

WEATHER UNIT STUDY

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UNIT STUDY



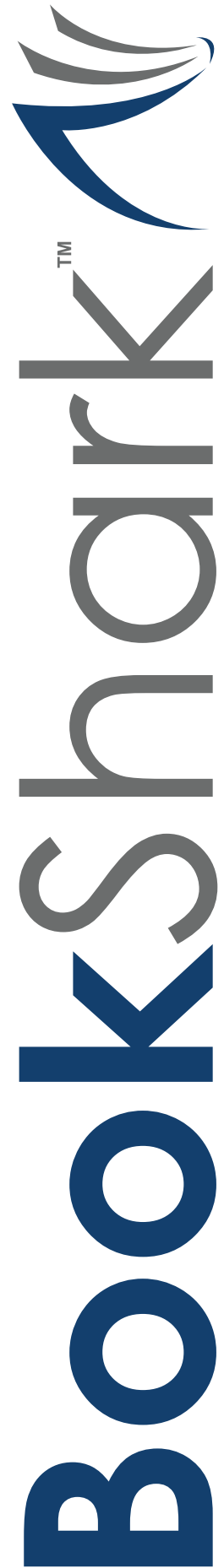
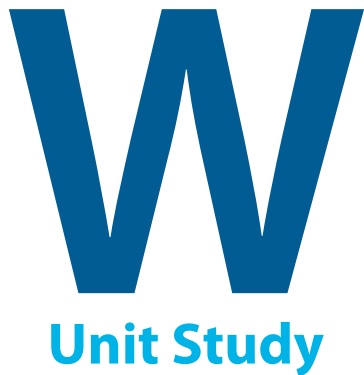
SCHEDULE & NOTES

BookShark 

Instructor's Guide

Weather Unit Study

by the BookShark Team



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NOTE TO PURCHASER

BookShark, LLC is committed to providing the best homeschool resources on the market. This entails regular upgrades to our curriculum and to our Instructor’s Guides. This guide is the 2022 Edition of the BookShark™ Science “Weather Unit Study” Instructor’s Guide.

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Weather Unit Study

Schedule and Notes

DISCLAIMER

BookShark Science and History curriculum is based on a mix of non-fiction and biographies. For this particular unit study we use *What Makes a Tornado Twist? And Other Questions About Weather* by Mary Kay Carson for the reading assignments.

This complete unit study is a sample that reflects typical elements you will find in BookShark History, Science, and/or Language Arts Instructor Guides: reading assignments, hands-on experiments, activity sheets, vocabulary words, and discussion questions, etc. In History, you will typically have a scheduled reading assignment followed by discussion questions and vocabulary words. In Science, you will typically have a reading assignment followed by activity sheet questions and a weekly science lab. In Language Arts, you may have copywork, dictation, mechanics, phonics, and/or writing practice, depending on the age of the student.

Please download free samples of the first three weeks of all BookShark Instructor's Guides (all subjects and levels) from <https://www.bookshark.com/instructors-guide-samples> to see exactly how the curriculum is designed.

Understanding the Structure of This Guide

Introduction

This 2-week unit study provides a schedule, notes, and map for the book, *What Makes a Tornado Twist? And Other Questions About Weather* by Mary Kay Carson.

Though the unit study is designed to resemble our Science guides, it also includes Activity Sheets that were added for fun more than academics and contains elements similar to our Language Arts and History guides.

BookShark's Instructor's Guides include a 36-week, 4-day Schedule and Notes. The History programs include History, Geography, Timelines, Read-Alouds, and Readers. BookShark's literature-based approach enables you to teach through reading and discussion. We do not assign activity sheets or tests as we believe discussion is the most effective way to retain and understand the knowledge gained from books.

BookShark's Language Arts and Science guides include Activity Sheets. Though they are engaging, they are designed for academic purposes and are used to enforce concepts in addition to discussion.

Depending on your students' age and/or reading level you can choose to use the *What Makes a Tornado Twist? And Other Questions About Weather* book as a Read-Aloud or Reader. Many older students will be able to read this book on their own. However, students enjoy being read aloud to even through their tween years, so feel free to use the book as a Read-Aloud if you would like to join your student in learning about weather. For parents who are not familiar with Read-Alouds, the benefits include...

- Introducing your children to great literature beyond their personal reading capacity.
- Developing a life-long love of reading: when you read great literature to your children, it creates a thirst to read. They'll begin to think, "I love books! One day I'm going to read books like this!"
- Expanding your children's vocabulary.
- Building important listening skills—including the ability to visualize the meaning of spoken words.
- Developing an ear for good oral reading.
- Developing oral reading skills: having heard quality oral reading done by you, your children will imitate you.
- Giving you and your children memorable and enjoyable times together.

Map Activities

BookShark's History Guides also include Map Activities.

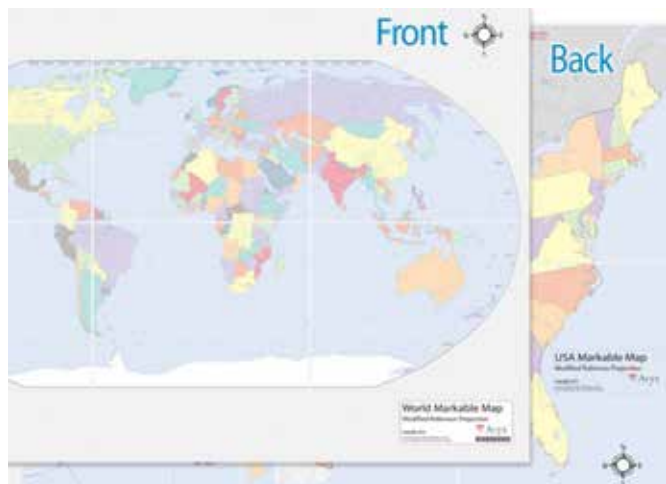
BookShark's geography program weaves assignments throughout the year from every appropriate book. It demonstrates to your children the importance of map skills while enhancing the learning adventure.

Completing map assignments provides geographical context to the stories your children are reading while expanding their geography knowledge. We provide the 🌐 symbol on the Schedule page to alert you that a map assignment is included in that day's notes.

For this unit study, we provide a mapping activity sheet in Week 1. When using a full BookShark curriculum, we recommend using BookShark's Markable Wall Map when completing Map Activities.

You can get one here:



<https://www.bookshark.com/markable-map>





Week 1 Schedule

Weather Unit Study

Date:	Day 1	Day 2	Day 3	Day 4
Read-Aloud or Reader				
<i>What Makes a Tornado Twist? And Other Questions About Weather</i>	pp. 4-7 	pp. 8-9 	pp. 10-11	pp. 12-13
Activity Sheets				
	Picture Study	Atmospheric Layers	Copywork & Dictation	Cloud Identification
Optional Activity				
	My Town's Weather Paint or Draw Your Favorite Weather	Pressure Demonstration	Puddle Tracing Water Cycle in a Bag	Cloud Detective Video Cloud in a Jar Edible Clouds
Other Notes				

Day 1

Read-Aloud or Reader

What Makes a Tornado Twist? | pp. 4-7

Vocabulary

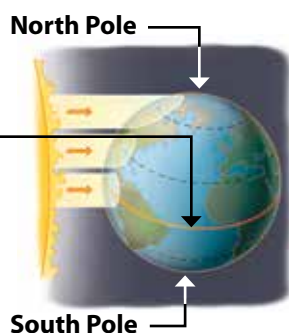
weather: the condition of the air in a specific place at a certain time.

damp: slightly wet.

temperature: a measurement of how hot or cold something is.

equator: the line around Earth's center.

Poles: the top and bottom of the Earth as it spins around; often referred to as North Pole and South Pole.



orbit: to circle around.

seasons: cyclical periods of weather patterns.

To Discuss After You Read

Q: What are the three ingredients of weather?

A: *air, water, and sunlight*

Q: How would you describe the weather happening where you are right now?



A: *answers will vary*

Q: When a part of the Earth is tilted toward the sun, what season is it for the people that live there?

A: *it is summer for the half of the Earth that is tilted towards the sun*

Q: What season is it where you are now? What does that mean about how the Earth is tilted in relationship with the sun in your area?

A: *answers will vary. Possible: It is winter, so my part of the Earth is tilted away from the sun. It is spring/fall so my part of the Earth is halfway between being tilted towards or away from the sun*

 Special Note to Mom or Dad  Map Point



Notes

Week 1

Note: In BookShark's Science curriculum, some questions are titled **Critical Thinking** or **Challenge** questions. The answers to these questions are not found in the book but require interpreting information from the book or using outside research to form the answer.

Q: Critical Thinking: If the Earth were not tilted, what would be different about our weather?

A: *areas near the poles would be dark all year round, and we wouldn't have seasons*

Map Activities

Identify and label the places below from today's reading passage on the corresponding maps found in Week 1 of your Activity Sheets:

🌐 Equator (E1-E12) (map 1)

🌐 Florida (E6), New York City (B8) (map 2)

We provide an answer key at the end of this Unit Study.

Activity Sheet

Picture Study

Complete "Picture Study" on the **Week 1 Activity Sheet**.

Optional Activities

My Town's Weather

Look at the monthly averages for your hometown at <https://www.usclimatedata.com/>. Then based on the data there, answer these questions:

1. What month is the coldest, on average, where you live?
2. What month is the warmest, on average, where you live?
3. What month has the most precipitation where you live?
4. What month has the least precipitation where you live?

Choose another city in the world and compare your town's weather to it.

Paint or Draw Your Favorite Weather

Compose a painting or drawing that uses color, texture, and shape to illustrate your favorite weather.

Day 2

Read-Aloud or Reader

What Makes a Tornado Twist? | pp. 8–9

Vocabulary

atmosphere: layers of gas surrounding the Earth or another planet.

atmospheric (or air) pressure: the pressing force of the air in the atmosphere, pushing down on Earth.

aurora: beautiful lights in the sky caused by solar storms interacting with gases in our atmosphere. Oxygen gives off green and red light. Nitrogen glows blue and purple.

To Discuss After You Read

Q: How thick is the Earth's atmosphere?

A: *the atmosphere is 300 miles thick, about the width of the state of Pennsylvania*

Q: What gases make up Earth's atmosphere?

A: *it is made mostly of oxygen and nitrogen*

Q: Is air heavy?

A: *yes, the weight of air creates atmospheric pressure*

Q: How is air pressure affected by temperature?

A: *colder air is heavier than warmer air, so warm air rises while cold air sinks*

Note: Why is warm air lighter than cold air? The book does not explain why because it requires some knowledge of atoms and physics. If your student wants to know, explain that warm air rises because warm molecules have more energy than cold molecules. Warm molecules move faster and hit each other more often which makes the molecules fly farther from each other, therefore making the air less dense. Density is a measurement of how many molecules are packed into a certain area. Because warm air is less dense (has less molecules in an area) than cold air, it is lighter than cold air. Gravity pulls heavy, cold air down which then pushes lighter, warm air upwards. This movement of air created by temperature differences causes many weather events.

Here's a mnemonic device to help you remember the layers from farther away to closer to the earth:

The Messy String Tangled



Thermosphere
Mesosphere
Stratosphere
Troposphere



The Earth's atmosphere does a lot more for us than provide oxygen to breathe and create weather. Without an atmosphere, Earth would be hit with more meteors, which are usually burned up in the mesosphere layer. The atmosphere also acts like insulation and prevents Earth from getting much, much hotter or much, much colder like the extreme temperatures of other planets in the solar system. [p. 8]

Map Activities

Identify and label the places below from today's reading passage on the corresponding maps found in Week 1 of your Activity Sheets:

-  Mount Everest (D9) (map 1)
-  Pennsylvania (B7) (map 2)

Activity Sheet

Atmospheric Layers

Complete "Atmospheric Layers" on the **Week 1 Activity Sheet**.

Answers

1. outer space
2. thermosphere
3. mesosphere
4. stratosphere
5. troposphere

Optional Activity

Pressure Demonstration (adult supervision required)

Explanation:

The layers of the Earth's atmosphere create pressure on the lowest layer of the atmosphere. There is more pressure on the troposphere than any other layer. Here's an experiment that can help students better understand atmospheric pressure.

Materials

- empty milk carton, or jug, or plastic water bottle
- thumbtack or nail
- water

Procedure

1. With a thumbtack or nail, poke three equal-sized holes in a vertical line on an empty milk carton.



2. Cover the holes with your fingers and fill the carton with water. Then set the carton on the edge of the sink, with the holes facing the sink.
3. Remove your fingers from the holes and observe the water leaving the carton then answer the following questions.

Reflection Questions

- Q: Which hole has the strongest stream? Why do you think that is?
- A: *the bottom hole. Its water is under more pressure, so it shoots out with more force. The water at the top of the carton has less pressure, so it shoots out with less force*
- Q: This experiment shows water pressure. How does it relate to layers of the Earth's atmosphere?
- A: *air pressure works in a way similar to water pressure. The closer air is to the Earth, the more pressure it is under, because there is more air pushing down on the lower layers*
- Q: Imagine there is someone at the top of a mountain and someone else at the bottom. Which person experiences more atmospheric pressure?
- A: *the person at the bottom of the mountain would experience more pressure*



Notes

Week 1

Day 3

Read-Aloud or Reader

What Makes a Tornado Twist? | pp. 10–11

Vocabulary

water cycle: the path of water as it moves to and from Earth's atmosphere and its surface, often changing forms between solid, liquid, and gas.

evaporate: to change from the liquid form of water to the gas form (water vapor).

water vapor: water in a gas state.

condense: to change from water vapor (gas) to the liquid form of water.

precipitation: water, such as rain or snow, that returns to Earth from the atmosphere.

prism: a transparent object that can split light into its many colors.



horizon: the line where the sky appears to meet the land.

To Discuss After You Read

Q: How do clouds form?

A: *clouds form when water vapor in the atmosphere cools enough to become tiny liquid water drops that float*

Q: How does temperature drive the water cycle?

A: *the heat of the sun causes evaporation. When the water vapor cools, it condenses back into a liquid and the drops fall as precipitation*

Q: What two ingredients are necessary for a rainbow?

A: *sunlight shining through raindrops*

Q: What shape are rainbows?

A: *rainbows are actually complete circles, but we only see half of them because of our perspective on Earth*

Activity Sheet

Copywork & Dictation

This Unit Study was designed for ages 7–12 so we have provided both Copywork and Dictation options. Please choose the one appropriate for your child. If you are new to BookShark our general recommendation would be for children ages 7–9 to complete the copywork and children ages 9–12 to complete the dictation.

Complete the "Copywork" or "Dictation" found on the **Week 1 Activity Sheet**.

Optional Activity

Puddle Tracing

Note: This activity is best done on a warm, sunny day.

Materials

- cup of water
- chalk
- sidewalk

Procedure

1. Take a small cup of water and pour it onto a flat sidewalk.
2. Once the water has stopped spreading out, trace around the spilled water with chalk.



3. Check back every 10 minutes. (For hot and dry climates, check every 5 minutes.)
4. Trace the new puddle boundary.
5. Repeat checking and tracing the puddle until it is gone.

Reflection Questions

Q: What did you notice during this activity?

A: *answers will vary*

Q: How long did it take for the puddle to disappear?

A: *answers will vary*

Q: Which of your vocabulary words are demonstrated in this experiment?

A: *we are able to see how water **evaporates** with this experiment*

Q: What factors in the environment might make your puddle disappear more slowly or more quickly?

A: *an increase or decrease in temperature of the water spilled and/or an increase or decrease in the air temperature can affect the rate of evaporation*

For further study, try the experiment again under different conditions.



Water Cycle in a Bag



Materials

- plastic zip top bag
- permanent marker
- water
- blue food coloring
- masking tape

Procedure

1. Draw an outdoor scene on the bag with permanent marker.
2. Add ¼ cup of water and one drop of blue food coloring to the bag.
3. Seal the bag tightly, being sure to leave it filled with air.
4. Tape the bag to a window with lots of sun, preferably a south-facing window.
5. Check back every few hours to see if the water cycle is happening in your bag. Once the water evaporates, you'll notice water droplets at the top of your bag, too!

Reflection Questions

- Q: Water started out at the bottom of the bag. How did it get to the top?
- A: *evaporation caused by the heat of the sun caused the water vapor to rise up*

Explanation:

There are no fluffy clouds in the little bag because the evaporated water doesn't have dust particles to cling to in the baggie. Instead it clings to the sides of the bag. So all the droplets at the top are like little clouds. Once those droplet clouds get too heavy, they rain down the side of the baggie, back to the bottom.

Day 4

Read-Aloud or Reader

What Makes a Tornado Twist? | pp. 12–13

Vocabulary

humid: describes the moisture content in air.

dense: tightly packed.

stratus clouds: flat, layered clouds low in the atmosphere .

cumulus clouds: fluffy, cotton-like clouds low in the atmosphere.

cirrus clouds: thin and wispy clouds high in the atmosphere .

fog: cloud touching the ground.

To Discuss After You Read

Q: What makes up clouds?

A: *clouds are made of water droplets*

Q: Why do clouds float?

A: *the humid air in clouds is less dense than the dry air around them, so they float*

Q: Are there any clouds where you are today? If so, what type are they?

A: *answers will vary*

Activity Sheet

Cloud Identification

Identify the clouds found on the **Week 1 Activity Sheet**, then discuss the following information. Reference page 13 in your book.

The biggest keys to cloud identification are how high or low clouds are and the cloud shape. Observing the clouds currently in the sky can help you predict what weather may happen in your area.

- Cirrus clouds mean fair weather, but a change is likely.
- Cirrostratus clouds mean precipitation in 12–24 hours.
- Cumulonimbus clouds indicate heavy precipitation.
- The anvil-shaped top generally points the direction wind is blowing.
- Altocumulus and altostratus clouds often form just before precipitation.
- Cumulus clouds generally mean fair, dry weather.
- Nimbostratus clouds mean light to moderate precipitation.

Go outside and see if you can identify any clouds today. What do those clouds mean for weather near you?



Notes

Week 1

Some fun sayings can help you remember which clouds predict what kind of weather. For example, the heavy precipitation of cumulonimbus clouds can be seen in this saying: "When clouds appear like rocks and towers, the Earth is refreshed with frequent showers?" Can you think of your own sayings to help you remember which cloud types mean a certain kind of weather?

When the clouds are _____, then _____.

Answers

1. Cirrus
2. Cumulus
3. Cumulonimbus
4. Nimbostratus

Optional Activities

How to Be a Cloud Detective

For more information on identifying clouds, watch this video: https://www.youtube.com/watch?v=cj_8_upaVo

Cloud in a Jar

Materials

- glass jar
- water
- shaving cream
- blue food coloring

Procedure

1. Fill the glass jar with warm water, leaving about an inch of space.
2. Use the shaving cream to cover the top of the water. This is your cloud. (The thicker the cloud, the more food coloring will be needed to make rain.)
3. Drip the food coloring onto the same spot on top of your cloud. (Start with 5 drops.)
4. Wait for several seconds and observe what happens. If nothing happens, add a few more drops of food coloring to the same spot and wait again.

Reflection Questions

Q: What did you notice?

A: *answers will vary*

Q: Which of your vocabulary words are demonstrated in this experiment?

A: *precipitation is demonstrated in this experiment*

Q: What part of the water cycle is illustrated here?

A: *when the cloud gets too heavy, the rain is released at the bottom*

Edible Clouds



Materials

- blue jello
- whipped cream
- glass or jar

Procedure

1. Prepare blue jello according to package directions.
2. Layer whipped cream and solidified jello in a glass to mimic a blue sky with clouds.

Reflection Questions

Q: What type of cloud does this edible cloud most resemble?

A: *answers will vary. Globes of whipped cream most closely resemble cumulus clouds*

Q: What foods could illustrate other cloud types?

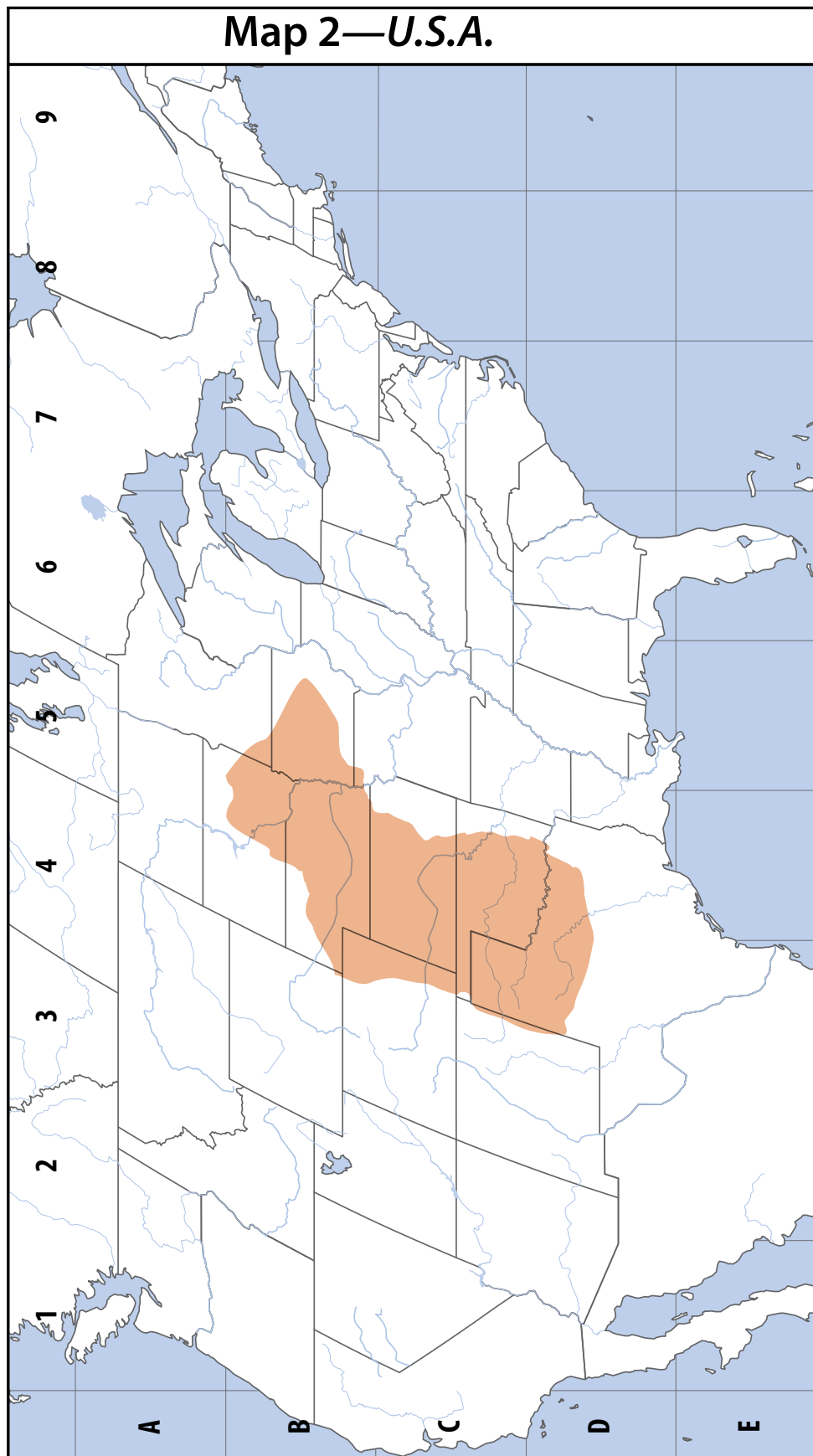
A: *answers will vary. May include cotton candy for cirrus clouds or mashed potatoes for stratus clouds. Try to think of a different food for several kinds of clouds* ■



Map Activities

Map 1—World Map







Picture Study

Find reproductions of these two works of art online or in a reference book so you can see more detail. Look at each painting for at least 45–90 seconds, absorbing all you see. Then discuss your answers to the questions below with an adult.



The Summer, Poppy Field by Claude Monet



Dutch Boats in a Gale by Joseph Mallord William Turner

1. What is happening in the painting? Describe everything you see.
2. Does this art remind you of anything?
3. What is the weather doing in these paintings? How do you know?
4. What season would you guess it is in these paintings? Why?
5. What similarities and differences do you notice between the paintings?

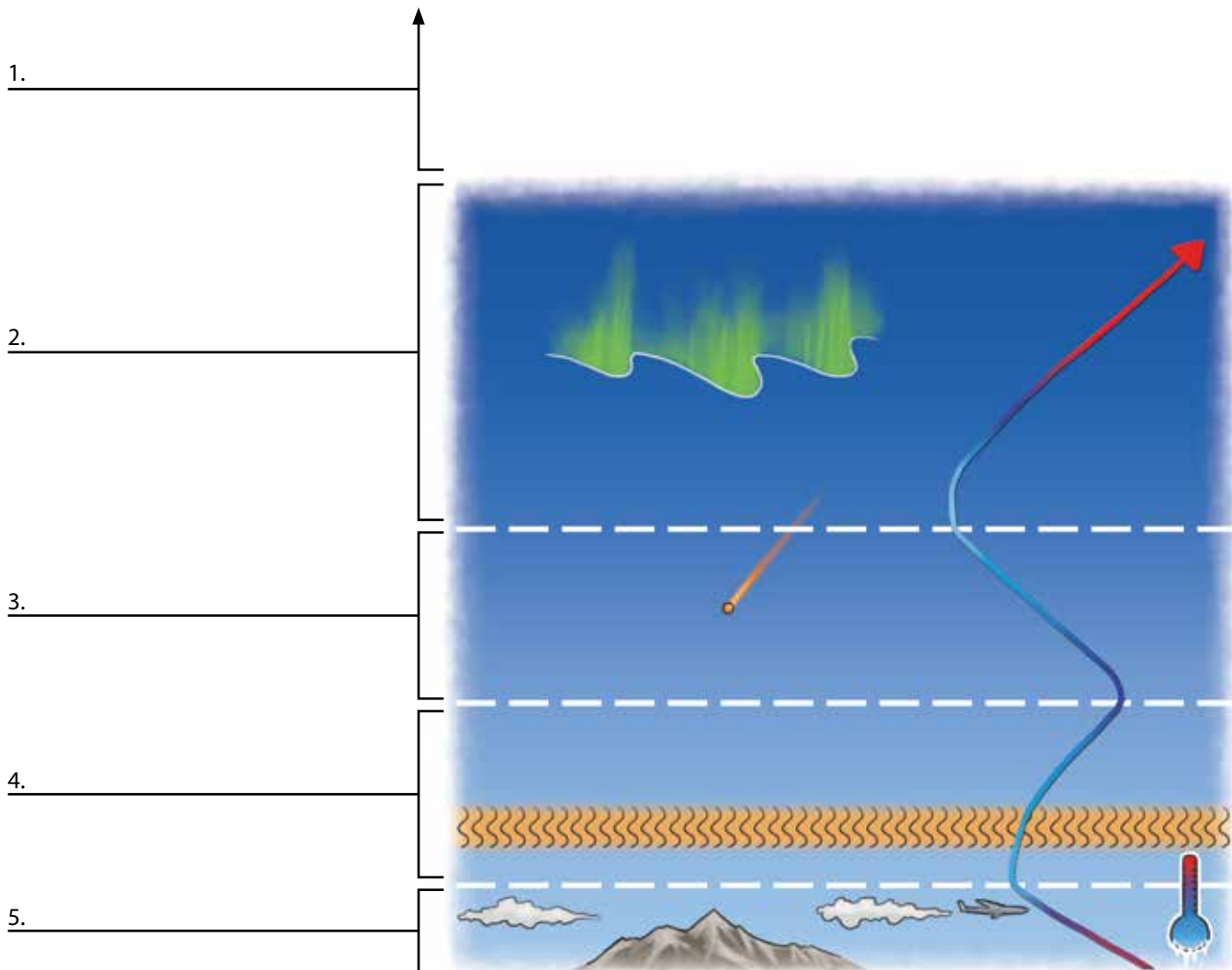


Week 1 Activity Sheet

Atmospheric Layers

Label the layers of Earth's atmosphere using the words in the box below.

Stratosphere	Outer Space	Troposphere	Mesosphere	Thermosphere
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Copywork or Dictation

People have always looked for patterns in the weather. From observing the way that animals act to paying attention to cloud formation, short sayings were created that help predict the weather have been passed down from generation to generation. For fun, see if you can memorize these short sayings. Notice if they seem to be true to real life. Here are a few:

When clouds appear like rocks and towers, the Earth is refreshed with frequent showers.

If the goose honks high, fair weather. If the goose honks low, foul weather.

Red sky at night, sailors delight; red sky in morning, sailors take warning.

Copywork | Ages 7–9

Copy one of the sayings on the lines below.

Dictation | Ages 9–12

Memorize at least one of the sayings. Note any words, capitalizations, or matters of punctuation that require special attention. Then, without looking at the passage, ask a parent to read the passage to you while you write it down on a separate sheet of paper.



Week 1 Activity Sheet

Cloud Identification

Write the name of the cloud next to its picture using the words in the box below. Use page 13 of your book for help.

Cumulus

Cirrus

Nimbostratus

Cumulonimbus



1. _____



2. _____



3. _____



4. _____



Week 2 Schedule

Weather Unit Study

Date:	Day 1	Day 2	Day 3	Day 4
Read-Aloud or Reader				
<i>What Makes a Tornado Twist? And Other Questions About Weather</i>	pp. 14–17 🌍	pp. 18–21 🌍 N	pp. 22–25 🌍	pp. 26–30 🌍
Activity Sheets				
	Vocabulary Crossword	Tornado Alley	Weather Safety Tips Weather Poetry	My Weather Forecast
Optional Activity				
	Realistic Paper Snowflakes	Storm Videos Tornado in a Bottle	Discuss your Safety Plan Storm Videos	Present a Weather Forecast
Other Notes				

Day 1

Read-Aloud or Reader

What Makes a Tornado Twist? | pp. 14–17

Vocabulary

drizzle: very small raindrops, smaller than .02 inches across.

sleet: raindrops that freeze as they fall.

freezing rain: rain that freezes upon touching the ground.

hail: layered balls of ice formed by wind in clouds.

storm: a disturbance in the atmosphere that causes wind and precipitation.

dicey: unpredictable and possibly dangerous.

front: the area where two different air masses meet.

Find a ruler that measures millimeters and find 0.5 mm. That is how small drizzle is!

To Discuss After You Read

Q: How many sides (or points) does a snowflake have?

A: *snowflakes have six sides*

Q: What factors determine if water falling from clouds becomes rain, snow, hail, or drizzle?

A: *the kind of cloud and the temperature of the air in the cloud as well as between the cloud and the ground*

Q: What's the difference between rain and drizzle?

A: *the size of the drops—bigger drops are rain, smaller drops are drizzle*

Q: What's the difference between sleet and freezing rain?

A: *sleet freezes in the air as it is falling, whereas freezing rain doesn't turn into ice until it hits the surface*

Q: Our senses help us observe precipitation. Have you ever seen, smelled, touched, heard, or tasted any of the examples of precipitation? What do you remember?

A: *answers will vary*



Notes

Week 2

Q: Critical Thinking: *Front* is a term used to describe a boundary between two groups who are at war. What does a **battle** have to do with weather?

A: *different air masses don't easily mix, and different air masses pushing against each other can cause changes in humidity, temperature, and precipitation. It's like an actual battle in the atmosphere between two kinds of air*

Q: How do fronts get the name *warm front* or *cold front*?

A: *fronts are named for whichever mass (warm or cold) seems to be advancing*

Air mass standoffs (when neither side is moving forward) are called *stationary fronts*.

Map Activities

Identify and label the places below on the corresponding maps found in Week 1 of your Activity Sheets:

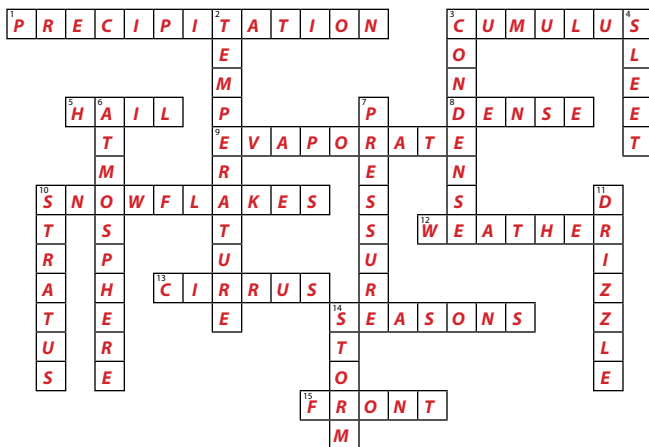
🌐 Antarctica (I6) (Map 1)

Activity Sheet

Vocabulary Crossword

Complete the "Vocabulary Crossword" on the **Week 2 Activity Sheet**.

Answers



Optional Activities

Realistic Paper Snowflakes

Make your own realistic paper snowflakes with 6 points. Excellent, detailed instructions are available at <https://www.instructables.com/How-to-Make-6-Pointed-Paper-Snowflakes/>

Day 2

Read-Aloud or Reader

What Makes a Tornado Twist? | pp. 18–21

Vocabulary

thunder: the sound of air exploding after lightning has split through it.

lightning: a sudden transfer of hot electric charge in the atmosphere.

tornado: sudden, violent storm with very fast wind speeds born from thunderstorms.

supercell: a powerful storm whose air rotates and goes upwards, can create severe tornadoes.

Tornado Alley: area in North America known for frequent, powerful tornadoes.

Note: Although Tornado Alley is a well-known term, many other places in North America including states in the South and Midwest often have powerful tornadoes as well.

Map Activities

On your maps, identify and label these places from the reading passage:

🌐 Tornado Alley (D4-B6) (Map 2)

🌐 Australia (F11), New Zealand (G12), Europe (C6), Asia (B7) (Map 1)

To Discuss After You Read

Q: Which occurs first in a storm, thunder or lightning?

A: *they occur at the same time*

Q: If thunder and lightning occur at the same time, why do we see lightning before seeing thunder during a storm?

A: *light travels faster than sound, so it takes a few seconds for the sound to catch up. We see the flash before hearing the boom*

Sound travels about 1 mile in 5 seconds. So if you see lightning and then count for 5 seconds before the thunder comes, that means the storm is 1 mile away. Try it together the next time you're in a thunderstorm.

Q: What other weather features can thunderstorms bring besides lightning and thunder?

A: *thunderstorms can also have heavy rain, hail, strong winds, and possibly tornadoes*



- Q: Critical Thinking: If lightning hits the tallest things in an area first, how can someone stay safe during a thunderstorm?
- A: *seeking shelter is the best way to stay safe. If you must be outside, don't stand in an open area (which would make you the tallest thing in the area) or under a tree. (It's also important to avoid being in water or on boats.)*
- Q: What are some dangerous aspects of tornadoes?
- A: *the high wind speeds of tornadoes can cause heavy items to blow around and cause incredible damage. Tornadoes can appear quickly, which means some people may not have time to find shelter*

Activity Sheet

Tornado Alley

Complete "Tornado Alley" on the **Week 2 Activity Sheet** and then discuss the following questions. You will need to go to the following link to complete this activity: <https://www.climate.gov/maps-data/dataset/average-annual-and-monthly-numbers-tornadoes-state-maps>

- Q: Tornado Alley is the nickname given to the band of midwestern states that experiences a high number of tornadoes each year. Although there's no official list of members, which states do you think could be classified as a part of Tornado Alley based on your map?
- A: *answers will vary but may include Texas, Oklahoma, Kansas, Nebraska, Iowa, Missouri, Illinois, and Colorado*
- Q: Which state has a high number of annual tornadoes but doesn't fit the pattern of being located in the Midwest?
- A: *Florida*
- Q: Which parts of the country generally have a low number of tornadoes?
- A: *the northeast coast and western states*
- Q: On average, which state has the most tornadoes each year?
- A: *Texas*

While Texas has many more tornadoes than other states, keep in mind that Texas is also much bigger than many other states. It's about 3.8 times the size of Oklahoma!

Optional Activities

Watch Storm Videos

Thunderstorm Video: <https://youtu.be/nBYZpsbu9ds>

Watch an amazing slow-motion lightning show set to music.

The Life of a Tornado: https://youtu.be/S_N-mnINp1Q

Reflection Questions

- Q: What color is the tornado at the beginning of the video?
- A: *at first, the tornado is pale gray*
- Q: What color is the tornado at the end? Why do you think the color changed?
- A: *at the end of the video, the tornado is much darker grey-brown. The color changed because it picked up so much dirt and debris*
- Q: The person who recorded this footage is a professional who has special equipment (including a camera on top of his vehicle) in order to stay safe. Do you think it's okay for anyone to be a storm chaser? What would make a good storm chaser?
- A: *answers will vary*

Tornado in a Bottle

Materials

- 2 clean 2-liter bottles (with the lids and lid rings removed)
- either duct tape or vortex bottle connector
- (optional) glitter (to show debris in the tornado)
- (optional) washer (to constrict water flow between bottles)

Procedure

1. Fill one bottle $\frac{2}{3}$ full of water. Dry the top and neck of the bottle thoroughly.
2. If using glitter, add a small amount to the water.
3. If using a washer, place it on top of the bottle with water. (The experiment still works without a washer, the tornado will just be wider without the washer.)
4. Either duct tape the two bottles together or use a vortex bottle connector to connect them. If using duct tape, be sure to use several layers and press firmly to minimize leakage.



Notes

Week 2



5. Take your contraption to an area prepared for potential spillage.
6. Turn the contraption so the bottle with water is on top.
7. Swirl the top bottle in a circular motion until a vortex is formed as the water moves downward.
8. Simply flip your contraption over and repeat.

For a video of this experiment, watch <https://youtu.be/LRWY7cBH-gs>.



Day 3

Read-Aloud or Reader

What Makes a Tornado Twist? | pp. 22–25

Vocabulary

hurricane: an enormous, swirling, tropical storm with winds over 74 mph, also called a tropical cyclone or a typhoon.

eye: the center of a swirling hurricane where there are no clouds and little wind.

nor'easter: short for northeaster, a winter storm with winds from the Northeast that occurs along the North Eastern coast coming from the ocean.

blizzard: storm with falling snow and winds faster than 35 miles per hour.

Map Activities

On your maps, identify and label these places from the reading passage:

🌐 *Indian Ocean (F9), New England (C3) (Map 1)*

Review and label north, south, east, west on your map of the USA and draw an arrow showing that winds come from the northeast into New England. (Map 1)

To Discuss After You Read

Q: Where do hurricanes form?

A: *hurricanes form above warm ocean water near Earth's equator*

Q: What are other names for hurricanes and what regions of the world call them that?

A: *hurricanes in East Asia are called typhoons. Hurricanes in the Indian Ocean and Australia are called cyclones. The broader term for all hurricanes is a tropical cyclone*

Q: What is more dangerous in a hurricane, the high winds or the flooding it causes?

A: *the flooding is more dangerous because it destroys more than the wind*

Q: Challenge! The book says, "A change of only a few degrees in temperature can turn rain to snow, or freezing rain to sleet."¹ At what temperature would these changes be taking place? (p. 24)

1. Carson, Mary Kay. "What Makes a Tornado Twist? And Other Questions about Weather." (New York: Sterling Children's Books, 2014), 24.



- A: *water freezes at 32 degrees Fahrenheit, so a change of only a degree or two can make a big difference at temperatures near that mark*
- Q: What is the difference between a normal snowstorm and a blizzard? (p. 24)
- A: *A blizzard must have both snow and winds over 35 mph, which makes it hard to see farther than a quarter mile away*

Activity Sheet

Weather Safety Tips

Complete "Weather Safety Tips" on the **Week 2 Activity Sheet**. Read about severe weather safety from the National Weather Service or other resource of your choice, and jot down two important safety tips for each type.

<https://www.weather.gov/safety/thunderstorm-during>
<https://www.weather.gov/safety/tornado-during>
<https://www.weather.gov/safety/hurricane-action>
<https://www.weather.gov/safety/winter-during>

Weather Poetry

Write a weather-themed poem. Choose a theme (use the word bank for inspiration) and then rely on your five senses to help you add vivid imagery to your poem. What does your weather theme sound, look, feel, taste, and smell like?

If your student needs a refresher or inspiration on types of poetry they can use, review the forms below:

Form: Haiku - Japanese 3-lined poem, often about nature
 Line 1 has 5 syllables,
 Line 2 has 7 syllables,
 Line 3 has 5 syllables.

Example

*Pitter patter rain
 Falling gently on my head
 Drops of happy spring*

Form: Acrostic - Spell out a word with the first letter of each line of the poem. It can rhyme or not rhyme.

Example

*Running through the puddles, splashing
 All the world is getting wet.
 Is the cloud almost through dumping?
 No. There's more rain in there yet!*

Form: Limerick - 5-lined poem that follows an AABBA rhyme pattern; A lines have 7–10 syllables and B lines have 5–7 syllables; often humorous and sometimes begins with "There once was a..."

Example

*There once was a tornado spinning 'round,
 Stirring up lots of stuff from the ground.
 It gobbled up trees
 With its circular breeze
 And left lots of rubble in a mound.*

Complete "Weather Poetry" on the **Week 2 Activity Sheet**.

Optional Activities

Discuss Your Safety Plan

Answer the following questions to help make a weather safety plan for your family.

1. Where can your family receive up-to-date weather information? (internet, local TV station, radio, weather radio)
2. What sorts of severe weather are possible where you live? (hurricanes, tornadoes, severe thunderstorms, blizzards, flooding)
3. For each possible severe weather scenario, what should you have ready? Where should you find shelter?
4. If your family must evacuate, where would you go? If for some reason your family gets separated, where is your meeting place if you are unable to communicate or return home?
5. Do you have an emergency preparedness kit? If yes, what is in your emergency preparedness kit? Where is it kept? Verify that all family members know its location.

Check www.ready.gov/kit to make sure your kit has what you need to keep your family safe.

Watch Storm Videos

Hurricanes 101: <https://www.youtube.com/watch?v=LIXVikDkyTg>

BlizzardTime Lapse: <https://www.youtube.com/watch?v=d5cFeUmYu98>



Notes

Week 2

Day 4

Read-Aloud or Reader

What Makes a Tornado Twist? | pp. 26–30

Vocabulary

climate: long-lasting pattern of weather in an area.

fossil fuels: items such as coal, oil, and gas used to power machines.

meteorologist: a scientist who studies weather.

forecast: to predict the weather.

climatologist: scientist who studies the weather and climate over an extended period of time.

Map Activities

On your maps, identify and label these places from the reading passage:

- 🌐 Alaska (B1), Hawaii (D1), Sahara desert (D6) (Map 1)
- 🌐 Arizona (C2) (Map 2)

To Discuss After You Read

- Q: What factors affect a place's climate?
 A: *distance from the equator, nearness to mountains or oceans, average temperature, and wind patterns can all play a part in a particular place's climate*
- Q: Can you tell a place's climate based on one day of weather?
 A: *no. Calculating average temperature, precipitation, etc. involves data over long periods of time*
- Q: Why is Earth getting warmer?
 A: *use of fossil fuels releases carbon dioxide into the atmosphere. It traps heat, making the Earth warmer*
- Q: What are some tools that meteorologists and climatologists use to study weather?
 A: *satellites, airplanes, radar, ships, weather balloons, computers, and even armored vehicles*

Activity Sheets

My Weather Forecast

Collect weather data from your area and perform your own weather forecast. Weather information is available in many places. For years, people would get their information from broadcasts on the radio or television. Newspapers would also publish local forecasts. Now many people check apps on their phones.

For an example of how a broadcast weather report sounds, check out <https://www.youtube.com/watch?v=X7jdYfQyxXY>.

Next, gather information for your area.

Visit the National Weather Service website, <https://www.weather.gov>. Near the top of the webpage, type in your zip code for data specific to where you are located.

There's a lot of information available! Remember that the three ingredients of weather are air, water, and sunlight. The way we experience those are through wind, precipitation, and temperature. Those are the features highlighted in a weather forecast.

Fill out the "My Weather Forecast" chart on the **Week 2 Activity Sheet**.

Check radar to see if there are any storms heading your direction. Remember that systems generally move from west to east in the United States.

<https://radar.weather.gov/>

Find your area on the map. What weather is predicted for where you live?

https://www.wpc.ncep.noaa.gov/national_forecast/natfcst.php

Optional Activity

Present a Weather Forecast

Now that you've collected your weather data, present it to your family or friends. Fill out the "Weather Forecast" script on the **Week 2 Activity Sheet** to get started. Draw a shape of your state and any weather events or temperatures you found in your research. Practice looking up and making eye contact with your audience. Smile and speak clearly. You can even have your parent record your presentation so you can watch it later. Maybe someday you'll be a broadcast meteorologist! ■

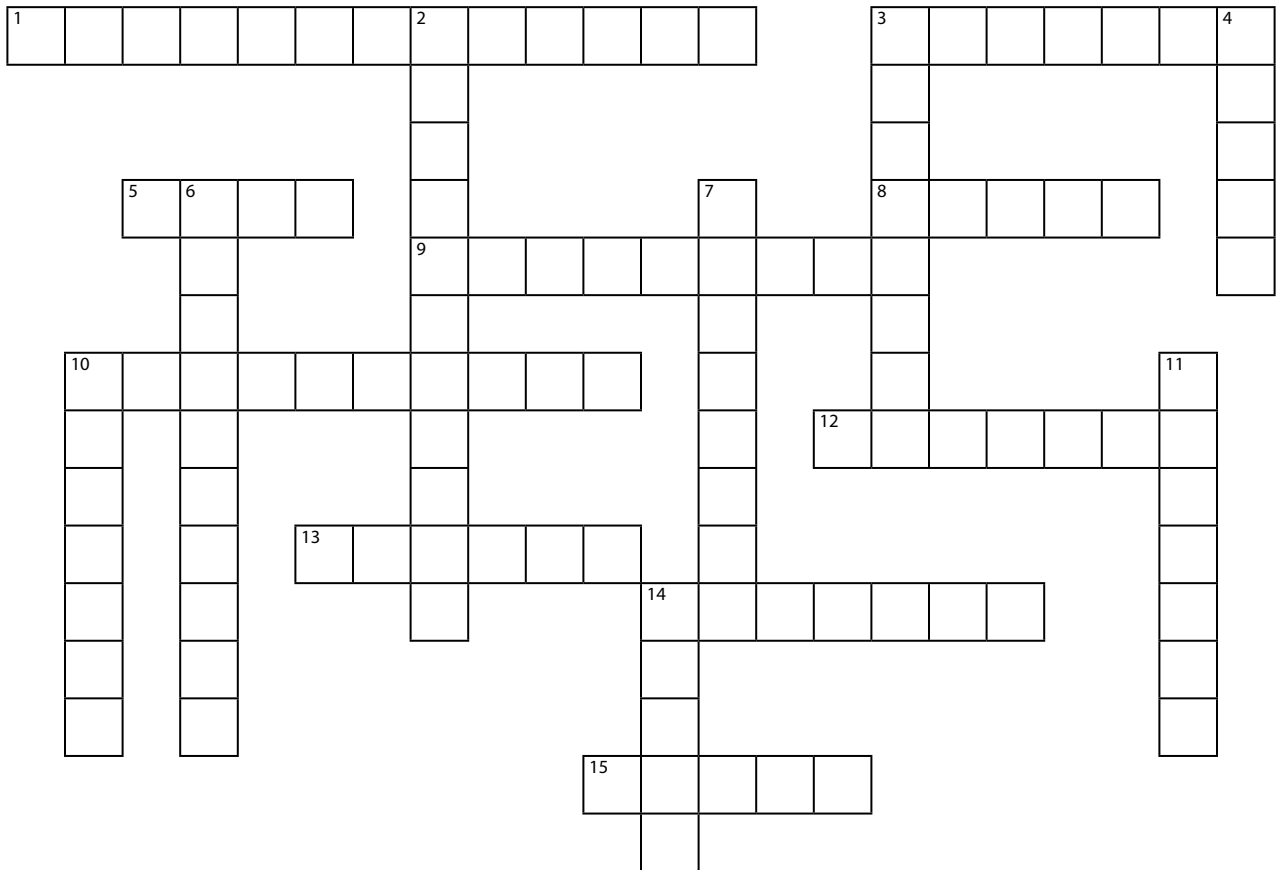
Week 2 Activity Sheet



Vocabulary Crossword

Complete the crossword puzzle using the words in the box below.

hail	storm	sleet	seasons	temperature	condense
pressure	dense	atmosphere	cumulus	snowflakes	evaporate
weather	cirrus	stratus	front	precipitation	drizzle



Across:

- water, like rain or snow, that falls from clouds
- fluffy cotton-like clouds
- layered ice formed in a thunderstorm
- describes tightly packed molecules
- to change water from liquid to gas
- light ice crystals that fall from clouds
- condition of the air at a certain place and time
- thin and wispy clouds
- cyclical periods of weather patterns
- area where two different air masses meet

Down:

- measurement of how hot or cold something is
- to change water vapor to liquid
- raindrops that freeze as they fall
- layers of gas surrounding the Earth
- a pressing force
- flat, layered clouds
- drops of precipitation smaller than .02 inches
- atmospheric disturbance causing wind and precipitation



Week 2 Activity Sheet

Tornado Alley

Using the scientific data at the link below, fill in the average number of tornadoes per year for each state on the map on the following page.

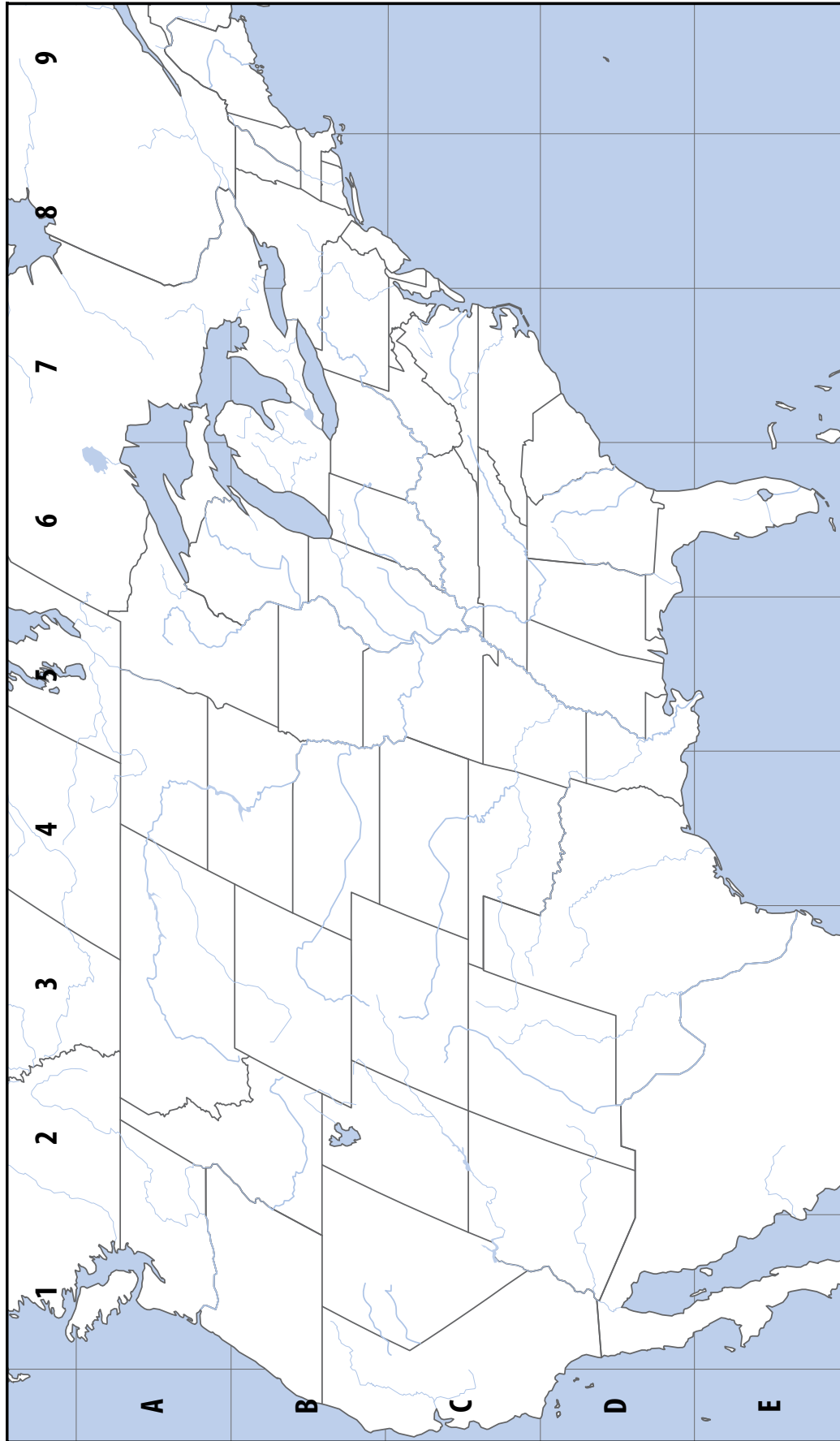
<https://www.climate.gov/maps-data/dataset/average-annual-and-monthly-numbers-tornadoes-state-maps>

Then color your map using this key.

Average Yearly # of Tornadoes 1991–2010	Color on Map
50+	Red
30–49	Orange
16–29	Yellow
0–15	Green



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Week 2 Activity Sheet

Weather Safety Tips

Even if you have a plan for severe weather where you live, it is still important to know how to act safely during other kinds of storms.

Read about severe weather safety from the National Weather Service or other resource of your choice, and jot down two important safety tips for each type.

<https://www.weather.gov/safety/thunderstorm-during>

<https://www.weather.gov/safety/tornado-during>

<https://www.weather.gov/safety/hurricane-action>

<https://www.weather.gov/safety/winter-during>



Thunderstorm: _____



Tornado: _____



Hurricane: _____



Winter storm: _____



Weather Poetry

Write a weather-themed poem. Choose a theme and then rely on your five senses to help you add vivid imagery to your poem. How does your weather theme sound, look, feel, taste, and smell? Let the words in the word bank below help inspire your poem!


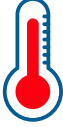














sunny	cloudy	rain	wind	drizzle	sleet	snowflake
blizzard	tornado	hurricane	thunder	lightning	precipitation	
nimbus	cumulus	evaporation	misty	stormy	rainbow	



Week 2 Activity Sheet

My Weather Forecast

Record the following information:

 Current Temperature: _____	 Today's High Temperature: _____	 Humidity: _____	 Today's Low Temperature: _____
Type of Cloud Cover: (circle one) <div> clear</div> <div> scattered clouds</div> <div> partly cloudy</div> <div> mostly cloudy</div> <div> overcast</div>			
Precipitation: (circle best option) <div> none</div> <div> rain</div> <div> freezing rain</div> <div> drizzle</div> <div> sleet</div> <div> snow</div> <div> hail</div>			
What sort of weather should people in your area expect? (Use describing words like snowy, cold, dry, rainy, hot, etc.)		Are there any special considerations such as watches or warnings for people to be aware of?	

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Week 2 Activity Sheet



Present a Weather Forecast (Optional)

1. Now take all of your data and present a weather broadcast. You can fill in the blanks and follow this script or create your own.

Good _____ (*morning, afternoon, evening*), this is _____ (*your name*)
from _____ (*your city*) today on _____ (*date*) for your daily weather update.

Currently it's _____ (*current temperature*) degrees and _____ (*cloud cover*), but we
should get up to _____ (*high temperature*) degrees with a low of _____ (*low temperature*) today.

Looks like with _____ (*describe what you see on the radar*)
we can expect _____ (*make a prediction*).

Thanks for joining me for the weather update. Have a great day, and don't forget your _____
(*sunscreen, umbrella, snowboots, etc.*).

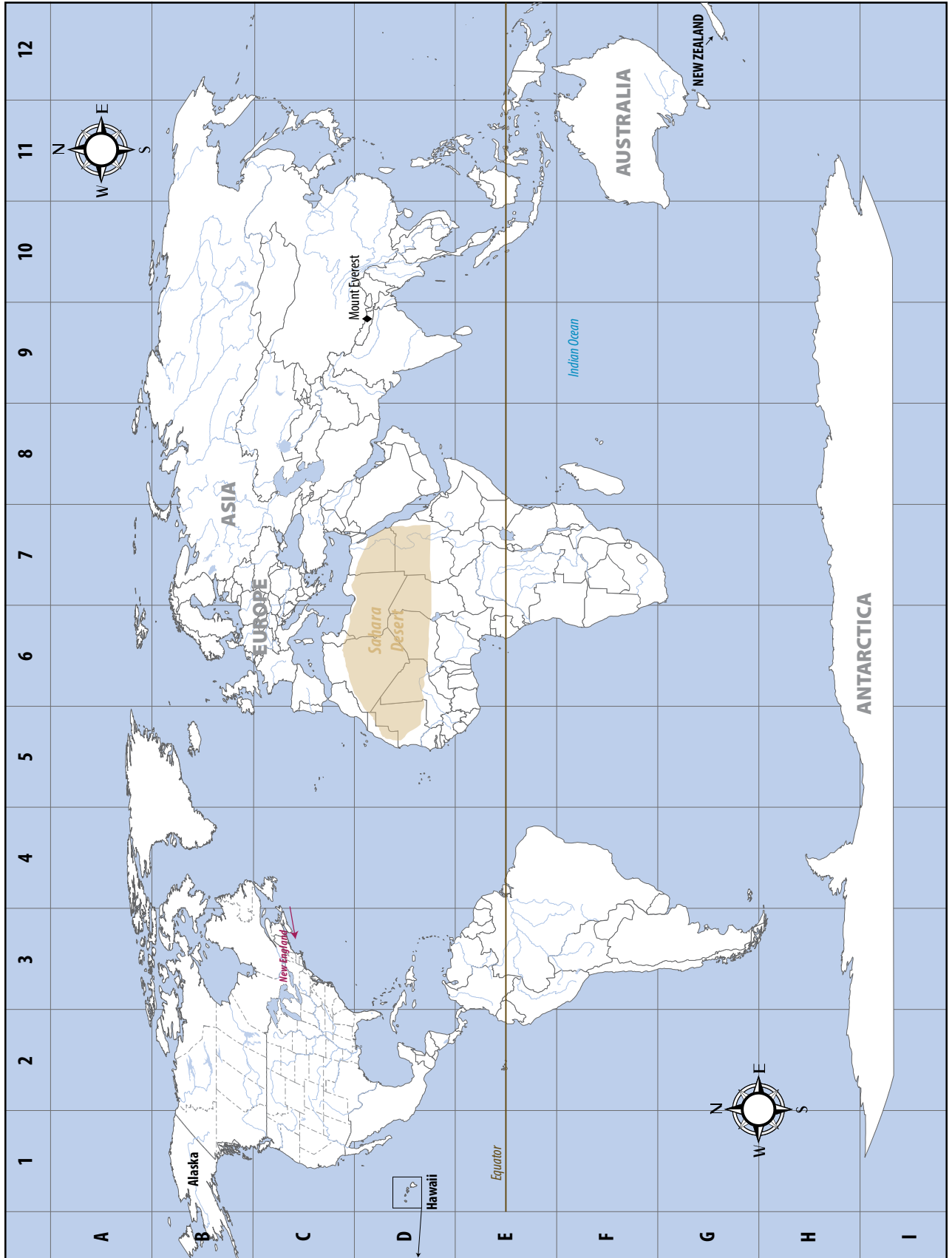
2. Draw a picture of your state and label any notable weather occurring in it below.

My State:

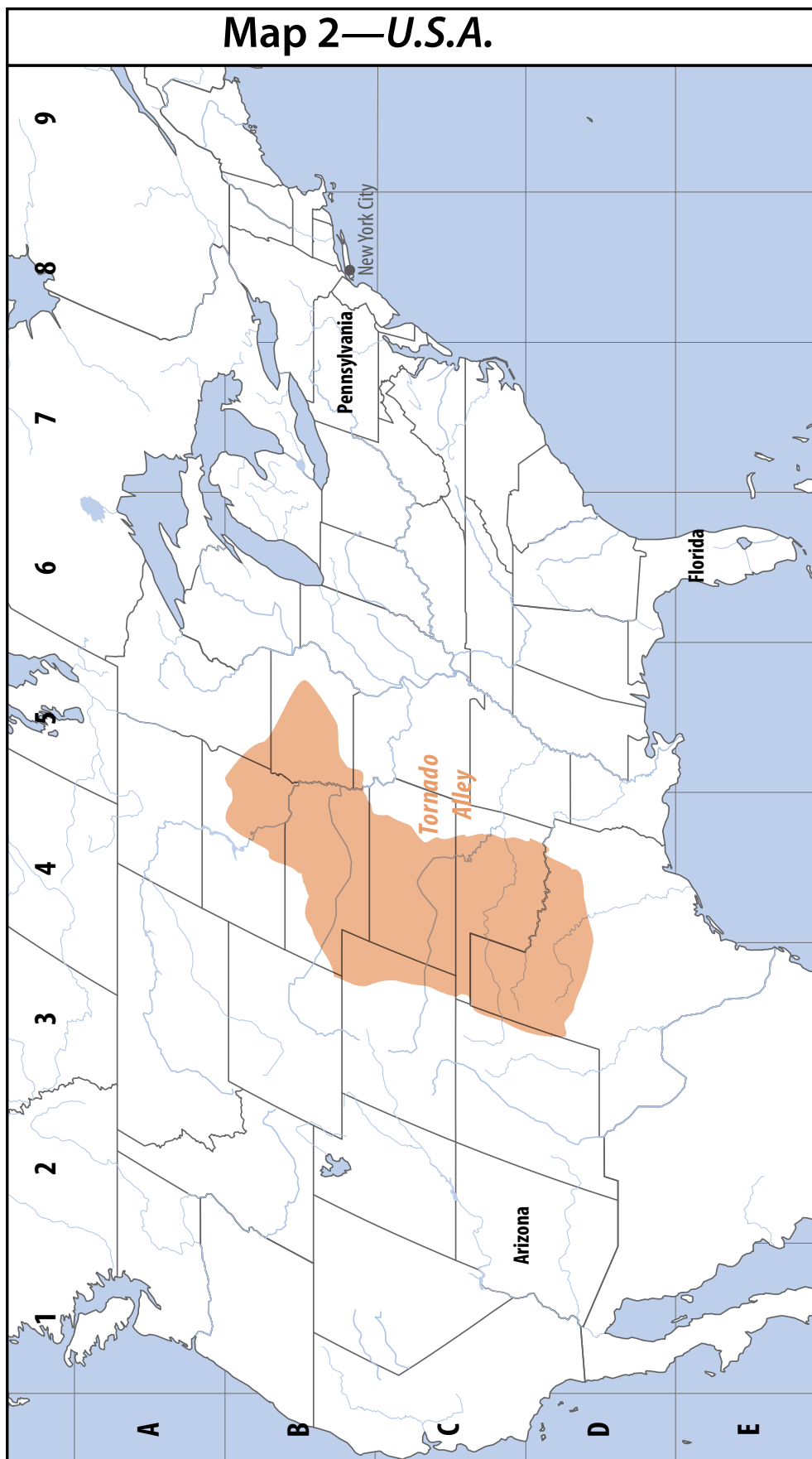
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Map Activities Answer Key

Map 1—World Map



Map Activities Answer Key



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Bibliography for Further Learning

Picture books

Snowflake Bentley by Jacqueline Briggs Martin

Telling the story of the first man to photograph snowflakes, *Snowflake Bentley* is a great picture book for learning more about the intricacies of snow.

The Big Storm by Bruce Hiscock

Following the path of a single storm in 1982 across the United States, this picture book gives a broad understanding of how weather works.

The Bravest of Us All by Marsha Arnold

This picture book does a great job describing what it's like to actually experience a tornado.

Magic School Bus: Inside a Hurricane from [BookShark Science A](#)

Take a journey with Ms. Frizzle and her class inside a hurricane!

Non-Fiction

Weather by Usborne from [BookShark Science A](#)

Usborne Internet-Linked Children's Encyclopedia from [BookShark Science A](#)

DK findout! Earth from [BookShark Science C](#)

DK Eyewonder Weather from [BookShark Science D](#)

Weather & Climate Change by Usborne from [BookShark Science H](#)

Weather Unit Study