

# Tornadoes Activity Key

\*\*\* For ease of use during class the Teacher Key pages are numbered the same as the Student Activity Book pages.

## I. Introduction

Have you ever seen a tornado? Hopefully, it was in a video on television. Each year as many as 1000 tornadoes may occur in the United States. Their destruction can range from minor to devastating. Although about 100 people are killed each year by tornadoes, many more people survive unharmed. By knowing what to do you can greatly decrease your chances of getting hurt. This activity will introduce you to the history of tornado forecasting, tornado formation and tornado safety.

### Get Info Objectives

1. Describe when and where most tornadoes form.
2. Explain tornado watches and warnings and how to respond.
3. Describe what tornadoes look like.

### Gather Data Objectives

1. Learn about the first tornado forecast.
2. Learn about the Fujita scale for rating tornadoes: what each category means and which ratings are most commonly given.
3. Learn how to calculate percentages.

### Applying Principles Objectives

1. Consider the impact the first tornado forecast had on saving lives.
2. Discuss the importance of following safety plans given the amount of damage done by most tornadoes.
3. Describe why it is unlikely an F6 rating will ever be assigned to a tornado.

Before doing anything else, add the NOAA Research "Tornadoes" site to Bookmarks or Favorites on your web browser.

## II. Get Info

### A. Occurrence

- Click on the "Preparedness Guide" site.
- Read the information and answer the following questions.

1. Describe where most United States tornadoes occur.

East of the Rocky Mountains

---

---

---

2. What time of year do most tornadoes form in the United States?

During the spring and summer months

---

---

---

3. Describe the most violent tornado in terms of wind speed and size of the damage path.

The most violent tornadoes can have winds speeds of 250 mph or more, and damage paths 50 miles long.

---

---

---



## B. Variations

- Scroll down the page to the "Tornado Variations" section.

1. Are tornadoes always easy to see? No

2. What happens to make them visible?

The winds pick up dust and debris.

3. What is a tornado over water called? A waterspout

- Scroll down the page to "Tornadoes Take Many Shapes and Sizes."

4. Which tornadoes occur most often: weak, strong, or violent?

69% of all tornadoes are weak.

5. Most tornado deaths are caused by violent tornadoes. Violent tornadoes represent what percent of all tornadoes?

Only about 2% of all tornadoes are violent.





### C. Awareness and Safety

- Scroll down the page to the "Frequency of Tornadoes" section.

1. What time of day are tornadoes most likely to occur?

Most tornadoes occur between 3 and 9 p.m.

---

- Click on "Months of Peak Tornado Occurrence."

2. During which months are tornadoes most likely to occur in your state?

Answers will vary; See graphic at

---

<http://www.nssl.noaa.gov/NWSTornado/pic12.jpg>

---

- Click "Back" and scroll to the section "What to Listen For."

3. Watches

- a. What is a tornado watch?

A tornado watch means that tornadoes are possible in your area.

---

- b. What should you do when a watch is issued for your area?

Remain alert for approaching storms; listen for tornado or severe thunderstorm warnings.

---

4. Warnings

- a. What is a tornado warning?

A tornado has been sighted or indicated by weather radar.

---



b. What should you do when a warning is issued for your area?

Go immediately to a safe place, such as a pre-designated shelter or a small interior room.



- Scroll down to "Environmental Clues."



5. What are the signs that a tornado might form?

a. Dark, often greenish skies

b. Wall cloud

c. Large hail

d. Load roar, similar to a freight train



- Scroll down to "Tornado Safety."



6. How do you prepare before the storm?

Develop a plan for you and your family for home, work, school and when outdoors. Have frequent drills. Know your county/parish name, and keep a highway map nearby to follow storm movement from weather bulletins.

7. How do you keep yourself informed when there is bad weather?

Have a NOAA weather radio with a warning alarm, or listen to local radio or TV stations. If planning a trip outdoors, listen to the latest forecasts and be prepared to take action if necessary.



8. If a warning is issued for your county you need to take shelter.  
Where would you go if you were:

a. at school?

Answers will vary; in general, an interior windowless room on the  
lowest floor of a permanent structure.

b. at home?

Answers will vary; in general, under a staircase or workbench in the  
center of the basement (if there is one), otherwise an interior  
windowless room such as a closet or bathroom on the lowest level of  
the house. If possible, get out of a mobile home and into a storm  
shelter or permanent structure.

c. in a car?

It is best to get out of a car and into a permanent structure, if possible.  
If there are no buildings nearby, a culvert under the road or a ditch may  
be the best option, but watch out for flooding.

- Close the "Tornadoes...Nature's Most Violent Storms" web site.
- Click "Back" to return to the Tornadoes main page, or choose "Tornadoes" from your Favorites or Bookmarks.
- Click "Gather Data."



### III. Gather Data

#### A. The First Tornado Forecast

- Click on the "Golden Anniversary" site.
- Scroll down to "Historical Events" and click on "Description of Historical Events."

- Scroll down to "March 20, 1948."
- Read the information and answer the following questions.

1. What happened at 10 p.m. on March 20, 1948?

A tornado crossed Tinker Air Force Base in Oklahoma City, Oklahoma,  
causing damage and injuries.

- Scroll down to "March 21, 1948."

2. On March 21, 1948, the Investigative Board decided that tornadoes could not be forecast, given the current state-of-the-art. What did they recommend?

They recommended that the weather community find a way to alert the  
public to these storms and urged Base

Commanders to develop safety precautions to minimize personnel and  
property losses in violent storms.

- Scroll down to "March 22-24, 1948."





3. What did Fawbush and Miller study over the next three days?

All the tornado maps they could find from previous tornado outbreaks

---

---

- Scroll down to "March 25, 1948."



4. What happened at 2:50 p.m. on March 25, 1948?

The first tornado forecast was issued.

---

---

5. Later that night, what happened for the second time in five days?

A tornado moved across Tinker Air Force Base

---

---

6. The first tornado forecast led to what?

The beginning of severe storm forecasting research

---

---

- Click "Back" twice to return to the Tornadoes "Gather Data.1" web page.

- Scroll to the bottom of the page and click "Forward."





## B. Tornado Statistics

- Click on the "Fujita Scale" site.
- Look at the two pie charts and read the descriptions.

1. What years of data are these statistics made from?

1950-1994

---

---

2. What percentage of all tornadoes are considered:

a. Weak? 74%

b. Strong? 25%

c. Violent? 1%

3. Did the number of people killed by tornadoes increase or decrease after 1950?

The number of deaths after 1950 decreased dramatically.

---

---

-Scroll down to "The Fujita Scale" table.





4. What kinds of damage are typical of these tornadoes?

a. Weak (FO and F1)

Roofs torn off frame houses, mobile homes destroyed, large trees  
snapped or uprooted, light objects become missiles (are thrown into  
and damage other things), trains overturned

b. Strong (F2 and F3)

Damage to roofs and chimneys, shallow-root trees knocked down,  
mobile homes pushed off foundations or rolled over, autos pushed off  
the road, attached garages destroyed

c. Violent (F4 and F5)

Well-constructed homes leveled, structures with weak foundations are  
moved, cars and other large missiles are thrown up to or over 100  
meters, trees are debarked, steel-reinforced concrete structures badly  
damaged.



- Click "Back" to get to the Tornadoes "Gather Data.2" web page.
- Scroll to the bottom of the page and click "Forward."

### C. Decoding the Dallas County Texas Tornado Statistics Summary



- Click on "All Tornado Statistics" site.
- Click on "every state in the USA."



1. What years of data were used for the first step?

1950-1995

---



- Scroll down to the map of the United States.
- Click on Texas.
- Click on the letter "D" and then scroll down to Dallas County.



1. Of the 66 tornadoes, tally with hatch marks how many were:



F0: 23

F1: 23

F2: 12

F3: 7

F4: 1

F5: None



2. Add your totals to show how many tornadoes were in the following categories:

Weak (F0 + F1): 46

Strong (F2 + F3): 19

Violent (F4 + F5): 1

3. Now calculate what percentage each category represents of the total number of tornadoes (hint: divide the number in the category by the total, 66, and multiply by 100):

Weak:  $45/66 \times 100 = 70\%$

Strong:  $19/66 \times 100 = 29\%$

Violent:  $1/66 \times 100 = 2\%$

- Close the "Texas Tornadoes - Page 3" web site.
- Click "Back" to return to the Tornadoes "Gather Data.3" page.
- Click "Return" at the bottom of the page to go to the Tornadoes main page or choose "Tornadoes" from your Favorites or Bookmarks.
- Click "Application."



## IV. Application

### A. Apply What You Learned About Tornadoes.

1. Look at your answers to the questions in sections A and B of Section III. Write a possible explanation for the dramatic decrease in deaths after 1950.

Introduction of forecasting watch and warning programs; public awareness and education

---

---

2. Safety plans emphasize going to the basement or interior closet, bathroom, or hall in a permanent structure during a tornado warning. Review the damage descriptions for the vast majority of all tornadoes (F0 to F3) and discuss why it is important to follow safety plans.

Knowing what to do could save your life. Injuries occur from collapsing roofs and flying debris.

---

---

3. An F6 rating has never been assigned to a tornado. Why is it unlikely a tornado will ever be given an F6 rating?

The small area of damage would not be recognizable amidst damage from F4 and F5 winds and secondary damage from missiles.

---

---





- Click "Return" to go to the Tornadoes main page.
- Click "Enrichment"

## V. Enrichment Activities

### A. You are the Mayor

1. How will your town's emergency management staff prepare if your town is in a tornado watch? What if your town is actually hit by a tornado? List potential duties for each group of emergency personnel:

- Civil defense coordinator
- Storm spotters
- Ambulance drivers
- Fire fighters
- Police
- Sanitation workers

### B. You are the Local Civil Defense Coordinator

1. Develop a public awareness plan to inform people what to do during tornado watches and warnings, and after a tornado hits. Include television, newspaper, and radio messages.
2. Develop a plan to make mobile home parks safer. Where should people in mobile homes go when they hear a warning?

### C. You are the Principal of a School

1. Design a tornado safety plan for the school. Include the months that are most likely to produce tornadoes. Describe what the students should do when there is a tornado warning.



2. Design a tornado safety plan for sporting events and other outdoor events at your school. Include who will stay aware of watches and warnings during the game/event, where people should go, and how much time might be needed to move everyone to a safe place.



- Click "Forward" to go to the Tornadoes "Enrichment.2" page.

### D. You are the Meteorologist



1. Tornadoes are currently assigned ratings based on the damage they do to man-made structures. Engineers and meteorologists worked together to study the amount of wind necessary to do different kinds of damage to buildings yet many tornadoes occur in farm fields, forests, and other similar places and never hit anything man-made. Devise a plan for rating such tornadoes.

### E. Local Tornado Data



- Click on the "Storm Events" site.
- Select your state and click on "Continue."



- Change "Begin Date" to "06/01/1995"
- Change "End Date" to "06/30/1995"
- Click on the "List Storms" button on the right side of the screen.



- Count the number of tornadoes for your state for June 1995.

1. How many tornadoes were reported? \_\_\_\_\_

Answers will vary by state on this and the following questions.



- Click on the "Location or County" to see a description of each tornado event.



2. What kinds of damage did the tornadoes do?

---

---

3. How often were other kinds of weather reported?

- a. Thunderstorm winds, severe thunderstorm winds, microbursts? \_\_\_\_\_
- b. Flood, flash flood, urban flood? \_\_\_\_\_
- c. Lightning? \_\_\_\_\_
- d. Hail? \_\_\_\_\_
- e. Heat/cold/drought? \_\_\_\_\_

4. Which type of weather event was most common for your state in June 1995? \_\_\_\_\_



- Close the "STORM EVENTS" site.
- Click "Return" to go to the Tornadoes main page.



## **F. Related Web Sites**

1. SPC Severe Storm Statistics  
<http://www.spc.noaa.gov/archive/tornadoes/>
2. National Severe Storms Laboratory  
<http://www.nssl.noaa.gov/>
3. Storm Data and Unusual Weather Phenomena  
<http://www.ncdc.noaa.gov/oa/climate/sd/pre0208.pdf>
4. Monthly Totals  
<http://www.spc.noaa.gov/archive/tornadoes/ustbmy.html>
5. TORNADO! The Oakfield, Wisconsin Case Study  
<http://cimss.ssec.wisc.edu/oakfield/cs1.htm>
6. VORTEX - Unraveling the Secrets  
<http://www.nssl.noaa.gov/oaastory/>
7. The Tornado Project Online  
<http://www.tornadoproject.com>
8. Severe Thunderstorm Climatology  
<http://www.nssl.noaa.gov/hazard/>