

# Lightning Student Activity Book

## I. Introduction

Lightning kills hundreds of people around the world each year. It is estimated that lightning strikes the earth about 100 times every second. Lightning starts wildfires, destroys computers, fries the wiring in phones, and upsets AM radio reception.

### Get Info Objectives

1. Explain the causes of lightning and thunder.
2. Describe lightning damage.
3. Describe the most safe and least safe places to be during a thunderstorm.

### Gather Data Objectives

1. Draw the types of lightning.
2. Determine the place and time lightning strikes most often in the United States.
3. Explain first aid for someone struck by lightning.

### Applying Principles Objectives

1. Calculate the distance from a strike using the flash to bang rule.
2. Calculate the speed of sound in feet per second.
3. Calculate the speed of sound in meters per second.

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

## II. Get Info

### A. Lightning Occurrence and Formation

- Click on the "Frequently Asked Questions about Lightning" site.
- Read the information and answer the following questions.

1. What causes lightning?

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2. What conditions are most favorable for lightning formation?

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3. What kinds of damage can lightning cause?

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4. Where are the most dangerous places to be during a thunderstorm?

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- Click "Back" to return to the Lightning "Get Info" web page.
- Click on the "Characteristics of a Storm" site.
- Read the thunder section. Answer the questions below.

5. Explain, in your own words, how thunder forms.

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- Click "Back" to return to the NOAA Research "Lightning" main page.



### III. Gather Data

#### A. Types of Lightning

- Click on the "Types of Lightning" site.
- Scroll down the web page until you see "Types of Lightning".
- Read the types of lightning section.

1. Draw and label the three major types of lightning.



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

#### B. Frequency of Strikes

- Click on the "Frequency of Strikes" site.

1. What areas of the continental United States have the most lightning strikes per year?

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



### C. Time of Strikes

- Click on the "Time of Day Variation" site.

1. During what six-hour period does most severe weather occur?

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- Click "Back" to return to the Lightning "Gather Data.1" web page.  
- Scroll down to the bottom of the web page and click "Forward".

### D. Safety

- Click on the "Frequently Asked Questions about Lightning" site.  
- Scroll down to and read the section "How can I stay safe from lightning?"

1. What does "flash to bang" mean?

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2. During what phases of a thunderstorm does lightning kill the most people?

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3. Where is the safest place to be during a thunderstorm?

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- Click "Back" to return to the Lightning "Gather Data.2" web page.

### E. Lightning Injuries and Damage

- Click on the "Lightning Social and Economic Costs" site.
- Scroll down to table 2.

1. What organic (physical) problems do lightning strike survivors have?

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- Click "Back" to return to the Lightning "Gather Data.2" web page.
- Click on the "First Aid" site. (Remember, first aid is the same for lightning victims in all parts of the country.)





- Scroll down and read the section "First Aid for Lightning Strike Victims."

2. What first aid should you do for someone who has been struck by lightning?

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- Click "Back" to return to the Lightning "Gather Data.2" web page.  
- Scroll down to the bottom of the page and click "Forward."

- Click on the "Lightning Damage/Costs" site.

3. What kinds of damage does lightning do?

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- Click "Back" to return to the Lightning "Gather Data.3" web page.

## F. Common "Knowledge"

- Click on the "Lightning Injury Facts" site.
- Read the section "Prevention/Avoidance" to answer the following questions.

1. Will wearing rubber shoes help keep you safe?

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2. Why is a car a fairly safe place to be during a thunderstorm?

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3. What types of structures get struck by lightning most often?

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4. Should you always stay away from trees?

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- Click "Back" to return to the NOAA Research "Lightning" main page.





## IV. Application

### A. Explain Lightning Fatalities

1. Hypothesize why most lightning fatalities occur at the beginning or end of a thunderstorm, rather than during the part of the storm with the heaviest rain.



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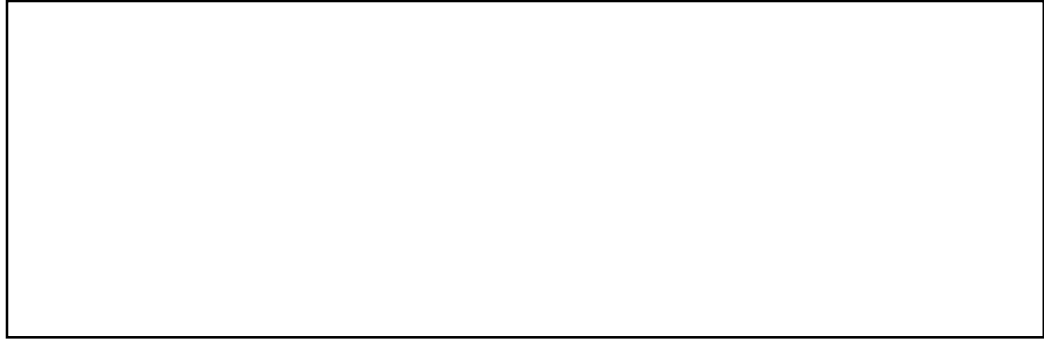
### B. Math Applications

1. If a lightning flash is seen 12 seconds before the thunder is heard, about how far away did the lightning strike?



\_\_\_\_\_ miles

2. There are 5280 feet per mile. Use the "flash to bang" rule to figure out the speed of sound in feet per second.



3. There are 2.54 centimeters per inch, 12 inches per foot, and 100 centimeters per meter. Convert your answer in number two to meters per second.



## V. Enrichment Activities

### A. Research

1. Research Saint Elmo's Fire. What kind of lightning is St. Elmo's Fire? Where does it occur? What problems does it cause?
2. Research "Faraday Cage".
3. Research Zeus' thunderbolts made by Vulcan.
4. Research Nicola Tesla.
5. Find out how buildings can be protected from lightning strikes.

### B. Interviews

1. Interview a meteorologist about lightning. Find out what equipment and technology is used to predict and track lightning.
2. Interview an electrician. Find out what "grounded" outlets are and how they work.
3. Interview a firefighter about what lightning can do to a forest and how they put out the fires.
4. Interview a forester about controlled burning. What is it and how is it used?

### **C. Related Web Sites**

1. Lightning Safety  
<http://www.lightningsafety.com>
2. Kid's Lightning Information and Safety Page  
<http://www.kidslightning.info/>
3. The Lightning Dictionary  
[http:// library.thinkquest.org/20698/data/light4.htm](http://library.thinkquest.org/20698/data/light4.htm)
4. National Weather Service - Lightning Safety  
<http://weather.gov/om/wcm/lightning/index.htm>
5. Lightning Kills, Play It Safe  
<http://www.lightningsafety.noaa.gov/>
6. Thunderstorms and Lightning  
<http://www.crh.noaa.gov/mkx/slide-show/tstm/index.html>
7. A Severe Weather Primer: Lightning  
[http://www.nssl.noaa.gov/primer/lightning/ltg\\_basics.html](http://www.nssl.noaa.gov/primer/lightning/ltg_basics.html)
8. Lightning Safety: What you need to know NOW  
<http://www.nssl.noaa.gov/edu/safety/lightning.html>