# Tsunami “Tscience”: Japan’s Killer Quake Video Questions

***Instructions****: Please answer the following questions completely in your journal using complete sentences.*

1. The Japanese earthquake shook the earth of its axis and caused the continent to

shift out to sea.

1. The first waves to arrive are called primary waves (p-waves) and they travel

every second!

1. Why are the secondary earthquake waves (s-waves) the most damaging?
2. Fill in these 2011 Japanese earthquake facts:
   1. Distance from epicenter:
   2. Tectonic plates involved:
   3. Rate of tectonic plate movement:
   4. Duration of quake:
   5. Magnitude of the earthquake:
3. What is liquefaction – a phenomenon that occurs during earthquakes?
4. What happened to cause this earthquake and the resulting tsunami?

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3. What is liquefaction – a phenomenon that occurs during earthquakes?
4. What happened to cause this earthquake and the resulting tsunami?
5. Fill in these 2011 Japanese tsunami facts:
   1. Height of column of displaced water during the earthquake:
   2. Amplitude of the tsunami wave:
   3. Wavelength of the tsunami wave:
   4. Top speed of the tsunami wave:
6. The speed of water waves depends on the .
7. What happens when the tsunami reaches shore with shallow water?
8. The tsunami wave brought in the over tons of water and

caused Japan’s coast to drop .

1. Why is the tsunami less intense the farther it gets from the epicenter of the earthquake?
2. How did cars and boats get on roof tops that were taller than the tsunami wave?
3. Over after-shock quakes occurred in the next week, ranging from

hundreds of magnitude to a handful of magnitude .

1. What happened at the Fukishima nuclear plant?
2. What is the Cascadia Subduction Zone?
3. Fill in these 2011 Japanese tsunami facts:
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# Tsunami “Tscience”: Japan’s Killer Quake Video Qs ANSWER KEY

***Instructions****: Please answer the following questions completely in your journal using complete sentences.*

1. The Japanese earthquake shook the earth of its axis and caused the continent to shift 2.4 m (8 ft) out to sea.
2. The first waves to arrive are called primary waves (p-waves) and they travel 4 miles every second!
3. Why are the secondary earthquake waves (s-waves) the most damaging?

They move the ground from side to side, causing most of the structural damage that occurs.

1. Fill in these 2011 Japanese earthquake facts:
   1. Distance from epicenter: 62 miles away from Japanese coast
   2. The Pacific tectonic plate was moving towards the Eurasian tectonic plate
   3. Rate of tectonic plate movement: 3 inches per year (same as your finger nails!)
   4. Duration of quake: 5 minutes
   5. Magnitude of the earthquake: 9.0
2. What is liquefaction – a phenomenon that occurs during earthquakes?

Loosely packed and waterlogged ground near the surface acts like a liquid. When the ground compresses, the liquefied sand is pushed to the surface.

1. What happened to cause this earthquake and the resulting tsunami?

The Eurasian plate compresses like a spring. The earthquake occurs when the upper plate springs back, displacing a column of water which collapses to form a tsunami.

1. Fill in these 2011 Japanese tsunami facts:
   1. Height of column of displaced water during the earthquake: 4 miles
   2. Amplitude of the tsunami wave: 3 meters
   3. Wavelength of the tsunami wave: 60 meters
   4. Top speed of the tsunami wave: over 500mph!
2. The speed of water waves depends on the depth of the water .
3. What happens when the tsunami reaches shore with shallow water?

The front of the wave slows down, causing water on the beach to look like its receding. The faster water at the back of the wave piles up (like a traffic jam), causing an even taller wall of water.

1. The tsunami wave brought in the over 1 billion (maybe as high as 10 billion) tons of water and caused Japan’s coast to drop 0.9 m (3 ft) .
2. Why is the tsunami less intense the farther it gets from the epicenter of the earthquake?

The energy of the wave is spread out along a wider circumference, reducing the intensity of the tsunami wave.

1. How did cars and boats get on roof tops that were taller than the tsunami wave?

The water was funneled into a small area by narrow straights. The only place for the water to go is up, so the level rises and can push the cars and boats onto roofs that are much higher than the recorded height of the wave.

1. Over 500 after-shocks occurred in the next week, ranging from magnitude 5.0 - 7.0 .
2. What happened at the Fukishima nuclear plant?

When the backup battery failed, the fuel rods continues to heat up, pressure in the reactors built up, water levels dropped, and the plant workers had to use sea water to cool the reactors. Hydrogen gas built up and exploded.

1. What is the Cascadia Subduction Zone?

The tectonic plate boundary off the coast of Oregon and Washington many scientists fear could be the location of an earthquake and tsunami like the ones in Japan in 2001 (and Sumatra in 2004). It will likely create a similar 9.0+ magnitude quake in the future. On average the fault produces a major earthquake every 500 years – the last occurring 305 years ago.