

Name: _____

Class: _____

Earth Science

Directions: Read the following article, then fill in the vocabulary and answer the questions that follow.

Disaster in Japan

What the deadly earthquake and tsunami mean for Japan, the global economy, and the future of nuclear power in the United States

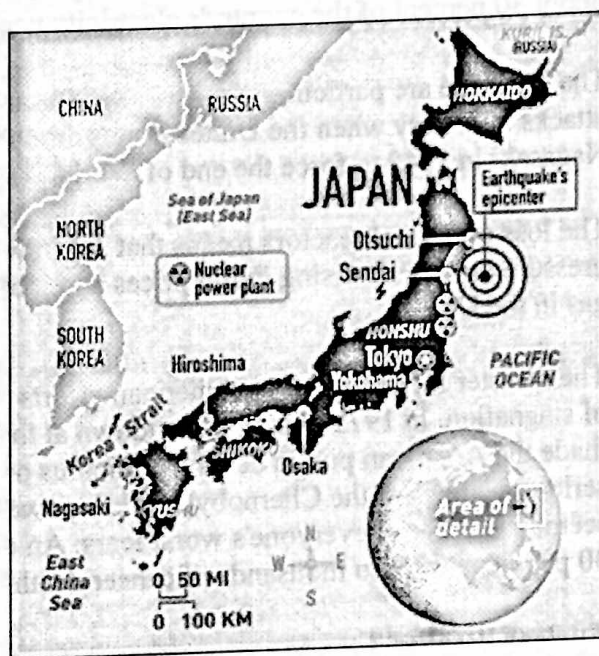
By Patricia Smith

The massive earthquake and tsunami that devastated northeastern Japan last month left that nation—and the world—with a host of troubling questions.

How is Japan, a global economic power whose economy was already struggling, going to recover from a disaster of this magnitude?

What's going to happen to Japan's critically damaged nuclear power plants—and to the nuclear power industry in general, especially in the United States, where nuclear power seemed to be on the verge of a comeback?

And is the rest of the world, including the U.S., prepared for this kind of disaster?



The 9.0-magnitude earthquake on March 11 struck off the coast of northeastern Japan. It caused a massive tsunami that slammed into the Japanese coast, killing thousands and obliterating entire villages. The quake was about 1,000 times stronger than the one that devastated Haiti last year and about 32 times stronger than the 1906 San Francisco earthquake.

The combination of earthquake and tsunami crippled a string of nuclear power plants, damaging their cooling systems and threatening catastrophic meltdowns and the release of deadly amounts of radiation into the atmosphere.

Prime Minister Naoto Kan described the triple whammy—the earthquake, tsunami, and nuclear calamity—as Japan's "worst crisis since World War II."

Economic Damage

The disaster further imperiled Japan's \$5 trillion economy, which had been struggling to climb out of a two-decade-long slump. In the last year, Japan was overtaken by China as the world's second-largest economy, after the United States.

Although Japan's industrial centers in the south and west seem to have been spared the worst, the crisis at the damaged nuclear plants north of Tokyo threatened to significantly reduce the amount of electricity available, forcing automakers like Toyota and Honda, as well as electronics giants like Sony, to halt production. That could further slowdown the Japanese economy.

The damage to the nuclear power plants will likely have long-term effects on the country's ability to generate enough electricity to power its high-tech economy. Japan is one of the world's top consumers of nuclear energy. The country's 17 nuclear plants—with 55 reactors—provided about 30 percent of the country's electricity needs.

The Japanese are particularly sensitive about nuclear issues, having suffered the only nuclear attacks in history when the United States dropped atomic bombs on the cities of Hiroshima and Nagasaki in 1945 to force the end of World War II.

The loss of several reactors means that Japan will have to import more oil, putting additional pressure on already-rising world prices and increasing the likelihood of the return of \$4-a-gallon gas in the U.S.

The disaster is likely to slow American efforts to increase the use of nuclear power after decades of stagnation. In 1979, a partial meltdown at the Three Mile Island nuclear plant in Pennsylvania made the American public deeply suspicious of nuclear power. And in 1986, a much more serious accident at the Chernobyl nuclear power plant in Ukraine (then part of the Soviet Union) seemed to confirm everyone's worst fears: An explosion, fire, and massive radiation leak killed 30 people and led to thousands of cancer deaths in the decades that followed.

Nuclear 'Brakes'?

But in the last few years, amid growing concerns about climate change and U.S. dependence on unstable sources of foreign oil, the idea of building more nuclear power facilities has become increasingly popular. President Obama, mainstream environmental groups, and large numbers of Republicans and Democrats in Congress seemed to be coming around to the idea that nuclear power should be part of the equation to satisfy America's long-term energy needs.

But that may change.

"I think it calls on us here in the U.S., naturally, not to stop building nuclear power plants but to put the brakes on right now until we understand the ramifications of what's happened in Japan," Senator Joseph Lieberman of Connecticut said last month on CBS's *Face the Nation*.

The situation in Japan raises troubling questions about how prepared other nations are for a disaster of this magnitude. Having spent billions of dollars developing the most advanced technology to warn and protect against earthquakes and tsunamis, Japan is considered the most prepared nation in the world for this kind of event. Its building codes are more stringent than American ones, and tsunami evacuation drills are a regular part of life.

Unlike Haiti, where shoddy construction vastly increased the death toll after last year's 7.0-magnitude quake, or China, where failure to follow construction codes worsened the death toll in the devastating 2008 Sichuan earthquake, Japan did everything "right."

All this has huge ramifications for California, which sits atop the volatile San Andreas Fault and is prone to major earthquakes. The most famous is the 7.9-magnitude San Francisco quake in 1906, which destroyed the city and killed more than 3,000. The state's most recent significant quake was the 6.7-magnitude Northridge earthquake, which struck southern California in 1994.

Seismologists believe California is due for a major quake along the lines of what occurred in Japan—the so-called "big one." That has Thomas Jordan, director of the Southern California Earthquake Center, very worried.

"You get what you pay for," Jordan says. "We're not paying for very much right now in terms of earthquake preparation, especially compared to the Japanese. And we're going to get our due."

(*The New York Times Upfront*, Vol. 143, April 4, 2011)

Vocabulary: write out the definitions for the following words:

Magnitude:

Epicenter:

Obliterate:

Meltdown:

Catastrophic:

Seismologists:

Calamity:

Stringent:

Ramifications:

Questions: After reading the article, answer the questions using your knowledge of Earth Science and your new found vocabulary skills.

- 1) From the article what was the 'triple whammy' that affected Japan?
- 2) Why should the country of Japan be concerned about earthquakes and their effects?
- 3) How big was the earthquake that hit Japan? Was this quake larger or smaller than the earthquake that Haiti experienced? How much larger or smaller?
- 4) How did the earthquake affect Japan's economy? Be specific.
- 5) Why is Japan sensitive to nuclear issues?
- 6) Do you think the disaster that affected Japan should have an impact the nuclear issues for the United States? Explain in a complete sentence.
- 7) Where in the United States should we be concerned about a future earthquake? Explain why this area is a particular danger.
- 8) Why did the situation in Japan raise earthquake preparation questions for other countries?