# Grade 4: Unit 3, Lesson 11

**Title:** *Hurricanes: Earth’s Mightiest Storms*

**Essential Question:** What are hurricanes and how do scientists learn about them?

**Week 1**

Questions to ask and discuss while reading:

**Where and when do hurricanes begin?**

*They begin in warm tropical oceans, feeding on the warm, moist air during times of low pressure.*

**How do hurricanes develop?**

*Warm moist air rises rapidly, cooling as it rises. The cooling causes moisture to condense and form clouds. The condensing gives off energy that powers the storm*

**What information does the diagram of the hurricane on page 323 show? How does this information connect with the text?**

*The diagram shows how warm air rises and gathers together (condenses) in the clouds- it is a visual which illustrates what is explained in the text above.*

**How do the earth’s rotation and the ocean’s temperature affect the whirling motion of a hurricane?**

*The rotation causes the rising air to turn, and the warm ocean adds a steady fuel of moist air. This results in strong spiraling winds.*

**Why is a hygrometer an important weather instrument?**

*It tells how much moisture is in the air, so it helps predict whether it is going to rain.*

**Why do planes fly into hurricanes to take measurements such as temperature and water content?**

*The measurements will show how strong the hurricane is and may become.*

**Why do weather satellites have a different view of hurricanes than that of planes?**

*Planes measure the inside of hurricanes; satellites get the big picture: size, location, path.*

**How can computers determine what a hurricane might do?**

*They can match a developing hurricane with previous hurricanes in similar circumstances and predict the strength and path of the new hurricane*

**Written Response**

**Option 1**

Write a description of a hurricane and how it forms using at least three vocabulary words. Write a paragraph and draw a diagram to explain your thinking.

**Sample Student Response**

*Note: This is for the teacher’s use only, not for students. The purpose is to show the teacher what the final piece might look like when students have completed their work.*

*Hurricanes are violent storms that start up in the ocean, using warm, moist air as fuel. It seems like they always start near the islands and places that are near the equator because those locations have a lot of hot air. Weather scientists can predict when hurricanes will form. When the rotating winds and air reach 74 miles per hour, the T.V. weather folks call it a hurricane. Hurricanes are huge storms that with winds that rotate, or circle, rapidly, around their center parts.*

*[diagram with labels]*

**Option 2**

Use evidence from the text to describe to describe at least two of the important tools scientists use to predict hurricanes.

**Sample Student Response**

*Note: This is for the teacher’s use only, not for students. The purpose is to show the teacher what the final piece might look like when students have completed their work.*

*Scientists have worked to develop tools that can help predict hurricanes. A hygrometer is a tool that measures the moisture and humidity in the air. Planes and weather satellites can measure the hurricane- how big it is, how strong it might become, and even take pictures of what it looks like. When scientists have this information they can learn more about hurricanes and predict when they might strike in the future. This can help because warnings can help people avoid the danger. That’s why scientist’s tools are important in predicting hurricanes.*

**Week 2, Building Knowledge: Extending the Topic**

**Essential Question:** What do natural disasters do to communities?

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| Cumulative Activities – The following activities should be completed and updated after reading each resource this week. The purpose of these activities is to capture knowledge building from one resource to the next, and to provide a holistic snapshot of central ideas of the content covered in response to the essential question. *It is recommended that students are required to complete one of the Cumulative Activities (Rolling Knowledge Journal or Rolling Vocabulary) for the week.* |

**Rolling Vocabulary: “**Sensational Six**”**

* Read each resource then determine the six words from each text that most exemplify (show best) the central idea of the text.
* Next use your six words to write about the most important idea of the text. You should have as many sentences as you do words.
* Continue this activity with EACH selection in the text set.
* After reading all the selections in the Expert Pack, go back and review your words.
* Now select the **“**Sensational Six**””** words from **ALL** the word lists.
* Use the **“**Sensational Six**”** words to summarize the most important learning from this text set.

**Sample Student Response**

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| **Title** | **Six Vocabulary Words & Sentences (with a few extra!)** |
| *Hurricanes: Earth’s Mightiest Storms* | **Words: condense, hurricane, rapidly, source, whirling, rotate**  **Sentences:**   1. A **hurricane** is a huge water-based storm that causes much destruction. 2. Huge **whirling** storms that develop in the ocean are called hurricanes. 3. The **source** of the storm’s rain was the group of clouds. 4. The water will cool and **condense** to form clouds. 5. The stormy waters moved **rapidly** across the ocean. 6. The huge storm is violent, and it will **rotate** around its center, or “eye.” |
| *Tornadoes* | **Words: ancient, condense, predict, rage, rapidly, registered, rotate, experience**  **Sentences:**   1. A tornado can **rage** on the ground for several minutes. 2. The air pressure can **rapidly** change the direction of a tornado. 3. The tornado’s destruction **registered** costs of two billion dollars. 4. I hope we never **experience** the effects of a tornado in our own. 5. As moisture in warm airs starts to cool and **condense**, it changes into small drops of water. 6. Thunderheads **rotate**, or spin around, and turn into tornadoes. 7. Scientists are able to correctly **predict** tornadoes. 8. Since **ancient** times, men have watched clouds to forecast storms. |
| *Volcanoes* | **Words: whirling, source, ancient, rapidly, predict**  **Sentences:**   1. Hot ash, gas, and **whirling** steam burst up and out of the mountain. 2. The erupting volcano was the **source** of the cloud of ash. 3. Long ago, **ancient** people told stories to explain why volcanoes erupted. 4. A huge cloud of ash **rapidly** formed above the top of the volcano. 5. The ashy, gaseous clouds seemed to be rotating around the top of the volcano. 6. Scientists are better able to **predict** where and when volcanoes will erupt. |
| *Tsunamis* | **Words: condense, predict, rage, registered, source, whirling,**  **Sentences:**   1. The earthquake in Ecuador **registered** above 7.5 on the Richter scale. 2. We just read that winds and waves are the **source** of most ocean waves. 3. I also learned that a narrow harbor forces a Tsunami to **condense** in a much smaller area. 4. The **whirling** tsunami pounded the inland and destroyed the plants. 5. The violent **rage** of the tsunami left thousands of people homeless. 6. Scientists in different countries work together to **predict** the path of tsunamis. |
| *The Big Dangerous Wave* | **Words: ancient, condense, rage, sources, tsunami, whirling**  **Sentences:**   1. A **tsunami** is a dangerous wave caused by an ocean’s earthquakes and landslides. 2. The **source**s of most ocean waves are wind and tides. 3. The tsunami’s **rage** destroyed everything in its way. 4. In a tsunami, land along the shore causes waves to **condense**, or squeeze, into a smaller space. 5. The news report stated that the **whirling**, or spiraling, tsunami was than more than 100 feet tall. 6. Tsunamis are not new weather disasters because records show they happened in **ancient** Japan. |
| *Nature Destroys, Nature Renews* | **Words: predict, rage, registered, rapidly, rotating, whirling**  **Sentences:**   1. The **whirling** clouds blow trees and plants down, but they also carry seeds throughout the countryside. 2. When lightning strikes forests, it causes wildfires to **rage** for days. 3. The destruction **registered** from weather-related natural disasters was more than 10 billion dollars, last year. 4. Nature unleashes many disasters on our slowly **rotating** planet. 5. Although forecasters may **predict** tsunamis and tornadoes, they rarely know when lightning will cause a wildfire. 6. The wind causes wildfires to spread **rapidly** through forests and neighborhoods. |
| **Sensational Six** | **ancient, eruptions, predict, whirling, rapidly, hurricane** |
| **Summary:**  The practice of studying nature began with **ancient** peoples long ago. In this unit we studied how scientists **predict** various natural disasters, like **hurricanes**. Scientists forecast natural forces, such as volcanic **eruptions** of **whirling** steam and ash that come down the volcano **rapidly**. | |

**Rolling Knowledge**

1. Read each selection in the set, one at a time.
2. After you read *each* resource, stop and think what the big learning was. What did you learn that was new *and important* about the topic from *this* resource?
3. Write, draw, or list what you learned from the text about (topic). Then write, draw, or list how this new resource added to what you learned from the last resource(s).

**Sample Student Response**

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| **Write, Draw, or List** | | |
| **Title** | **New and important learning about the topic** | **How does this add to what I learned already?** |
| 1. *Hurricanes: Earth’s Mightiest Storms* | A hurricane is a huge, whirling, water-based storm that develops in the ocean and causes a lot of destruction. | A hurricane differs from a tsunami in that it is not caused by an earthquake. |
| 2. *Nature Destroys, Nature Renews* | While wildfires destroy a lot of land, they also can be helpful to the soil. | Burned matter from wildfires leave nutrients in the soil. |
| 3. *The Big, Dangerous Wave* | A tsunami is a big, dangerous wave caused by a strong movement of land into or below the sea. | Landslides, volcanoes, and earthquakes can cause tsunamis. |
| *4. Tornadoes* | Most tornadoes start as thunderstorms which form when large streams of cool, dry air hit warm, wet air. | It’s the movement of cool air and warm air that forms thunderstorms and tornadoes. |
| *5. Tsunamis* | Earthquakes on the sea floor can cause gigantic wave called a tsunami. | Tsunamis can travel at speeds up to 600 mph. |
| *6. Volcanoes* | Volcanoes occur when gases, hot ash, and melted rock push up from the mantle through openings in the crust. | The hot melted rock, or lava, is what erupts, or flows from, the top of the volcano. |

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**Title:** *Hurricanes: Earth’s Mightiest Storms*

**Essential Question:** What are hurricanes and how do scientists learn about them?

*This is a note taking form for you to collect thoughts and evidence during your reading and class discussions. You can use this when you write your essay later.*

Where and when do hurricanes begin? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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How do hurricanes develop? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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What information does the diagram of the hurricane on p. 323 show? How does this information connect with the text? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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How do the earth’s rotation and the ocean’s temperature affect the whirling motion of a hurricane? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Why is a hygrometer an important weather instrument? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Why do planes fly into hurricanes to take measurements such as temperature and water content? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Why do weather satellites have a different view of hurricanes than that of planes? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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How can computers determine what a hurricane might do? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Week 1 Written Response**

**Prompt #1:**

Write a description of a hurricane and how it forms using at least three vocabulary words. Write a paragraph and draw a diagram to explain your thinking.

**Prompt #2:**

Use evidence from the text to describe to describe at least two of the important tools scientists use to predict hurricanes.

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**Building Knowledge: Extending the Topic**

**Essential Question:** What do natural disasters do to communities?

**Rolling Vocabulary: “Sensational Six”**

* Read each resource then determine the 6 words from each text that most exemplify (show best) the central idea of the text.
* Next use your 6 words to write about the most important idea of the text. You should have as many sentences as you do words.
* Continue this activity with EACH selection in the text set.
* After reading all the selections in the Expert Pack, go back and review your words.
* Now select the “Sensational Six” words from **ALL** the word lists.
* Use the “Sensational Six” words to summarize the most important learning from this text set.

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| **Title** | **Six Vocabulary Words & Sentences** |
| *Hurricanes: Earth’s Mightiest Storms* | Words:  Sentences:  1.  2.  3.  4.  5.  6. |
| *Tornadoes* | Words:  Sentences:  1.  2.  3.  4.  5.  6. |
| *Volcanoes* | Words:  Sentences:  1.  2.  3.  4.  5.  6. |
| *Tsunamis* | Words:  Sentences:  1.  2.  3.  4.  5.  6. |
| *The Big Dangerous Wave* | Words:  Sentences:  1.  2.  3.  4.  5.  6. |
| *Nature Destroys, Nature Renews* | Words:  Sentences:  1.  2.  3.  4.  5.  6. |
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| **Sensational Six:** | |
| **Summary:** | |

**Rolling Knowledge Journal**

1. Read each selection in the set, one at a time.
2. After you read *each* resource, stop and think what the big learning was. What did you learn that was new *and important* about the topic from *this* resource? Write, draw, or list what you learned from the text about (topic).
3. Then write, draw, or list how this new resource added to what you learned from the last resource(s).

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| **Write, Draw, or List** | | |
| **Title** | **New and important learning about the topic** | **How does this add to what I learned already?** |
| 1. *Hurricanes: Earth’s Mightiest Storms* |  |  |
| 2. *Nature Destroys, Nature Renews* |  |  |
| 3. *The Big, Dangerous Wave* |  |  |
| *4. Tornadoes* |  |  |
| *5. Tsunami* |  |  |
| *6. Volcanoes* |  |  |