

Name: _____ Class: _____

Explainer: Hurricanes, Cyclones, and Typhoons

Here's how the storms form and why they are so dangerous

By Lillian Steenblik Hwang
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In this informational text, Lillian Steenblik Hwang discusses how hurricanes, cyclones, and typhoons form, as well how they impact people. As you read, take notes on the different factors that contribute to the formation of hurricanes, cyclones, and typhoons.

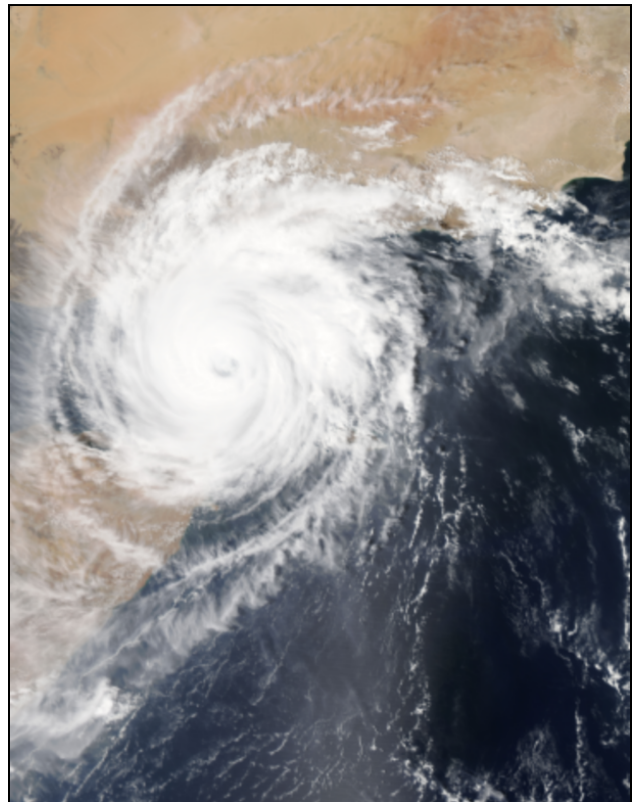
- [1] A tropical cyclone is one of the most destructive natural forces on Earth. These enormous, swirling storm systems form over the ocean. Tropical cyclones in the Atlantic Ocean or Eastern Pacific are known as hurricanes. Those in the Western Pacific are known as typhoons. When such storms erupt in the Indian Ocean, they're referred to as cyclones.

Whatever you call them, these storms need several starting ingredients. First, there must be some sort of atmospheric disturbance or event. Typically, that will be a thunderstorm. Second, that disturbance has to occur over ocean water that is at least 26° Celsius (80° Fahrenheit). The air also needs to contain plenty of moisture, notes Kam-Biu Liu. He studies hurricanes at Louisiana State University in Baton Rouge.

Next? As the sun warms the atmosphere, pockets of warm, humid air begin to rise from above the ocean's surface. This temperature driven movement is known as convection. This now-water-saturated¹ air rises into the tropopause.

This is a region in the atmosphere somewhere between 9 and 17 kilometers (5.6 and 11 miles) above Earth's surface.

As soon as the warm air gets here, it begins to cool. Cool air can't hold as much moisture as warm air. So some of that excess water vapor condenses² to form clouds and rain. This releases some heat, which warms the surrounding air. As this warm air rises, it creates regions of low air pressure beneath it.



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1. full of moisture or water
2. to change from a gas or vapor to a liquid

- [5] A new parcel³ of air will now spin under the storm and into the space left behind by the rising warm air. This air flows in from a region of higher pressure outside the storm. It gets drawn into the center of the cyclone, the region having the lowest pressure. If the cyclone is strong enough, this center will form an “eye.” That’s a calm and cloud-free area of low pressure. A quiet zone, it sits smack dab in the middle of the raging bands of turbulence⁴ encircling it.

Together, convection and condensation⁵ drive the hurricane, explains Liu. They “create a very efficient heat engine that fuels the hurricane.”

From storm to hurricane

But swirling ocean-born storm clouds are not enough to qualify as a hurricane. The critical issue is wind speed.

As a storm strengthens, its circulating winds will become more powerful. As long as the winds’ sustained speed does not exceed 61 kilometers (38 miles) per hour, this storm will be known as a *tropical depression*. If its winds continue to build, attaining 62 to 117 kilometers (39 to 73 miles) per hour, it will formally become a *tropical storm*. At this point, it will receive an official name — such as Katrina (2005 in the Gulf of Mexico), Nepartak (2016 in China and Taiwan), Roanu (2016 in the Bay of Bengal) or Harvey (2017 in the Gulf of Mexico).

Finally, if conditions are right, the storm can intensify into a hurricane (or typhoon or cyclone, depending on its location). These intense circulating storms are rated category 1 to 5 on the Saffir-Simpson Hurricane Wind Scale. That rating reflects the maximum sustained wind speed (as measured over a 2-minute period).

- [10] **Category 1** storms range from 119 to 153 kilometers per hour (74 to 95 miles per hour). Such winds can rip shingles off of houses and snap tree branches. The damage frequently is bad enough to knock out electric power for up to a few days.

A **Category 2** storm will have sustained winds of 153 to 177 kph (96 to 110 mph). Winds this strong can rip siding off of buildings and uproot trees. Associated power outages can last more than a week.

A **Category 3** storm slams a region with 178 to 208 kph (111 to 129 mph) winds. Category 3 and higher tropical cyclones are classified as major hurricanes. These can unleash enough damage to knock out power and water for weeks. Superstorm Sandy was, at its strongest, a category 3 hurricane. It weakened to below true hurricane status by the time it came ashore in New York and New Jersey. Still, it was devastating enough to cripple⁶ large swaths⁷ of coastal communities there.

A **Category 4** storm’s sustained winds run from 209 to 251 kph (130 to 156 mph). That’s enough to flatten homes or rip through them, rendering whole communities uninhabitable. Hurricane Opal, a category 4 storm, ravaged the Florida Panhandle in 1995.

3. a quantity or amount of something
4. violent or unsteady movement of air or water
5. **Condensation (noun)**: the process by which a gas cools and becomes a liquid
6. **Cripple (verb)**: to cause serious damage to something
7. a broad strip or area of something

Category 5 storms are the most powerful of all. Their catastrophic winds lash a region at speeds of 252 kph (157 mph) or higher. They can unleash such extensive destruction that people may not be able to return to their homes for months. At its strongest, Hurricane Katrina reached category 5 status. It flooded whole sections of New Orleans, La., and devastated the U.S. Gulf Coast.

- [15] Tropical cyclones travel, often creating havoc⁸ far from the warm waters that first spawned them. Some may move hundreds to thousands of kilometers (or miles) across open oceans. Along that path, they may strengthen or weaken several times. Especially dangerous are storms that “make landfall.” This refers to their having crossed some island or coastline. Most hurricanes lose steam within a day or two of making landfall.

Why hurricanes are dangerous

Hurricanes are defined by their winds. And those winds unquestionably pose⁹ a major threat to coastal communities. Steady winds and even higher gusts can blow down electric-power lines, upend trees, and toss debris through the air. Whole buildings can be knocked down. The gusting, gale-force tempests¹⁰ can even transform branches and other types of debris into potentially deadly projectiles.

But storm dangers are not due solely to the speed at which hurricanes blow.

One of the greatest dangers that these storms pose to coastal areas is what’s known as a storm surge. As a tropical cyclone spins toward land, its winds can push seawater ashore. This may temporarily flood the land to depths of 1 to 4 meters (3 to 13 feet) or more. A storm surge can be especially dangerous if it coincides with high tide; this can push an even higher wall of water onshore.

Another hazard: Torrential storms may dump 25 centimeters (10 inches) or more of rain within 24 hours. These rains can fall too fast to soak into the ground, posing a risk of flash floods. This may occur inland, far from any storm surge. And these storms may trigger lightning and tornadoes, which pose their own risks.

Preparing for hurricane season

- [20] In the Atlantic, nearly all tropical cyclones occur between June 1 and November 30. The number of storms that form during this “hurricane season” can vary widely from year to year. In general, August and September tend to be the most at-risk months.

If you live in an area that is vulnerable¹¹ to hurricanes, there are things you can do to prepare. Consider stocking up on emergency supplies. Families may want to also draw up a hurricane plan. This will include things like identifying who is supposed to take on which tasks in preparing for the storm. Part of the plan also should include identifying your closest storm shelters.

8. **Havoc** (*noun*): widespread destruction
9. **Pose** (*verb*): to cause something, especially a problem
10. a violent windy storm
11. **Vulnerable** (*adjective*): open to harm or damage

If a hurricane is headed toward your community, you might be directed to evacuate altogether. Know the best routes to get out of town. If you need to evacuate, make sure your family has a pre-packed hurricane kit. It might include batteries, cash, matches, a flashlight, first aid supplies, medications and copies of important documents.

If you aren't advised to leave and your family decides to take shelter at home, make sure to stock up with several days' worth of food and water. Expect that you could lose power and running water for several days. So prepare by charging all phones and other electronic devices ahead of the storm.

And help your family prepare your home. This may include covering windows and clearing yards and porches of toys, chairs or other large items that the winds could turn into dangerous missiles.

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Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: Which statement identifies the central idea of the text?
 - A. Hurricanes, cyclones, and typhoons are differentiated based on how powerful they are and the damage they can do.
 - B. Storms that form over water cause greater damage to the environments than human populations.
 - C. Hurricanes, cyclones, and typhoons all have the potential to cause serious damage to humans because of wind speeds and flooding.
 - D. Storms that form over water are unpredictable and nearly impossible for humans to adequately prepare for.

2. PART B: Which TWO details from the text best support the answer to Part A?
 - A. "Tropical cyclones in the Atlantic Ocean or Eastern Pacific are known as hurricanes. Those in the Western Pacific are known as typhoons." (Paragraph 1)
 - B. "That's a calm and cloud-free area of low pressure. A quiet zone, it sits smack dab in the middle of the raging bands of turbulence encircling it." (Paragraph 5)
 - C. "These intense circulating storms are rated category 1 to 5 on the Saffir-Simpson Hurricane Wind Scale." (Paragraph 9)
 - D. "Steady winds and even higher gusts can blow down electric-power lines, upend trees, and toss debris through the air. Whole buildings can be knocked down." (Paragraph 16)
 - E. "As a tropical cyclone spins toward land, its winds can push seawater ashore. This may temporarily flood the land to depths of 1 to 4 meters (3 to 13 feet) or more." (Paragraph 18)
 - F. "If you aren't advised to leave and your family decides to take shelter at home, make sure to stock up with several days' worth of food and water." (Paragraph 23)

3. How do paragraphs 10-14 contribute to the development of ideas in the text?
 - A. They show how dangerous hurricanes can become as their wind speeds increase.
 - B. They prove that all hurricanes are dangerous, no matter their category.
 - C. They emphasize how difficult it is for people to protect themselves from hurricanes.
 - D. They show how the size of hurricanes directly relate to the dangers they pose.

4. What is the connection between a storm's wind speeds and its power?
 - A. A storm's wind speeds determine what type of storm it will turn into, such as a hurricane, cyclone, or typhoon.
 - B. A storm's wind speeds decide how far a hurricane will travel and the level of damage it can inflict on people.
 - C. A storm's wind speeds regulate how much water it absorbs and when it releases that water, resulting in floods.
 - D. A storm's wind speeds determine whether or not it will become a hurricane and its strength.

5. What is the relationship between preparation and protecting yourself against a hurricane?
