Science Homework

Name: _____ _____ Core: _____ Date: _____

Article is underlined and [illegible] words are circled/highlighted: _____/20 points

Science Synonyms WORD [illegible]d boxes: _____/20 points

4 Most Important words & definitions: _____/20 points

2 Most Important Facts & Supporting Details: _____/20 points

2 Paragraph Summary using *at least 2 Important Words/Facts*: _____/20 points

You may have heard of tsu[illegible]mis, the enormous waves that crash into the coastline and flood entire towns, even cities. The 2011 Tōhoku tsunami, which slammed into Japan, caused billions of dollars worth of [illegible]amage. Thousands of lives were lost. It even caused the meltdown of the Fukushima Daiichi N[illegible]clear Power Plant.

But what exactly causes such waves to form in the first place?

The waves produced during the Tōhoku tsunami were, quite simply, huge. The tallest may have reached a height of 133 feet, scientists believe. In certain areas, these waves traveled as far as six miles inland, wiping out nearly everything in their path.

Waves of this size are usually caused by earthquakes. In the case of Tōhoku, the earthquake was classified as an "undersea megathrust earthquake," and it is considered the biggest earthquake to ever have hit Japan. In fact, it was the fifth-largest earthquake ever measured, since humans began tracking the size of earthquakes in 1900.

The earthquake caused the ocea[illegible] floor to be thrust upwards by as much as 15 feet. When the seabed rises, so does the oc[illegible] above it. And the more shallow the water is where the earthquake occurs, the larg[illegible] the tsunami will be. Unfortunately for the inhabitants of Japan's coastline, the earthquake h[illegible]pened just 45 miles off the coast.

Tsunamis behave differentl[illegible]han average ocean waves. For one thing, the type of waves you see at the beach are caused by wind. They tend to have a wavelength—that is, the distance between the crests of two consecutive waves—of around 330 feet. They also tend to average about 6.6 feet in height.

By contrast, deep ocean tsunamis typically have a wavelength of 120 miles. The amplitude of the waves—or the distance from the top of the wave to the bottom—is usually around 3.3 feet.

This isn't a very big wave at all. However, as the tsunami gets closer to shore, it grows dramatically in size. This is because the sloping of the coastline causes the wave to be compressed. While its speed and wavelength decreases, its amplitude increases. In turn, the frequency of the waves, or the number of wave cycles per second, also increases.

One indication that a tsunami is on its way is that the water that normally covers the shorelines begins to recede. Some of those who were unlucky enough to experience the Tōhuku tsunami described the ocean receding out to sea, before coming back in the form of some very big waves.

Not all tsunamis are formed by undersea earthquakes. They can be triggered by explosions and underwater landslides. Picture a glacier cracking in half, and sending a chunk of ice miles long plunging into the ocean. That will cause a gigantic amount of water to be displaced, and can often result in a tsunami.

Similarly, a tsunami could be generated by a giant meteor splashing into the ocean from outer space. Or a volcanic eruption in an underwater volcano. And yet the most common causes of tsunamis remain underwater earthquakes.

The reason we don't hear about too many tsunamis striking the Atlantic Ocean coastlines of the US and Europe is that they more frequently happen in the Pacific. The floor of the Pacific Ocean consists of oceanic plates and continental plates that constantly slide against one another. On occasion, the plates get stuck, causing the upper plates to snap upward several inches or even a few feet, pushing a whole section of the ocean up with it.

Again, a rise of a few inches may not sound like much. But it can cause devastating waves. To achieve equilibrium, the water above the crack in the plates spreads out. It starts moving toward the shore very quickly, often at hundreds of miles per hour. And when it starts to reach shallow land, that's when it transforms into what we think of when we think of tsunamis. Terrible disasters often result.

By definition, all waves transmit energy from one place to another. The energy of an underwater earthquake, in other words, is often transmitted to land in the form of a series of tsunamis.

Ocean waves are only one of many kinds of waves. Another common wave form is the sound wave. Sound waves travel through the air the way water waves travel through the ocean. Similar to water waves, sound waves are created by vibrating objects, which cause the air around them to vibrate as well. This vibrating air, in turn, causes the human eardrum to vibrate. The brain interprets this vibration as sound.

One form of sound waves and water waves is the same. They exhibit the same consistent, rippling pattern. You might imagine sound waves as tiny, invisible ocean waves crashing on the shores of the human eardrum.

Then again, sound waves don't only travel through the air. They can also move through water. In fact, water is an excellent conductor of sound waves; the medium allows sound waves to travel five times as fast as they would in the air. Sound waves generated under water can also travel much longer distances.

Whales are particularly well known for using sound waves to communicate deep beneath the surface of the ocean. Their "songs," as we call their form of communication, can last for up to 30 minutes. Whales use sound waves as mating calls, or as a method of alerting other whales to the existence of a nearby food supply. Some marine biologists believe that whales use sound as a way to socialize in certain parts of the ocean. Each whale species has its own set of sounds.

Unlike humans, whales receive sound waves through a section of their lower jaw, which then transmits the message to the middle ear. There, however, the processing of sound waves occurs as it does in humans: a sensitive membrane perceives the different vibration frequencies.

It is important to remember that the amplitude of sound waves, not the frequency, is what determines whether a sound is heard or not. Changes in amplitude create changes in volume. This is why performing musicians play music through amplifiers on stage: so that the people in the back rows can hear. Were bands somehow able to perform underwater they wouldn't need quite so many amplifiers.

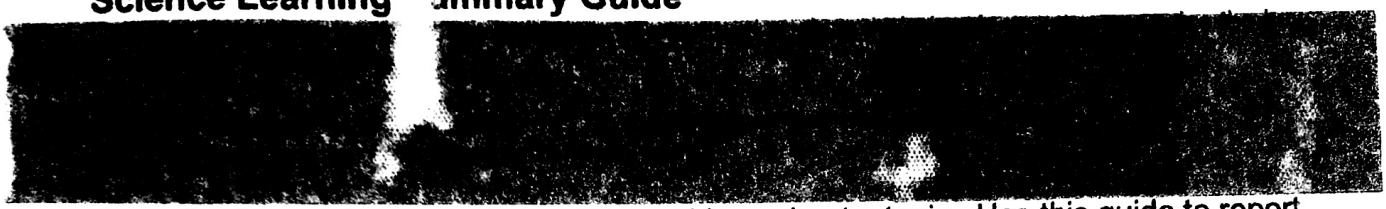
SCIENCE SYNONYMS

[redacted]

WORD	Show what it means. Draw a picture.	Write a word that tells about your word. It could be a synonym. It could be a category.

[redacted]

Science Learning ummary Guide



A good article or chapter includes different ideas about a topic. Use this guide to report on a topic you learn about by reading.

TOPIC: _____

What are 4 words that are important to understanding this topic?

Word	What It Means

List two different ideas you learned. For each idea, list two facts that support it.

Idea: _____

Supporting Facts:

Idea: _____

Supporting Facts:

Write a Summary

Use your words, facts, and ideas to write about this topic.