Earthquake activity 1: Introduction to Earthquakes

Description: An introduction to earthquakes for junior students, including questions for class discussion, easy demonstrations, map analysis, and finishing with an earthquake safety drill.

Materials: Overheads (1.Tectonic Plates map; 2. Earthquakes in Canada map)
Brick
Sandpaper
Elastic cord

Teacher instructions:

1. Preparation: The teacher may want to review information on the following websites in advance.
   Geological Survey of Canada: http://earthquakescanada.nrcan.gc.ca/index_e.php
   Atlas of Canada: Earthquakes [PDF] - included as part of these resources
   Public Safety Canada: http://getprepared.ca/knw/ris/eq-eng.aspx
2. **Note: This topic may frighten some children. It is good to preface this lesson by reassuring the class that they will learn how to increase their safety.** For example: "Today we are going to learn about earthquakes, what happens during an earthquake, and what we can do to be safe."
3. Introduce the topic by asking a few questions to encourage student participation.
   - Have you ever felt an earthquake? What happened? Where were you when it happened?
4. **Introduction to earthquakes**: Ask the class the following questions and lead them to the appropriate answers given below.

   What is an earthquake?

   - Lead them to understand that it is a sudden shaking of the ground. It can be very gentle or very violent. Ask the students to stand up and show you a very gentle shake and then a much bigger shake.

   What happens during an earthquake?

   - Ensure that they understand that sometimes the event is so small that people do not even notice that an earthquake has happened, although scientific instruments can still measure it. However, sometimes the shaking is so strong that books may fall off the shelves, furniture may move, people may fall down, and buildings may collapse. It might even create a huge wave in the ocean called a tsunami.

   What causes an earthquake?

   - Tell them that the hard outer shell of the Earth (the crust) is divided into many large segments, called tectonic plates. Show them the Tectonic Plate map (Overhead 1). These plates move very slowly, most less than 10 cm/year (about as fast as your fingernails grow). In some places, the rock of the crust is under a great deal of stress to move. At first the rocks stick together and do not move. Suddenly they move with a jerk before becoming stuck again. The energy released in this movement is an earthquake.

     Demonstration: To demonstrate the stick-slip motion instruct the students to do the following
     a) Push hard straight down onto the table top with one hand.
     b) Lean slightly back so that you are pushing at an angle.
     c) How does you hand move? (*It will stay still, then jerk forward, then stick again.)*

Or the teacher can demonstrate the stick-slip motion with a brick and elastic.

a) Cover a brick with sandpaper.
b) Use a piece of elastic to drag the brick along the floor. This works better if the floor is carpeted. Alternatively you can cover a long plank with sandpaper.
c) How does the brick move? *(The elastic will stretch and the brick stays still. Then suddenly the brick will slide forward and the elastic contracts. The brick sticks again and the cycle repeats.)*
(source: S. Heenan, Stick Slip Motion, http://www.es.uwo.ca/Outreach/educators%20index.htm)

Where do Earthquakes happen?

- The students can suggest countries or areas. Use the tectonic plate overhead to show them that most places where earthquakes are common are near tectonic plate boundaries.

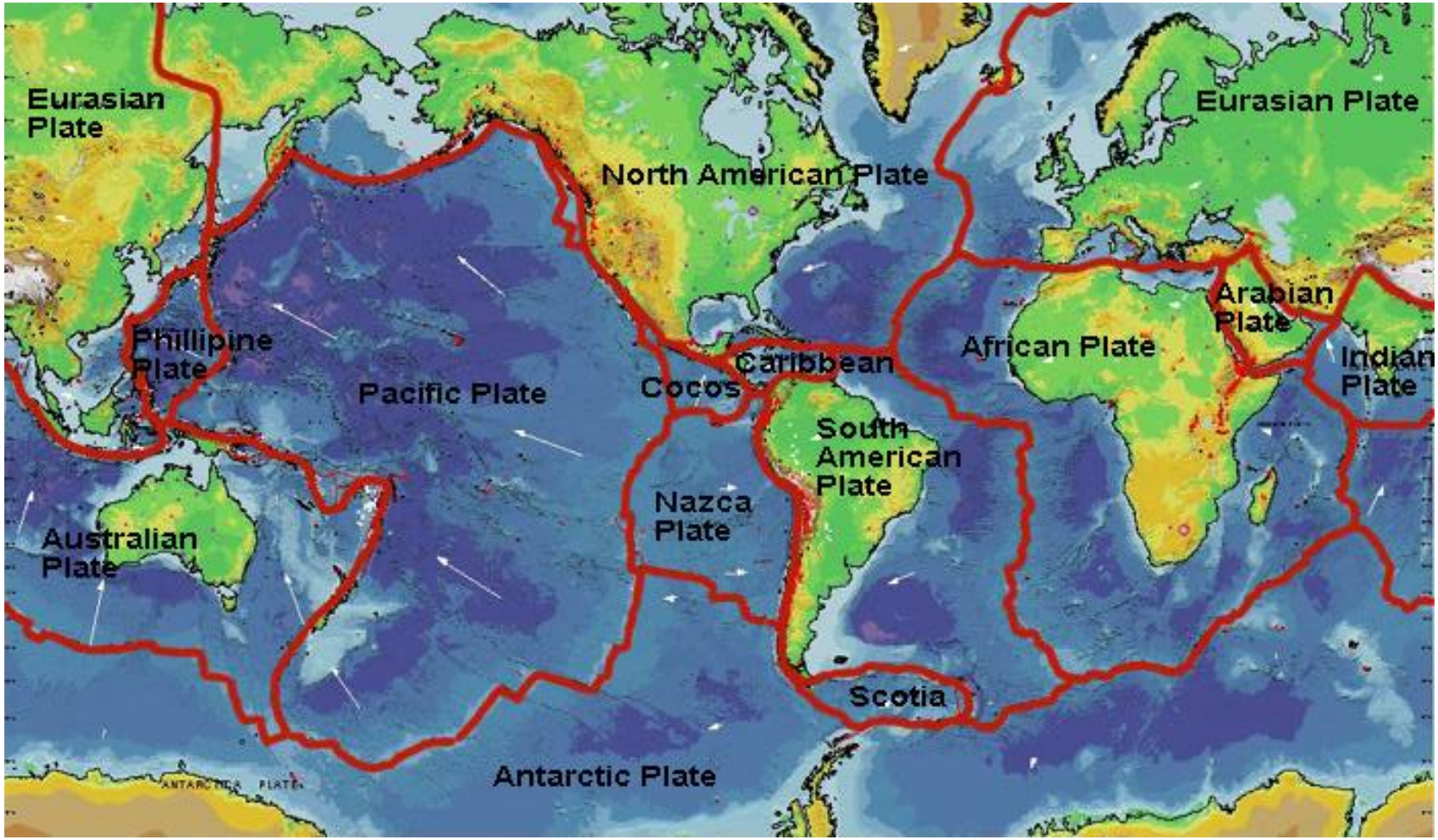
Where do most of the earthquakes happen in Canada?

- Ask students if they think earthquakes happen in Canada. Show them the Earthquakes in Canada map (Overhead 2). Identify the areas. *(Note: All the earthquakes in Canada are not associated with tectonic plate boundaries. In eastern and northern Canada they seem to be associated with old zones of crustal weakness and faults.)*
- Explain that earthquakes are most dangerous if they occur in areas where lots of people live.

5. **What can we do to be safe?** *See Public Safety Canada website for more information.*

    - Remind the students that, during an earthquake the building may be shaking strongly, people may fall over, furniture may slide, windows may break and high objects may fall on them from the wall or tall furniture.
    - Introduce **DROP, COVER, HOLD.**
        - **Drop** under heavy solid furniture such as a table, desk or bed
        - **Cover** your head and upper body (torso) to prevent being hit by falling objects
        - **Hold** onto the object that you are under so that you remain covered.
    - Look around the classroom. Have the class identify unsafe areas *(eg. Windows may break, doors may slam shut, tall furniture or bookshelves may fall over).* Discuss what might be a safe place in the room. *(under desk)*
    - **Drill**: Tell the class that they are going to practice earthquake safety. When the lights flicker, they are to pretend that an earthquake is shaking their school and they should DROP, COVER, HOLD. When the drill starts, they should chant "Drop, Cover, Hold" as a reminder to themselves. Repeat several times during the day. Flicker the lights for varying lengths of time, up to about 90 seconds.
    - **Poster**: Have each student draw a poster that illustrates DROP, COVER, HOLD. It should include the web address of Public Safety Canada: http://getprepared.ca

6. **Homework:** Students should show their picture poster and explain DROP, COVER, HOLD to their parents and together they should decide on safe places in their house. The next day the students might report their safe places to the class.



Tectonic Plates

Courtesy of the USGS

Overhead 2 Earthquakes in Canada map