

ALL-IN-ONE!

Weather

Middle School Teacher Instructions and Activity

Based on the guidelines of the Saffir-Simpson Scale for hurricane severity and the Fujita Scale for tornado damage, students will write a brief synopsis of a fictional storm on a reproducible sheet.

Supplies needed: pencil, crayon or colored pencils, reference sheets with Saffir-Simpson Scale and Fujita Scale, reproducible page

Directions:

1. You will provide information for each student to write a storm synopsis.

For example, with a hurricane, you would provide information such as this:

Storm surge: 17 feet

Winds: 132 to 153 mph

Damage: flooding, extensive damage to structures such as windows and doors; trees and signs are blown down; mobile homes are destroyed.

Based on this information, the student would write the following information on their reproducible sheet:

Hurricane Glenda

With winds ranging from 132 to 153 mph, a storm surge of 17 feet, and damage such as flooding, extensive structural damage, signs and trees downed, and mobile homes destroyed, Hurricane Glenda is a Category 4 hurricane.

For example, with a tornado, you would provide information such as this:

Winds: 290 mph

Damage: homes leveled, large buildings have lost roofs and walls, trees have lost their bark, homes lifted off their foundations; incredible damage will occur.

Based on this information, the student would write the following information on their reproducible sheet:

Lynnville Tornado

The Lynnville tornado had winds in the range of 290 mph. It caused incredible damage, lifting many homes off their foundations, completely leveling many homes, blowing the roofs off of the hospital and the high school, and destroying countless trees. It was an F5 tornado.

2. Pass out the reproducible sheet and the sheets describing the storm severity/damage scales. Ask students to determine where their storm fits on the storm scale. Direct them to describe their storm as explained above and write their description on the reproducible sheet.
3. Urge students to come up with a way to uniquely identify their tornado, such as naming a city after themselves and referring to their tornado in that way. For example, in the case of a student named Lynn, the tornado could be referred to as “Lynnville Tornado.”
4. After the students fill in the information, direct them to color their sheets (encourage them to be creative—they don’t have to stick to grey or blue—they can use the colors that appear on weather radar equipment).
5. Ask students to present their storm to the class like meteorologists on television would, and then hang their papers on the bulletin board.

The Saffir-Simpson Hurricane Scale

The Saffir-Simpson Hurricane Scale is a 1-5 rating based on the hurricane's present intensity. This is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall. Wind speed is the determining factor in the scale, as storm surge values are highly dependent on the slope of the continental shelf and the shape of the coastline, in the landfall region. Note that all winds are using the U.S. 1-minute average.

Category One Hurricane:

Winds 74-95 mph (64-82 kt or 119-153 km/hr). Storm surge generally 4-5 ft above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Also, some coastal road flooding and minor pier damage. Hurricane Lili of 2002 made landfall on the Louisiana coast as a Category One hurricane. Hurricane Gaston of 2004 was a Category One hurricane that made landfall along the central South Carolina coast.

Category Two Hurricane:

Winds 96-110 mph (83-95 kt or 154-177 km/hr). Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center. Small craft in unprotected anchorages break moorings. Hurricane Frances of 2004 made landfall over the southern end of Hutchinson Island, Florida as a Category Two hurricane. Hurricane Isabel of 2003 made landfall near Drum Inlet on the Outer Banks of North Carolina as a Category 2 hurricane.

Category Three Hurricane:

Winds 111-130 mph (96-113 kt or 178-209 km/hr). Storm surge generally 9-12 ft above normal. Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane. Flooding near the coast destroys smaller structures with larger structures damaged by battering from floating debris. Terrain continuously lower than 5 ft above mean sea level may be flooded inland 8 miles (13 km) or more. Evacuation of low-lying residences with several blocks of the shoreline may be required. Hurricanes Jeanne and Ivan of 2004 were Category Three hurricanes when they made landfall in Florida and in Alabama, respectively.

Category Four Hurricane:

Winds 131-155 mph (114-135 kt or 210-249 km/hr). Storm surge generally 13-18 ft above normal. More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of structures near the shore. Terrain lower than 10 ft above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles (10 km). Hurricane Charley of 2004 was a Category Four hurricane made landfall in Charlotte County, Florida with winds of 150 mph. Hurricane Dennis (pdf) of 2005 struck the island of Cuba as a Category Four hurricane.

Category Five Hurricane:

Winds greater than 155 mph (135 kt or 249 km/hr). Storm surge generally greater than 18 ft above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of all structures located less than 15 ft above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles (8-16 km) of the shoreline may be required. Only 3 Category Five Hurricanes have made landfall in the United States since records began: The Labor Day Hurricane of 1935, Hurricane Camille (1969), and Hurricane Andrew in August, 1992. The 1935 Labor Day Hurricane struck the Florida Keys with a minimum pressure of 892 mb--the lowest pressure ever observed in the United States. Hurricane Camille struck the Mississippi Gulf Coast causing a 25-foot storm surge, which inundated Pass Christian. Hurricane Katrina (pdf), a category 5 storm over the Gulf of Mexico, was still responsible for at least 81 billion dollars of property damage when it struck the U.S. Gulf Coast as a category 3. It is by far the costliest hurricane to ever strike the United States. In addition, Hurricane Wilma (pdf) of 2005 was a Category Five hurricane at peak intensity and is the strongest Atlantic tropical cyclone on record with a minimum pressure of 882 mb.

Fujita Tornado Damage Scale

Developed in 1971 by T. Theodore Fujita of the University of Chicago

SCALE	WIND ESTIMATE *** (MPH)	TYPICAL DAMAGE
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; box cars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

*** IMPORTANT NOTE ABOUT F-SCALE WINDS: Do not use F-scale winds literally. These precise wind speed numbers are actually guesses and have never been scientifically verified. Different wind speeds may cause similar-looking damage from place to place -- even from building to building. Without a thorough engineering analysis of tornado damage in any event, the actual wind speeds needed to cause that damage are unknown. The Enhanced F-scale will be implemented February 2007.



Storm Name
