Landslide!

Grades K-4

Overview:

In this lesson, students investigate models of landslides, what triggers them, as well as their potential to create tsunamis.

Targeted Alaska Grade Level Expectations:

Science

[3] SA1.2 The student demonstrates an understanding of the processes of science by observing and describing the student's own world to answer simple questions.

[4] SA1.2 The student demonstrates an understanding of the processes of science by observing, measuring, and collecting data from explorations and using this information to classify, predict, and communicate.

[4] SD2.2 The student demonstrates an understanding of the forces that shape Earth by identifying causes (i.e., earthquakes, tsunamis, volcanoes, landslides, and avalanches) of rapid changes on the surface.

Objectives:

The student will:

- identify landslides as a potential tsunami trigger;
- compare elements of a landslide model to their real-world representations; and
- identify triggers of landslides.

Materials:

- Sand
- Foam board; or cardboard covered with aluminum foil (2 sheets – 5 1/2" x 8 ½")
- Tape
- Newspaper or butcher paper
- Balloon
- Pan or container large enough to build, hold or contain a sand castle
- Water
- Cup or bottle
- VIDEO FILE: "Underwater Slide Generating a Tsunami Wave"
- STUDENT WORKSHEET: "Landslide!"

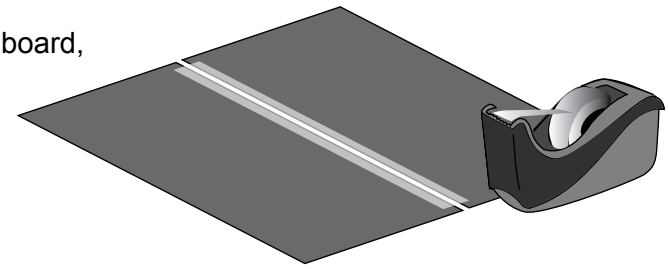
Science Basics:

Landslides are the second most common cause of tsunamis. Landslides can occur on land as well as underwater. Wind, increased precipitation, earthquakes, volcanic slope failure as well as human actions can trigger landslides. Volcanic slope failure is caused by the buildup of magma within a volcano. The energy from a landslide dissipates faster than an earthquake so their consequences are not as far reaching.

	Natural Triggers	Human Triggers
Removal of Support	erosion at the base of a slope by streams, waves, glaciers	excavation at the base of a slope or excavation on a hillside
Removal of Vegetation	forest fires	clearing trees, removing plants
Addition of Moisture	rainfall or snowmelt	sewage or runoff disposal, broken water pipes, improper grading
Addition of Weight	heavy snowfall, volcanic ash, landslides	placement of fill
Oversteepening	magma buildup within volcanoes	placing fill at an angle that exceeds its stability
Vibrations	earthquakes, thunder	blasting, operation of heavy equipment

Activity Preparation:

1. Tape the two sheets of foam board or cardboard, covered with aluminum foil, together with a thin space between the two sheets.
2. Pour sand into pan.



Activity Procedure:

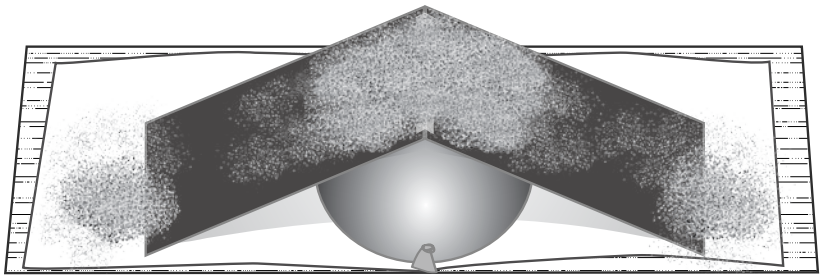
1. Ask students if they have ever thrown rocks in a pond or river to see how big a splash they could make. Ask students what they did to make a bigger splash *(throw a bigger rock, throw lots of rocks at once, or throw harder)*. Explain that nature and humans can create large masses of rock, soil or ice that can slide into the ocean; if these landslides are powerful enough, and the depth of the water is just right, they can generate a tsunami.
2. Explain that students will view a short animation of an underwater slide generating a tsunami wave. Access VIDEO FILE: “Underwater Slide Generating a Tsunami Wave” on the ATEP video playlist.

Critical Thinking:

Think-Pair-Share: Ask students what could trigger, or start a landslide *(earthquake, volcano, rain, snow, human actions)*. Allow thinking time then have students share their ideas with a partner. Call on pairs to share their ideas with the class. Write the correct responses on the board and add any other appropriate triggers from the chart in the Science Basics section. Emphasize that in order for a strong landslide to start a tsunami it must happen in, or next to, the ocean.

3. Explain landslides are sliding masses of rock or soil on a steep slope.
4. Explain that students will see models of some of the ways a landslide may start. Models help scientists explain or understand how they believe something works. The first model is how a landslide on a volcano may form. Place newspaper or butcher paper on the edge of a table. Place a deflated balloon at the edge of the table with the taped section of the foam board over the top of it. Firmly pat down a ½-inch to 1-inch layer of damp sand onto the foam board. Explain that as magma builds up in

a volcano, the sides become steeper and steeper, and dirt and rock on the sides of the volcano may slide down the volcano. Blow up the balloon slowly until a "landslide" occurs. Then ask students what different parts of the model represent.



5. Create a sand castle in the pan. Pour water on it slowly and gently until the sand can absorb no more water and the slope fails creating a slide. Call on students to describe their observations of the process. Ask students how this model compares, or is similar to rainfall and mountains?
6. Recreate a sand castle. Shake the container that the sand castle is in to simulate an earthquake until "land" slides off the sand castle. Ask students to identify which trigger you just modeled. Ask the students to compare the model to earthquakes and mountains.
7. Maintain stations for students to manipulate the modeling activities.
8. Distribute STUDENT WORKSHEET: "Landslide!" for students to complete.

Extension Idea(s):

- Take a walk around the community to observe sites that may have potential for a slide.
- Investigate how long it takes to create a "landslide" with the sand castles at varying strengths of "earthquakes."
- View an excerpt (8:23- 14:48) from the movie *Ocean Fury: Tsunamis in Alaska*, to view how an earthquake started an underwater landslide under the dock in Valdez, and how a nearby glacier avalanched and collapsed creating a tsunami. Also in this section are computer models of tsunami-related actions and two other slide-generated tsunamis (Lituya Bay and 1946 tsunami).

Answers:

1. Landslide picture is circled
2. Ocean picture is circled
3. Any three of the following: earthquake, volcano oversteepening, excessive rain or snow, human actions, etc.

Name:_____

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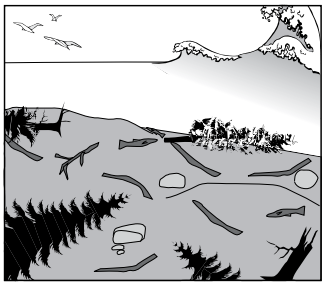
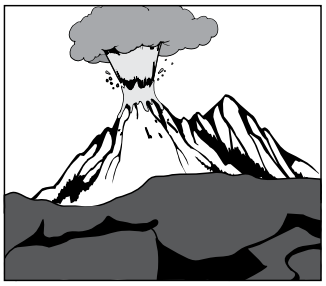
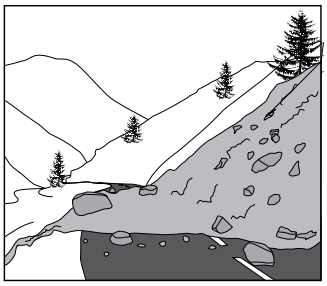
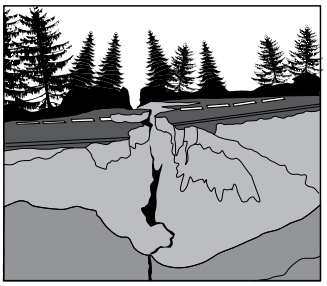
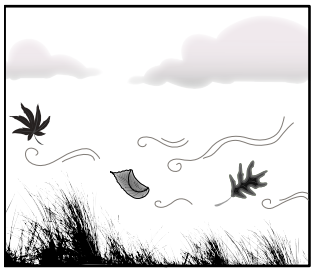
Student Worksheet

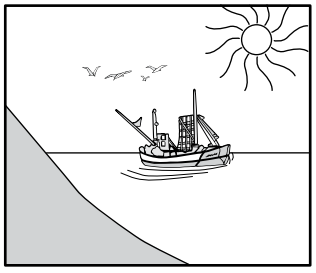
Landslide

1. Circle the picture of a landslide.

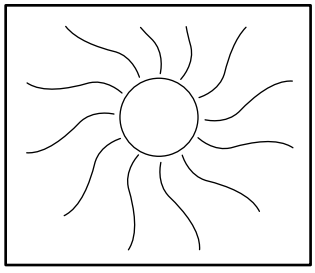





2. For a strong landslide to start a tsunami another element is needed. Circle the element.


wind


ocean


trees


sun

3. Draw or write three things that could trigger or start a landslide.