



**HURRICANES**  
The power of the sea

## 4th Grade Lesson Plan: Hurricanes

### Overview

This series of lessons was designed to meet the needs of gifted children for extension beyond the standard curriculum with the greatest ease of use for the educator. The lessons may be given to the students for individual self-guided work, or they may be taught in a classroom or a home-school setting. This particular lesson plan is primarily effective in a classroom setting. Assessment strategies and rubrics are included. The lessons were developed by Lisa Van Gemert, M.Ed.T., the Mensa Foundation's Gifted Children Specialist.

## Introduction

Kids find weather fascinating. Big storms, snow days and wind enough to fly a kite all hold their attention. Hurricanes, one of nature's most destructive forces, are particularly interesting and lend themselves to independent exploration. The study of hurricanes rewards the young scholar with the ability to understand more about the forces that shape our world.

### Guiding Questions

- What are hurricanes?
- What are the conditions under which a hurricane can form?
- How are hurricanes measured?
- How do hurricanes travel?
- How are hurricanes named?

### Learning Objectives

After completing the lessons in this unit, students will be able to:

- Define hurricane
- Determine what conditions are necessary to create a hurricane
- Locate when and where hurricanes form and travel to within the

Atlantic ocean

- Define the stages of development and recognize the parts of a hurricane
- Explain how the intensities of hurricanes are measured and the damage they inflict
- Create a chart of the destruction of historical storms
- Understand hurricane naming
- Evaluate hurricane strength
- Analyze primary documents related to hurricanes
- Plot the path of a hurricane
- Write a newspaper article about an imaginary hurricane

- Make their own hurricanes
- Conduct an interview regarding dramatic weather experiences
- Analyze hurricanes as a theme in literature and art

### Preparation

- This plan requires extensive Internet access.
- The plan should be printed for student use, but due to the extensive linking of external sites, students may wish to use the plan at [MensaForKids.org](http://MensaForKids.org) to access the link without typing the entire url.

### Assessment

Not every activity is planned to be graded. The assessment section at the end has scoring guides and rubrics for the assignments for which grades are planned, although a teacher/parent may decide to score every activity.



## Lesson 1: Introduction

Eventually, the residents of the biggest, most populated city in Texas would call it "The Great Storm," but that was years after the tempest was born off the coast of Africa in the late summer of 1900. It traveled stealthily, almost without notice, across the Atlantic Ocean. It struck Antigua, Cuba, and then the Florida Keys. American weather forecasters ignored the warnings of Cuban meteorologists as the storm careened across the Gulf of Mexico. It greeted the residents of New Orleans with heavy damage before turning its unrelenting eye toward the rich, vulnerable, soon-to-be-destroyed island of Galveston, Texas. It was Saturday afternoon, the 8th of September, when the warning came. The shifting storm teased the residents – yes, it will hit; no, it will not. By Sunday morning, the storm was gone, and so was most of the city.

It was the deadliest natural disaster to ever hit the United States before or since, and it killed approximately 8,000 people – one in every five residents of the city. We don't know how fast the wind was blowing because, after recording a wind speed of 100 mph, the measuring device was destroyed, and only estimates could be made. But it wasn't the wind that did the killing. It was the water.

Galveston, basically a large sand bar, had an average elevation of fewer than nine feet above sea level. The storm surge that baptized the island was more than 12 feet high. All telegraph equipment was destroyed, and it took two days for word to begin to get out that Galveston and its residents were devastated.

*"The wreck of Galveston was brought about by a tempest so terrible that no words can adequately describe its intensity, and by a flood which turned the city into a raging sea."*

**Richard Spillane's first-hand account, published in *The New York Times*, September, 1900**



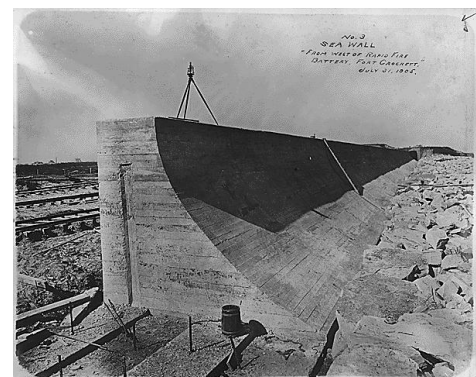
In the picture at left, residents pick through the ruins of their houses, searching for anything they can salvage.

At first they tried to dump the bodies at sea because there were too many to bury, but the currents of the Gulf of Mexico brought them back to the island, where they washed up on the beach. For weeks after the storm, men collected and burned the bodies in funeral pyres.

Recovery took years, and Galveston never regained its place of prominence. The Great Storm ensured that Houston, not Galveston, would be the most important

port city in Texas. In the picture at right, you can see the construction of the seawall, built after the devastation storm to protect the island.

The Great Storm was a hurricane – one of nature's most fascinating and destructive phenomena.

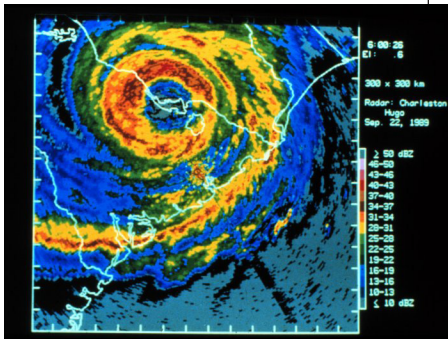




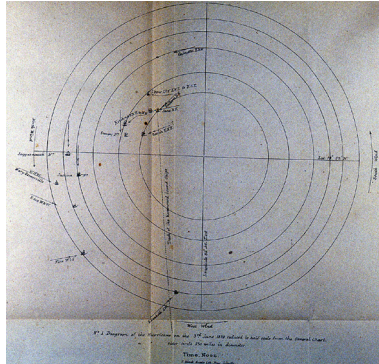
## Lesson 2: Definitions and descriptions

Hurricanes are called tropical cyclones by meteorologists, and actually they are only called hurricanes in certain parts of the world. In the northwest Pacific, they are called typhoons, and in the Indian Ocean they are called cyclones. We will use these terms interchangeably, and it's intriguing to see where these different names originated.

**Hurricane:** This word is interesting because it comes directly to English from the Spanish (instead of Latin). The Spanish explorers got the word from the Taino Native American language, in which it means "storm." Some people say that it also referred to a storm god, but that's not completely verified. Because the letters "f" and "h" used to be interchangeable in Spanish, centuries ago "hurricane" was spelled with an "f." In fact, in Portuguese, it is still furacão.



The satellite image above is of Hurricane Hugo, a very large storm that hit land in 1989. In this image, it has already moved inland near Charleston, S.C.



**Cyclone:** This word proves that you, too, can make up a word. A man named Henry Piddington, who worked for the British East India Company, created this word as a name for monstrous oceanic storms after witnessing one in December of 1789 in India. He adapted the word from the Greek *kyklon*, meaning "moving in a circle, whirling around." This is also related to *kyklos*, which means "circle." It has also been applied to tornados for 150 years. Sir Henry went on to study these storms and wrote a book about them for sailors. The picture above, drawn by Sir Henry, is important because it was one of the earliest pictures to show cyclones were circular and how they rotated.

**Typhoon:** Pick an origin, any origin! There are several possibilities for the origin of the word "typhoon." In Greek mythology, Typhon was the son of Gaia and Tartarus. He was enormous, and he had 100 dragon heads on each hand. In the picture below, you can see Zeus with his thunderbolt ready to attack Typhon. Do you see how Typhon's bottom half is a snake? It hissed! Scary! In Arabic, Persian and Hindi, there is a word *tufan* that means "big cyclonic storm." This word could have come to the Arabic from the Greek. In the Koran, *Al-tufan* refers to a storm or flood. In Chinese, *tai fung* is a big wind. In India, the word *toofan* is a big storm.



**Willy-Willy:** This is what they're called in Australia! It's an Aboriginal word that can also mean a dust storm.

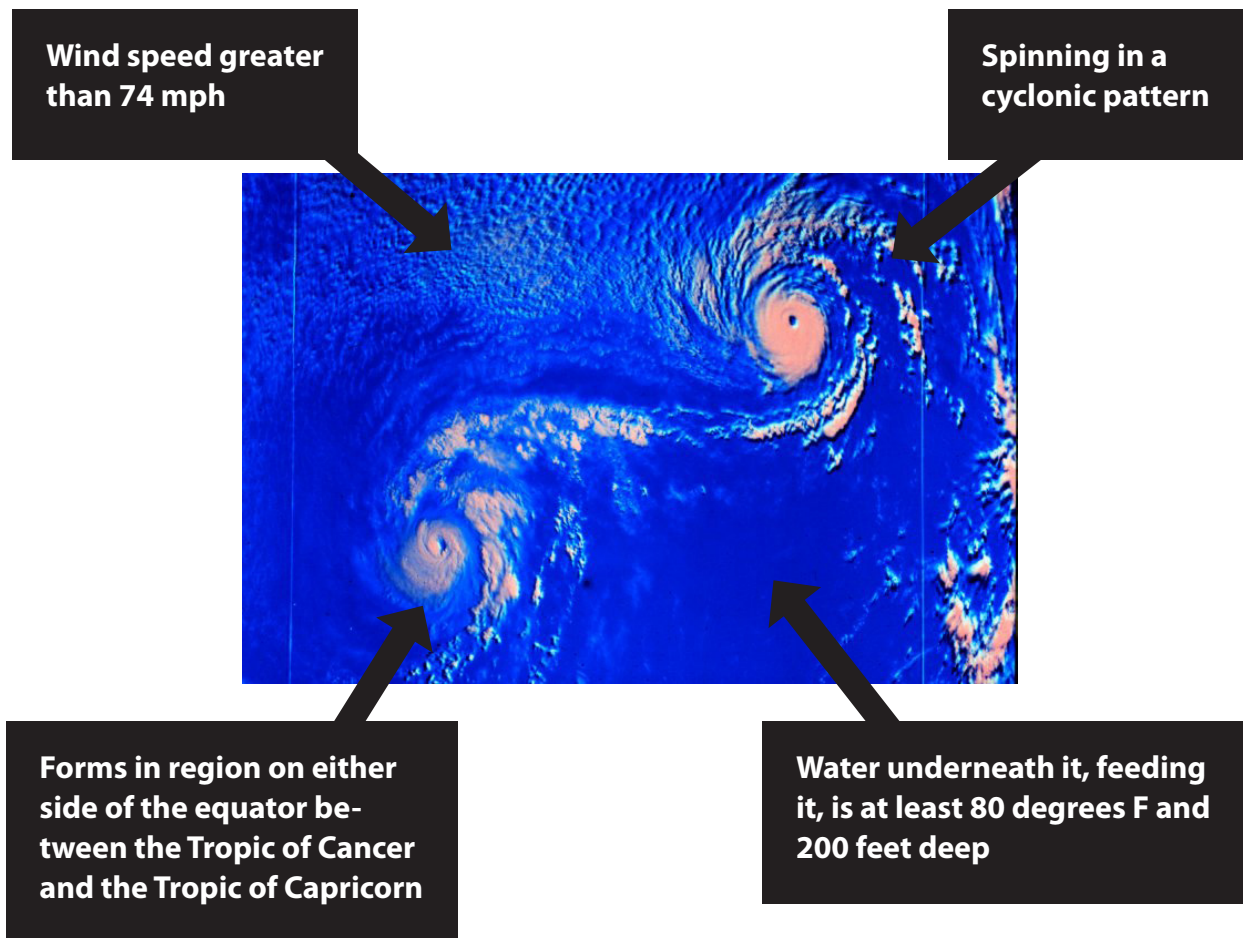


**You name it:** Imagine that NOAA (National Oceanographic and Atmospheric Administration) has asked you for a new name for tropical cyclones that hit land in the North Atlantic (rare, but happens). They want a name that has some significance (the word has an appropriate meaning or a name with a history/background that is applicable). What would you name it, and why?

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So, what are they? To be called a tropical cyclone, a storm has to meet certain conditions:



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Watch this animation about how hurricanes form:

[cbsnews.com/htdocs/natural\\_disasters/hurricanes/frameource\\_flash.html](http://cbsnews.com/htdocs/natural_disasters/hurricanes/frameource_flash.html)

Make a flow chart to show the critical stages of the formation of a hurricane using the information from the animation and what you have read. Select five key steps that you feel are the most important in the formation of a hurricane. Next to each key step, you should add two pieces of information. The information can be facts about hurricanes you learned from the animation, or more information about the step you chose.

**STEP 1**

**STEP 2**

**STEP 3**

**STEP 4**

**STEP 5**

1 \_\_\_\_\_

2 \_\_\_\_\_

1 \_\_\_\_\_

2 \_\_\_\_\_

1 \_\_\_\_\_

2 \_\_\_\_\_

1 \_\_\_\_\_

2 \_\_\_\_\_

1 \_\_\_\_\_

2 \_\_\_\_\_

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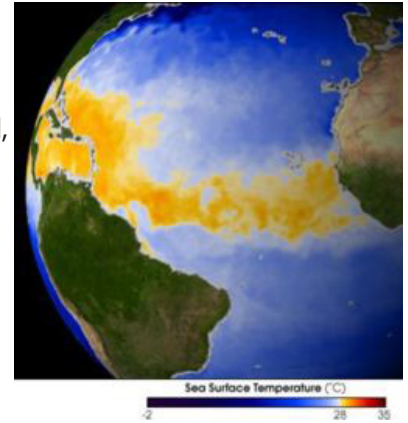


Sir Henry Piddington, the man who named cyclones, called the eye of a cyclone the "fatal centre." Why is this a good name, even though the eye is calm?

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This image from NASA shows the band of warm water (in yellow) extending across the Atlantic Ocean from Africa (on the right) to the Caribbean Sea (on the left). It is in this band of warm water that hurricanes are born, first as wind, then tropical depressions, then tropical storms, and then finally, hurricanes.



Read the article at [nytimes.com/1990/09/25/science/more-strong-hurricanes-predicted-for-east-in-next-2-decades.html](http://nytimes.com/1990/09/25/science/more-strong-hurricanes-predicted-for-east-in-next-2-decades.html) and then answer the questions regarding it.

1. Why should people outside of Africa be concerned about weather in the Sahel Region?

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2. Which is more likely to produce a strong hurricane season, a wet season in the Sahel or a dry one? \_\_\_\_\_

3. Dr. Gray believed the 1990s and 2000s were going to have more severe storms and more of them than in the 1970s and 1980s. Go to [nhc.noaa.gov/pastdec.shtml](http://nhc.noaa.gov/pastdec.shtml) and use the information to answer the following questions:

- Were there more hurricanes in the 1990s than in the 1980s? \_\_\_\_\_
- Were there more category 4 and 5 hurricanes in the 1990s than in the 1980s? \_\_\_\_\_
- Based on the table of information at this site, was Dr. Gray correct or incorrect in his prediction? \_\_\_\_\_
- If he asked you to join him in further research, what would you do to try to prove his hypothesis correct?

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## Lesson 3: Analyzing the effects of a hurricane

In 1969, two scientists created a scale to rate the strength of hurricanes based on wind speed. The scale, called the Saffir-Simpson Scale after the two developers, is available at [nhc.noaa.gov/sshws\\_table.shtml?large](http://nhc.noaa.gov/sshws_table.shtml?large) with details about the types of damage that each level of hurricane can cause. Using the table on that National Hurricane Center website, complete the following activities:

1. If a hurricane destroyed nearly all the mobile homes in an area, what category hurricane was it likely to have been? \_\_\_\_\_

2. If an area is hit with a Category 1 storm, are power outages likely? \_\_\_\_\_

3. What causes injury and death to people and animals during a hurricane?

\_\_\_\_\_

4. Imagine that a hurricane has occurred in an area that lacks a way to measure wind speed. Using the table to help you, design a questionnaire to be given to people after the hurricane to determine the category the hurricane most likely was. Your questionnaire should have questions about at least five of the different types of damage (trees, power and water, frame homes, mobile homes, etc.). You will use separate paper for this assignment. Use the rubric below to guide you in your effort to create the questionnaire.

	<b>Exemplary (4)</b>	<b>Met standard (3)</b>	<b>Near standard (2)</b>	<b>Below standard (1)</b>	
<b>Question quantity</b>	Questions covered more than five of the areas (mobile homes, frame homes, trees, power and water, etc.)	Questions covered five of the areas.	Questions covered between 3 and 4 of the areas.	Questions covered 2 or fewer areas.	___ /4
<b>Question quality</b>	Questions corresponded clearly with the Saffir-Simpson Scale and could easily be interpreted into a storm category.	Questions corresponded fairly clearly with the Saffir-Simpson Scale and could be interpreted into a storm category with little effort.	Questions did not correspond clearly with the Saffir-Simpson Scale and could be interpreted into a storm category, but with effort.	Questions did not correspond clearly with the Saffir-Simpson Scale and could be not interpreted into a storm category without significant effort.	___ /8
<b>Questionnaire layout</b>	The presentation of the questionnaire is professional-looking, with neat, accurate layout and pleasing presentation. Some type of graphic is used.	The presentation of the questionnaire is neat, accurate, and visually pleasing.	The presentation of the questionnaire is lacking in neatness and/or accuracy. It may have grammar or spelling errors that distract from its effectiveness.	The presentation of the questionnaire is sloppy and/or inaccurate. It shows a lack of effort and care.	___ /4
<b>TOTAL</b>					___ /16

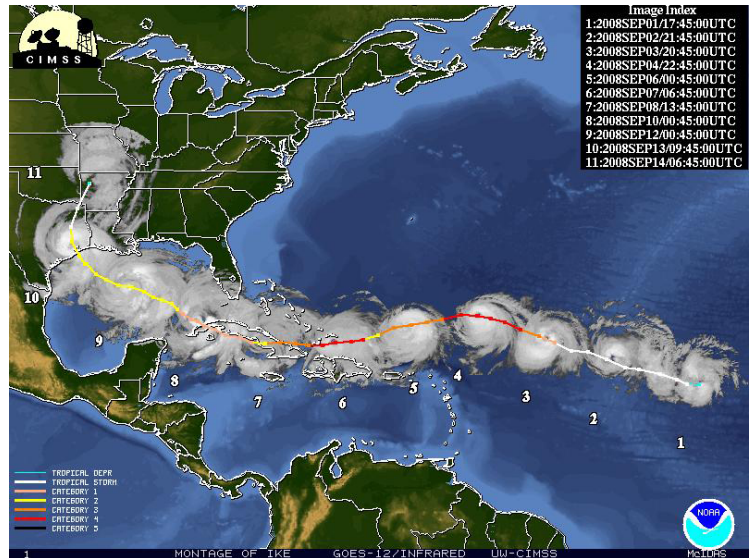


## Lesson 4: Tracking and comparing hurricanes

Print two copies of the hurricane tracking map from this site: [nhc.noaa.gov/AT\\_Track\\_chart.pdf](http://nhc.noaa.gov/AT_Track_chart.pdf)

The University of Wisconsin compiles satellite montages of the tracks of hurricanes such as the one you see at right. The montages show the path of the hurricane, with different colored lines on top of the image indicating the storm's intensity. *(Image courtesy of the University of Wisconsin-Madison Space Science and Engineering Center)*

Go to this site and complete the activity below: [cimss.ssec.wisc.edu/tropic/archive/montage/montage.html](http://cimss.ssec.wisc.edu/tropic/archive/montage/montage.html)



1. Using the montages on the site above, plot the tracks of Hurricanes Ike and Katrina on separate copies of the tracking map you printed.

2. Hold both papers up to light (put them on a window, one on top of the other) and trace the track of Katrina on the map you just did of Ike using a different color marker or colored pencil.

3. How were the paths different? \_\_\_\_\_

4. What clues does the satellite montage give you to the destruction the storms caused? \_\_\_\_\_

5. Can you tell from the satellite images which storm was worse? How? \_\_\_\_\_





[ncdc.noaa.gov/pub/data/images/hurricane2009-23x36.pdf](http://ncdc.noaa.gov/pub/data/images/hurricane2009-23x36.pdf) will take you to a document that shows hurricane strikes in the United States from 1950 to 2009. (It takes some time to load – be patient.) Use the document to answer the questions below.

6. How many Category 5 storms do you see? \_\_\_\_\_

7. Which level of hurricane seems to be the most common? \_\_\_\_\_

8. Some areas of coastline have no hurricane strikes for a great distance. What do you think could account for that?

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9. Would you rather live in an area that received fewer, very strong hurricanes or frequent, weaker storms and why?

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## Lesson 5: The name game

As you read earlier, the Galveston hurricane was called “The Great Storm.” You can see how calling storms things like “great” could get confusing when you are comparing many storms. During World War II, the military started giving women’s names to big storms in the Atlantic Basin, and then in 1950 the World Meteorological Organization decided to go to an alphabetical naming system that used the military’s radio code. This wasn’t a good solution, though, because you could end up with more than one storm with the same name, so they decided to rotate names and retire the names of truly significant storms, just like you would retire the jersey of a star athlete. In 1979, they added men’s names, too.

Even though there are 26 letters in the alphabet, they only use 21 letters for the names because some letters don’t have enough names that start with them. Can you guess which five they are? (The answer is at the very end of the assessment!) If there are more than 21 storms in a season, they start using the letters of the Greek Alphabet.

The names are cycled every six years, unless a name is retired. That means that the names used in 2010 will be used again in 2016. Because the Caribbean has Spanish- and French-speaking people, the names reflect those cultures as well.

Since tropical cyclones exist all around the world, different regions have different names. If you look at [nhc.noaa.gov/aboutnames.shtml](http://nhc.noaa.gov/aboutnames.shtml), you can find the naming systems for Australian cyclones, Indian Ocean cyclones and more!

More tropical cyclones occur in the western section of the north Pacific Ocean than any other place (an average of 25+ storms and 16 cyclones a year) because the slightly warmer water covers a larger area. The Pacific Ocean is big! Look at the names for storms in the Atlantic Basin in the chart at right. Do you see your name? Then use the chart to answer the questions on the next page.

**Hurricane names selected for the Atlantic Basin**

2010	2011	2012	2013	2014	2015
Alex	Arlene	Alberto	Andrea	Arthur	Ana
Bonnie	Bret	Beryl	Barry	Bertha	Bill
Colin	Cindy	Chris	Chantal	Cristobal	Claudette
Danielle	Don	Debby	Dorian	Dolly	Danny
Earl	Emily	Ernesto	Erin	Edouard	Erika
Fiona	Franklin	Florence	Fernand	Fay	Fred
Gaston	Gert	Gordon	Gabrielle	Gonzalo	Grace
Hermine	Harvey	Helene	Humberto	Hanna	Henri
Igor	Irene	Isaac	Ingrid	Isaias	Ida
Julia	Jose	Joyce	Jerry	Josephine	Joaquin
Karl	Katia	Kirk	Karen	Kyle	Kate
Lisa	Lee	Leslie	Lorenzo	Laura	Larry
Matthew	Maria	Michael	Melissa	Marco	Mindy
Nicole	Nate	Nadine	Nestor	Nana	Nicholas
Otto	Ophelia	Oscar	Olga	Omar	Odette
Paula	Philippe	Patty	Pablo	Paulette	Peter
Richard	Rina	Rafael	Rebekah	Rene	Rose
Shary	Sean	Sandy	Sebastien	Sally	Sam
Tomas	Tammy	Tony	Tanya	Teddy	Teresa
Virginie	Vince	Valerie	Van	Vicky	Victor
Walter	Whitney	William	Wendy	Wilfred	Wanda



1. Keeping in mind that hurricane season in the Atlantic basin runs from June through November, is a hurricane in September more likely to be named Nadine or Ernesto? Why?

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2. What criteria do you think they should use when determining when to retire a name? How big is big? Should every Category 5 storm have a retired name? Should it be determined by a certain level of damage or loss of life?

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## Lesson 6: Historic storms

We began this lesson with the Great Storm that hit Galveston in 1900. Since then, there have been many notable storms – some impressive because of their strength and some because of their destruction.

1. Research destructive storms and create a table of devastation for five of them, using the information you find. Here are some places with information to help you choose which storms to use and facts about their destruction:

- [nhc.noaa.gov/HAW2/english/history.shtml](http://nhc.noaa.gov/HAW2/english/history.shtml)
- [pbs.org/wgbh/americanexperience/features/timeline/hurricane-timeline](http://pbs.org/wgbh/americanexperience/features/timeline/hurricane-timeline)
- [ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/hurr/hurtrack/index.html](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/hurr/hurtrack/index.html)
- [bionomicfuel.com/top-10-most-devastating-hurricanes-in-american-history-full](http://bionomicfuel.com/top-10-most-devastating-hurricanes-in-american-history-full)
- [hurricaneville.com/historic.html](http://hurricaneville.com/historic.html)

Storm name	General location	Loss of life	Damage in dollars	Loss of homes	Other damage

2. As you may have read, it isn't always the wind and rain of the hurricane that causes the most damage. Storm surge and fire also cause destruction. Damage can also be impacted by the quality of construction and other factors. Read the article at [nhc.noaa.gov/ssurge/index.shtml](http://nhc.noaa.gov/ssurge/index.shtml) and then answer this question: What can create dynamic of weaker storms causing more devastation than stronger storms?

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## Lesson 7: Create your own hurricane

1. Go to [weirdsciencekids.com/hurricaneinabottle.html](http://weirdsciencekids.com/hurricaneinabottle.html) for instructions on making a hurricane with soda bottles.
2. To view a mock hurricane from a different angle, pour water into a bowl or baking dish. Stir the water using a large spoon. Tie a piece of string onto a paper clip and lay the paper clip on the water in different places within the bowl/dish. Where does the paper clip spin fastest – near the center or farther from it? Now take a straw and gently blow “waves” on the surface of the water. As you blow harder, what do you notice about the height of the waves? What happens if you make the water in the bowl/dish deeper or shallower?

Describe what you noticed here: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

3. Follow the directions here to make a model of the spiraling effects of hurricane winds: [miamisci.org/hurricane/hurricanepopup.html](http://miamisci.org/hurricane/hurricanepopup.html)

4. Read through the information and then create a hurricane at [environment.nationalgeographic.com/environment/natural-disasters/forces-of-nature](http://environment.nationalgeographic.com/environment/natural-disasters/forces-of-nature)

5. Can you create the perfect storm? Try it at [nhc.noaa.gov/HAW2/pdf/canelab.htm](http://nhc.noaa.gov/HAW2/pdf/canelab.htm)

6. If you can create it, can you aim it? Try it at [nhc.noaa.gov/HAW2/english/kids/movncane.htm](http://nhc.noaa.gov/HAW2/english/kids/movncane.htm)

7. Now, imagine you are a meteorologist and have discovered a tropical storm that is just becoming a hurricane.

Name your hurricane: \_\_\_\_\_ What category is your hurricane? \_\_\_\_\_

Where will it hit land? \_\_\_\_\_

When your hurricane hits land, how much damage and what kind of damage will it do? (Be sure that the damage matches the category of storm you chose.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Now imagine that you are a journalist who writes about extreme weather. Write a newspaper article about your hurricane; read an example here: [nytimes.com/2008/09/13/us/13ike.html?\\_r=1&ref=hurricaneike](http://nytimes.com/2008/09/13/us/13ike.html?_r=1&ref=hurricaneike) Make sure to include a visual image (a map, a chart, a picture, etc.). Follow the rubric below to make sure that your article is effective.

Category	5	4	3	2
<b>Organization</b>	The story is organized at a superior level. The ideas flow smoothly and topic sentences are effective and reflective of paragraph content.	The story is very well organized. One idea or scene follows another in a logical sequence with clear transitions.	The story is pretty well organized. One idea or scene may seem out of place. Clear transitions are used.	The story is a little hard to follow. The transitions are sometimes not clear.
<b>Focus on assigned topic</b>	The story focuses on the key elements of the hurricane and also includes sufficient scientific background knowledge to explain hurricanes in general to the reader.	The entire story is related to the hurricane and allows the reader to understand much more about the hurricane.	Most of the story is related to the hurricane. The story wanders off at one point, but the reader can still learn something about the hurricane.	Some of the story is related to the hurricane, but a reader does not learn enough about it.
<b>Accuracy of facts</b>	The facts are not only accurate, but also interesting and include facts comparing and contrasting this hurricane to previous hurricanes, demonstrating clear knowledge of hurricane history.	All facts presented in the story are accurate.	Almost all facts presented in the story are accurate.	Most facts presented in the story are accurate (at least 70%).
<b>Spelling, punctuation &amp; vocabulary</b>	Not only are no spelling errors, there is complete consistency in names and a broad use of subject-specific vocabulary.	There are no spelling or punctuation errors in the final draft. Character and place names that the author invented are spelled consistently throughout.	There is one spelling or punctuation error in the final draft.	There are 2-3 spelling and punctuation errors in the final draft.
<b>Illustrations</b>	The illustrations are effective in conveying the main ideas behind the story.	Original illustrations are detailed, attractive, creative and relate to the text on the page.	Original illustrations are somewhat detailed, attractive, and relate to the text on the page.	Original illustrations relate to the text on the page.

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## Lesson 8: Investigation

You have read (and written) about hurricanes. Now it is time to do some research of your own. With your parents' permission, interview two people you know about the most dramatic weather incident they have ever experienced. Make a list of questions to ask them. Possible questions include subjects such as how old they were, why they remember this particular incident, what were the reactions of people around them, and so on. When you have interviewed both of them, write about the incidents below, comparing and contrasting the experiences. Be sure to write at least one way in which they were similar and one way in which they were different.

I interviewed \_\_\_\_\_ and \_\_\_\_\_.

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## Lesson 9: Literary connection

Read the following excerpt from Joseph Conrad's story *Typhoon*.

*Nobody — not even Captain MacWhirr, who alone on deck had caught sight of a white line of foam coming on at such a height that he couldn't believe his eyes — nobody was to know the steepness of that sea and the awful depth of the hollow the hurricane had scooped out behind the running wall of water.*

*It raced to meet the ship, and, with a pause, as of girding the loins, the Nan-Shan lifted her bows and leaped. The flames in all the lamps sank, darkening the engine-room. One went out. With a tearing crash and a swirling, raving tumult, tons of water fell upon the deck, as though the ship had darted under the foot of a cataract [a cataract is a large waterfall].*

*Down there they looked at each other, stunned.*

*"Swept from end to end, by God!" bawled Jukes.*

*She dipped into the hollow straight down, as if going over the edge of the world. The engine-room toppled forward menacingly, like the inside of a tower nodding in an earthquake. An awful racket, of iron things falling, came from the stokehold. She hung on this appalling slant long enough for Beale to drop on his hands and knees and begin to crawl as if he meant to fly on all fours out of the engine-room, and for Mr. Rout to turn his head slowly, rigid, cavernous, with the lower jaw dropping. Jukes had shut his eyes, and his face in a moment became hopelessly blank and gentle, like the face of a blind man.*

*At last she rose slowly, staggering, as if she had to lift a mountain with her bows.*

*Mr. Rout shut his mouth; Jukes blinked; and little Beale stood up hastily.*

*"Another one like this, and that's the last of her," cried the chief.*

*He and Jukes looked at each other, and the same thought came into their heads. The Captain! Everything must have been swept away.*

What are five words that Conrad uses to show the power of the storm?

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

Which line in this excerpt do you feel best relates the power of the storm?

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Find at least one simile in the passage. Copy it down here:

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Analyze the simile by answering these questions:

1. What two things is it comparing? \_\_\_\_\_

2. Is the comparison valid under the circumstances and why?

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3. Create your own simile to put in the same place. How does yours compare? Does it create a stronger or weaker visual image than the original?

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4. Write three sentences that will come before or after the passage above and give more information about the strength of the storm.

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## Lesson 10: Fine arts connection

Look at this painting by Winslow Homer called *After the Hurricane* (1899).



What in the picture hints at the power of the storm that has passed? Give at least three details.

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If you could add one detail to the painting to make the storm's devastation even more clear, what would it be?

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Think of another name for the painting. \_\_\_\_\_

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## Extension: There's so much more to learn!

**You say it's your birthday!** Go to [www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?WWNEXRAD~Images2](http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?WWNEXRAD~Images2) Input your birthday and see if there were tropical cyclones on your special day. If not, how about your half birthday?

**Read about the Hurricane Hunters!** Even though most people try to avoid hurricanes, some brave people actually fly into them – on purpose! Read more about them at [hurricanehunters.com](http://hurricanehunters.com).

### Hurricanes in the movies!

● *The American Experience – The Hurricane of '38* (also included in set below). Note: You can read about the hurricane of 1938 [The Long Island Express] here:

[pbs.org/wgbh/americanexperience/features/introduction/hurricane-introduction](http://pbs.org/wgbh/americanexperience/features/introduction/hurricane-introduction)

- *NOVA Hurricane Set (Hurricane / Hurricane Katrina / Hurricane of '38)*
- *The Wrath of God, Disasters in America - The Hurricanes: Deadly Wind, Deadly Rain* (History Channel) (1998)
- *The Wrath of God, Disasters in America - The Hurricanes: Deadly Wind, Deadly Rain* (History Channel) (1998)
- *Hurricanes! History's Most Destructive Storms (Hurricane Camille & Betsy)* (Paula Morgan, Directory)

### Books!

● Read all of *Typhoon* and analyze at what point he went wrong. Find it free at [gutenberg.org/ebooks/1142](http://gutenberg.org/ebooks/1142).

You can also listen to it as a free audio book at [booksshouldbefree.com/book/typhoon-by-joseph-conrad](http://booksshouldbefree.com/book/typhoon-by-joseph-conrad).

● *Aircraft: Hurricane Hunters* by Timothy R. Gaffney. This book explores the different planes and agencies that fly into (instead of away from) hurricanes and large storms. Fairly technical in nature, this book introduces readers to not only the planes, but the people who fly them.

● *Hurricanes: Witness to Disaster* by Judy and Dennis Fradin (National Geographic)

● *Two Bobbies: A True Story of Hurricane Katrina, Friendship, and Survival* by Kirby Larson. This book is for younger kids, but it's such a neat story that readers of all ages will enjoy it.

● *Hurricanes: Earth's Mightiest Storms* by Patricia Lauber

### Caution! Grown-up books ahead!

● *Sudden Sea: The Great Hurricane of 1938* by R.A. Scotti

● *A Wind To Shake The World* by Everett S. Allen

● *Isaac's Storm: A Man, a Time, and the Deadliest Hurricane in History* by Erik Larson

● *Infinite Monster: Courage, Hope, and Resurrection in the Face of One of America's Largest Hurricanes* by Leigh Jones and Rhiannon Meyers

**Discover the hurricane/El Nino connection!** Go to [pbs.org/wgbh/nova/elnino](http://pbs.org/wgbh/nova/elnino)



**Satellites!** See satellites and movies of satellite imagery of hurricanes at [climate.noaa.gov/index.jsp?pg=../education/hurricanes/multimedia.jsp](http://climate.noaa.gov/index.jsp?pg=../education/hurricanes/multimedia.jsp)

**Want to more about weather?** Check out the world weather information service: [worldweather.wmo.int](http://worldweather.wmo.int)

**Need a science fair project?** Can you recreate or come up with your own science project related to hurricanes? Check one out at [usc.edu/CSSF/History/2006/Projects/J0124.pdf](http://usc.edu/CSSF/History/2006/Projects/J0124.pdf).

**Blog!** This site calls itself a “blog,” but really it’s just got great information on hurricanes, and the graphics are really clear. This link takes you to the parts of a hurricane, but there are many useful pages to explore: [accuweather.com/blogs/hurricanefacts/story/31027/what-are-the-parts-of-a-hurric.asp](http://accuweather.com/blogs/hurricanefacts/story/31027/what-are-the-parts-of-a-hurric.asp)

**What does Kublai Khan have to do with it?** Find out what World War II kamikaze pilots, typhoons and Japan have to do with the Mongol emperor at [ancientworlds.net/aw/Article/1211978](http://ancientworlds.net/aw/Article/1211978)

**National Hurricane Center in the news!** Read articles that have appeared in *The New York Times* about the National Hurricane Center: [nytimes.com/keyword/national-hurricane-center/5](http://nytimes.com/keyword/national-hurricane-center/5)

**Go straight to the source!** Read a first-hand account of Galveston Hurricane published in *The New York Times* in 1900: [query.nytimes.com/mem/archive-free/pdf?res=F00917FD3D5811738DDDA80994D1405B808CF1D3](http://query.nytimes.com/mem/archive-free/pdf?res=F00917FD3D5811738DDDA80994D1405B808CF1D3)

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## Assessment

### Lesson 2: Definitions and descriptions

- You Name it: The name should meet the criteria outlined (have significance or be particularly appropriate), and the justification should be reasonable.
- Flow Chart: The steps should be key points (not minor or partial steps), and the extra information should be pertinent, accurate, and should have two items per step.
- Article from *The New York Times*: Responses will be variations of these answers:
  1. Weather in the Sahel affects hurricane patterns all over the world
  2. Wet
  3.
    - a. Were there more hurricanes in the 1990s than in the 1970s? yes
    - b. Were there more category 4 and 5 hurricanes in the 1990s than in the 1980s? yes
    - c. Based on the table of information at this site, was Dr. Gray correct or incorrect in his prediction? Answers vary for this and the question below because data are inconclusive and contradictory for the 1990s.
- If he asked you to join him in further research, what would you do to try to prove his hypothesis correct? Student's response should reflect reasonable understanding that more tracking over time is necessary.

### Lesson 3: Analyzing the effects of a hurricane

1. 5    2. Yes    3. Flying or falling debris    4. Rubric for questionnaire: See below:

	Exemplary (4)	Met standard (3)	Near standard (2)	Below standard (1)	
<b>Question quantity</b>	Questions covered more than five of the areas (mobile homes, frame homes, trees, power and water, etc.)	Questions covered five of the areas.	Questions covered between 3 and 4 of the areas.	Questions covered 2 or fewer areas.	___ /4
<b>Question quality</b>	Questions corresponded clearly with the Saffir-Simpson Scale and could easily be interpreted into a storm category.	Questions corresponded fairly clearly with the Saffir-Simpson Scale and could be interpreted into a storm category with little effort.	Questions did not correspond clearly with the Saffir-Simpson Scale and could be interpreted into a storm category, but with effort.	Questions did not correspond clearly with the Saffir-Simpson Scale and could be not interpreted into a storm category without significant effort.	___ /8
<b>Questionnaire layout</b>	The presentation of the questionnaire is professional-looking, with neat, accurate layout and pleasing presentation. Some type of graphic is used.	The presentation of the questionnaire is neat, accurate, and visually pleasing.	The presentation of the questionnaire is lacking in neatness and/or accuracy. It may have grammar or spelling errors that distract from its effectiveness.	The presentation of the questionnaire is sloppy and/or inaccurate. It shows a lack of effort and care.	___ /4
<b>TOTAL</b>					___ /16



#### **Lesson 4: Tracking and comparing hurricanes**

This section should be assessed holistically, with the student creating neat charts that clearly show the paths of the storms. Their answer to question 9 should reflect thoughtfulness and an understanding of the information gleaned from the information provided. This section could appropriately reflect 5-10% of the student's grade on the lesson plan.

#### **Lesson 5: The name game**

1. Nadine because the season is halfway over, and Nadine is closer to the halfway mark of the alphabet than Ernesto. Other appropriate reasoning could include Nadine because historically hurricanes about that time of year have been closer to N's in the alphabet than E's. If a student answers Ernesto, the reasoning should still reflect an understanding of the naming system of hurricanes.
2. Answers to this question will vary, and should reflect an understanding of the storm categorizing system.

#### **Lesson 6: Historic storms**

1. The chart should be complete and accurate. To raise the level of rigor for this section, the teacher could have the student provide the sources for the chart and/or expand the chart to include additional analysis of the storms (either by adding categories or more storms).
2. Answers should reflect the idea that weaker storms can be more devastating depending on the geography of the affected area. For example, storm surge will differ depending on the configuration of the basin. Additionally, poorer countries will suffer more damage than wealthy ones in terms of loss of life because of the lack of strong building codes and the spread of disease.

#### **Lesson 7: Create your own hurricane**

1. The hurricane should "work" and not leak.
2. Students should recognize the difference that stronger wind and water depth make.
3. The spiral should spin and should be colored appropriately.
- 4-6. Ungraded
7. Article itself only portion assessed. Use rubric on next page:



Category	5	4	3	2
<b>Organization</b>	The story is organized at a superior level. The ideas flow smoothly and topic sentences are effective and reflective of paragraph content.	The story is very well organized. One idea or scene follows another in a logical sequence with clear transitions.	The story is pretty well organized. One idea or scene may seem out of place. Clear transitions are used.	The story is a little hard to follow. The transitions are sometimes not clear.
<b>Focus on assigned topic</b>	The story focuses on the key elements of the hurricane and also includes sufficient scientific background knowledge to explain hurricanes in general to the reader.	The entire story is related to the hurricane and allows the reader to understand much more about the hurricane.	Most of the story is related to the hurricane. The story wanders off at one point, but the reader can still learn something about the hurricane.	Some of the story is related to the hurricane, but a reader does not learn enough about it.
<b>Accuracy of facts</b>	The facts are not only accurate, but also interesting and include facts comparing and contrasting this hurricane to previous hurricanes, demonstrating clear knowledge of hurricane history.	All facts presented in the story are accurate.	Almost all facts presented in the story are accurate.	Most facts presented in the story are accurate (at least 70%).
<b>Spelling, punctuation &amp; vocabulary</b>	Not only are no spelling errors, there is complete consistency in names and a broad use of subject-specific vocabulary.	There are no spelling or punctuation errors in the final draft. Character and place names that the author invented are spelled consistently throughout.	There is one spelling or punctuation error in the final draft.	There are 2-3 spelling and punctuation errors in the final draft.
<b>Illustrations</b>	The illustrations are effective in conveying the main ideas behind the story.	Original illustrations are detailed, attractive, creative and relate to the text on the page.	Original illustrations are somewhat detailed, attractive, and relate to the text on the page.	Original illustrations relate to the text on the page.



### **Lesson 8: Investigation – unassessed**

### **Lesson 9: Literary connection**

This section should be assessed holistically, with answers reflecting thoughtful response and an understanding of the literary element of simile. This section could appropriately reflect 2-3% of the overall grade on the lesson plan.

### **Lesson 10: Fine arts connection – unassessed**

**Answer to question about hurricane names:** The letters q, u, x, y and z are not used.