

Name Kely Class period _____

Thunderstorms, tornados, and hurricanes web-quest

PART 1 Thunderstorms go to <http://www.nssl.noaa.gov/education/svrwx101/thunderstorms/>

1. What makes a storm a thunderstorm? A thunderstorm is a rain shower during which you hear thunder.
2. What are the three basic ingredients needed to make a thunderstorm?
 1. moisture
 2. Rising, unstable air (air keeps rising after being "nudged")
 3. lifting mechanism to provide the "nudge"
3. What are the 3 things that can make a thunderstorm "severe"?
One or more of the following: hail 1" or greater, winds gusting in excess of 50 knots (57.5 mph), or a tornado
4. How is a thunderstorm a result of convection?
Caused by surface heating, convection brings moisture (water vapor) upward with it, condensing into cumulonimbus clouds
5. What is caused by thunderstorms that results in the death of more people each year than hurricanes and tornados combined?
Flash flooding
6. What tiny little things bouncing together collect an electric charge and end up being discharged as a bolt of lightning?
Ice particles

PART 2 Tornados go to http://www.weatherwizkids.com/?page_id=60

7. What is a tornado?
A violent rotating column of air extending from a
8. How does a tornado form?
When 2 air masses meet (CP, mT/cT) they create instability in the atmosphere. Wind direction changes, wind speed increases, height increases, creating an invisible horizontal spinning effect in lower atmosphere. Updraft tilts it to vertical.
9. List 3 factors needed for a tornado to form.
 1. Abundant low level moisture
 2. An unstable atmosphere
 3. Strong winds, turn with height clockwise
10. What is a supercell thunderstorm?
A long-lived thunderstorm with updrafts and downdrafts in balance.
11. What is the fastest winds peed recorded for a tornado in the United States?
318 mph
12. Can people stop a tornado? explain why or why not.
Yes, in theory, but do not have the resources to try it

PART 3 Hurricanes go to http://www.weatherwizkids.com/?page_id=58

13. What is a hurricane?
Largest of the storms. Up to 600 miles across, wind speeds of 75 to 200 mph.

14. Fill in the following data grid

How wide/across can a hurricane get?	600 miles
How fast do the winds in a hurricane move?	75 - 200 mph
What is the calmest part of a hurricane?	The eye (the center)
What 3 things cause damage in a hurricane?	Strong winds, heavy rain, and large waves

15. How does a hurricane form?

Atmosphere cools quickly. Winds blow in same direction and speed to force air upward from the ocean. Winds flow outward above, air rises upward from below.

16. What is needed to create the spin in a hurricane?

Coriolis Effect

17. What is the difference in a hurricane and a typhoon?

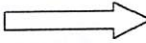
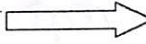
Nothing except geography

Part 4 simulations go to <https://www.nationalgeographic.org/interactive/forces-nature/>

Answers Vary

18. Tornado: Click on the SHORTCUT "Cause your own tornado" in bottom left side of the first box on the page.

Select the 4 conditions needed to make a tornado. (conditions must be just right, read the hints provided)

Your tornado results	Fujita scale score	Damage level	Winds speeds recorded MPH
Your results 			
Damage caused 			

19. After recording the data from your tornado go to the top of that box and click on the hurricanes box it looks like this



on the right side of that screen click the "spin of your own hurricane"

to start.

a. What number starting point did you select? _____

b. Next create the right atmosphere conditions for a hurricane.

c. Record your results in the table below

Intensity at landfall	
Top speeds	
Danger	

THUNDERSTORMS

- storms with lightning, thunder, heavy rain, possible hail and tornadoes
- occur inside warm, moist air masses and at fronts (especially cold fronts)
- There are 3 ingredients:
 1. moisture - air reaches dew point and condenses to form clouds and rain
 2. unstable air - warm air that rises rapidly
 3. lift - cold fronts cause warm air to "lift" quickly
- heavy rain - rain droplets collide with other droplets making bigger droplets
- lightning - occurs when rapid uplift of air builds up separated electric charges (positive and negative) in the clouds; positive charges flow toward negative charges creating a current; can heat the air to 30,000°C
 - in-cloud, cloud to cloud, cloud to ground (most dangerous)
- thunder - lightning heats the air causing it to expand rapidly; it cools quickly and contracts; the molecules moving rapidly back and forth form sound waves
- hail - drops of water freeze around small nuclei; grow larger as they travel up and down on updrafts and downdrafts in cumulonimbus clouds; the stronger the winds and the more they travel - the bigger they get
- Can you tell how far away a storm is? Yes!
number of seconds between the lightning flash and thunder / 5 = mile(s)
- Severe thunderstorm watch - a severe thunderstorm (damaging winds of 58 mph or more, or 1" hail in diameter or greater) is *likely* to develop in your area
- Severe thunderstorm warning - a severe thunderstorm (damaging winds of 58 mph or more, or 1" hail in diameter or greater) is *taking place* in your area

TORNADOES

- vertical funnels of rapidly, spinning air
- wind speeds range from 65 mph to up to 250+ mph
- path - can be a mile wide and up to 50 miles long
- United States has more tornadoes than any other country in the world
- Tornado Alley - Texas, Nebraska, Oklahoma, Kansas, Colorado, and South Dakota
- forms when changes in wind speed and direction create a horizontal spinning effect (mesocyclone) within a storm cell; it is then tipped vertically by updrafts in the thundercloud
- occur in cold fronts in cumulonimbus clouds and supercells
- more frequent outbreaks in March through May
- more common in late afternoon due to daytime heating
- most dangerous at night (sleepers not aware)
- usually transparent -color comes from the debris they pick up
- move across the surface 10-20 mph
- most last from 1 - 10 minutes; some severe ones have lasted up to an hour
- Enhanced Fujita Scale: weak: EF0 - EF1 (69% of all tornadoes)
strong: EF2 - EF3 (29% of all tornadoes)
violent: EF4 - EF5 (2% of all tornadoes)
- Tornado Watch: conditions are favorable for tornadoes to develop
- Tornado Warning: a tornado has been spotted
- warning signs: green sky, hail, wall cloud, freight train sound
- what to do: seek lowest level of home or interior room with no windows; get out of mobile homes and cars