Module 2. Earthquakes

Title	Earthquake safety
Keywords (meta tag)	**Earthquakes, danger, procedures, safety, instructions**
Provided by	**Military Academy**
Language	English
Area	*Please select one or more of the following:* *How to react in case of fire* [ ] *How to react in case of earthquake* [X] *How to react in case of flood* [ ]
Objectives & goals	
- To introduce children, young people and persons with special needs with the specifics of earthquakes; - To introduce children, young people and persons with special needs with the specific guidelines during earthquakes; - To introduce children, young people and persons with special needs with the proper behaviour during earthquakes; - To develop skills in the abovementioned categories for prevention and preparedness for earthquakes.	
Description	
This course will introduce children, young people and persons with disabilities with content related to earthquakes, preparedness for earthquakes, guidelines for earthquake safety, guidelines for children and guidelines for persons with disability. This content will elaborate on the safest ways of action before, during and after an earthquake.	

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Predict
PREvention of Disasters ICT

Contents arranged in 3 levels

Module name: Earthquake safety

Contents

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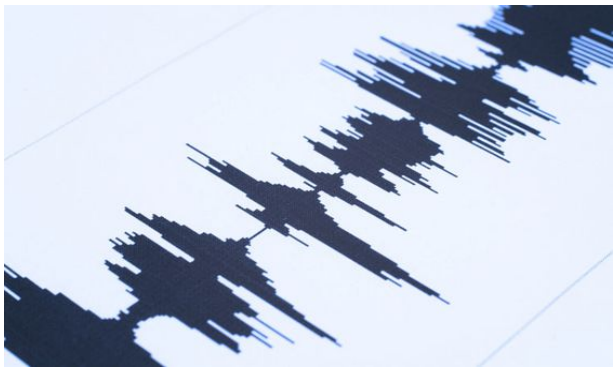
1. Introduction

1.1. What is an earthquake?

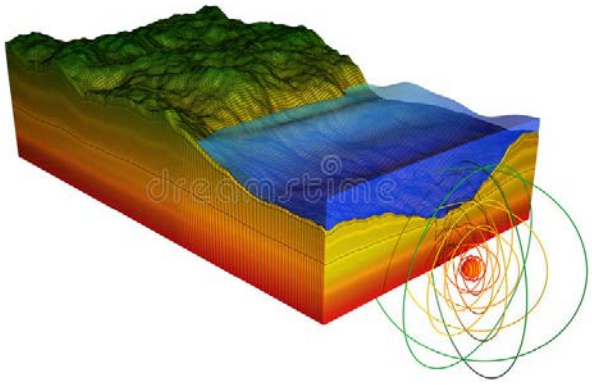
Earthquakes are not associated with weather, but instead are natural disasters**.** Earthquakes are the shaking, rolling or sudden shock of the earth's surface. They are the Earth's natural means of releasing stress. More than a million earthquakes rattle the world each year. Earthquakes can be felt over large areas although they usually last less than one minute. Earthquakes cannot be predicted - although scientists are working on it!



Picture 1. Seismometer motions during earthquakes

1.2. What causes an earthquake?

There are about 20 plates along the surface of the earth that move continuously and slowly past each other. When the plates squeeze or stretch, huge rocks form at their edges and the rocks shift with great force, causing an earthquake. Think of it this way: Imagine holding a pencil horizontally. If you were to apply a force to both ends of the pencil by pushing down on them, you would see the pencil bend. After enough force was applied, the pencil would break in the middle, releasing the stress you have put on it.



Picture 2. How an earthquake is formed?

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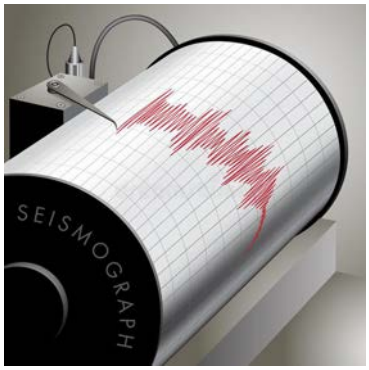
The Earth's crust acts in the same way. As the plates move they put forces on themselves and each other. When the force is large enough, the crust is forced to break. When the break occurs, the stress is released as energy which moves through the Earth in the form of waves, which we feel and call an earthquake.

Picture 3. Animated picture of an earthquake

1.3. What is a seismograph?

A seismograph is an instrument used for recording the intensity and duration of an earthquake.



Picture 4. Seismograph

1.4. What is a Richter Scale?

A Richter scale measures the strength of an earthquake. Each one-point increase on the scale indicates ten times the amount of shaking and 33 times the amount of energy.
The energy released by a large earthquake may be equal to 10,000 times the energy of the first atomic bomb.
The most powerful earthquake ever recorded on Earth was in Valdivia, Chile.
It happened in 1960, and measured 9.5 on the Richter scale.

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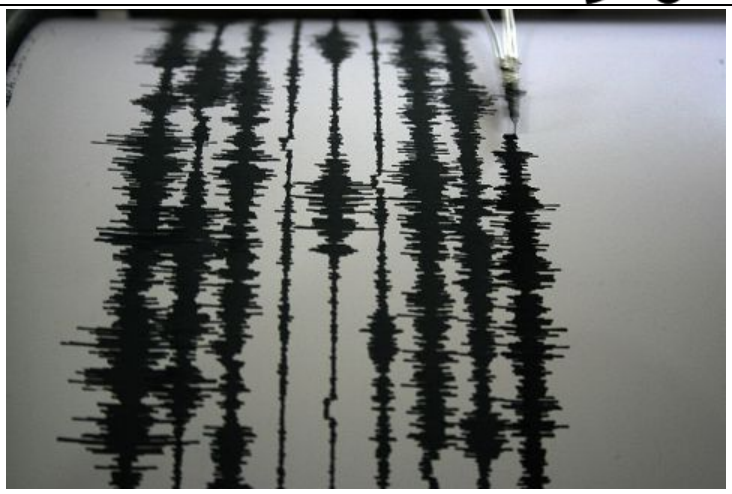

Picture 5. Seismographic measurements

1.5. Interesting Facts about Earthquakes!

- 80% of the world's earthquakes happen in the Pacific Ocean near Japan in a place called the 'Ring of Fire'.
- Sadly about 10,000 people die in earthquakes each year. Most of the deaths are when people are trapped in falling buildings.
- They have had about 12,000 earthquakes in the last 30 years. Alaska is followed by California, Hawaii, Nevada, Washington, Idaho, Wyoming, Montana and Utah.
- The largest earthquake ever recorded in the world was in Chile in 1960. It measured a 9.6 on the Richter Scale. The largest in the US was a 9.2 magnitude in Alaska in 1964.
- They can cause huge waves in the ocean called tsunamis.
- Movement of tectonic plates has formed large mountain ranges like the Himalayas and the Andes.
- Earthquakes can happen in any kind of weather.
- Alaska is the most seismically active state and has larger earthquakes than California.

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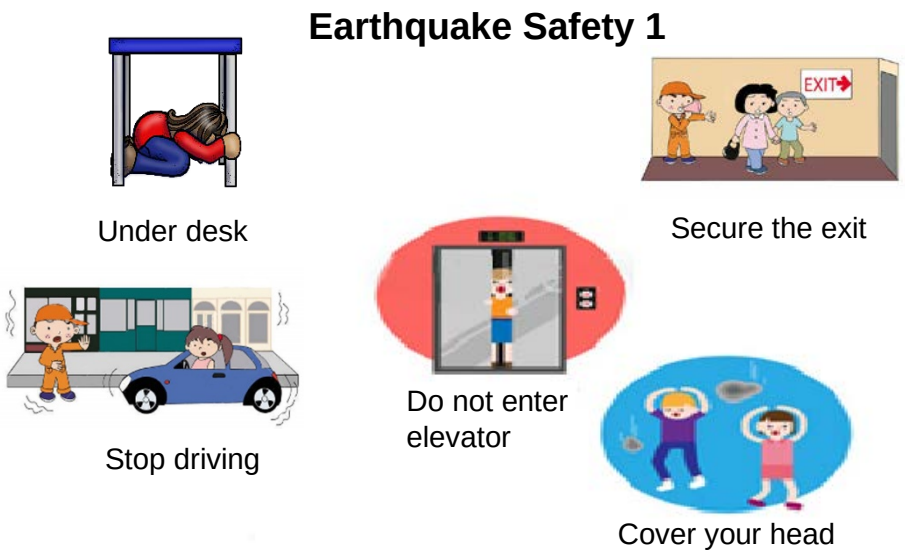
2. Earthquake safety

2.1. Earthquake safety guidelines

Remain Calm. Sound usually precedes earthquake motion by a split second. If you have developed the correct earthquake responses in your mind before a quake, this split second is enough time to activate your automatic reactions. If you stay calm, you will be better able to assess your situation. The rolling and roaring may terrify you, but unless something falls on you, the sensations probably won't hurt you. Try talking yourself through the violent motion phase. This will release stress and others may take courage and follow your reasoned restraint. Think through the consequences of any action you plan to take.

If you are indoors, stay there. If you are in danger:

- Get under a sturdy table, desk or bed.
- Brace yourself in an inside corner away from windows.



Picture 6. Earthquake safety tips

- Move to an inner wall or corridor. (A door frame or the structural frame or inner core of the building are its strongest points and least likely to collapse. They will also break the impact of any falling objects).

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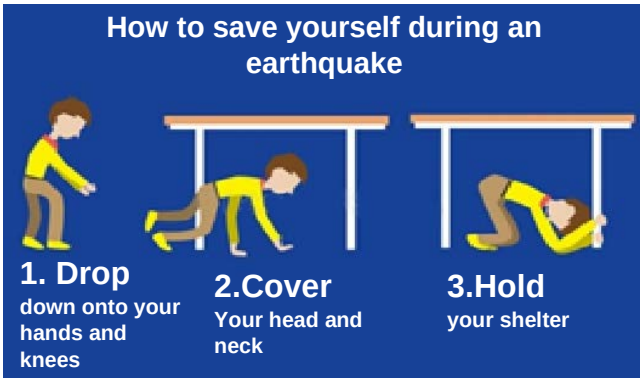

Picture 7. Animation of how to save yourself during an earthquake?

- In an apartment building the safest place is by the central reinforced core of the building, which is usually located by the elevator well.
- Choose shelter which will provide an airspace if it collapses. If your furniture shelter moves, stay under it and follow it around the apartment.
- Watch for falling objects - plaster, bricks, light fixtures, pots and pans, etc.
- Stay away from tall shelves, china cabinets and other furniture, which might slide or topple over.
- Stay away from windows, sliding glass doors, mirrors.
- Grab anything handy (blanket, pillow, tablecloth, newspapers, box, etc.) to shield your head and face from failing debris and splinting glass.
- Don't be alarmed if the fire alarm or sprinklers go off.
- Do Not Rush Outside. Stay on the same floor that you are on. Stairways may be broken and exits jammed with people. Do not use elevators as the power for elevators may go out and leave you trapped. The greatest danger from falling debris is just outside doorways and close to outer walls. If for safety reasons you must leave the building, choose your exits as carefully as possible.

If you are outside, stay there. Move away from the building, garage, walls, power poles and lampposts. Electric power lines are a serious hazard - stay away from fallen lines. If possible, proceed cautiously to an open area.

- If you are in a moving car, stop. Stop as quickly as safety permits in the best available space. Stay in your car. Don't stop where buildings can topple down on top of you. A car is an excellent shock absorber and will shake a lot on its springs during an earthquake, but it's a fairly safe shelter from which to assess your situation.
- Avoid Fallen Power Lines. The possibility of encountering fallen live wires is great during and after an earthquake. If you are on foot, make a wide path around the wires. If you are in the car and live wires have fallen across the car, remain where you

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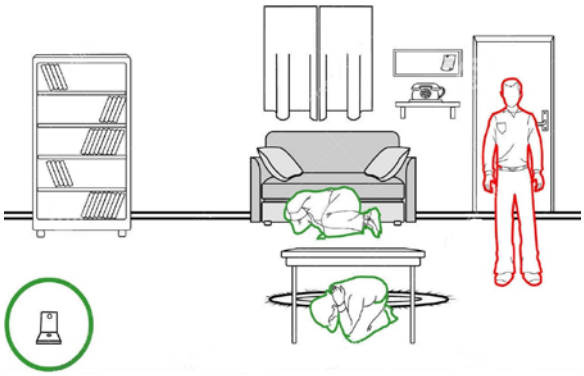
are. Your car is usually well insulated and will protect you from electric shock. Never assume that downed power lines are dead.

2.2. Earthquake safety at home

Unlike hurricanes and some other natural hazards, earthquakes strike suddenly and without warning. Nevertheless, if you live in an area at risk for earthquakes, there are things that you can do to reduce the chances that you or other members of your household will be injured, that your property will be damaged, or that your home life will be unduly disrupted by an earthquake. These things all fall under the term preparedness, because to be effective, they must be done before earthquakes occur.



Picture 8. Safety tips for earthquake in the home

Make your home safer to be in during earthquakes and more resistant to earthquake damage by assessing its structure and contents. Depending on when and how it was designed and built, the structure you live in may have weaknesses that make it more vulnerable to earthquakes. Common examples include structures not anchored to their foundations or having weak crawl space walls, unbraced pier-and-post foundations, or unreinforced masonry walls or foundations.

If you own your home, then correct any such weaknesses, yourself or with professional help. If you are a renter, ask what has been done to strengthen the property against earthquakes, and consider this information in deciding where to rent. If you are building or buying a home, make sure that it complies with the seismic provisions of your local building code. What is in your home can be as or more dangerous and damage-prone than the structure itself. Any unsecured objects that can move, break, or fall as an earthquake shakes your home are potential safety hazards and potential property losses. Walk through each room of your home and make note of these items, paying particular attention to tall, heavy, or expensive objects such as bookcases, home electronics, appliances (including water heaters), and items hanging from walls or ceilings. Secure these items with exible fasteners, such as nylon straps, or with closed hooks, or by relocating them away from beds and seating, to lower shelves, or to cabinets with latched doors. Ensure that plumbers have installed exible connectors on all gas appliances.

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2.3. Earthquake safety on the street

2.3.1. Instructions on how to act if you are moving vehicle during an earthquake:

- Stop if traffic safety permits.
- Avoid stopping near buildings, trees, overpasses, and utility wires.
- Proceed cautiously once the earthquake has stopped.
- Avoid roads, bridges, or ramps that might have been damaged by the earthquake.

Picture 9. Earthquake safety tips on the street

2.3.2. Instructions on how to act during an earthquake if you are trapped under rubber:

- Do not light a match.
- Do not move about.
- Cover your mouth with a handkerchief or clothing.
- Tap on a pipe or wall so that rescuers can locate you. Use a whistle if one is available. Shout only as a last resort. Shouting can cause you to inhale dangerous amounts of dust.
- Stay calm and try to orientate yourself.
- If you are pressed by rubble, start removing it slowly to save strength and beware of sharp objects and ensuing injury.

Picture 10. Earthquake safety tips if under rubber

2.3.3. Instructions how to act after the first shocks:

- Be ready for aftershocks. If the building is damaged and since there is a possibility of a stronger earthquake, leave the building calmly, without panic and in order: mothers with children, the elderly, the sick, the disabled, etc.

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- If you are in a damaged building and smell gas or see broken wires, do not burn candles or matches because of the risk of fire and explosion.
- Check whether someone is injured.
- Do not move seriously injured persons.
- Follow the instructions of competent authorities.
- Use the phone only if necessary to avoid the overloading of phone lines.
- Do not use cars in order not to obstruct rescue teams in carrying out their duties.
- Avoid entering into the house, especially if it is damaged, if you smell gas or see damaged wires.

2.4. After an earthquake

2.4.1. Within the First Several Minutes:

- Remain Calm. Don't Panic. Try to calm and reassure others. Stop and take time to think.
- Wait until all motion has stopped. Do not run down stairs or outdoors. Be prepared for additional shockwaves.
- Do not light matches, cigarettes or turn on electrical switches. Flashlights are one of the best light sources after a damaging earthquake. Proceed with extreme caution.
- Protect hands and feet from broken glass or debris. Keep head and face protected (hardhat, blanket, tablecloth, etc.)
- Make a quick check for injuries or trapped people. Provide emergency first aid if needed.
- Do not try to move seriously injured persons unless they are in immediate danger from further injury.
- Turn off all appliances and office machines. Extinguish all open flames. Check power lines and cords. If problems exist in electrical lines or gas lines the mains should be shut off.
- It may be necessary to draw a moderate amount of cold water in bathtubs and sinks and other containers, in case service should be disrupted.

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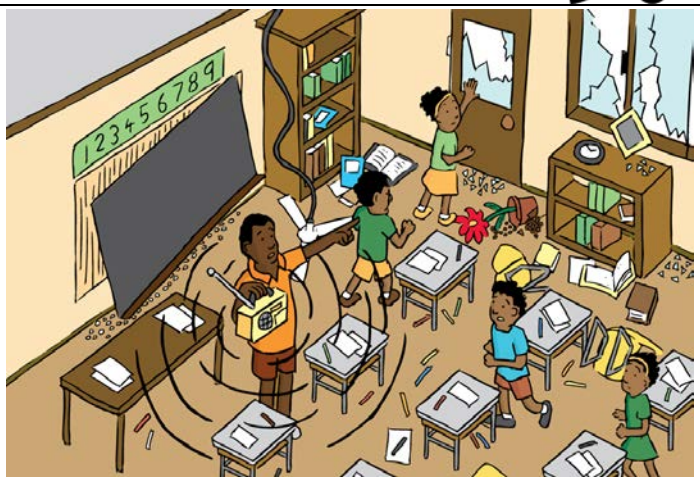

Picture 11. After earthquake in the classroom

2.4.2. During the Next Several Hours:

- Do not operate electrical switches, appliances or open-flame equipment if gas leaks are suspected. Sparks or flames can ignite gas from broken lines causing an explosion.
- Tend further to injured or trapped persons. Try to get help if necessary. If a person is trapped and you can free him without injury to yourself, remove debris piece-by-piece starting with the top of the pile.
- Be prepared for aftershocks - they are weaker than the main shock but can cause additional damage and psychological trauma. Watch out for other possible dangers, which may follow an earthquake, such as fire, flood, landslide or TSUNAMI (tidal wave).
- Turn on a battery radio to receive disaster instructions. Use telephones only to report extreme emergency situations.
- Inspect your work area carefully for structural damage. Carefully open exit doors – they sometimes jam. The initial quake may damage the structure and an aftershock could knock down weakened walls. Use extreme caution when moving around in damaged areas - they may collapse without warning. Check to see that sewage lines are intact before flushing toilets.
- You should not try to get home until government authorities say it is safe, which will be when the worst fires are under control and the streets have been cleared. This may happen quickly or it may take longer (perhaps 72 hours or more). You should advise your family that in the event of a major earthquake you maybe retained at work. When possible notify your family about your well being.
- Don't go outside sightseeing. Keep streets clear for passage of emergency vehicles. Your presence might hamper rescue and other emergency operation.

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3. Earthquake safety for School-age Children

By age three or so, children can understand what an earthquake is and how to get ready for one. Take the time to explain what causes earthquakes in terms they'll understand. Include your children in family discussions and planning for earthquake safety. Conduct drills and review safety procedures every six months.

- Show children the safest places to be in each room when an earthquake hits. Also show them all possible exits from each room.
- Use sturdy tables to teach children to Duck, Cover & Hold.
- Teach children what to do wherever they are during an earthquake (at school, in a tall building, outdoors).
- Make sure children's emergency cards at school are up-to-date.
- Although children should not turn off any utility valves, it's important that they know what gas smells like. Advise children to tell an adult if they smell gas after an earthquake.

Picture 5. Earthquake safety in schools

TEACH YOUR KIDS

- Basic personal information to identify themselves if separated from you
- Home phone number
- How to dial emergency number
- Family's meet-up locations
- How to reach the family's out-of-town contact
- Create a go kit
- Each child's contact and medical information
- Recent photos of each child
- Comfort food and treats

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- Activity items like books, puzzles and games
- Comfort items like a studded animal or blanket

Children's Needs

Fear is a normal reaction to danger. A child may be afraid of recurrence, injury, or death after an earthquake. They may fear being separated from their family or being left alone. Children may even interpret disasters as punishment for real or imagined misdeeds. Children will be less likely to experience prolonged fear or anxiety if they know what to expect before, during, and after an earthquake. Talking to children openly will also help them overcome fears.

Here are some suggestions:

- Explain that an earthquake is a natural event and not anyone's fault.
- Talk about your own experiences with natural disasters, or read aloud books about earthquakes.
- Encourage your child to express feelings of fear. Listen carefully and show understanding.
- Your child may need both verbal and physical reassurance that everything will be all right. Tell your child that the situation is not permanent.
- Include your child in clean-up activities. It is comforting to the child to watch the household begin to return to normal and to have a job to do.

4. Earthquake safety for People with Special Needs

4.1. Before an earthquake:

Write down any spefic needs, limitations, and capabilities that you have, and any medications you take. Make a copy of the list and put it in your purse or wallet.
Find someone (a spouse, roommate, friend, neighbor, relative, or co-worker) to help you in case of an emergency. Give them the list. You may wish to provide a spare key to your home, or let them know where they can find one in an emergency.

4.2. During an earthquake:

- If you are with a wheelchair, try to get under a doorway or into an inside corner, lock the wheels, and cover your head with your arms.
- Remove any items that are not securely attached to the wheelchair.
- If you are able, seek shelter under a sturdy table or desk. Stay away from outer walls, windows, replaces, and hanging objects.
- If unable to move from a bed or chair, protect yourself from falling objects by covering up with blankets and pillows.
- If you are outside, go to an open area away from trees, telephone poles, and buildings, and stay there.

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4.3. After an earthquake:

- If you are trapped, try to attract attention to your location.
- Turn on your battery-operated TV or radio to receive emergency information and instructions.
- If you can, help others in need.

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- After an earthquake
- Earthquake safety for School-age children
- Earthquake safety for people with special needs

Results

School-age children, young adults and persons with disabilities will gain competencies and skills for earthquake safety as well as knowledge of how to properly behave before, during and after an earthquake.

5 glossary entries

Earthquake: An ***earthquake*** is what happens when two blocks of the earth suddenly slip past one another.

Earth surface: The earth's surface dynamic union of its solid crust, its atmosphere, its hydrosphere, and its biosphere, all having acted in concert to produce a constantly renewing and changing symphony of form.

Tectonic plates: A ***tectonic plate*** (also called ***lithospheric plate***) is a massive, irregularly shaped slab of solid rock, generally composed of both continental and oceanic lithosphere.

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Persons with special needs: In clinical diagnostic and functional development, the term **Special needs** (or additional **needs**) describes **individuals** who require assistance for disabilities that may be medical, mental, or psychological.

First shocks: A foreshock is an **earthquake** that occurs before a larger **seismic** event (the mainshock) and is related to it in both time and space. The designation of an **earthquake** as foreshock, mainshock or aftershock is only possible after the full sequence of events has happened.

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Related Material	Earthquake Safety Checklist
Related PPT	PREDICT_training_earthquakes short version for children; PREDICT_training_earthquakes
Reference Link	/
Video if applicable	PREDICT_Training_earthquakes

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