

## Lesson 3: Storm Stories



SKILLS:



**Lesson question:** How have people in our community experienced hurricanes?

### Learning objectives:

- Students learn about local people's experiences with hurricanes and tropical storms by conducting interviews.
- Students analyze their interview data to identify the actions people took to stay safe during, and bounce back after, a hurricane or tropical storm.
- Students identify characteristics of storms that affected the local area based on their interview data and online research about the physical characteristics of the storms themselves.

### Timing:

- Four class periods
  - › Day 1: Introduce the Storm Stories project and plan for interviews
  - › Day 2: Practice interviewing and collecting data
  - › Homework: Students interview a community member about two storms
  - › Day 3: Analyze interview data about actions people took to stay safe
  - › Day 4: Analyze interview data about storm impacts and online storm research

### A note about the paper-based and digital versions of this lesson:

This lesson can be done with students either collecting and analyzing data on paper questionnaires or with students entering the data into a spreadsheet via a Google Form. If you have two or more classes that are doing this lesson or are doing the lesson as distance learning, it's recommended that you have students use the Google Form to upload their data. This will allow all students to compile the interview data into one spreadsheet. The Google Form can be accessed via phone, tablet, or computer. Throughout the lesson, directions marked **[Digital Option]** indicate the instructions for digital data analysis.

### Materials:

- Hurricane Timelines (created in Lesson 2)
- Hurricane Resilience Driving Question Board
- Classroom projector and computer with Internet access
- Computers or tablets with Internet access for each pair of students
- Student pages:
  - › *Storm Stories Interview Protocol* (page 30)
  - › *Storm Story Questionnaire* (pages 31-32)
  - › *Accounts of a Storm* (pages 33-34)
- Student notebooks or paper, pens/pencils
- Chart paper
- Markers (one for each student)
- Long paper strips for writing headlines (one for each student)
- A list of potential interviewees for students who need suggestions
- Optional: Storm Story interview data collected by previous/other classes (to add to what students collect)
- **[Digital Option]** Google Form for student data entry and access to Google Sheets (see preparation below)

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### Preparation:

- Create a list of school employees who are willing to be interviewed by students.
- Make three or four copies of the *Storm Story Questionnaire* for each student (Day 1-2).
- Make one copy of the *Storm Stories Interview Protocol* for each student (Day 1-2).
- Make one copy of the *Accounts of a Storm* student page for each student (Day 4).
- **[Digital Option]** Copy of the Google Form (Find the link to the Google Form at [scied.ucar.edu/HurricaneResilience](https://scied.ucar.edu/HurricaneResilience)) to your Google Classroom if you would like students to enter data through the form and analyze it via a spreadsheet. Provide students with the link to the form on Day 2.

### Directions

#### Day 1

#### Introduce the lesson.

- Have students look at the Hurricane Timelines they created during Lesson 2.
- Remind students that not all hurricanes cause the same amount of damage. And not all places feel the same effects. Ask students to speculate about which of the storms on their timeline probably caused the most damage. (*Some students may indicate that the storms that made the most direct pass over the location would cause the most damage. Others might think that the strongest category storms caused the most damage. The case study about Hurricane Florence might lead them to suggest that slow-moving hurricanes cause the most damage.*)
- Record the ideas on the board or chart paper as hypotheses (educated guesses). Students will return to these on Day 4 of the lesson.
- Explain that we can find out how past hurricanes impacted the community by asking people who lived through them. Tell students that in this project, they will interview people they know about their experiences during hurricanes to find out how places and people were affected.

#### Prepare for interviews.

- Introduce students to the *Storm Stories Interview Protocol*. Review the protocol as a class. Explain that they are at Step 1, and will do Step 2 as homework.
- Orient students to the *Storm Stories Questionnaire*. This is where they will take notes during each interview. Explain that they will fill out the *Storm Stories Questionnaire* during each interview.
- **[Digital Option]** Orient students to the Google Form for data entry to prepare students to upload data.

#### Have students make interview plans.

- Have students list two people they want to interview (a first choice and a backup). Encourage students to choose people who are older than them so that they can gather data about storms that are throughout their Hurricane Timeline.
  - › Storm stories can be collected from family members, teachers and other school employees, neighbors, or others in the community. Ensure that student plans for Storm Story interviews include people with whom students feel safe.
  - › Have a list of potential interviewees available for students who may not have anyone in mind to interview (for example, if they are new to the community). This list might include teachers or other adults at school that students know.
- Have students compare their lists to make sure there are no repeat names.

#### Homework:

- Students should set up an interview for the following afternoon or evening (or over the weekend - see note below). If their first interviewee is not available, instruct students to contact the second. Interviews need to be conducted between Day 2 and Day 3 of the lesson.

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- › If you started the Hurricane Resilience curriculum on a Monday and have five classes per week, then interviews will occur over a weekend, which should add some flexibility for both students and their interviewees.
- › Have students interview a person about two storms, or interview two people if each person only has one storm to share.
- › If you are teaching this lesson with multiple classes, you can pool all their data for analysis and allow each student to collect data about one storm. If you are teaching this lesson for multiple school years, save the data from interviews to increase the size of the dataset that students analyze.

### Day 2

#### Review the homework.

- Ensure that all students were successful in setting up an interview time with one person for after school. There is a chance that some students were not successful through no fault of their own if the people are not available. In that case, have students select a name from your list of additional potential interviewees.

#### Have students practice interviewing each other.

- Have students work in pairs to practice interviewing each other. Students will trade rolls as the interviewer. Have each student ask all of the questions and fill out the questionnaire before trading rolls. Note that if students have not experienced any hurricanes or tropical storms, they can make up a Storm Story. Ensure that any questionnaire about a fictional story is labeled so that it doesn't become part of the class data set. If students have experienced a hurricane, their interviews can become part of the data that the class will analyze.
- **[Digital Option]** If you have students upload their data via the Google form, have them try to do this directly on a computer or mobile device during the interview and compare that to the process of filling out the paper questionnaire. You may wish to let students decide which strategy they'd prefer. (Using the paper questionnaire makes it easier to change answers and collect answers out of order, but it means that there is a data entry step at the end. Collecting data directly into the form eliminates a step, but if technology fails, then the data could be lost.)
- After all students have had the experience of interviewing another student, have the class discuss their experiences as the interviewer. Ask what they might do differently during their actual interviews.
- Explain that, because the whole class will analyze all the data as a group, it's important that all students use the same methods when collecting the data. Ask if students have questions about how to fill in parts of the questionnaire. If there are questions, decide as a class what to do in that situation so that everyone is collecting data with the same methods.

#### Have students prepare for interviews.

- Instruct students to use the Hurricane Timeline they developed to identify which storms their interviewee might remember.
- Handout two copies of the *Storm Stories Questionnaire*.
- **[Digital Option]** Provide students with the link to the Google Form.
- Remind students that the focus of this project is to learn how people in our community have experienced hurricanes. However, if they discover that their interviewee moved into the area from another hurricane-prone location, Storm Stories about another place are okay. Stories that are from other locations will still help us learn about the challenges presented by hurricanes and what people do to stay safe. (Since students are asking where interviewees lived at the time, the non-local data can be excluded during the second part of the data analysis.)

#### Homework

- Students conduct their interviews and fill out the questionnaire about two storms that the interviewee remembers (using one copy of the questionnaire for each storm). This should take between 20 minutes and an hour depending on the interviewee.
- **[Digital Option]** Students upload their interview data via the Google Form.

Day 3

**Introduce the data analysis activity.**

- Tell students that, now that we have the Storm Stories, it’s time to make sense of the information. While every person who was interviewed had their own individual experiences with hurricanes, we can analyze all the data together to figure out whether there are patterns in terms of what people experienced and what they did during hurricanes and tropical storms.
- Introduce the day’s data analysis question: *What actions did people take to stay safe and keep their homes and belongings safe?*

**Analyze the data about resilient actions.**

**[Digital Option] If students have entered the data via the Google Form:**

- Project the Google Form, click responses, and then click the green icon to create a spreadsheet of data that students entered. Orient students to the spreadsheet.
  - › Rows are for each storm that each interviewee described. (For example, if one person was interviewed about Hurricane Betsy and Hurricane Ivan, that would be in two rows of the spreadsheet.)
  - › Columns indicate the types of data. (For example, one column includes the data about whether people answered no, yes, or don’t remember when asked if there was flooding.)
- Organize students into five groups and provide each group with a computer or tablet to access the spreadsheet of data.
- Have each group make a copy of the spreadsheet that they will use for analysis (File > Make a Copy).
- Assign groups to focus their analysis on one of the following questions:
  - › How did you learn that the storm was coming?
  - › Before the storm, what did you do?
  - › During the storm, what did you do?
  - › After the storm, what did you do?
  - › What decisions have you made to stay safe from hurricanes in the long term?
- Help students focus their data analysis by providing the following questions on the board:
  - › How many interviews chose each answer?
  - › Which answer was most frequently selected? Which was least frequently selected?
  - › How many interviews added something extra to the “other” field and what did they add?
- Visit each group to ensure that they focus on the correct columns of data to answer their assigned question. To help students focus on the data that they need to analyze, they may wish to hide columns in the spreadsheet that show other data types and make the column that they are focusing on wider so that they can see all the answers.
- If students are familiar with spreadsheets, instruct them to create a bar graph of their data. If they are less proficient, you may have them count the number of different answers and make a bar graph by hand. When there are multiple answers to each question, students will need to break apart the answers to count how many there are total.

An example of the Google Form that students will fill out if you are using the digital option.

Answers	number of responses
Stocked up on food/water	4
Created an emergency kit	4
Installed window protections	1
Secured home exterior and items in the ya 2	
Secured or relocated vehicles	2
Turned off electricity/gas	0
Planned for evacuation	1
Evacuated prior to the storm	1
Took care of other people or pets	1

Example of student collected data in the spreadsheet. Questions that allow multiple answers to be selected will include the selected answers separated by commas. It’s helpful to increase the column width to see all the answers.

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### If students have the data in paper copies of the *Storm Stories Questionnaire*:

- Organize five sheets of chart paper around the classroom, each with one of the following questions. Include the checkboxes from the questionnaire and space for other answers:
  - › How did you learn that the storm was coming?
  - › Before the storm, what did you do?
  - › During the storm, what did you do?
  - › After the storm, what did you do?
  - › What decisions have you made to stay safe from hurricanes in the long term?
- Model for students how they will add checkmarks to specific answers on the chart paper. This will allow the class to summarize all of their data together. Note how they should fill in the “other” category if that is their answer.
- Have students add checkmarks to each sheet of paper with a marker to indicate how their interviewee answered each question. Since students collected two Storm Stories, they should add two checkmarks, one for each storm, to each question.
- Divide the class into five groups and assign each group to summarize the data for a piece of chart paper. Instruct groups to create bar graphs of the data. Provide an example of a bar graph and guidance if needed.

### Communicate results.

- Review the data analysis question (*What actions did people take to stay safe and keep their homes and belongings safe?*) and note that each group analyzed a piece of the dataset that allows us to answer that question. Have each group present their bar graph to the rest of the class and explain what it indicates.
- Discuss how people’s actions change before, during, and after a storm and when planning for the long term.
- Save the data analysis (whether in spreadsheets or on paper) for use during Lesson 10.

### Exit ticket: Construct explanations for how hurricanes affect people in the community.

- Share the question: *What actions did people take to stay safe and keep their homes and belongings safe?*
- Pass out long strips of paper and markers, one per student. Instruct students to write a headline that addresses the question. Remind students that a good headline is catchy but, more importantly, it gets at the heart of the issue.
- Hang the headlines on the wall and, if possible, leave them displayed for the rest of the unit.

#### Notes about data analysis:

When students are analyzing the most frequently mentioned storms on Day 4, you may find that some groups have more data points than others. This shouldn’t matter if students are analyzing data via a spreadsheet, but might make the activity too long if student groups are working with the Storm Stories Questionnaires. You may choose to have two groups divide up one storm and then see whether they had the same description of it in the end.

Hurricanes and tropical storms only described in one story are interesting, but will not be helpful in the Day 4 analysis activity. Choose the storms that were most often described in stories and assign each group one of those storms. It’s not necessary for students to analyze all storms. The idea is to illustrate the diversity of storms and their impacts.

If you have students analyze the data digitally, you may want to spend some time orienting students to the data, depending on your students’ proficiency with spreadsheets. Remind student groups to make a copy of the spreadsheet before they start their work so that groups can be analyzing different parts of the data and not make changes (such as sorting rows, hiding columns) that will affect other groups.

Depending on prior experience, students may need additional support to create bar graphs of data during Day 3 and 4.

## Day 4

**Introduce the data analysis activity.**

- Have students review what hazards people face during hurricanes and tropical storms, according to their Storm Story interviews. (*Students will likely mention wind, flooding, and rain.*)
- Ask students: Do all storms have the same amount of damage from wind or flooding? How are these storms the same? How are they different? These are the day's data analysis questions. (*Answers will vary, but students may note that the person they interviewed had different experiences during the two storms they described.*)
- Tell students that in this data analysis activity, each group will analyze one storm to define what the storm was like, given people's descriptions of it. Then, they will look up their storm in NOAA Historical Hurricane Tracks and learn about the physical characteristics of the storm.
- Have students return to their groups from the previous day.

**Organize the data by storm.****[Digital Option] If students have entered the data via the Google Form:**

- Project the spreadsheet for the class, sort the data by the storm names, and have students identify the most commonly described storms from the list. Note that because students entered this data manually, there may be spelling errors.
- Provide each student group with a computer or tablet and have each group make a copy of the spreadsheet that they will use for analysis.
- Assign each group a different storm, using the most commonly described storms, and instruct students to hide data rows that are from other storms so that they can focus on their assigned storm.

**If students have the data in paper copies of the Storm Stories Questionnaire:**

- Identify the storms that were most commonly described by having students record how many interviews they have about each storm. Tally the results on the board.
- Assign each group a different storm, using the storms that are most commonly described in the interview data, and provide the *Storm Stories Questionnaire* pages that the class collected about that storm.

**Have students compare the accounts about a storm to the physical science data about the storm.**

- Hand out a copy of the *Accounts of a Storm* student page to each student and a computer or tablet to each group.
- Following the instructions on Part 1 of the student page, students will define what the storm was like given interview descriptions of wind, flooding, road closures, and the length of the storm. Before they begin, orient students to the bar graph templates.
  - › Students who are unfamiliar with graphing may benefit from an example of how to create percentages of the data and how to create bars that show the percentages.
  - › Note: if there are only a small number of Storm Stories that describe each storm, creating bar graphs of the data isn't going to be meaningful. You may instead have students summarize the data without graphing.
- Following the instructions for Part 2 of the student page, students should look up their storm in NOAA Historical Hurricane Tracks ([coast.noaa.gov/hurricanes/](https://coast.noaa.gov/hurricanes/)) and zoom into the part of the map where the storm track affected their community. Students will note the characteristics of the storm (such as category, wind speed, and how fast the storm was moving) at that location on the map.

**Students share their storm.**

- Give each group time to develop a slide to present to the class that describes their storm, including:
  - › their analysis of the Storm Stories data about the storm
  - › the characteristics of the storm they researched in NOAA Historical Hurricane Tracks
- Have student groups present about their storm to the rest of the class (1- 2 minutes for each presentation) so that all students

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- get an overview of each storm. As other groups present, have students in the audience take notes about each storm and its characteristics.
- Hold a brief discussion after all the groups have presented, focusing on the data analysis questions: Do all storms have the same amount of damage from wind or flooding? How are these storms the same? How are they different? (*Students will likely discover that there are differences between the storms, which is something they will learn more about in the next lesson.*)
- Have students review the hypotheses they generated at the beginning of the lesson and discuss whether their data supports any of the hypotheses.

### Update the Driving Question Board.

- Have students return to the Driving Question Board to see whether there are questions that can now be answered or questions that should be changed based on what we know now. Have students consider whether they have new questions to add to the Board.

### Opportunities for Assessment

- The content of the data that students collect during interviews will depend on the person they are interviewing, so focus on the quality of the data that students collect, including the completeness of the data when assessing student work. Since the interview data will be needed before analysis, it's recommended that you include timeliness of interviews as a part of students' grades to add incentive for students to complete interviews on time.
- Answers to the exit ticket question should communicate students' conclusions after analyzing data about how people in their community were affected by hurricanes. This is directly tied to the lesson question and should indicate the understanding that students have developed.
- Answers on the *Accounts of a Storm* student page should indicate how students are making sense of the storm data.
- Once groups present about the different storms (Day 4), listen to student ideas comparing storm characteristics (e.g., how some storms have higher winds than others, some stay in the area for longer, some cause more flooding). Students will investigate hurricane characteristics in depth in the next lesson.
- Give students the Hurricane Resilience Quiz 1 to assess learning through the end of Lesson 3 (Part 1). Assessments can be downloaded from the [Hurricane Resilience Assessments](#) google folder.

# Storm Stories Interview Protocol

## Lesson 3 Student Pages: Storm Stories

### Step 1: Prepare

- Think of two local people you are interested in interviewing. When thinking of who to interview, keep in mind:
  - › Older people have experienced more hurricanes and tropical storms.
  - › People who have lived in the area for many years will likely have experienced more storms in this area.
- Based on your Hurricane Timeline and how long these people have lived in the area, identify which hurricanes and tropical storms you want to ask them about.

### Step 2: Set up your interview.

- Contact one of the two people and ask if you can interview them. Let them know that this is for a class project to explore how hurricanes and tropical storms have affected the local area. Tell them that you'd like to interview them about two hurricanes or tropical storms that they remember.
- If they agree to an interview, set up a time. (Your teacher will tell you when this assignment should be completed.)
- Not everyone wants to be interviewed. That's okay. If someone doesn't want to be interviewed, move on to the other person on your list.

### Step 3: Conduct the interview.

- You'll need:
  - › Two copies of the *Storm Stories Questionnaire* (one for each storm you're asking about)
  - › A pencil or pen
  - › The URL for the Storm Stories Google Form on a phone, tablet, or computer (if your class is entering the data into a spreadsheet).
- Remind the person that you'd like to ask them about two hurricanes or tropical storms that they experienced. Have them choose the storms. To help stay organized, interview them about one storm at a time.
- An interview is often more like a conversation. It's okay if there are pauses in the conversation.
- Ask questions from the *Storm Stories Questionnaire* to guide your interview. Listen carefully to the answers to the questions and note them in the *Storm Stories Questionnaire*.
- If the person doesn't remember something, note that in the *Storm Stories Questionnaire*. (There are options for "don't remember" for each question.)

### Step 4: Upload your data.

- If your class is entering the data into a spreadsheet with the Storm Stories Google Form, enter your data using the form. Each questionnaire (Storm Story) should be added to the form separately, so you will fill out the form twice - once for each hurricane or tropical storm the person described.
- If your class is not using the Google Form, then bring your *Storm Stories Questionnaires* to the next class. Your class will analyze the data then.



Student name: \_\_\_\_\_

# Storm Stories Questionnaire

## Lesson 3 Student Pages: Storm Stories

My interview with  about  in the year .

(Fill in person's name.) (Fill in hurricane or tropical storm name.) (Fill in year.)

### Before the storm

**Where did you live at the time of the storm?** (Name a town or city and state) \_\_\_\_\_

**How did you learn that the storm was coming?** (select all that apply)

- TV
- Radio
- Internet
- Friends or family
- Other \_\_\_\_\_

**How did you feel when you learned that the storm was coming?** \_\_\_\_\_

**What did you do?** (select all that apply)

- Stocked up on food/water
- Created an emergency supply kit
- Installed window protections
- Secured home exterior and items in the yard
- Secured or relocated vehicles (car/boat)
- Turned off electricity/gas
- Planned for evacuation
- Evacuated prior to the storm
- Took care of other people or pets
- Other \_\_\_\_\_

### During the storm

**What did you do during the storm?** (select all that apply)

- I evacuated nearby (less than 20 miles).
- I evacuated far away (more than 20 miles).
- Other people came to my house.
- I stayed in a part of the house until the storm passed.  
Which part of the house? \_\_\_\_\_
- I stayed inside.
- I went outside.
- Other \_\_\_\_\_

**Was there flooding at your location?**

- Yes
- No
- Don't remember
- Don't know because evacuated

## Storm Stories Questionnaire

### Lesson 3 Student Pages

#### Was there wind damage?

- Yes
- No
- Don't remember
- Don't know because evacuated

#### Were roads closed?

- Yes
- No
- Don't remember
- Don't know because evacuated

#### How long did the storm last?

- Less than 1 day
- 1-2 days
- 3 days or longer
- Don't remember
- Don't know because evacuated

#### After the storm

##### I found that these items were damaged:

- House
- Cars/trucks
- Boat
- Trees
- Belongings
- Other \_\_\_\_\_
- Nothing was damaged.

##### What did you do?

- Fixed my home.
- Fixed a car/boat.
- Repaired other damaged items.
- Cleaned up debris.
- Checked on other people.
- Cleaned up the yard.
- Other \_\_\_\_\_

How long did it take for life to get back to normal? \_\_\_\_\_ (fill in the blank)

##### What decisions have you made to stay safe from hurricanes in the long term?

- Bought flood insurance
- Moved to higher ground
- Modified home (such as raising it up to avoid flooding)
- Developed an evacuation plan
- Created an emergency kit
- Bought a generator
- Raised appliances
- Other \_\_\_\_\_

Name: \_\_\_\_\_



# Accounts of a Storm

## Lesson 3 Student Pages: Storm Stories

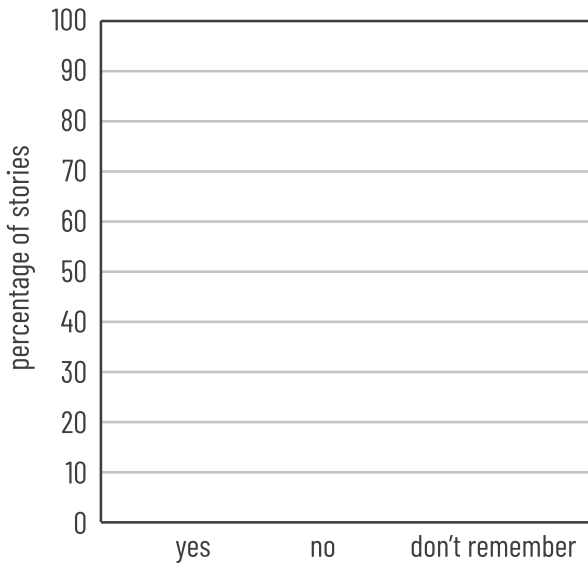
Storm Name:  Year:

Total number of stories we collected about this storm:

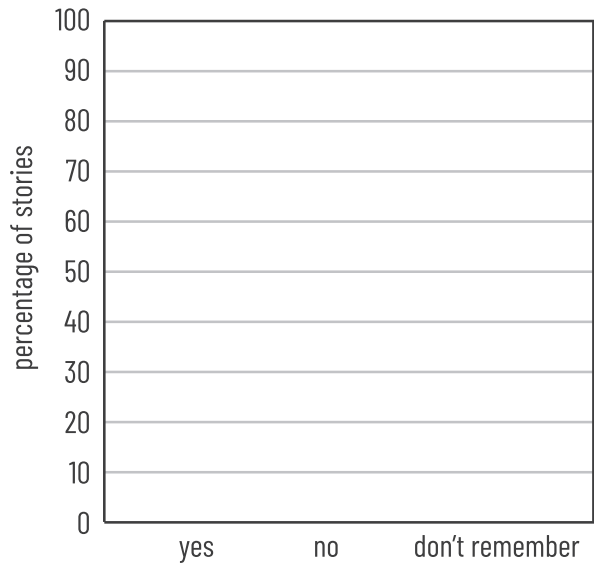
### Part 1: What was the storm like according to the Storm Stories data?

Instructions: Make bar graphs to describe the percentage of stories that reported wind damage, flooding, and whether roads were closed. To calculate percentages of answers, you will need to divide the number of stories that had each answer by the total number of stories and multiply by 100. For example, if 4 out of 10 stories noted that there was wind damage that is  $4/10 \times 100 = 40\%$

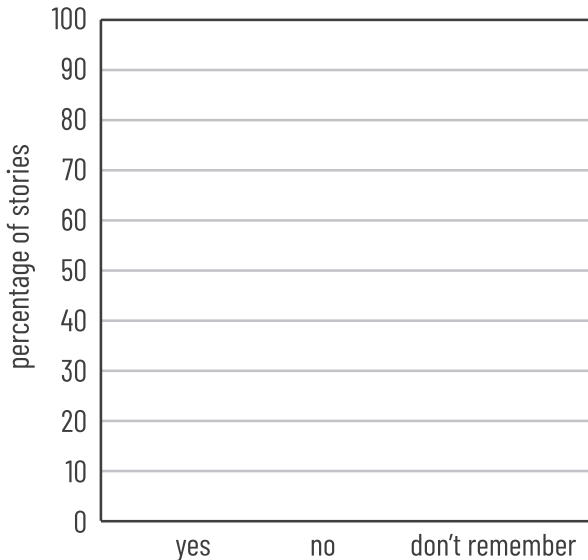
#### Was there wind damage?



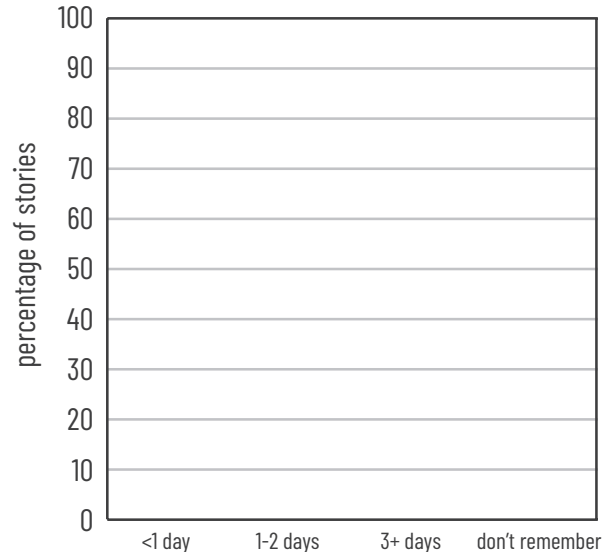
#### Was there flooding?



#### Were roads closed?



#### How long did the storm last?



## Accounts of a Storm

### Lesson 3 Student Pages

#### Part 2: What was the storm like according to the storm's physical characteristics?

Instructions: Go to NOAA Historical Hurricane Tracks ([coast.noaa.gov/hurricanes](https://coast.noaa.gov/hurricanes)) and search for the storm. Since multiple hurricanes can have the same name, make sure to check that the storm has the correct year. Zoom into the map of the storm's track to find the data about the storm when it hit your location. Record the data below.

Storm category:

Wind speed:

How long was it over your location?

From what direction did it approach the coast?

What else do you notice about the storm?