I. **Pre-reading.** Discuss the following topics with other students at your table.
   - What countries or regions of the world have earthquakes?
   - Do earthquakes occur in the United States? Where? When?
   - What about Oregon? Does Oregon ever have earthquakes?
   - What kind of damage do earthquakes cause?
   - What is a “computer simulation?”

II. Now **skim** the story for five minutes. Remember, **skimming** means reading quickly trying to understand the main ideas. Then, answer the true/false questions that follow the story.

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**Mondo Quake in Pacific Northwest?** By Leander Kahney

Geologists have discovered **evidence** of a powerful earthquake zone beneath the Pacific Northwest just **offshore** from the Seattle area. They made the discovery by comparing ancient records of a giant Japanese **tsunami** and a computer simulation of a huge **temblor** in the late 17th century. The vast earthquake zone runs 600 miles up the Pacific Coast from Northern California to southern British Columbia. This area appears to experience **monster** earthquakes about every 500 years.

Known as the Cascadia Subduction Zone, the **fault** could threaten Vancouver, Portland and Seattle. These cities are full of buildings that were not built to withstand **massive** earthquakes. "This region has the potential for truly enormous earthquakes," said Brian Atwater of the U.S. Geological Survey, one of three authors of a new paper about a giant 17th-century quake along the fault. Published in the **Journal of Geophysical Research-Solid Earth,** Atwater’s paper presents **solid** evidence that a magnitude-9 earthquake once sent a tsunami across the Pacific Ocean to Japan, where it caused considerable damage. The quake occurred on Tuesday, January 26, 1700. About 14 hours later, a 15-foot tsunami pounded the Japanese coast. In the United States, reports of the quake **survive** only in Native American **legend,** but in Japan, there are **extensive** written records of the tsunami, Atwater said.

Atwater and the other two authors of the paper, Kenji Satake of the Geological Survey of Japan, and Kelin Wang of the Geological Survey of Canada, wrote that the tsunami “**flooded** farmed fields, **ruined** salt kilns, damaged fishermen's **shacks,** ascended a castle moat, entered a government warehouse, drove people to high ground, and probably ran 2 kilometers up a river. **It wrecked** houses not only by flooding them but also by starting a fire. It contained multiple **waves** that lasted from midnight until the following noon.”

The geologists say that there are several pieces of geological evidence in the United States that indicate a big quake happened here about 300 years ago. It is not completely clear, however, whether this quake caused the Japanese tsunami. Atwater and the other authors made the connection between the Japanese tsunami and the earthquake in the Pacific Northwest through some **stands** of dead trees along the U.S. Pacific coast. These trees **drowned** in seawater between August 1699 and January 1700. Their time of death was determined by the trees' last growth
"That's the best link we have between the Japanese tsunami and the evidence in North America," said Atwater.

During the quake, the sea floor stretched 60 feet and dropped 5 feet. "It was a sudden lowering of a sizeable chunk of the ocean floor," Atwater said, "The ocean rushed in, and that's what created the tsunami." In Japan, Satake created a detailed computer model showing how the tsunami crossed the Pacific before crashing into Japan. According to Atwater, the Cascadia fault ruptures about once every 500 years and is capable of creating "truly giant earthquakes."

He said only three quakes this century compare in magnitude -- a 9.0 quake in Kamchatka in 1952, a 9.5 quake in Chile in 1960 and a 9.2 temblor in Alaska in 1964. "The famous 1906 earthquake (in San Francisco) was a very big earthquake, but this thing in 1700 was in a different class," said Atwater. He said that earthquakes in the Cascadia Subduction Zone typically have tremors that last for several minutes. "It is very challenging for building design," he said. "Most earthquakes don't last that long, so we have no experience building to withstand this type of prolonged shaking."

Thomas Heaton, an earthquake expert at California Institute of Technology, agreed with Atwater’s conclusions. Heaton said that the Cascadia Subduction Zone is very worrisome because no one knows how buildings in the region, especially high-rises, will behave in a large earthquake. "People don't have an adequate understanding of events of this magnitude," he said. "Most buildings in Seattle, Vancouver and Portland were built without consideration for this kind of event.” Heaton thinks that most wooden buildings would probably survive a big earthquake. However, structures made of masonry might have problems. "Most buildings in Seattle, Vancouver and Portland were built without consideration for this kind of event.” Heaton thinks that most wooden buildings would probably survive a big earthquake. However, structures made of masonry might have problems. Tall buildings and big bridges in our major Northwest cities would be especially vulnerable to long-period tremors. So, would they fall down? "We don't really know what to expect," Heaton replied. "We don't have good records."


III. Comprehension Questions. True or False. Answer true (T) or false (F) for each statement.

_____ 1. Geologists think that a big earthquake hit the Pacific Northwest about 300 years ago.

_____ 2. There was a tsunami in Japan at about the same time 300.

_____ 3. Oregon, Washington, and British Columbia are in a major earthquake zone.

_____ 4. Buildings in Portland and Seattle were built to be safe in an earthquake.

_____ 5. An earthquake destroyed Portland and Seattle in 1700.

_____ 6. This article shows that Oregonians don't have to worry about earthquakes.
IV. **Vocabulary.** Complete the chart for these words from the reading.

<table>
<thead>
<tr>
<th>Word or phrase</th>
<th>Do I know it?</th>
<th>Is it important in the story?</th>
<th>Is there an internal definition?</th>
<th>Can I guess or do I need the dictionary?</th>
<th>Meaning</th>
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V. Identifying the Main Idea. Read the story again more carefully. Choose the sentence that best states the main idea of each paragraph. Circle the letter of the best answer. Be ready to support your answer with passages in the story.

Paragraph 1 (lines 1-5).
  a. The Pacific Coast has big earthquakes about every 500 years.
  b. A huge tsunami hit Japan in the 17th Century.
  c. Scientists have found that the Pacific Northwest is a major earthquake area.

Paragraph 2 (lines 6-15)
  a. Three geologists just published a paper in an important scientific journal.
  b. Scientists think that a powerful earthquake in the Cascadia Subduction Zone caused a tsunami in Japan.
  c. Native Americans in the Pacific Northwest tell ancient stories about a strong earthquake.

Paragraph 3. (lines 16-21)
  a. According to ancient reports, a tsunami damaged Japanese coastal villages and farms.
  b. A tsunami started fires along the Japanese coast.
  c. A tsunami struck the Japanese coast for twelve hours.

Paragraph 4. (lines 22-29)
  a. Saltwater killed stands of trees along the Pacific coast about 300 years ago.
  b. There is some evidence of a link between the tsunami in Japan and an earthquake in the Pacific Northwest.
  c. There was a big earthquake in Japan 300 years ago.

Paragraph 5. (lines 30-34)
  a. The tsunami formed when the ocean floor moved and broke.
  b. One of the geologists used a computer model to show how the tsunami crossed the Pacific.
  c. The Cascadia fault could cause a major earthquake.

Paragraph 6. (lines 35-41)
  a. Three of the biggest quakes of the 20th Century occurred in Kamchatka, Chile, and Alaska.
  b. Earthquakes in the Cascadia Zone typically last longer, so they could be more destructive.
  c. There was a very big earthquake in San Francisco in 1906.

Paragraph 7. (lines 42-51)
  a. Buildings in the Pacific Northwest were not built with earthquakes in mind.
  b. Wood-frame houses are safer in an earthquake than brick or concrete houses.
  c. It’s difficult to know how much damage a major earthquake would cause in the Pacific Northwest.
VI. **Writing & Discussion.** Short answer. Read the article again. Answer the following questions with one or two sentences. Then, discuss your answers with others in your group.

1. The Japanese recorded many details about the tsunami that struck the coast of Japan in January of 1700. The people of Oregon and Washington didn’t write about an earthquake that happened about the same time. Why not?

2. According to the article, most of the buildings in Seattle, Vancouver, and Portland are not designed to survive earthquakes. What are some possible reasons for this?

3. If Dr. Atwater and his colleagues are correct, what does it mean for the future of the Pacific Northwest? Explain.

4. Do you think that a magnitude 9 earthquake could strike Oregon in the future? What could we do to minimize the damage?

**Do you want to learn more?** Now, write your questions about the article or about the topic. What do you want to know about earthquakes in the Pacific Northwest?