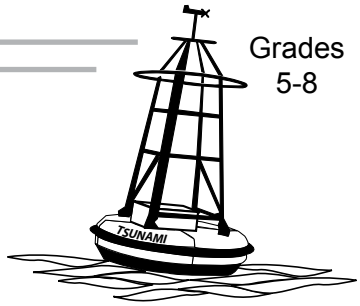
Tsunamis Around the World

Grades 5-8



Overview:

Students learn about major tsunamis that have occurred in other parts of the world, and locate recent tsunamis on a world map using latitude and longitude.

Targeted Alaska Grade Level Expectations:

Science

[5 - 8] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

Objectives:

The student will:

- read a report of a recent tsunami;
- use latitude and longitude to locate tsunamis on a world map;
- describe a tsunami event to classmates; and
- communicate and present information about one recent tsunami.

Materials:

- Poster-size world maps with latitude and longitude lines (one per group)
- Red star stickers (small, one per group)
- Red sticky dots (small, five per group)
- Red pencils (one per student)
- STUDENT WORKSHEET: “Tsunamis Around the World”

Science Basics:

Large tsunamis leave behind clues that help scientists determine how extensive they were, and how large the earthquakes were that caused them. Tsunami research on two major tsunamis in Chile, one in 1575 and another in 1737, revealed that neither was likely to have been caused by a quake as large as the magnitude 9.5 quake that devastated the Chilean Coast in 1960. Using soil samples at elevations likely to have been inundated by tsunamis, scientists find sea salt and other ocean-born matter. Scientists use the data to help unlock the mystery of past tsunamis. Today, instruments around the world record tsunamis as they occur, providing scientists with new data to help them understand these dangerous waves.

Activity Procedure:

1. Explain that tsunamis have affected many coastal communities around the world. Some tsunamis do relatively little harm, while others do a great deal of damage and result in many deaths.
2. Explain that earthquakes cause most tsunamis; some are caused by landslides or volcanic eruptions. The eruption of the Krakatau Volcano in 1883 created an explosion heard more than half-way around the world, and caused a tsunami with waves up to 120 feet tall that killed 36,500 people and destroyed 295 towns.
3. Another unusual tsunami occurred on August 17, 1999, following a 7.6 magnitude earthquake in Tur-

key. The tsunami was unusual because it occurred in a small, inland sea (the Sea of Marmara), not in the ocean. The tsunami waves claimed the lives of 150 people. Nearly 17,000 people were killed as a result of the earthquake in this highly populated area.

4. Explain that tsunamis occur nearly every year somewhere in the world, and that they are often destructive and sometimes deadly. Explain that students will use the information they used in the previous latitude and longitude lesson to map recent tsunamis around the world.

5. Explain that students will work in groups to learn about and map a recent tsunami event. Each group will present their map and describe their tsunami to the rest of the class.

6. Divide students into groups of two or more. Distribute a STUDENT INFORMATION SHEET, a world map, a red star sticker and five red sticky dots to each group.

7. Explain that each information sheet describes a different tsunami. Ask students to read about their tsunami, then plot the tsunami source on their map and mark it with the red star. Next, plot the five points of greatest water height on the map and mark them with red dots.

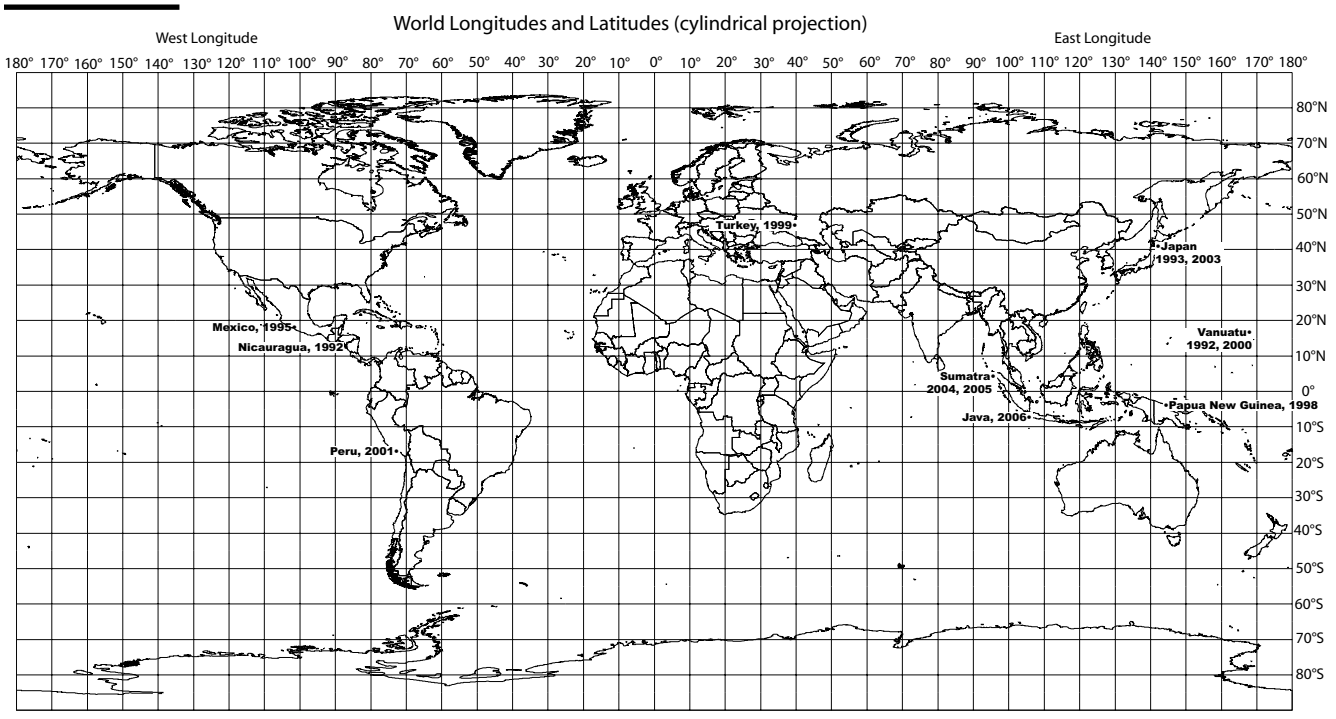
8. After groups have completed their plotting, allow five minutes for groups to plan presentations. Explain that each group member must have a role in the presentation. Groups must share their maps and describe the tsunami that they studied.

9. Distribute the STUDENT WORKSHEET: "Tsunamis Around the World" and ask students to individually plot the tsunami sources on the map.

Critical Thinking:

Activity Response Method : Ask students to write a paragraph describing their response to the presentations of other groups. They can begin their response with "I was surprised to learn…" or "I learned that…" or "I wonder if…"

Answers:



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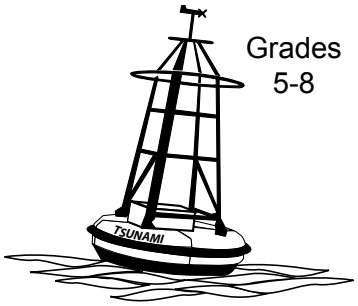

Student Information Sheet

“2001 Peru Tsunami”

On June 23, 2001, a magnitude 8.4 earthquake shook Peru. The quake generated a tsunami that was observed in more than 60 locations as far away as Hawaii, Japan and Alaska. The area around Camana, Peru sustained the most damage. The water height reached 8 meters in this region and more than 20 people died. Structures were severely damaged leaving thousands homeless. Many hotels and restaurants were destroyed.

Tsunami Source Information:

Date	Place Name	Earthquake	Deaths	Latitude	Longitude
June 23, 2001	Peru	magnitude 8.4	26	16º S	73º W

Top 5 Water Heights:

Location	Water Height (meters)	Latitude	Longitude
Camana, Peru	8.00	17º S	73º W
Arica, Chile	2.50	18º S	70º W
Talcahuano, Chile	2.50	36º S	73º W
Iquique, Chile	1.65	20º S	70º W
Coquimbo, Chile	1.30	30º S	71º W

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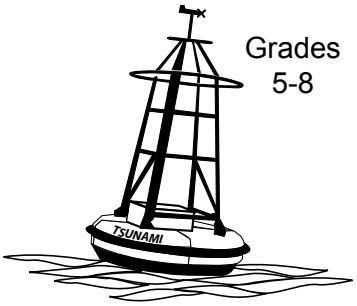
Student Information Sheet

“2003 Japan Tsunami”



On September 25, 2003, a magnitude 8.3 earthquake shook Japan, generating a tsunami that was observed in 11 locations throughout the country. The area along the southeastern coast of Hokkaido was struck by the largest wave, which was 4 meters high. Fortunately, no lives were lost during the tsunami, though more than 700 were injured during the quake. The earthquake also caused $90 million in damages to structures.

Tsunami Source Information:

Date	Place Name	Earthquake	Deaths	Latitude	Longitude
September 25, 2003	Japan	magnitude 8.3	0	42º N	144º E

Top 5 Water Heights:

Location	Water Height (meters)	Latitude	Longitude
Cape Erimo, Japan	4.00	42º N	143º E
Urakawa, Japan	1.30	42º N	143º E
Kushiro, Hokkaido Is., Japan	1.20	43º N	144º E
Hachinohe, Honshu, Japan	1.00	41º N	142º E
Nemuro, Japan	0.90	43º N	146º E

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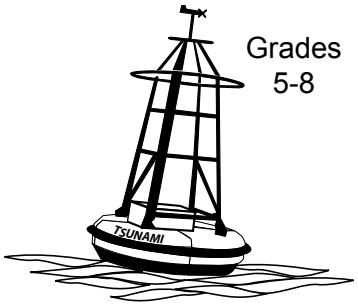
Student Information Sheet

“2004 Sumatra, Indonesia Tsunami”



The worst tsunami in recorded history struck on December 26, 2004. An extremely powerful earthquake occurred under the Indian Ocean near the island of Sumatra, Indonesia. With a magnitude of 9.0, this earthquake was the third largest ever recorded, causing a series of tsunami waves that washed ashore in Thailand, South Asia, Indonesia, India and Sri Lanka. More than 297,000 people were killed, and over one million people were left homeless. Economic losses resulting from this tsunami event exceeded $10 billion. Resulting waves were recorded nearly world-wide in more than 700 locations.

Tsunami Source Information:

Date	Place Name	Earthquake	Deaths	Latitude	Longitude
December 26, 2004	Sumatra	magnitude 9.0	297,248	3º N	96º E

Top 5 Water Heights:

Location	Water Height (meters)	Latitude	Longitude
Labuhan, Sumatra, Indonesia	50.90	5º N	95º E
Rhiting, Aceh, Sumatra, Indonesia	48.86	5º N	95º E
Lhok Nga, NW coast of Sumatra, Indonesia	35.70	5º N	95º E
Banda Aceh East Coast, Sumatra, Indonesia	34.90	5º N	96º E
West Coast of Aceh, Sumatra, Indonesia	34.85	5º N	95º E

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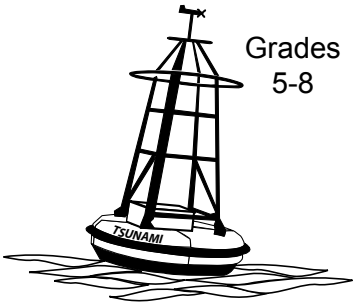

Student Information Sheet

"2005 Sumatra, Indonesia Tsunami"

On March 28, 2005, a magnitude 8.7 earthquake generated a tsunami which struck Indonesian coastlines. Ten lives were lost in the tsunami, but more than 1,300 perished as a result of the earthquake, which also caused extreme damage to structures. This dealt a discouraging blow to a region already devastated by the tsunami of the previous December. Waves from the 2005 Indonesian Tsunami were recorded in 11 locations; the greatest wave height was 3 meters. Minimal damage was caused by the tsunami itself, though a port and airport were damaged.

Tsunami Source Information:

Date	Place Name	Earthquake	Deaths	Latitude	Longitude
March 28, 2005	Sumatra	magnitude 8.7	1314	2º N	97º E

Top 5 Water Heights:

Location	Water Height (meters)	Latitude	Longitude
Simeulue Island, Indonesia	3.00	3º N	96º E
Singkil-Baru, Sumatra, Indonesia	1.00	2º N	98º E
Salalah, Oman	0.39	17º N	54º E
Rodrigues Island, Port Mathurin, Mauritius	0.36	20º S	63º E
Colombo, Sri Lanka	0.31	7º N	80º E

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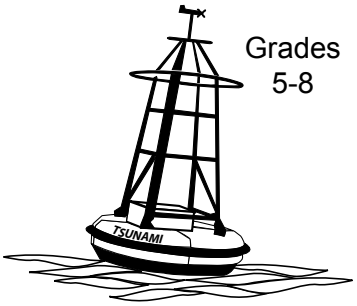
Student Worksheet (page 1 of 2)

"Tsunamis Around the World"



Directions: Use the latitudes and longitudes, accurate to the nearest degree, from the tsunami data below and the map on the following page to find and mark recent tsunami sources around the world. Use a red pencil to mark where each earthquake occurred and write the name of the country and the year next to the mark. Write small enough to fit everything on the map.

Date	Place Name	Earthquake	Deaths	Latitude	Longitude
1992, September 2	Nicaragua	magnitude 7.7	168	12º N	87º W
1993, July 12	Japan	magnitude 7.7	239	42º N	139º E
1995, October 9	Mexico	magnitude 8.0	40	19º N	104º W
1998, July 17	Papua New Guinea	magnitude 7.1	2,182	4º S	144º E
1999, August 17	Turkey	magnitude 7.6	150	40º N	30º E
1999, November 26	Vanuatu	magnitude 7.4	5	16º S	168º E
2001, June 23	Peru	magnitude 8.4	100	16º S	73º W
2002, January 2	Vanuatu	magnitude 6.3	0	17º S	167º E
2003, September 25	Japan	magnitude 8.3	0	42º N	144º E
2004, December 26	Sumatra	magnitude 9.0	297,248	3º N	95º E
2005, March 28	Sumatra	magnitude 8.7	2,909	2º N	97º E
2006, July 17	Java	magnitude 7.7	800	9º S	107º E

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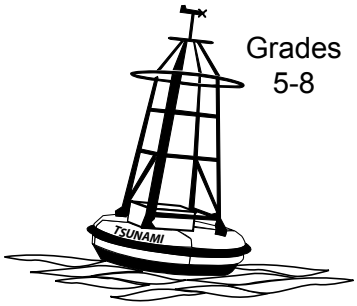

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"Tsunamis Around the World"