

# Ladders

Explorer Tim Samaras

# TORNADOES



Twister



Eyewitness to  
a Tornado



Tim Samaras, Severe  
Storms Researcher



Tim's Tips for  
Staying Safe



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## TORNADOES

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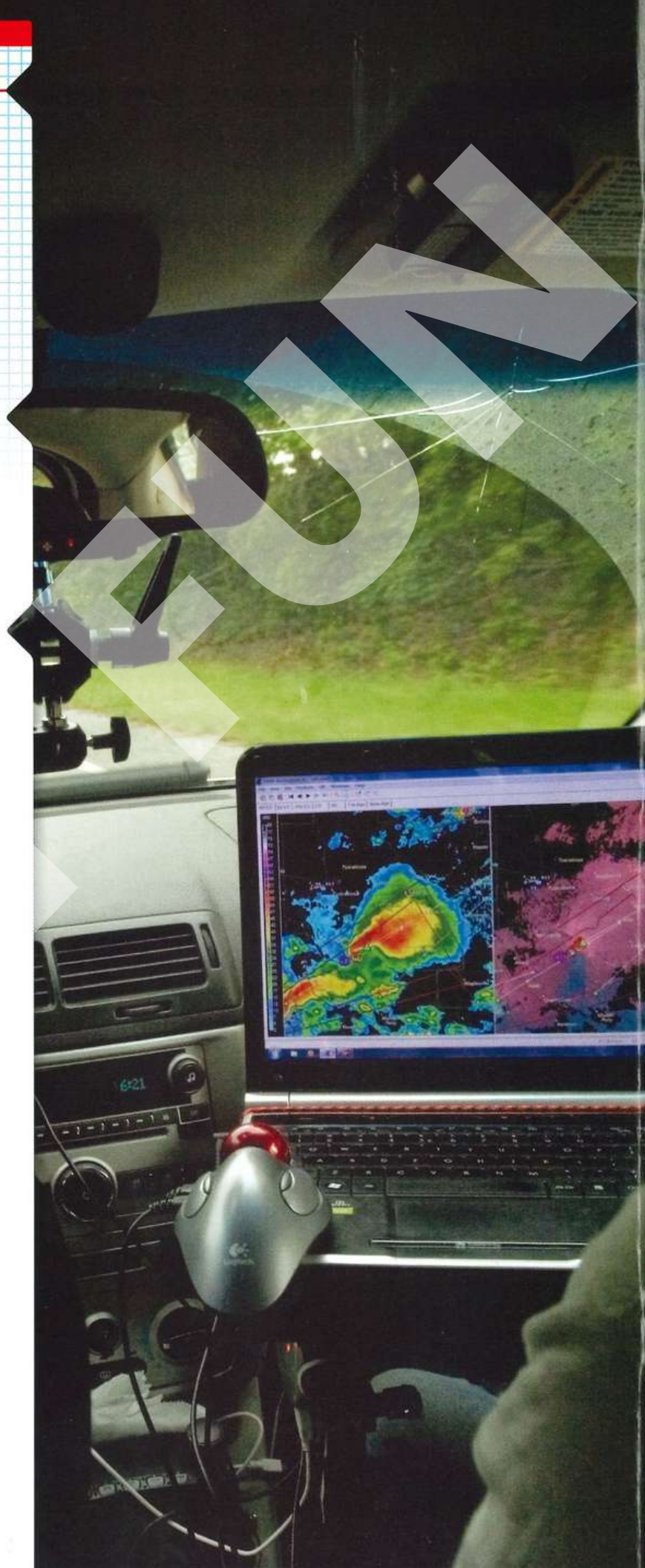


## Identifying and Describing the Problem

### **National Geographic:**

What inspired you to study severe storms, specifically tornadoes?

**Tim Samaras:** It all started when I was about six years old and I saw the fantastic tornado in *The Wizard of Oz*. In the movie, the whirling, twisting tornado picked up the entire house—Dorothy and Toto, included! I became fascinated with tornadoes from then on. Later in life, I began to chase storms in Tornado Alley. Now, studying severe storms is my passion. I find each new storm to be as fascinating as the first.





# TORNADO RATINGS

The most powerful tornadoes have wind speeds over 322 kilometers per hour (200 miles per hour). They can destroy buildings and throw vehicles hundreds of meters.

Scientists and engineers rate tornadoes using the Enhanced Fujita (EF) Tornado Intensity Scale. Ratings are from EF0 to EF5. Ratings are based on the **velocity**, or the speed and direction of the wind. Ratings are also based on the damage that occurs.

## EF 0

**WIND SPEED:**  
137 km/h (85 mph)  
or less

### LIGHT DAMAGE:

small tree branches broken; minor damage to the roofs of houses



## EF 1

**WIND SPEED:**  
138-178 km/h  
(86-110 mph)

### MODERATE DAMAGE:

windows broken; mobile homes pushed off their bases or flipped over; trees uprooted



## EF 2

**WIND SPEED:**  
179-218 km/h  
(111-135 mph)

### CONSIDERABLE DAMAGE:

pieces of roof ripped off houses and other buildings; mobile homes destroyed; wooden electrical poles broken





## ENHANCED FUJITA (EF)

Tetsuya Theodore Fujita is one of the world's most famous tornado experts. He developed a system in which tornado ratings were based on the damage that occurred. Later tornado researchers added wind speed to the scale. Fujita's name is used in rating a tornado. "EF" stands for "Enhanced Fujita."

### EF 3

**WIND SPEED:**  
219-266 km/h  
(136-165 mph)

#### SEVERE DAMAGE:

walls of houses, schools, and malls toppled; steel electrical poles bent or broken



### EF 4

**WIND SPEED:**  
267-322 km/h  
(166-200 mph)

#### DEVASTATING DAMAGE:

houses destroyed; large sections of schools, malls, and other large buildings damaged



### EF 5

**WIND SPEED:**  
over 322 km/h  
(200 mph)

#### INCREDIBLE DAMAGE:

schools, malls, high-rise buildings, and other large buildings destroyed



Check In

How does a tornado form?



People are keeping safety in mind as they rebuild Joplin. Basements and storm shelters are being built. Storm shelters are designed to hold up during strong winds. They also protect against flying debris that can cause damage or injury during a tornado.

This tragedy caused the people of Joplin a lot of sadness. But this community is planning for the future. They are building storm shelters and making emergency plans. The next time there is a severe weather warning, the people of Joplin will be ready.



✔ Tornado damage is evident immediately after the tornado (top photo). Progress in clean up and repair is evident in the same place a few weeks later (lower photo).

✔ One year after the tornado, the area below looks much different from May 23, 2011.



**Check In**

What are some things you could do to prepare for a tornado?





## Discuss

1. How does the information you read about in the interview with Tim Samaras relate to the other selections?
2. What new ideas or concepts about tornadoes did you learn about from this book?
3. In what ways do you think science, technology, engineering, and math are related in understanding severe storms better?
4. What are some things you could do to stay safe in the event of a tornado?
5. What other questions do you have about tornadoes? Where could you find answers to your questions?



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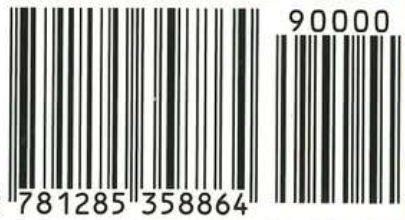
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NGL.Cengage.com 888-915-3276

ISBN 978-1-2853-5886-4

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