

Understanding Tsunamis

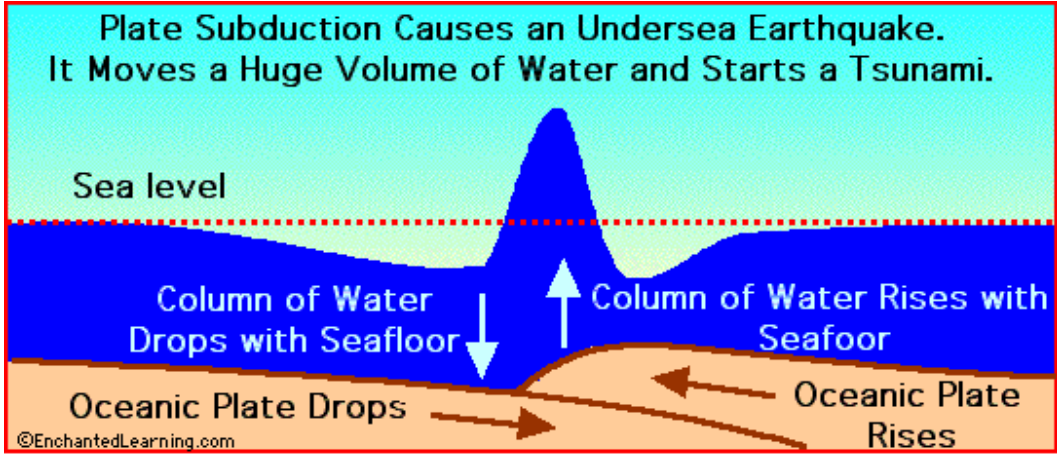
Lesson Plan: Making students aware of the tsunami and its devastation as well as learning about proportion for years 6 under the topic of proportion

Objective of Lesson: By the end of the lesson pupils will:

1. Know about tsunami as well as being aware of the devastation it causes
2. Have an idea of what elements causes the devastation
3. Be able to relate devastation to the power (energy) of tsunami and force depends on how fast water moves and mass (amount) of water coming.
4. Experience different ways of calculating the power of tsunami as a proportion of the mass (hence amount) of water.

Lesson period: 1 hour

Activity	UNDERSTANDING TSUNAMIS	Teacher's & Student's role
1	<p><u>Introduction</u> News about Tsunami. Videos or pictures showing devastation caused by tsunamis. http://www.youtube.com/watch?v=ENpOvC9LW8c&feature=related</p> <p>T: Working in groups, discuss: Do you know what Tsunami is? What causes Tsunami? Why is the tsunami so powerful to cause such devastation?</p> <p>Most tsunamis are caused by earthquakes. It may also be caused (less common) by landslides. After the huge volume of water has moved, the resulting wave is very long (the distance from crest to crest (wavelength) can be very long) but not very high. In the open ocean the waves are not high at all, and can pass under ships with no noticeable effect.</p>	<p>Teacher play the video, pupils watch</p> <p>Teacher orchestrate the discussion and feedback from students</p> <p>Key points to look at in the feedback: A. Tsunami is a series of extremely large/great sea waves.</p>

	<p style="text-align: center;">Plate Subduction Causes an Undersea Earthquake. It Moves a Huge Volume of Water and Starts a Tsunami.</p>  <p>Tsunamis can travel at the speed of a jet aircraft and can stretch in length for hundreds of kilometres across the ocean. As the waves approach land, their amplitude (height of the wave) increases, and it can reach a height of 60 meters.</p> <p>The extent of devastation depends on how fast and how large the Tsunami is because the larger and faster the tsunami, the bigger the energy or power of the tsunami.</p>	<p>Teacher to explain the diagram.</p> <p>Teacher to discuss with children. Guide them to look at what makes devastation large. Pupils saw in the video how big the wave is and how fast it travels when it hit the shore.</p>
<p>2</p>	<p><u>Relationship between Power (Energy) and Volume of Water</u></p> <p>The size and power of a tsunami depends on the amount of energy an earthquake transfers to the ocean when it causes the ocean floor to move from side to side (Song, 2010). The power of the tsunami can also be approximated by looking at the height of the wave (amplitude). Energy is the ability to do work. In the SI system, the unit of energy is the <i>joule</i>. Power is work divided by time, so the unit of power is the <i>joule/s</i>, which is called a <i>watt</i></p> <p>As explained above, one of the factors of the power of the tsunami is how much water crash to the shore. Imagine having two buckets of water poured on you compared to 1 bucket. The more the amount (volume) of water, the more the energy.</p>	<p>Teacher to discuss power and energy with students and its association to mass (hence volume) and speed in simple language.</p> <p>The simplest way to calculate the power. In</p>

- **Power is proportional to the volume of water.**

Q: If the power of a tsunami wave is 5.2 megaJoule/s when the volume of water is 2 cubic metre, what is its power when the volume of water displaced is 10 cubic metre? Imagine what it will do to your house if your house is at the beach where tsunami happen.

mid-ocean, long waves have kinetic energy $\frac{1}{2}u^2$ per unit mass. The mass of a column of water a square metre in cross-section and D metres tall is ρD , where ρ is the density of water, about one tonne per cubic metre. So, per unit horizontal area, the energy is $\frac{1}{2}\rho Du^2$.

Teacher to highlight the different ways of solving the problem. I think there are at least 5 different ways of solving.