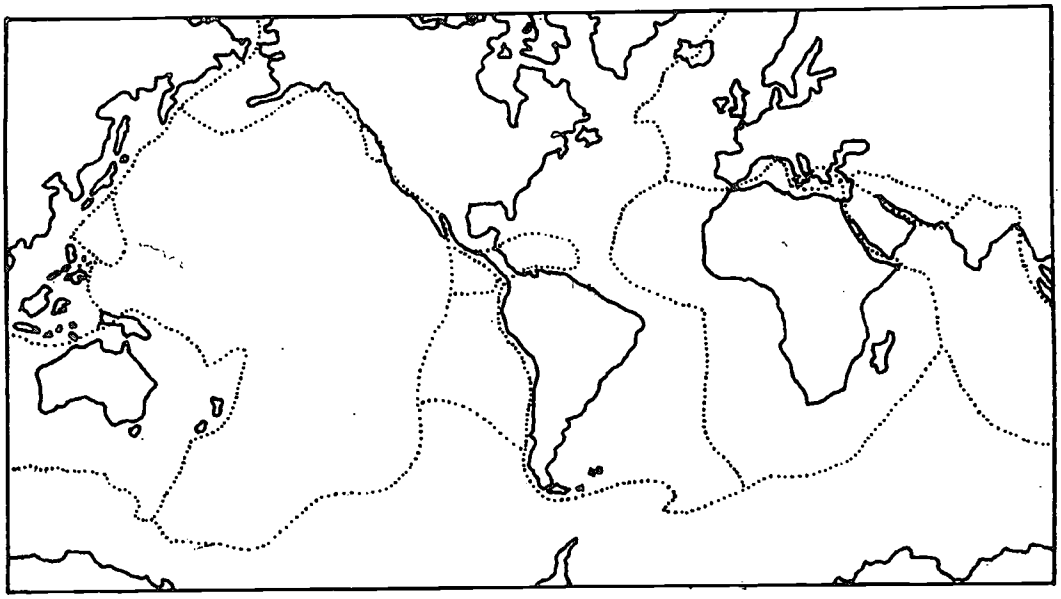
.....

- What happened to the eggshell when you split the boiled egg?

.....

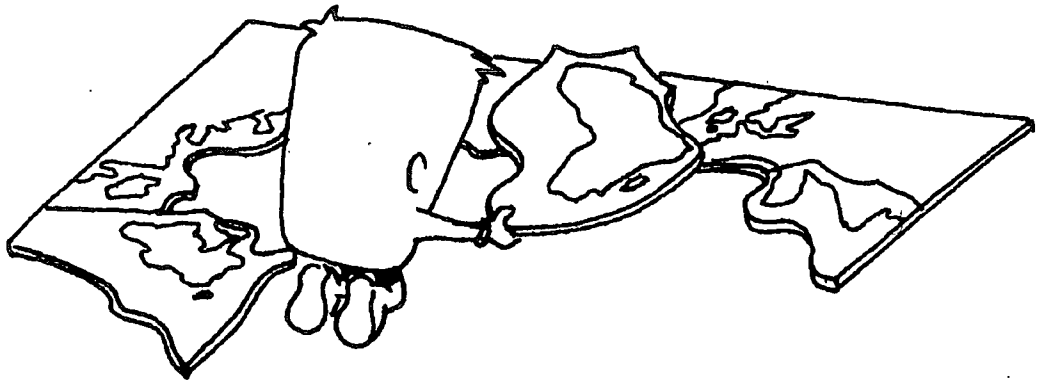
Compare it with the earth's crust.





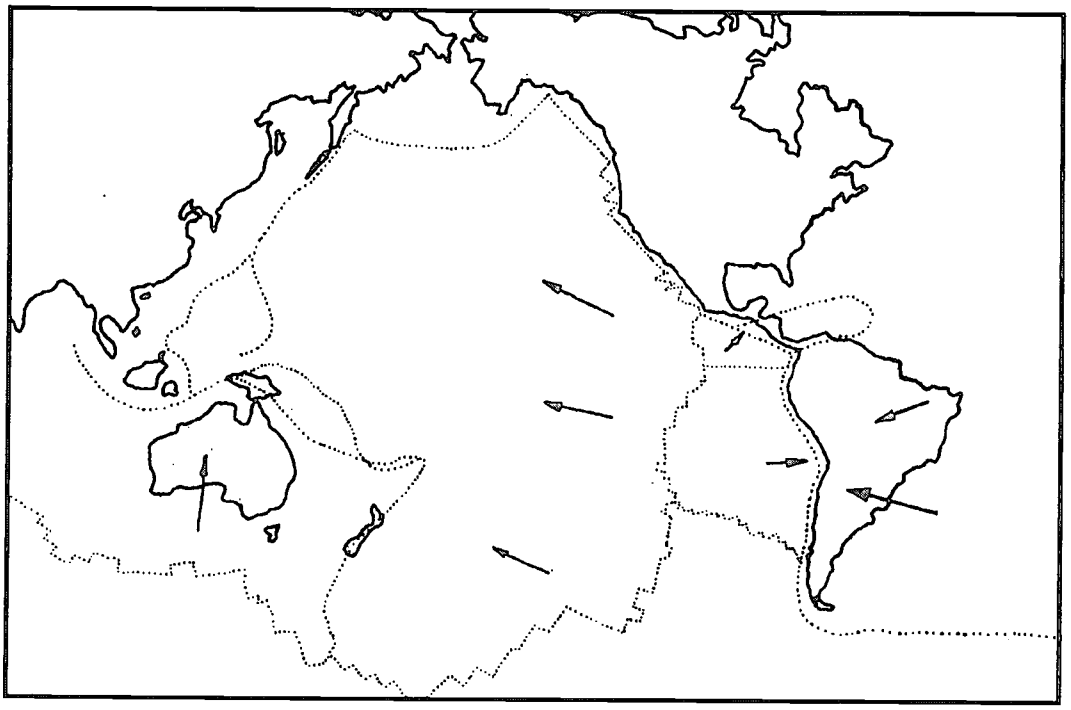
The earth's crust is composed of huge pieces that form a gigantic jigsaw puzzle.

Every piece is a "plate" and the zone where two plates meet is called the "plate boundary". To show this, cut out the pieces of the jigsaw puzzle from page 31 and stick them together on this page.



The crust is composed of plates moving over the mantle.

Locate your country in this map and mark the border with a colored pencil.

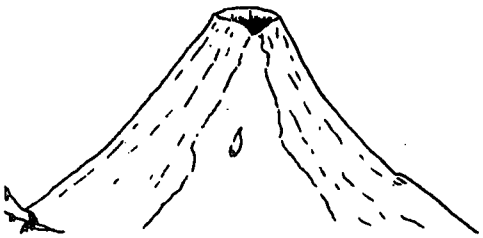


Notice that plates go across countries, continents and oceans. These huge plates move according to the arrows shown on the map, and they collide with each other. When this happens the earth and the oceans shake.

Color each plate a different color, and highlight the collision boundaries.

LET'S KNOW VOLCANOES

According to these diagrams, what are the similarities and differences between a volcano and a mountain.



What are the similarities?

.....

.....

.....

.....

What are the differences?

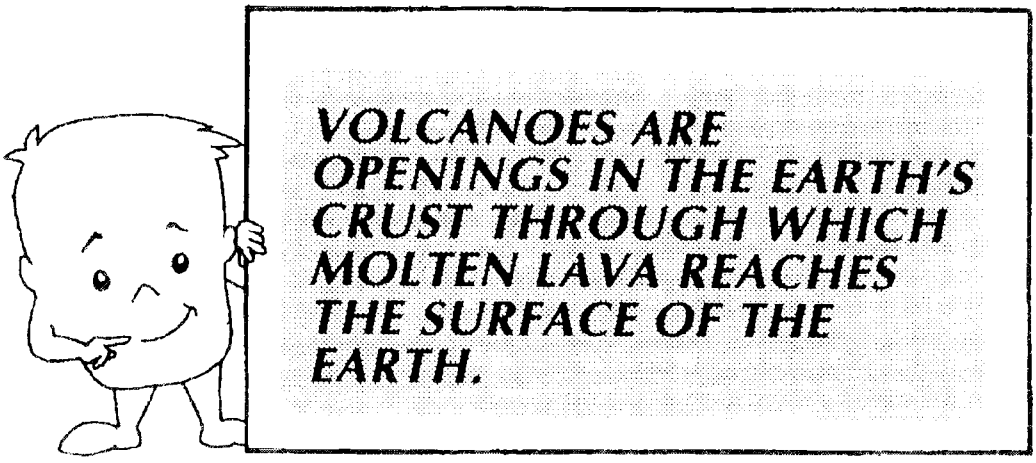
.....

.....

.....

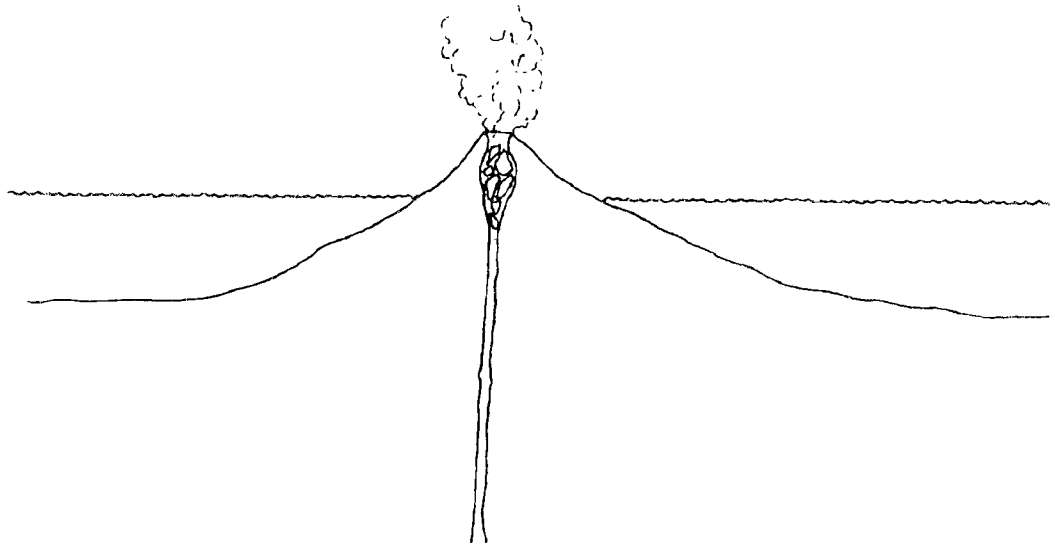
.....

How many differences did you find?



Like each of us, a volcano could be dormant (passive) or wide- awake (active). When a volcano is wide-awake or active, there are movements deep in its interior and the volcano can throw out gases, dust, steam, ash and lava.

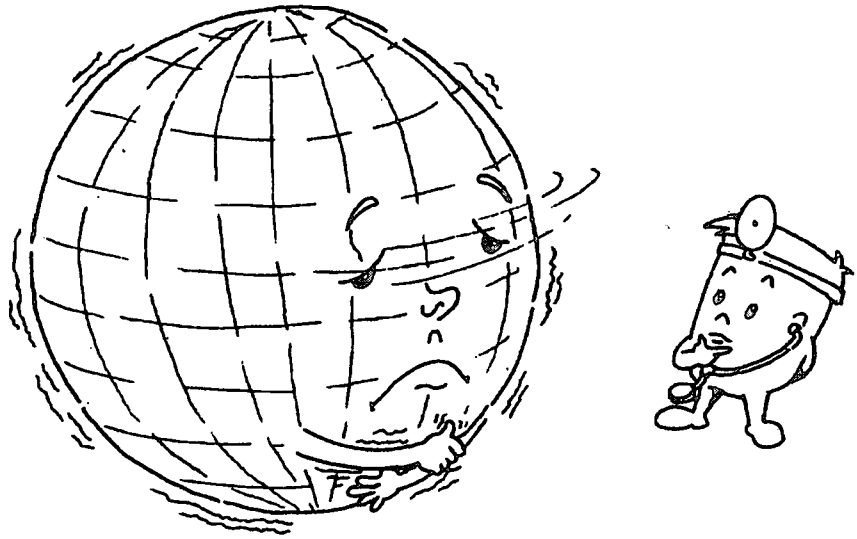
Volcanoes can also be born in the ocean and if they grow big enough, they can reach the surface of the sea and form an island, as seen here.



Color in red the lava output pipe through which lava goes out.

Look at the picture on page 5 again.

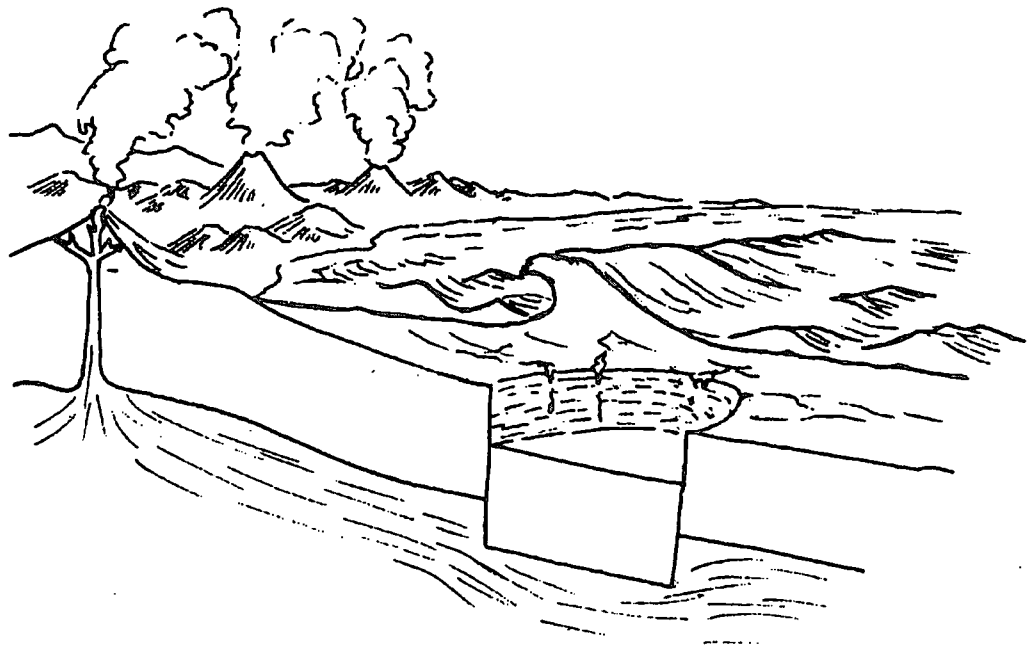
VOLCANIC ACTIVITY



When you have a burning stomach, what do you do?

Imagine the earth has in its interior a huge amount of heat and energy that are released through volcanoes.

This energy looks for a way to go out, when this route is found, energy and heat are released moving the mountain and the surrounding area. When this happens we know it because the earth shakes.



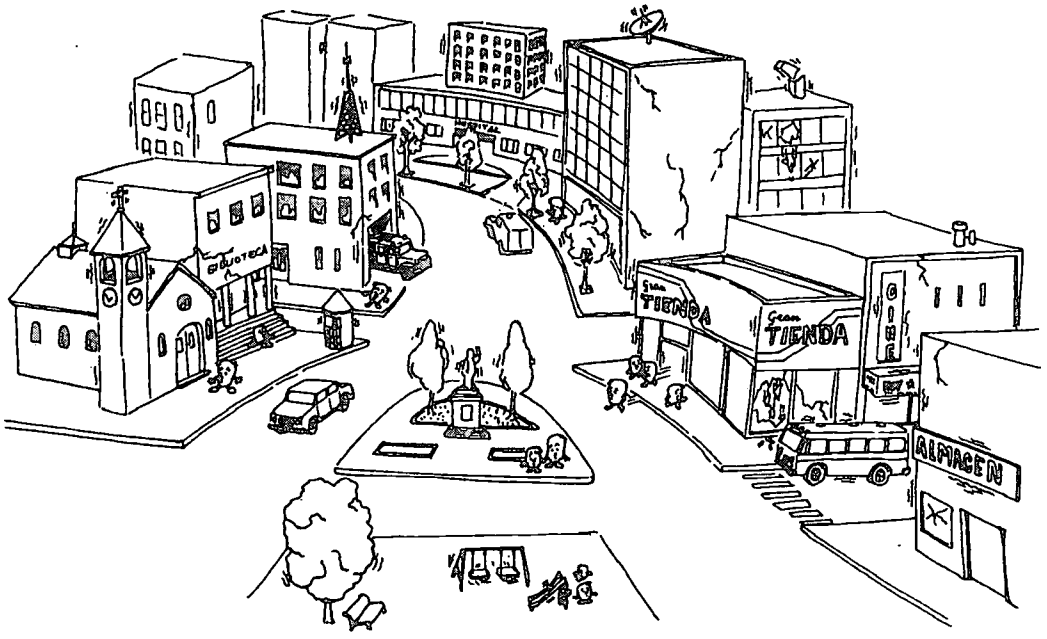
Color with different colors the plates and the outpour of lava.

UNIT III

EARTHQUAKES AND TSUNAMIS

WHAT IS AN EARTHQUAKE?

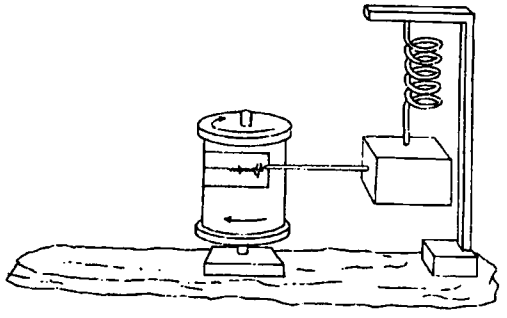
What is happening to the earth in this picture?

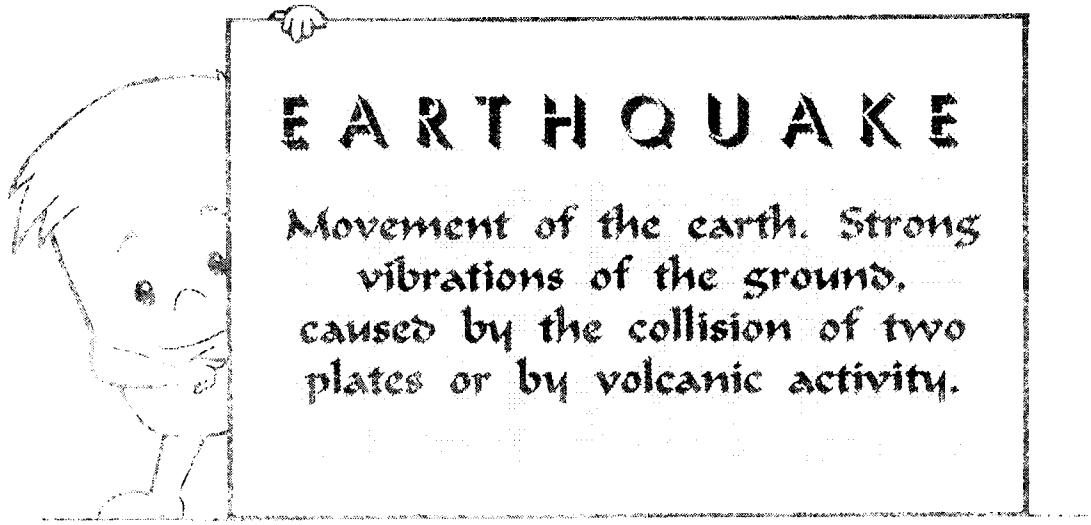


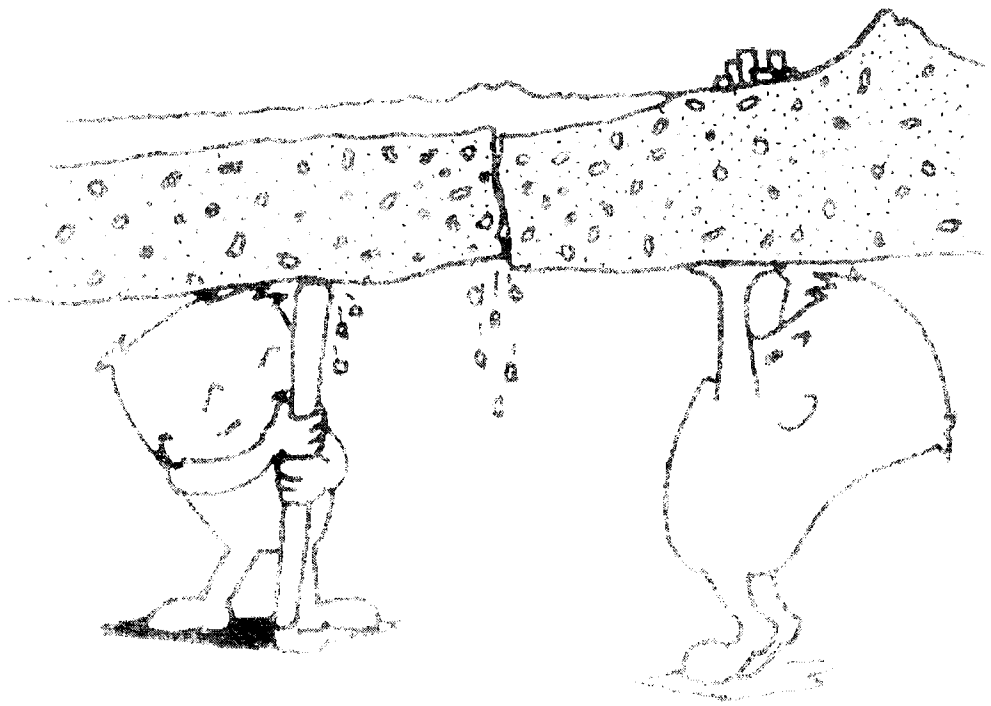
Have you ever felt an earthquake?

Earthquakes occur because the huge plates of the earth move and collide. This action releases energy stored in the plates.

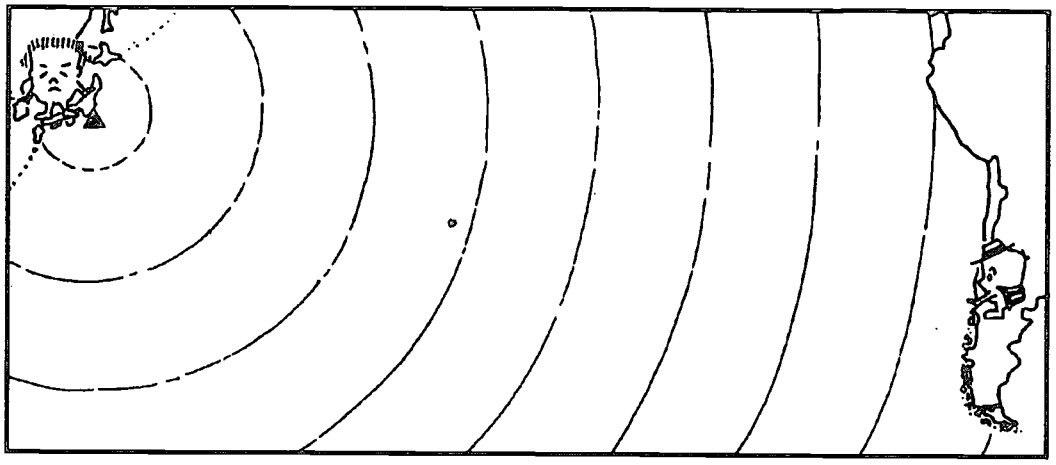
Do you remember? When these plates collide, the earth dances and the water moves. All these movements are recorded using an instrument called a "**seismograph**".




EARTHQUAKE
Movement of the earth. Strong vibrations of the ground, caused by the collision of two plates or by volcanic activity.



Look carefully at the following picture.



The triangle shows an earthquake.

What is the name of the country where the earthquake occurred?

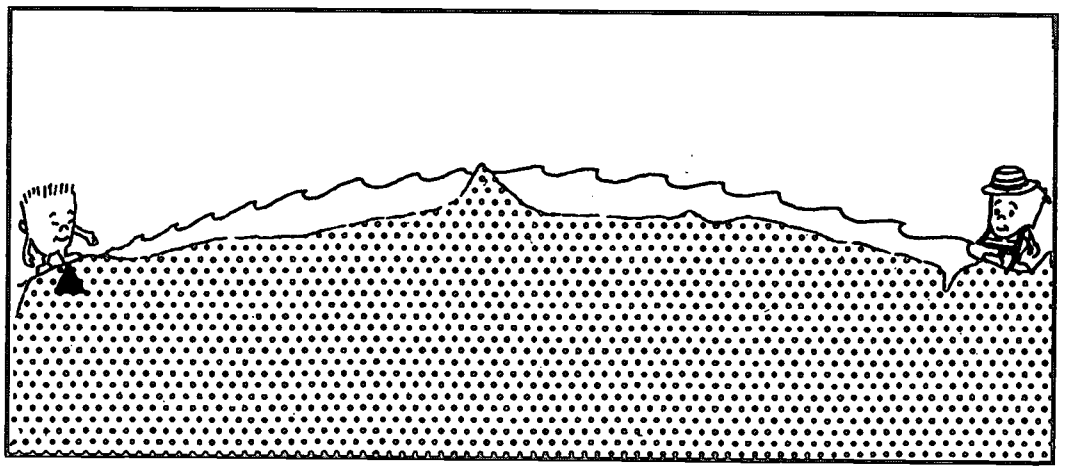
.....

The waves starting from this earthquake travel across the .....

ocean and arrive to a very long and narrow country called.....

Do you know what is going on?

A tsunami has been created and it is arriving at the coastline of the very long and narrow country some time after the earthquake occurred in Japan.



DO YOU KNOW WHAT A TSUNAMI IS?

A TSUNAMI IS A SERIES OF VERY LONG WAVES TRAVELING AT GREAT SPEED ACROSS THE OCEAN.

These waves can inundate coastal cities and cause a lot of damage.

We will simulate a tsunami using a tray not deeper than 10 centimeters. Put sand in the bottom in an irregular distribution and cover it with water. With the help of a fan or a hair dryer you can create waves in this tray.

A tsunami is somewhat similar to those waves, but for a better understanding of this natural phenomenon, Tommy Tsumi shows us how it actually is.

LET'S SEE HOW MUCH WE HAVE LEARNED

1. The earth has a shape very similar to a flattened sphere. The flattened ends are called.....

2. The imaginary line dividing the earth into two equal parts called hemispheres is called.....

3. The oceans are very wide surfaces of....., separating the .....

4. The largest ocean in the world is the .....ocean.

5. Volcanoes are vents in the earth's....., through which molten ..... reaches the surface.

6. When a volcano is active, it means that in its interior there are .....

7. When the earth moves and the ground vibrates, that is an .....

8. The instrument used to measure the magnitude of earthquakes is called a .....

9. Waves in the ocean traveling at great speed are called .....

10. A tsunami may be generated when a large ..... occurs beneath an ocean.

UNIT IV

WHAT IS IT A NATURAL HAZARD?

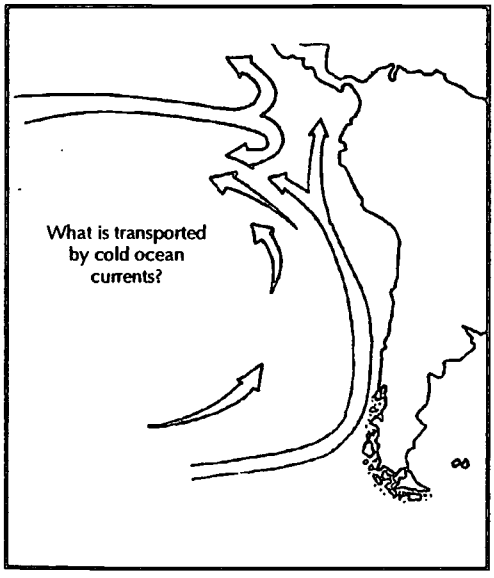
Our planet Earth is alive the same way you are. Therefore, it is developing and changing.

There are many natural phenomenon producing beneficial effects for human life, for instance:

THE RAIN

Why rain is beneficial?

THE OCEAN CURRENTS



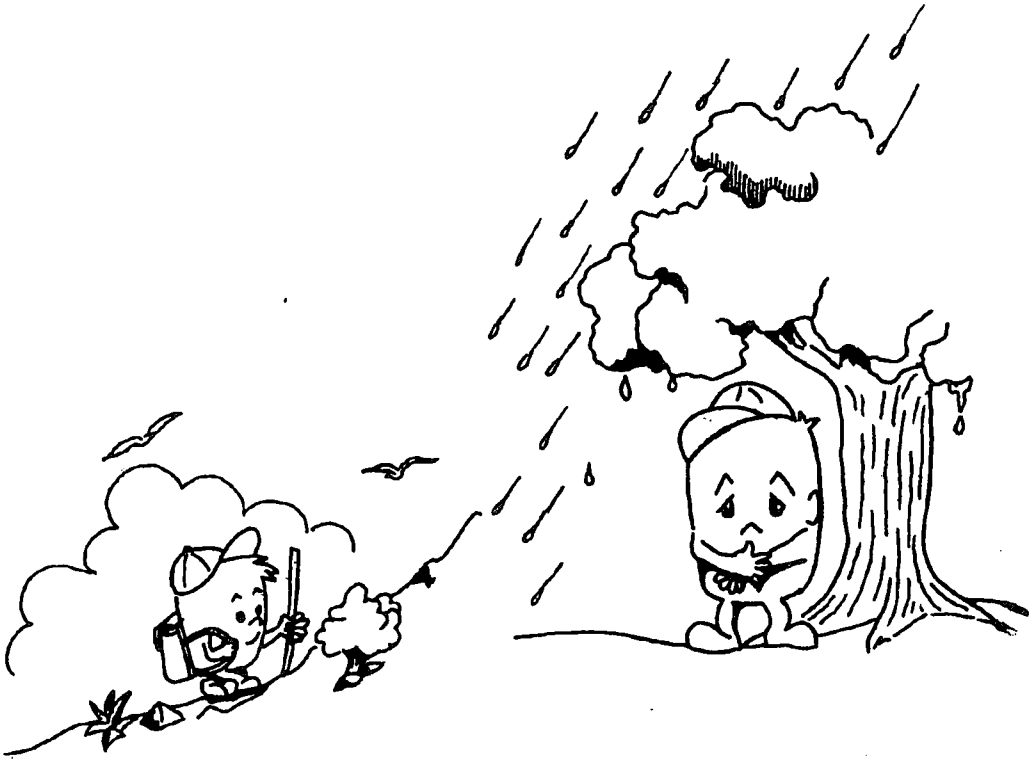
But there are also other natural phenomena whose effects can be very harmful to Man, and because of this they are called NATURAL HAZARDS.

This does not mean they are harmful to earth, but these changes of the planet are harmful to humans.

Do you remember which natural phenomena can be harmful to Man?

If you don't remember, review pages 9, 10, 11, and 12.

You are probably aware that volcanic eruptions, earthquakes and tsunamis are natural hazards which, coming from Nature, cannot be avoided. They are like the weather; if it suddenly starts to rain when you are on a picnic, you can't help it. But you can be prepared for the unexpected rain, so you don't get wet.



What would you do if you knew it might rain during a picnic? Mark with an X.

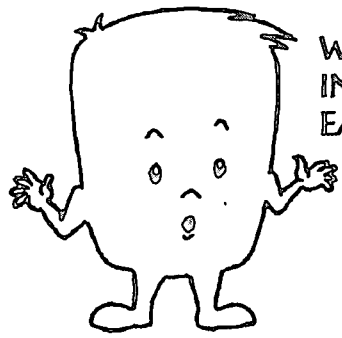
- ☐ take an umbrella
- ☐ take a swimsuit
- ☐ run away
- ☐ take cover
- ☐ take a raincoat
- ☐ make an outside barbecue

UNIDAD V

BASIC PREVENTION RULES IN CASE OF NATURAL HAZARDS

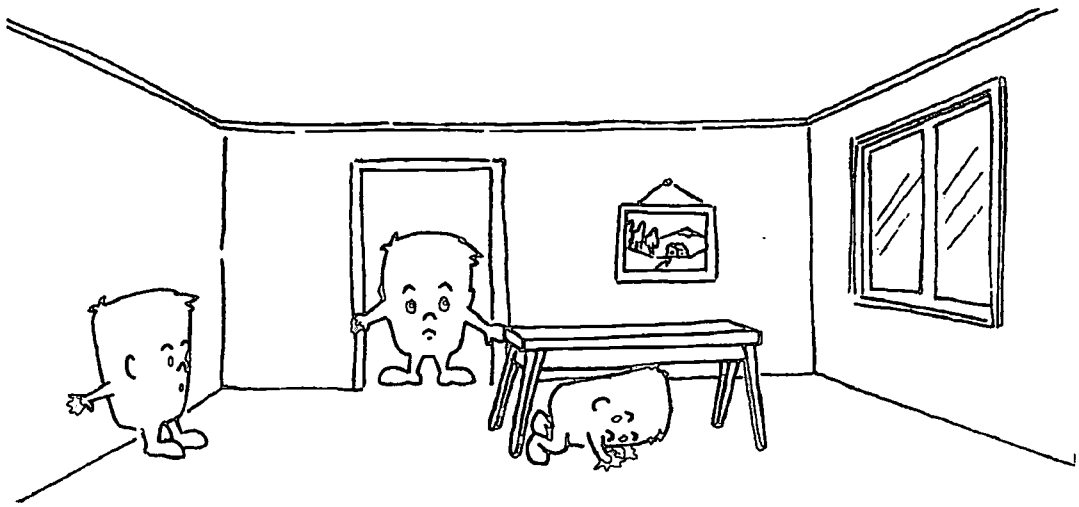
You would take the necessary precautions to be as dry as possible.
In the same way, you also have to prepare for a natural hazard like an earthquake or a tsunami.

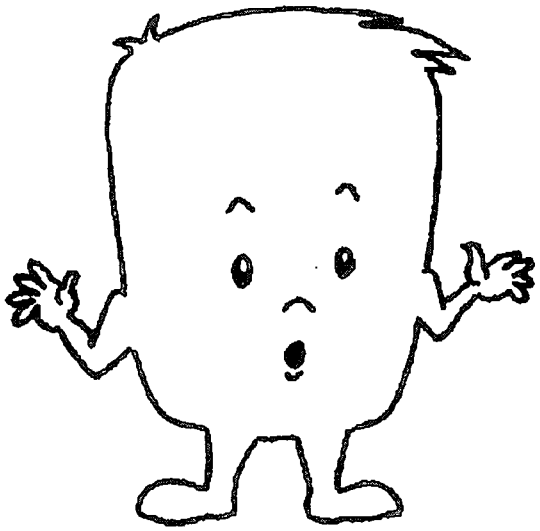
P R E V E N T



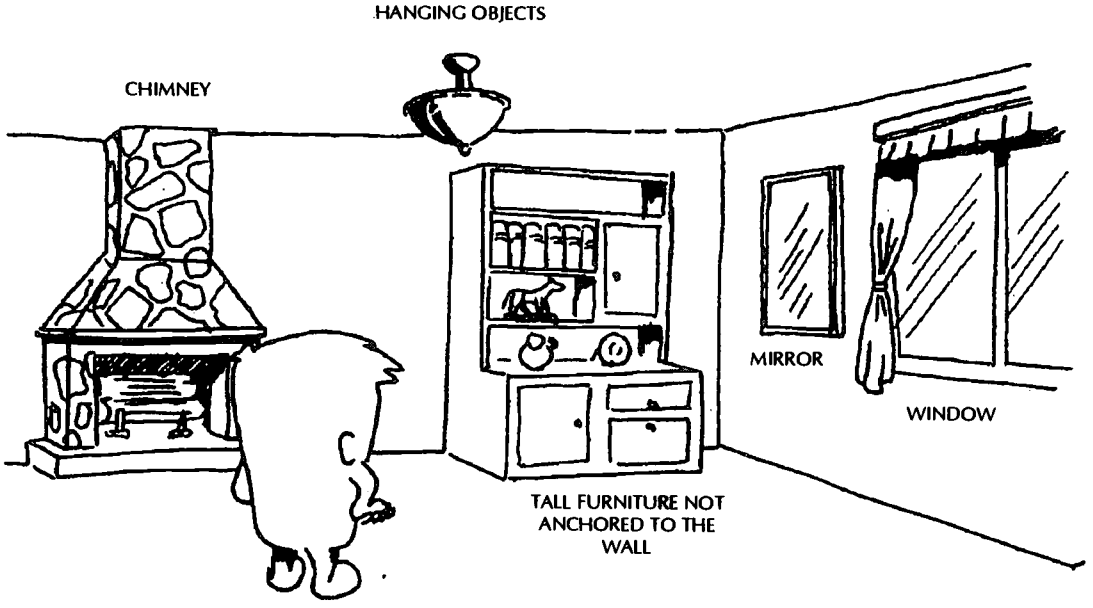
Like most natural hazards earthquakes occur unexpectedly with no warning; that is why it is important for you to know how to react in this situation.

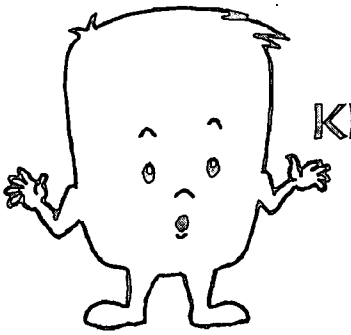
First I will show you the safest places.





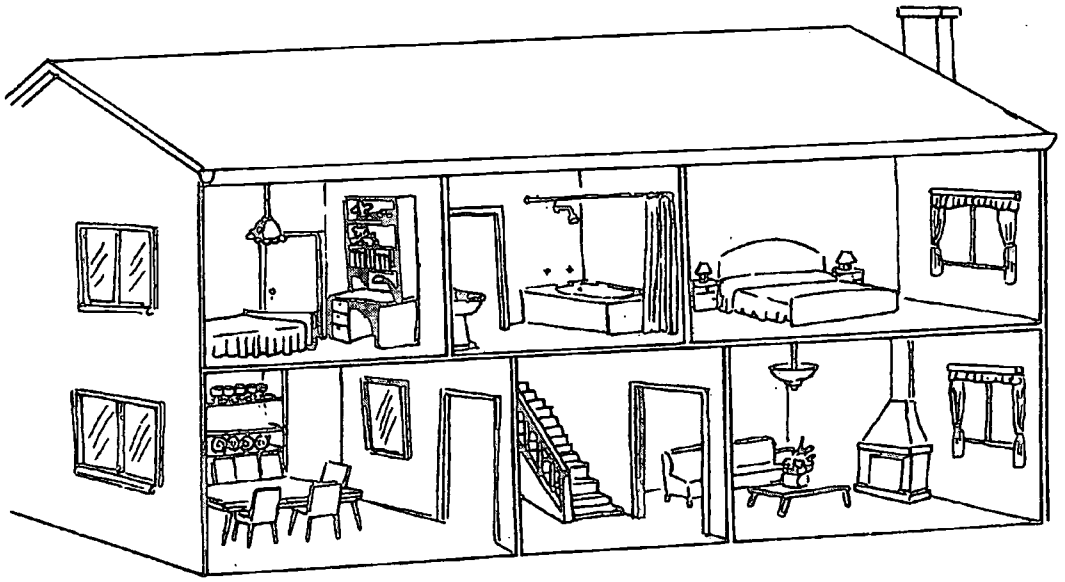
The most dangerous places from which you MUST KEEP AWAY.





WE ALREADY KNOW WHAT TO DO DURING AN EARTHQUAKE

Yes, as Tommy Tsumi says, the first thing is to keep calm, don't run away or scream because both actions are useless.

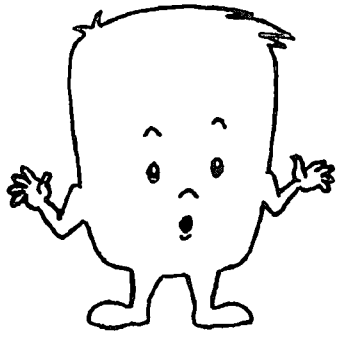


IF YOU ARE INSIDE YOUR HOME...

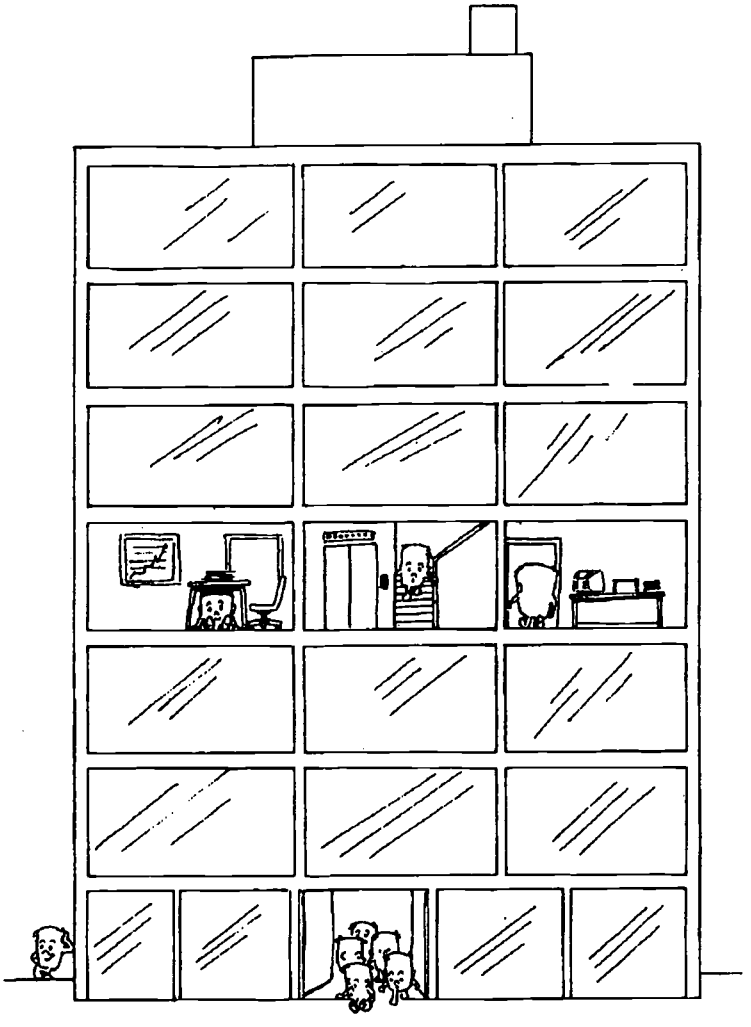
- Get under the table or under a desk. Hold onto it to prevent it moving away from you.
- Stand in a corner or under a doorway.
- Beware of big furniture than can overturn, as well as mirrors and windows.

o ***Circle with a green pencil what you must do and the safest places.***

o ***Circle with a red pencil what you should not do.***

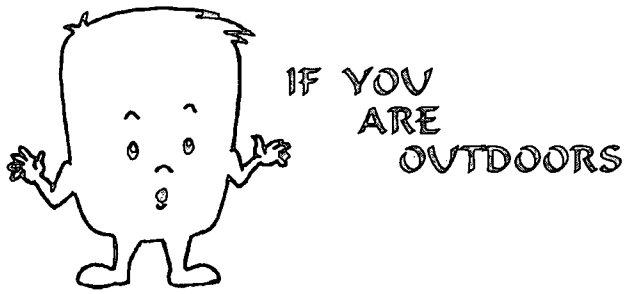


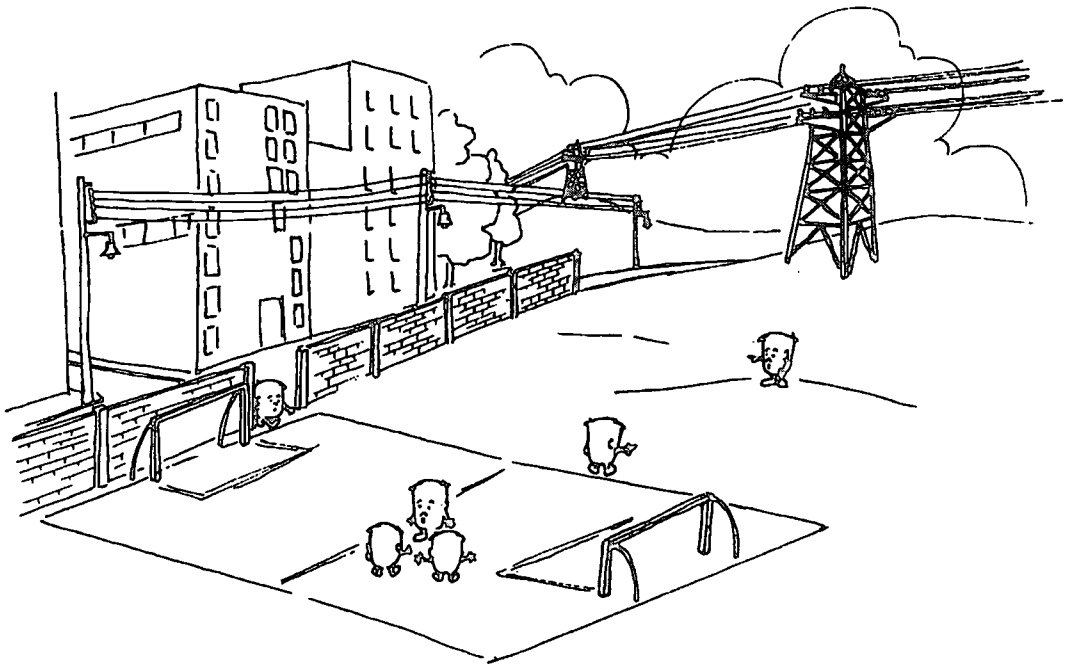
IF WE ARE INSIDE A BUILDING



- Keep away from windows, balconies and external walls.
- Get under a desk or table.
- Do not use the elevators; remember, if power is cut off you could get trapped inside one.

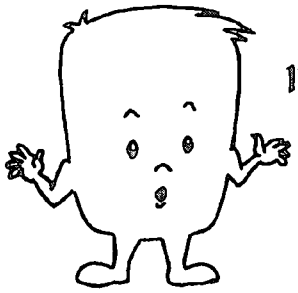
- ***Circle with a green pencil what you must do and the safest places.***
- ***Circle with a red pencil what you should not do.***



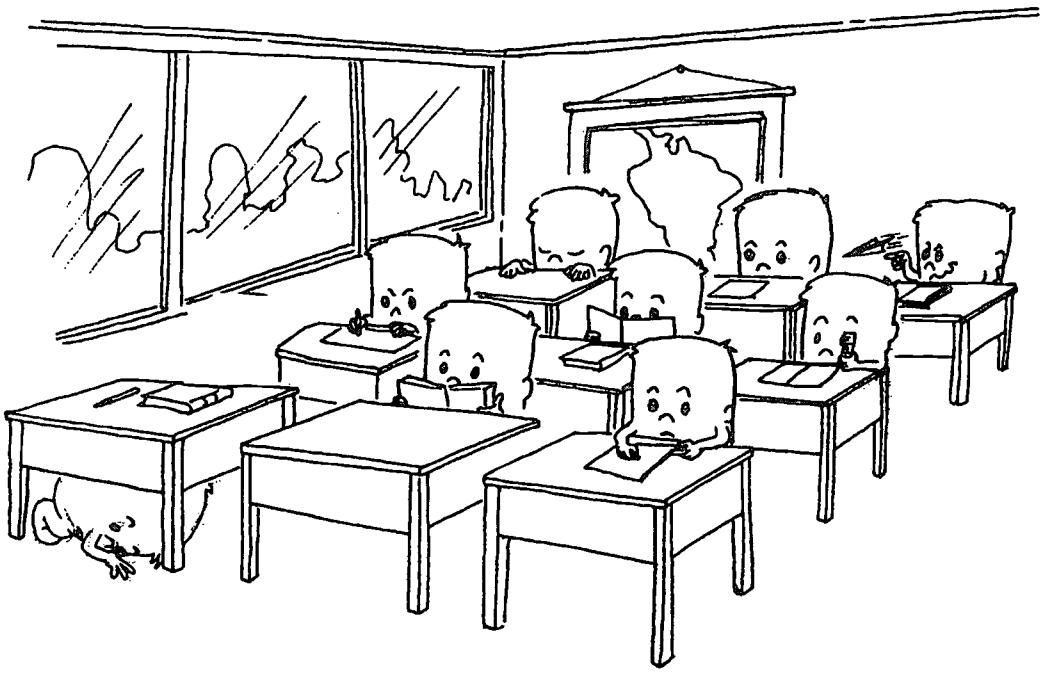


- Get into an open area.
- Stay away from walls, or narrow streets with high buildings.
- Stay away from lighting poles, power lines, and hanging signboards.

- *Circle with a green pencil what you must do and the safest places.*
- *Circle with a red pencil what you should not do.*

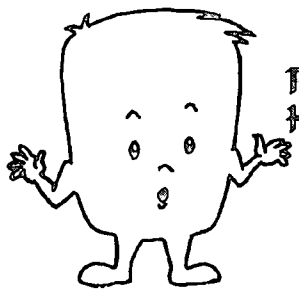


IF YOU ARE IN THE CLASSROOM



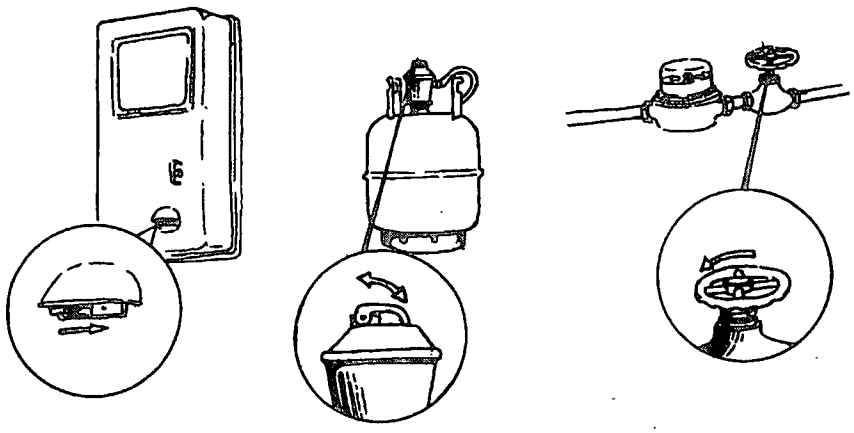
- Get under the desk.
- Avoid possible injury from falling book shelves and books.
- Listen carefully to the teacher's directions.
- Put something over your head.
- Without pushing file quietly out into the playground.
- When you have reached the evacuation area, line up and wait for further instructions.

- ***Circle with a green pencil what you must do and the safest places.***
- ***Circle with a red pencil what you should not do.***



PREPARE YOUR HOME AND FAMILY

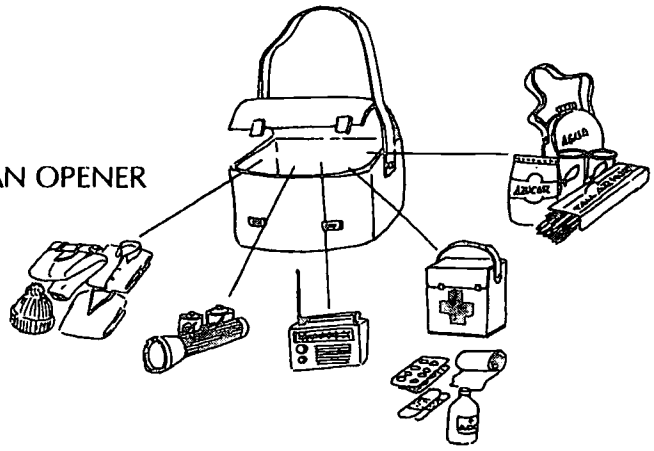
Learn how to turn off electricity and gas mains.

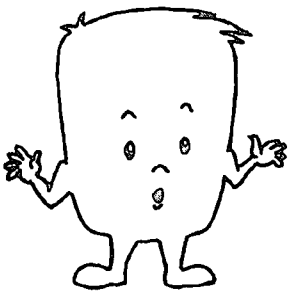


- Keep a survival kit including canned food and water.

CHECKLIST TO SEE IF YOU HAVE ALL THE ESSENTIAL ITEMS FOR A SURVIVAL KIT

- FLASHLIGHT
- PORTABLE RADIO
- EXTRA BATTERIES
- FIRST AID KIT
- CANNED FOOD AND A CAN OPENER
- DRINKING WATER
- BLANKETS

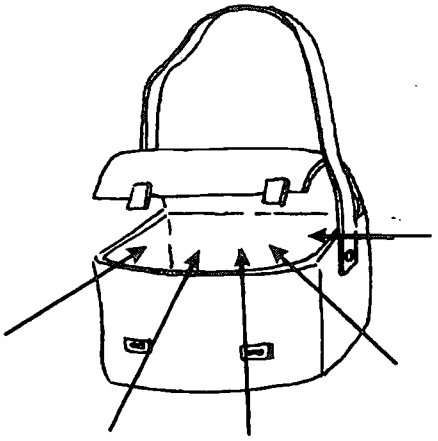


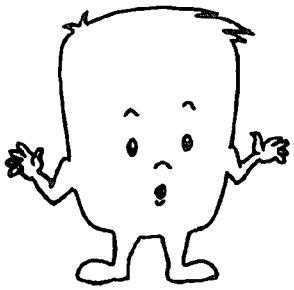


MY EMERGENCY BAG

What would you carry in your personal bag?

Stick on this page everything you would carry in your emergency bag.





LET'S PLAN A FAMILY STRATEGY IN CASE OF A TSUNAMI

What will happen if there is a tsunami and you are far away from your family?

To know what you have to do in this case, it is important that you talk with your parents and agree on a meeting place your family will use in such an emergency.

Let's consider a few things when choosing the meeting place:

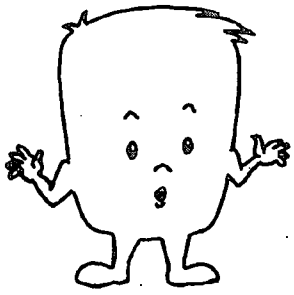
- It has to be easily accessible on foot

- It should be a place higher than 30 meters above mean sea level

My family and myself .....will

meet at .....

if there is a tsunami.



TO COMMENT WITH YOUR FRIENDS.

Did you know that strange animal behaviors were observed in China just hours before an earthquake? Cattle, sheep, mules, and horses would not enter corrals. Rats fled their homes. Hibernating snakes left their burrows early. Pigeons flew continuously and did not return to their nests. Rabbits raised their ears, jumped about aimlessly, and bumped into things. Fish jumped above water surfaces.

China was not the only country to report such unusual animal behavior. Late on May 6, 1976, an earthquake shook a town in Italy. Before the earthquake, pet birds flapped their wings and shrieked. Mice and rats ran in circles. Dogs barked and howled.

MAKE A DRAWING OF THE ANIMALS MENTIONED BEFORE.

Color the animals you like.

FIGURES TO CUT OUT

LAVA

VAPOR

DUST

GAS

ASH

ROCKS

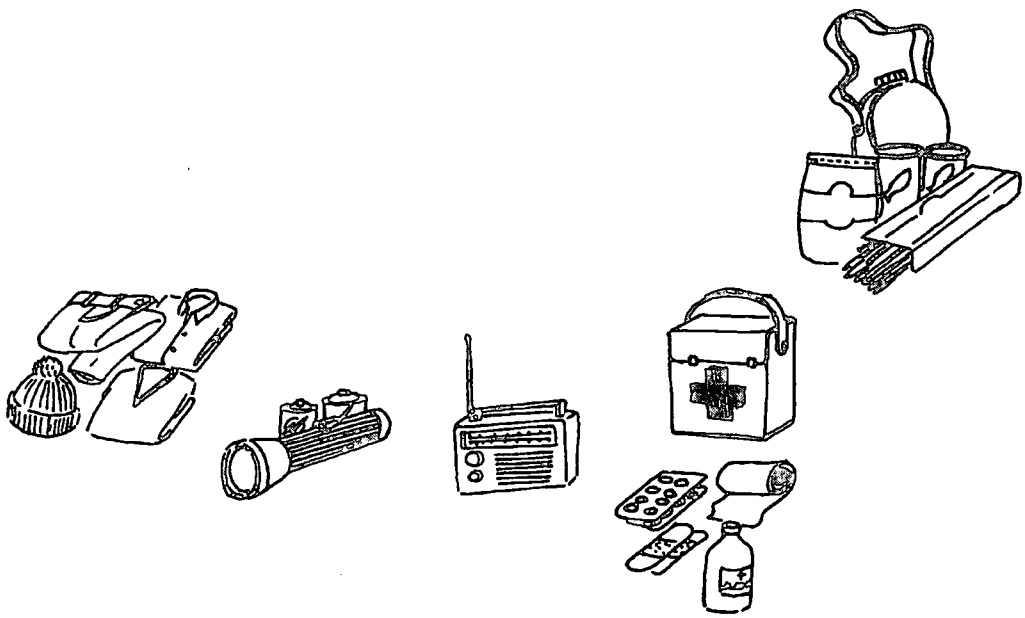
RIDGE

TRENCH

BOTTOM OF THE OCEAN

PACIFIC OCEAN

VOLCANO



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Title: EARTHQUAKES AND TSUNAMIS TEXTBOOKS AND TEACHERS' GUIDEBOOKS

Author(s): Yolanda Martinez, Rosenda Espinoza, Liliana Vera, Blanca Levill

Corporate Source: Servicio Hidrografico y Oceanografico de la Armada de Chile, IOC, ITIC (Sp. Version was published by Chili; E and R versions by IOC/UNESCO)

Publication Date: 1944 (Sp. version); 1996 (Eng. Ver.) 1998 (Rus. version)

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