CAROLINA
UNLEASH LEARNING™

Smithsonian | SCIENCE for the classroom

Why Is It Snowing in July? Using Hands-On and Literacy to Support Elementary Students' Explanations of Confusing Weather Phenomena (K-5)

Dr. Sarah Glassman
Manager of K-8 Curriculum, SSEC

Rachel Patton
Science Curriculum Developer, SSEC

Hoover Herrera
National Presenter, Carolina Science

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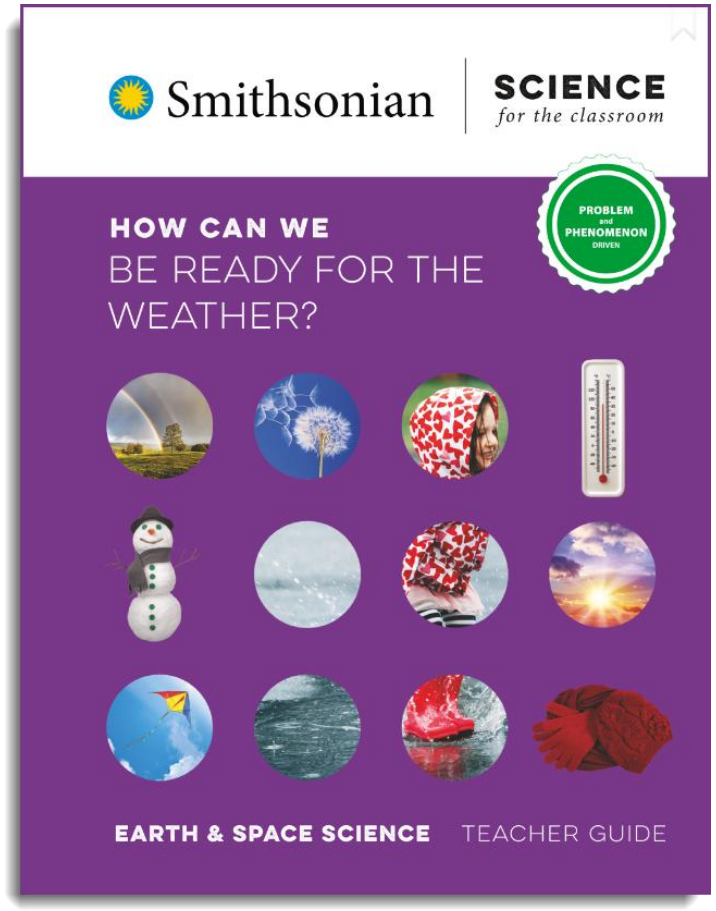
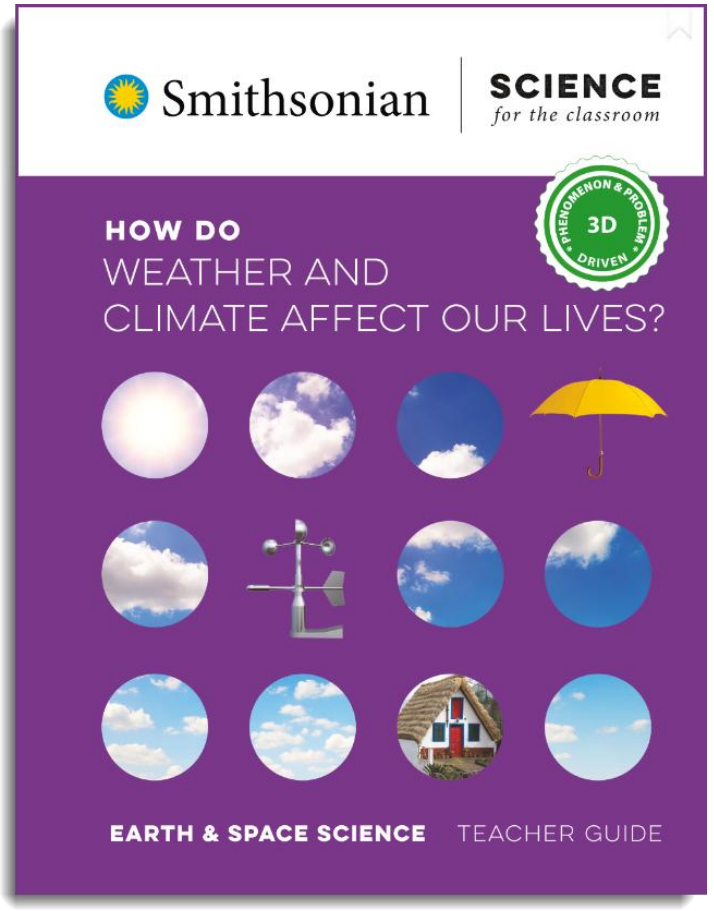
Kindergarten



3rd Grade



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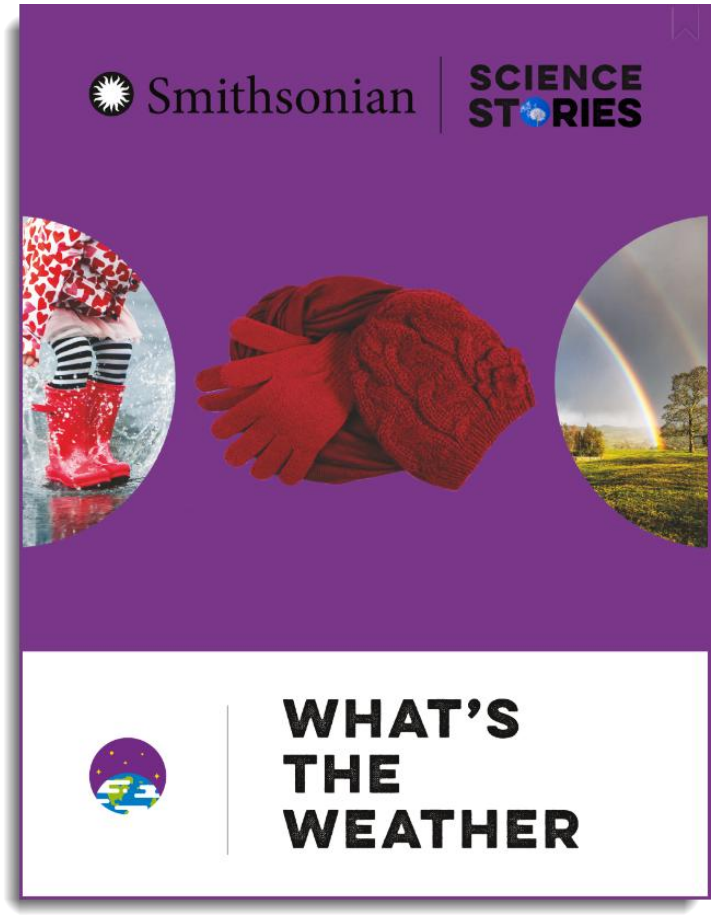
Reading, writing, and speaking for **purpose**

K



3rd

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Using ELA time to read and write about science

8:15-8:30	Morning meeting
8:30-9:30	Math
9:30-10:30	Reading
10:30-11:30	Writing
11:30-12:30	Lunch/Recess
12:30-1:30	Specials
1:30-1:45	Snack
1:45-2:45	Science/Social studies
2:45 – 3:00	Pack Up

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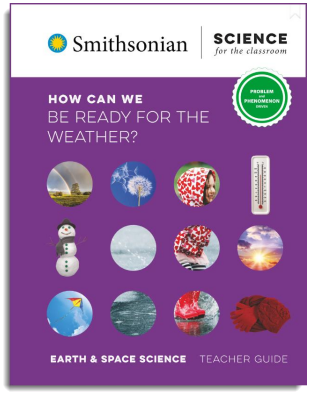
Kindergarten



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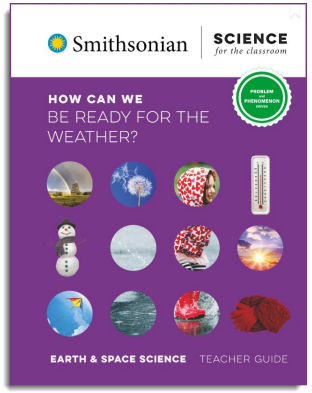
Kindergarten



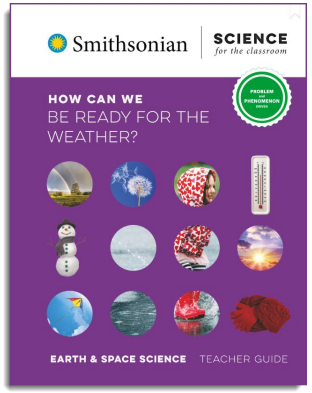
Phenomena: Observable events that occur in the universe.

Phenomenon: A pole is wet on one side but not on the other side.

CAROLINA UNLEASH LEARNING

Smithsonian | SCIENCE for the classroom

Kindergarten



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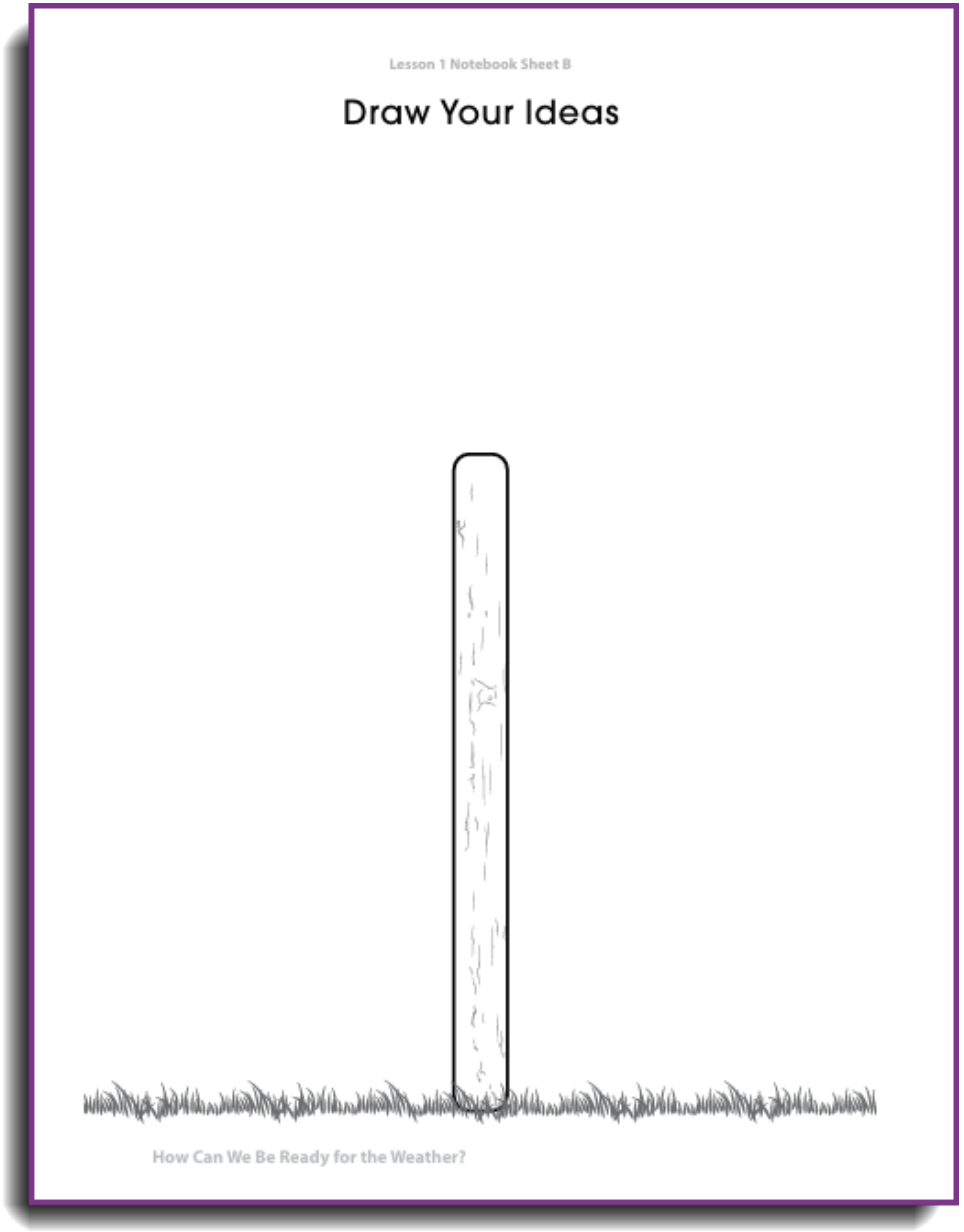

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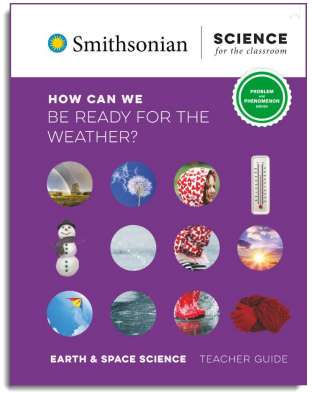
Kindergarten



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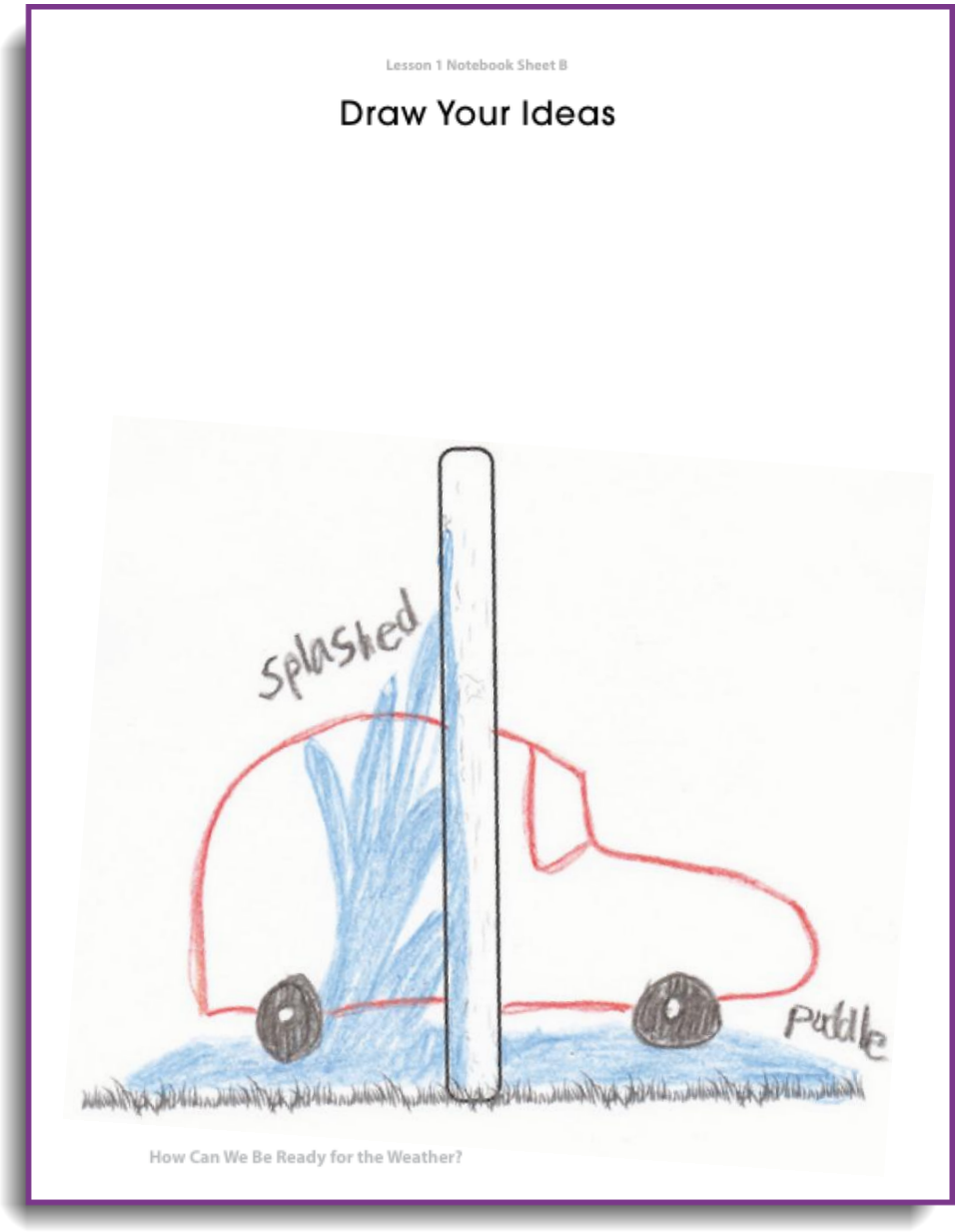

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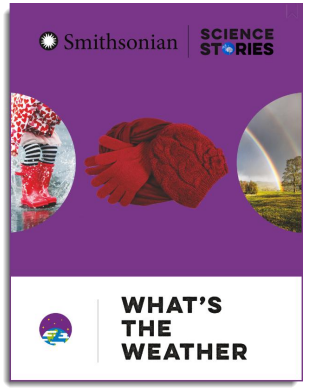
Kindergarten



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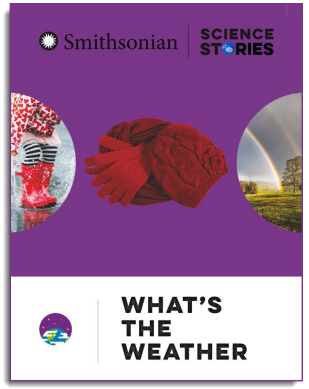
Kindergarten



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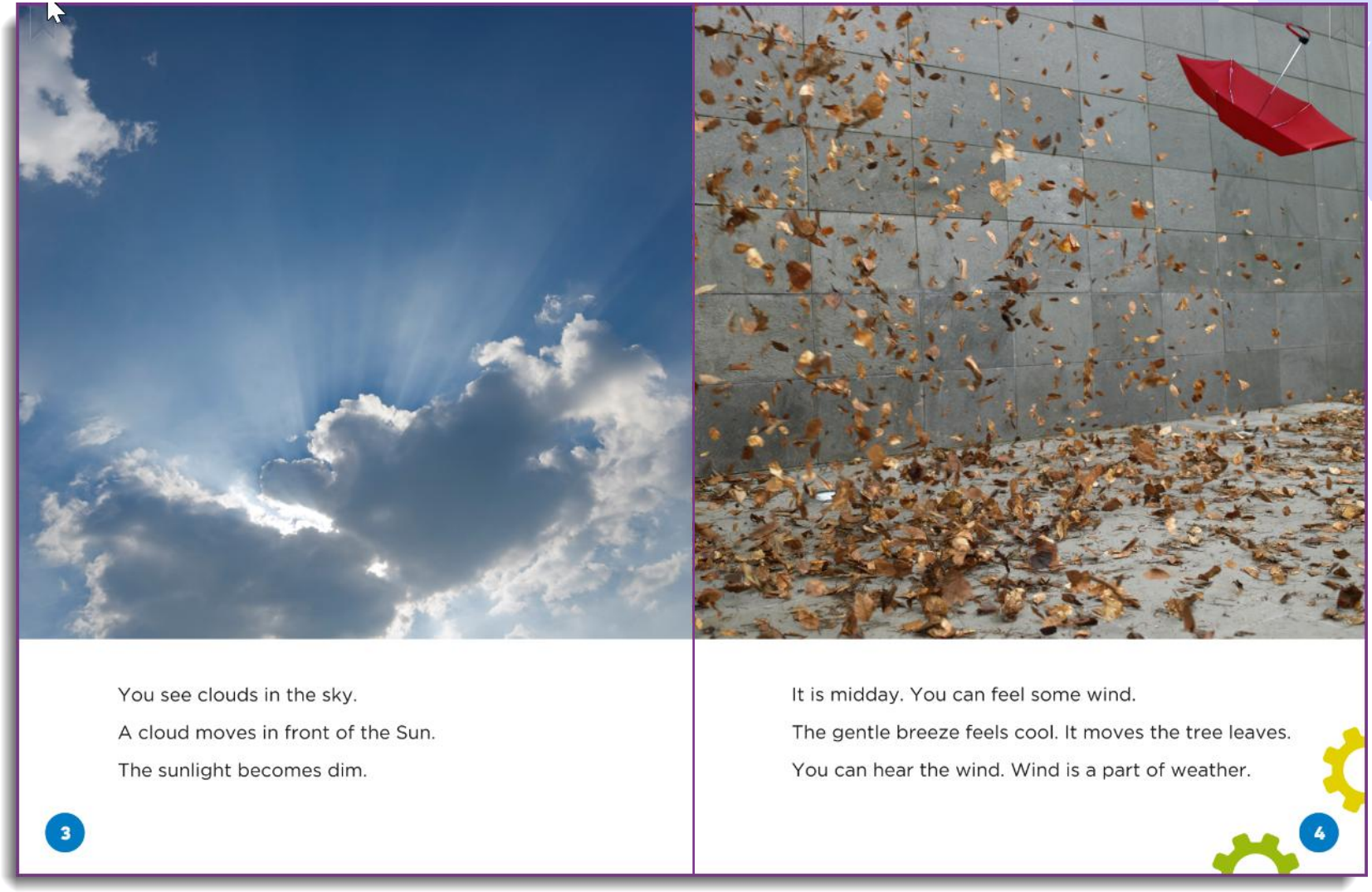

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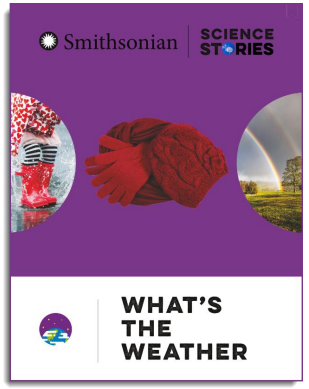
Kindergarten



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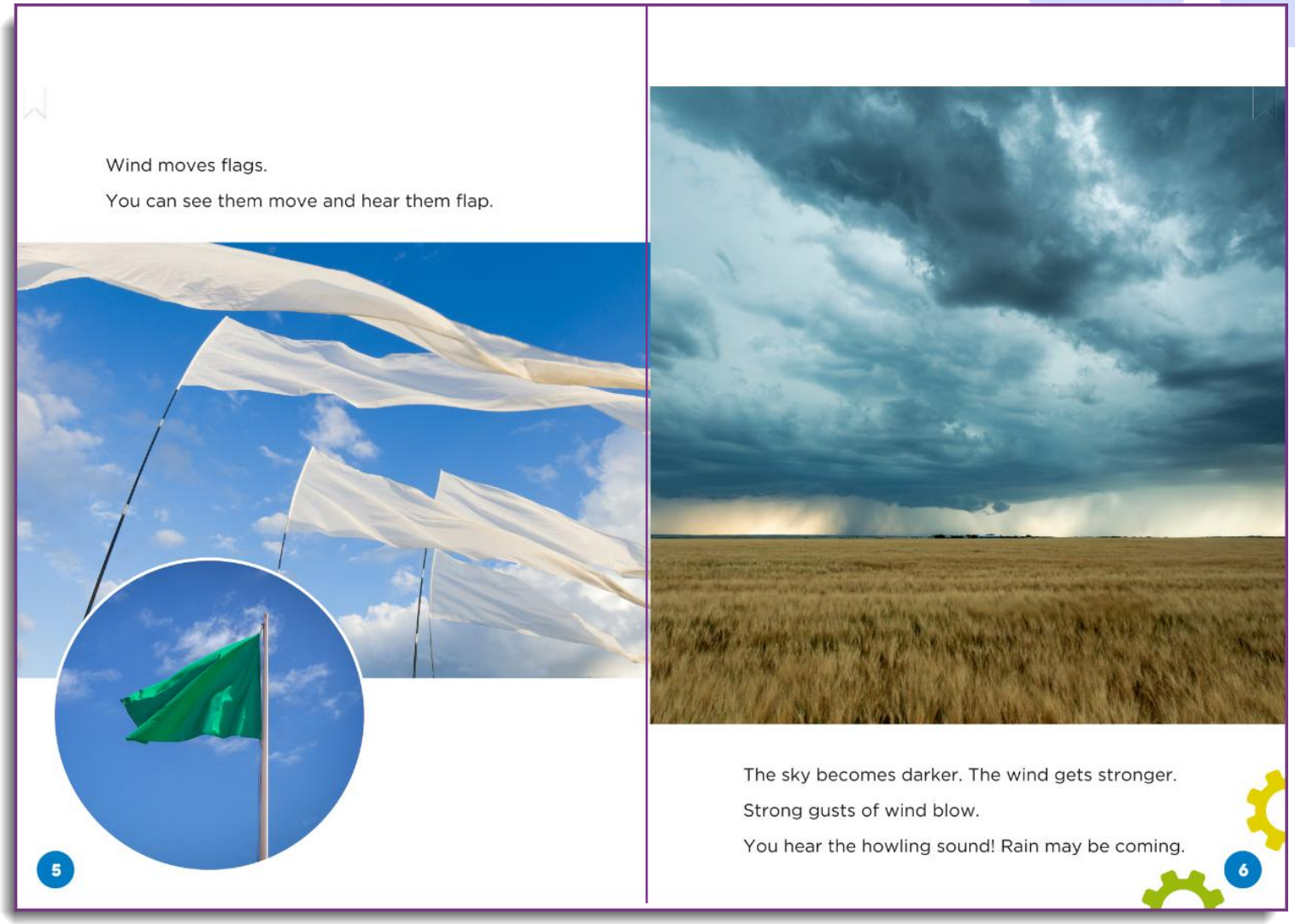

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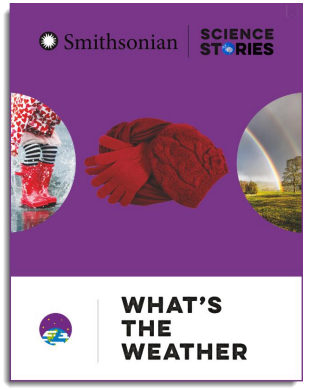
Kindergarten



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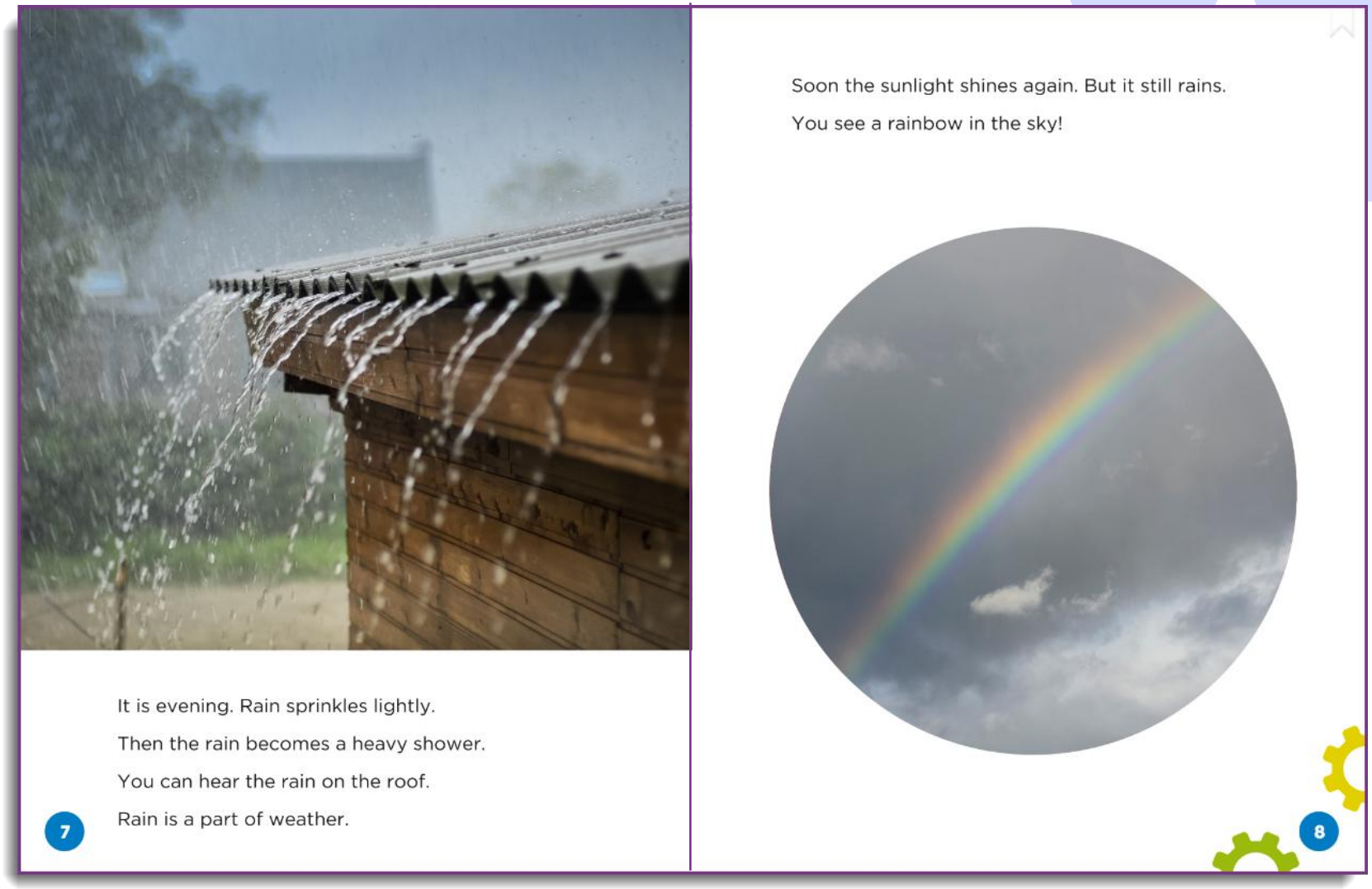

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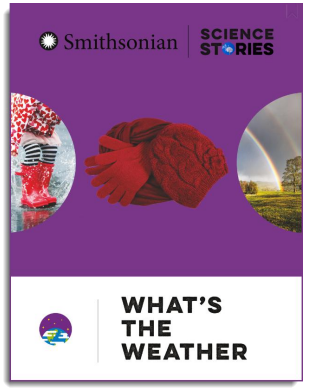
Kindergarten



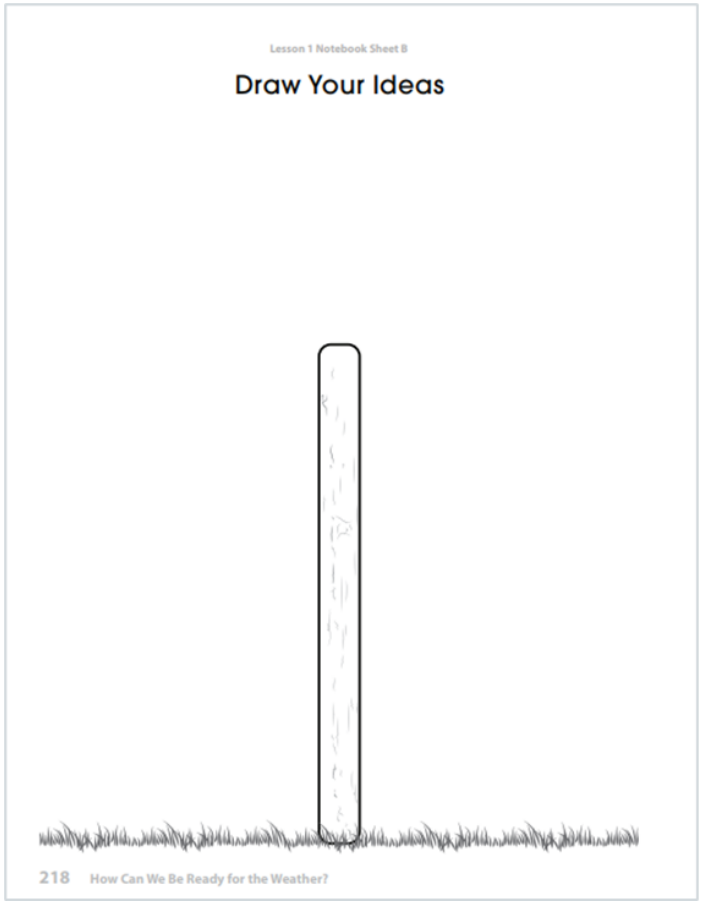
Phenomenon: A pole is wet on one side but not on the other side.

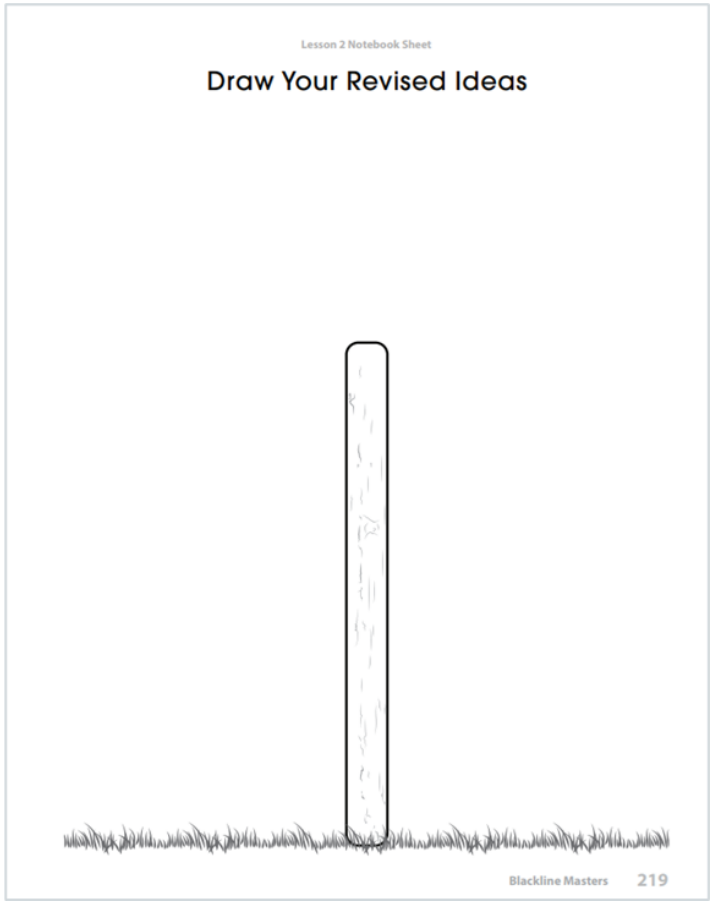
CAROLINA UNLEASH LEARNING

Scientists Investigate: Types of Weather

Weather Is	Examples
Rain	Sprinkle, mist, pour, heavy, light, strong
Sunlight	Bright, clear, cloudy, partly cloudy
Wind	Breeze, gust, gale, still, strong, light
Temperature	

Scientists Use Models

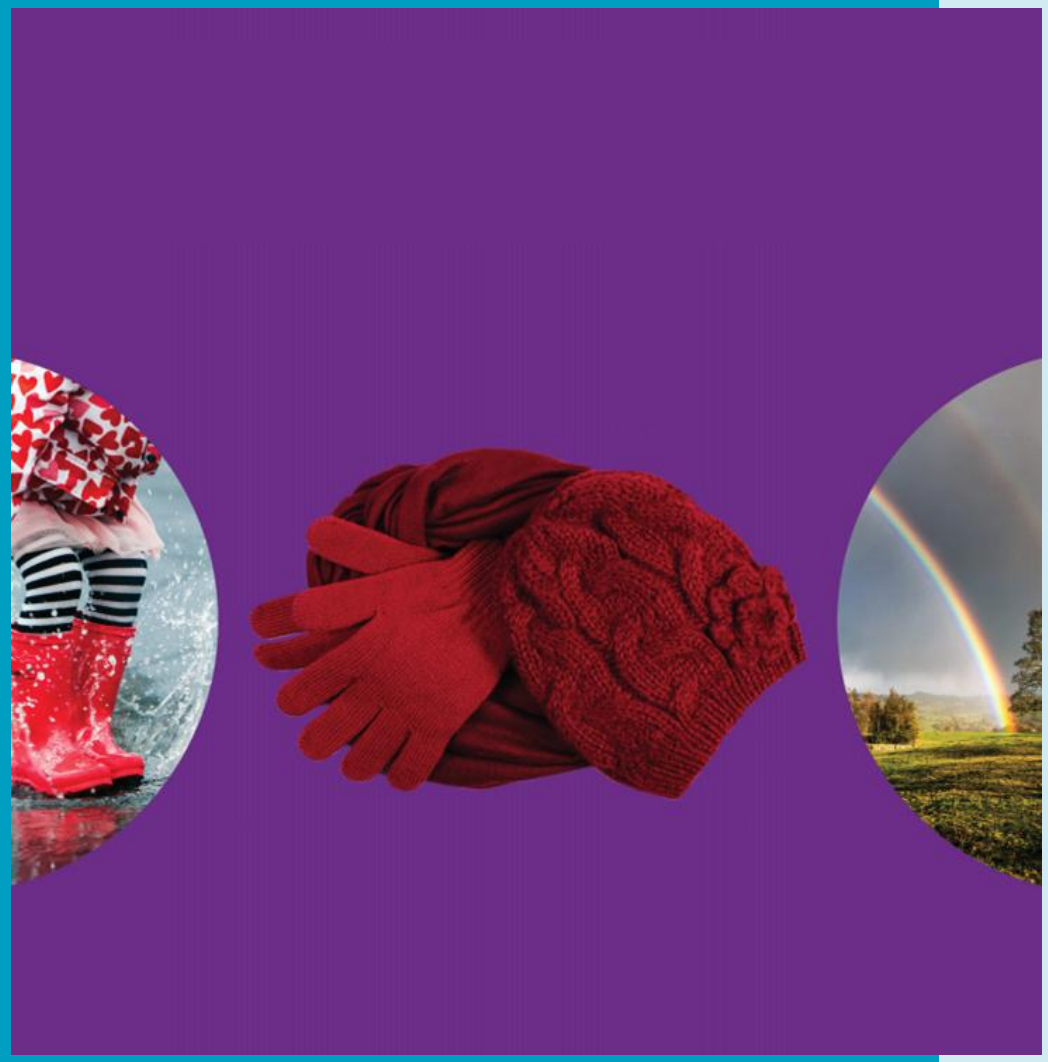




Scientists Use Models

A **model** represents something. Drawings can be models.

Scientists use **models** to explain what is happening.



Lesson

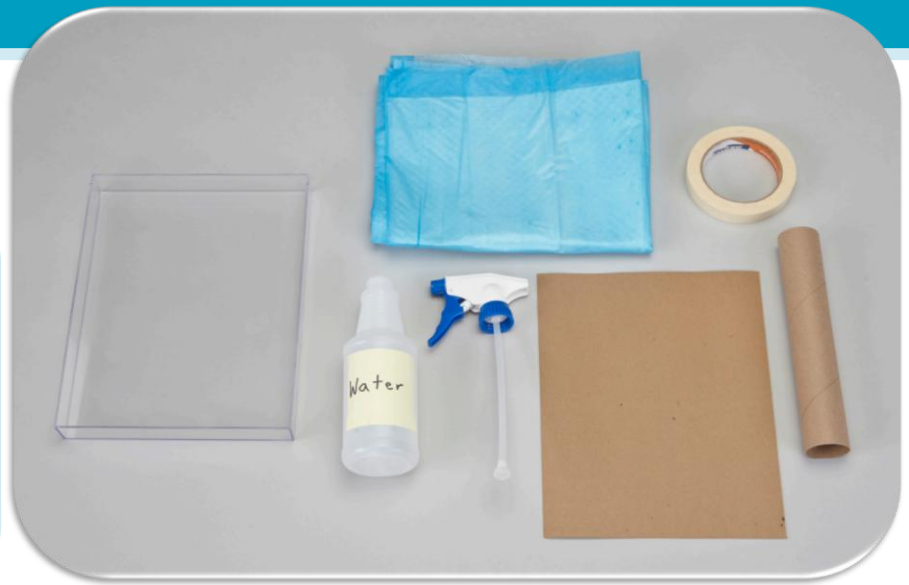
3

Making Sense with Models

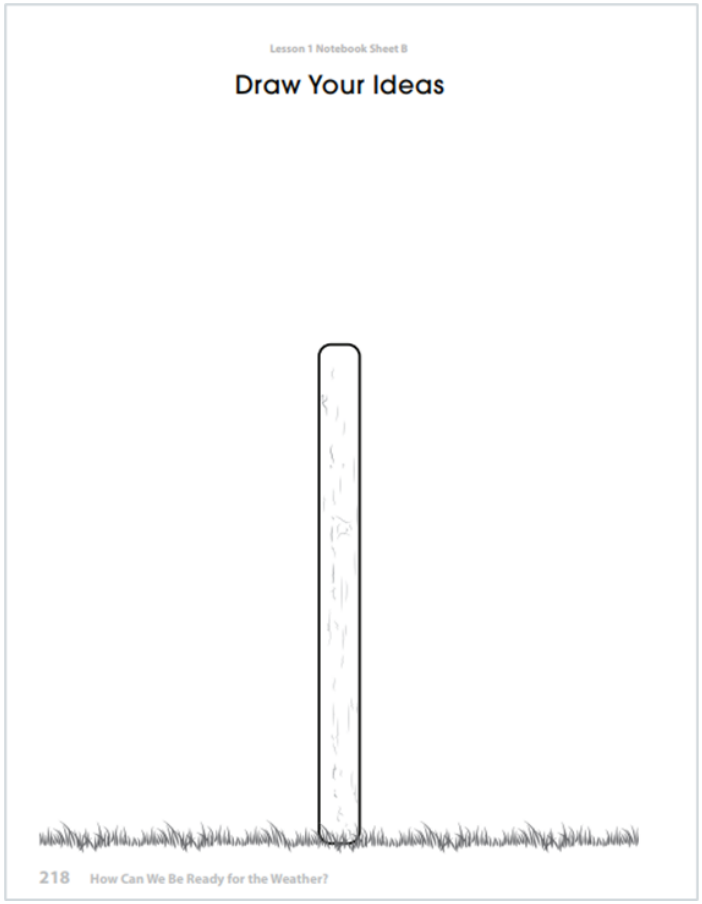
Scientists Investigate: Rain

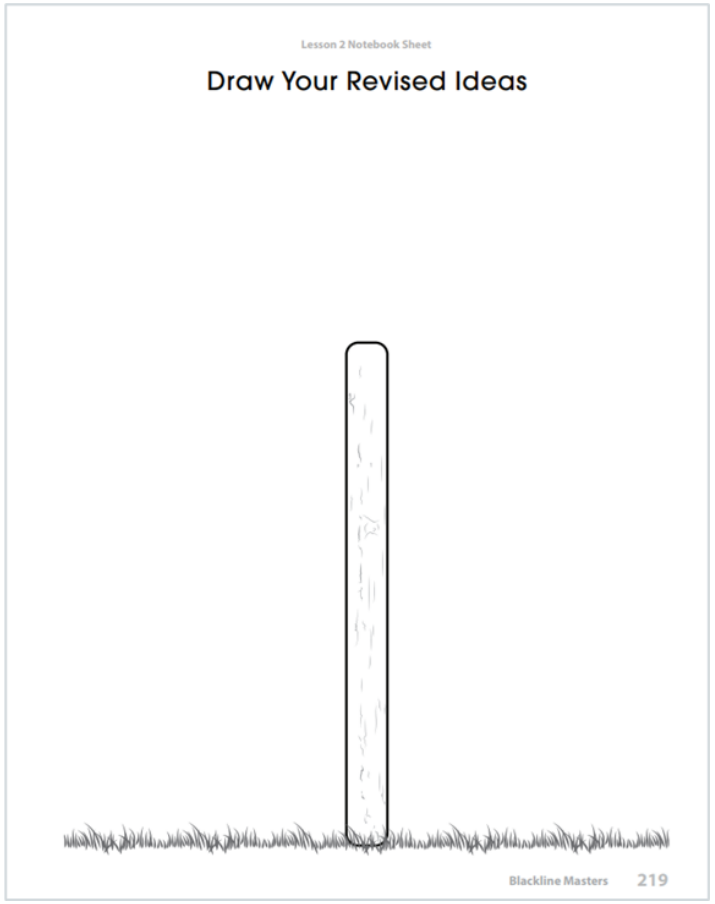
Work Together

Scientists work in groups to share work and ideas.



Scientists Use Models





Scientists Use Models

A **model** represents something. Drawings can be models.

Scientists use **models** to explain what is happening.

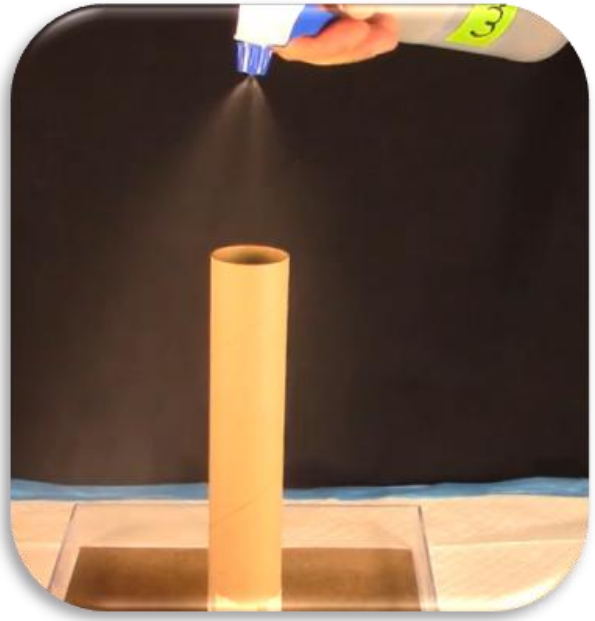
Scientists Investigate: Rain

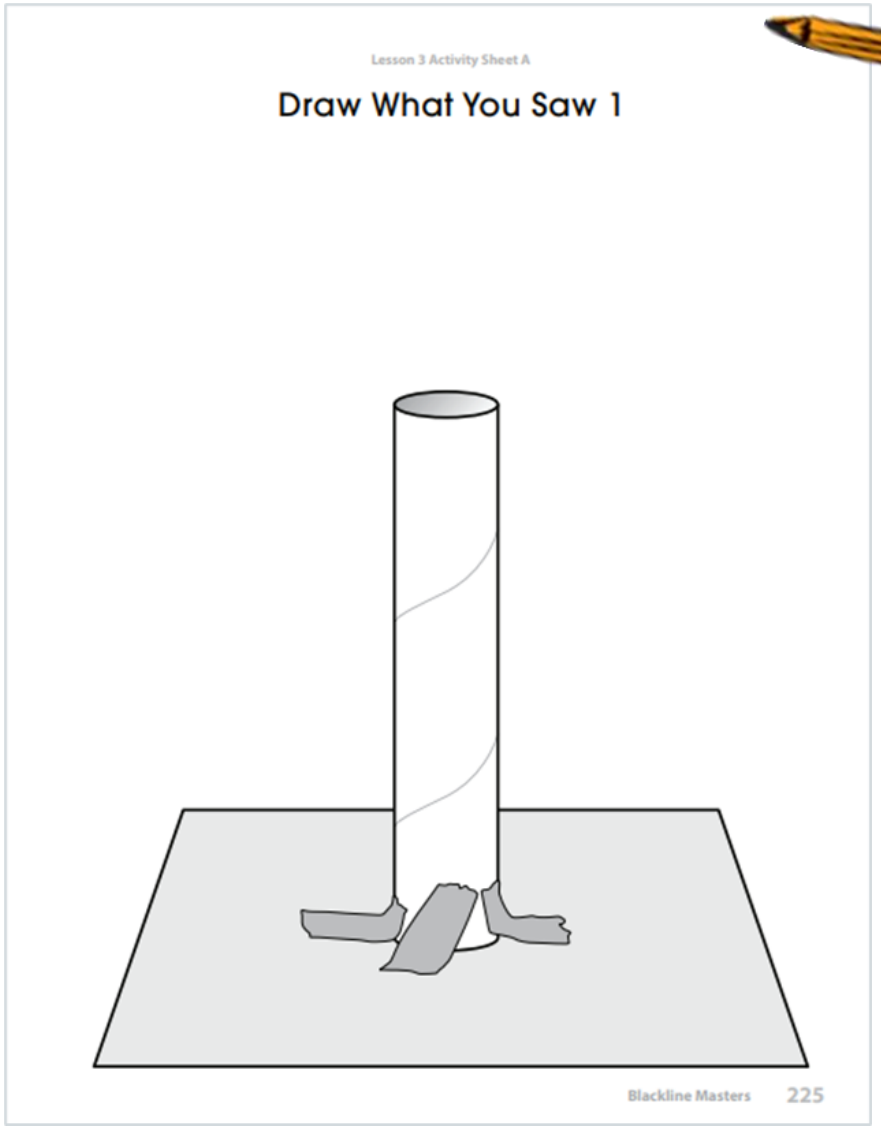
Pair 1

Test the model.

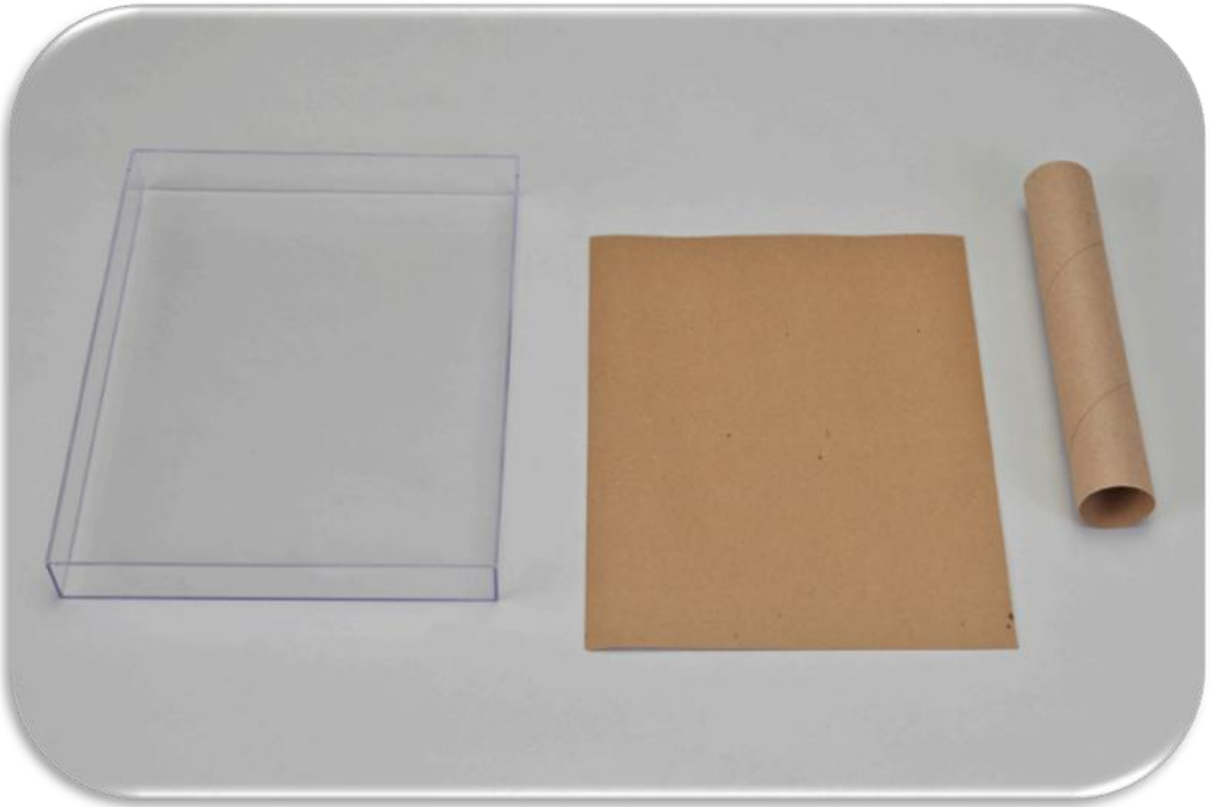
Pair 2

Draw Observations.





Scientists Investigate: Rain and Wind



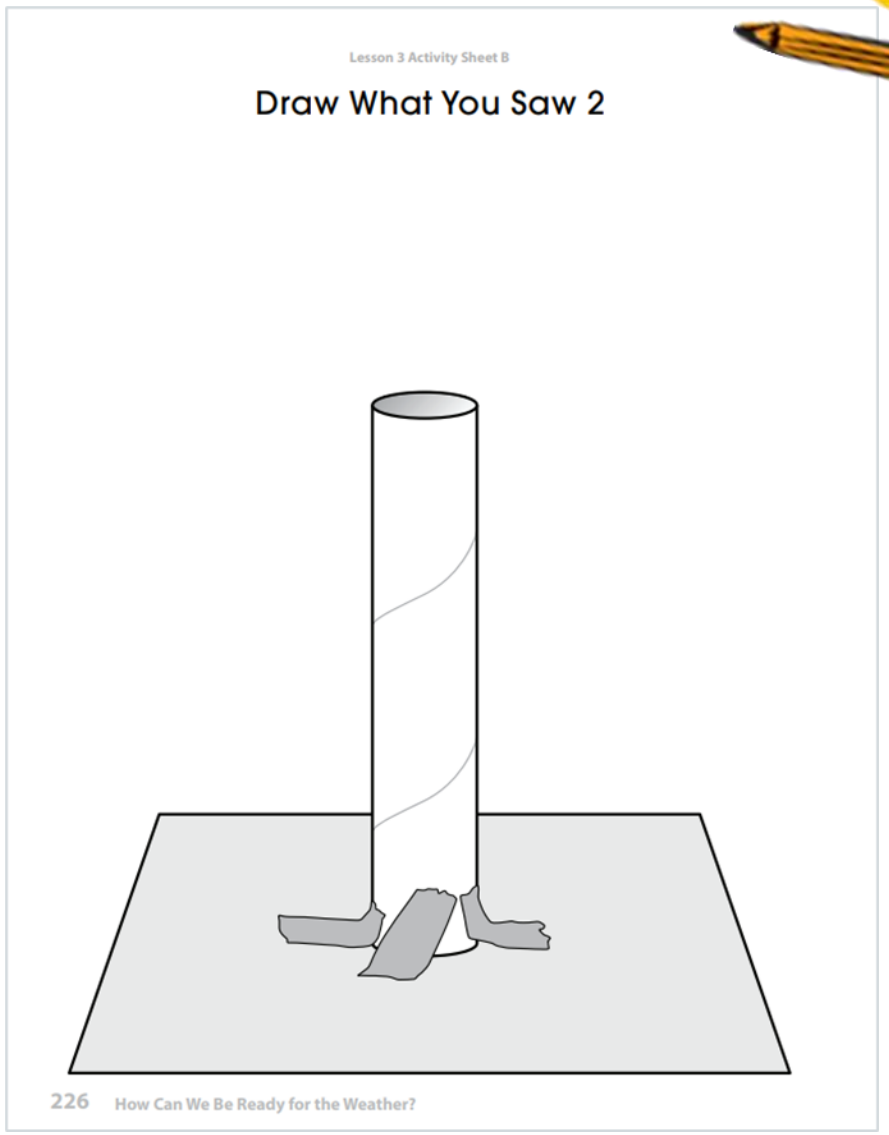
Scientists Investigate: Rain and Wind

Pair 1

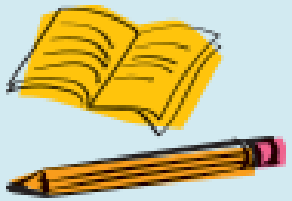
Draw Observations.

Pair 2

Test the model.

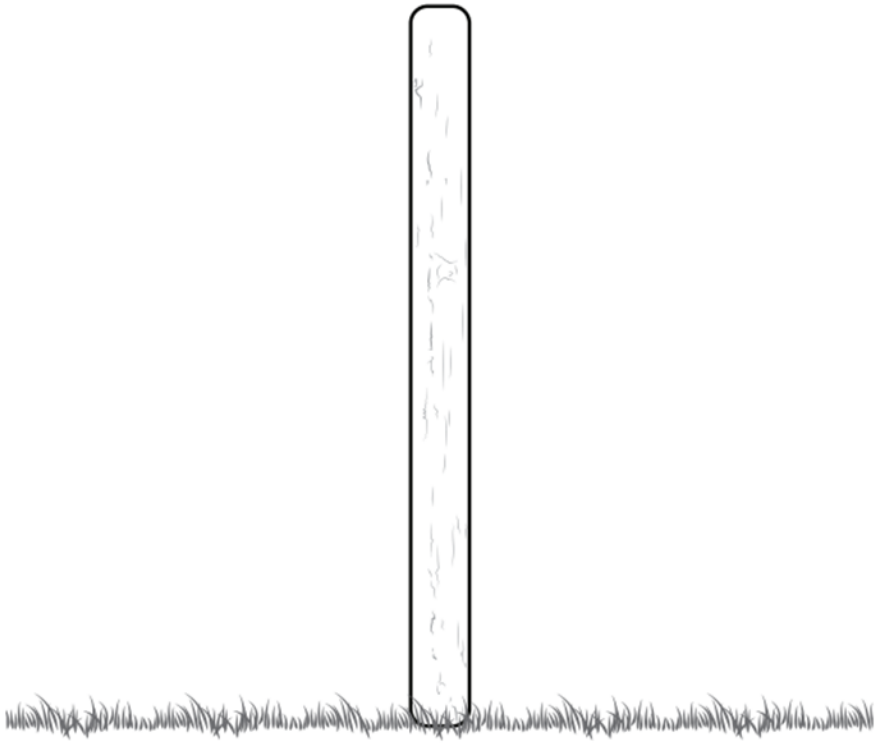


STEM Notebook



Lesson 3 Notebook Sheet A

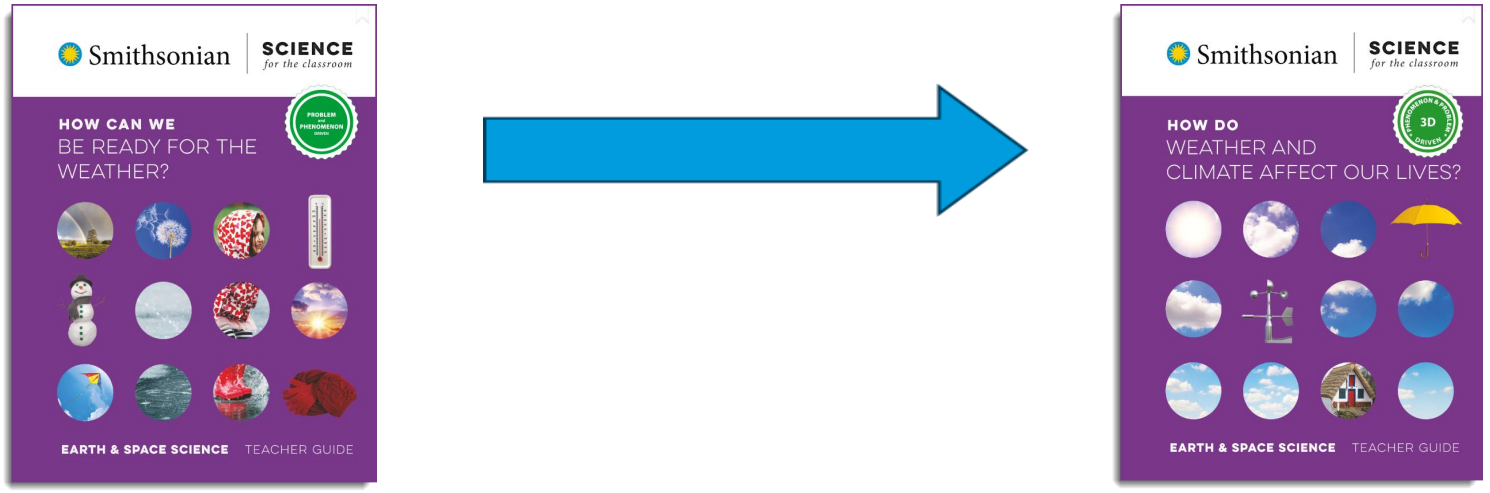
Draw Your New Revised Ideas



Connection between Kindergarten and 3rd grade modules

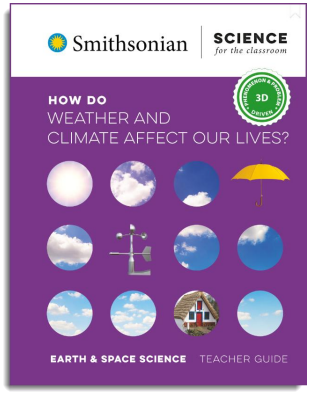
Kindergarten DCI: Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time.

Grade 3 DCI: Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.



Smithsonian | SCIENCE *for the classroom*

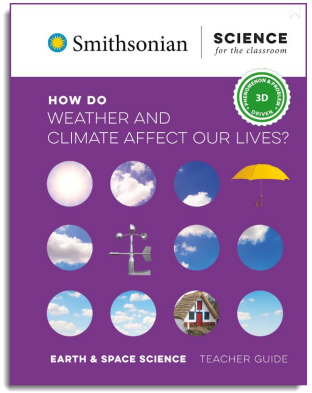
3rd Grade



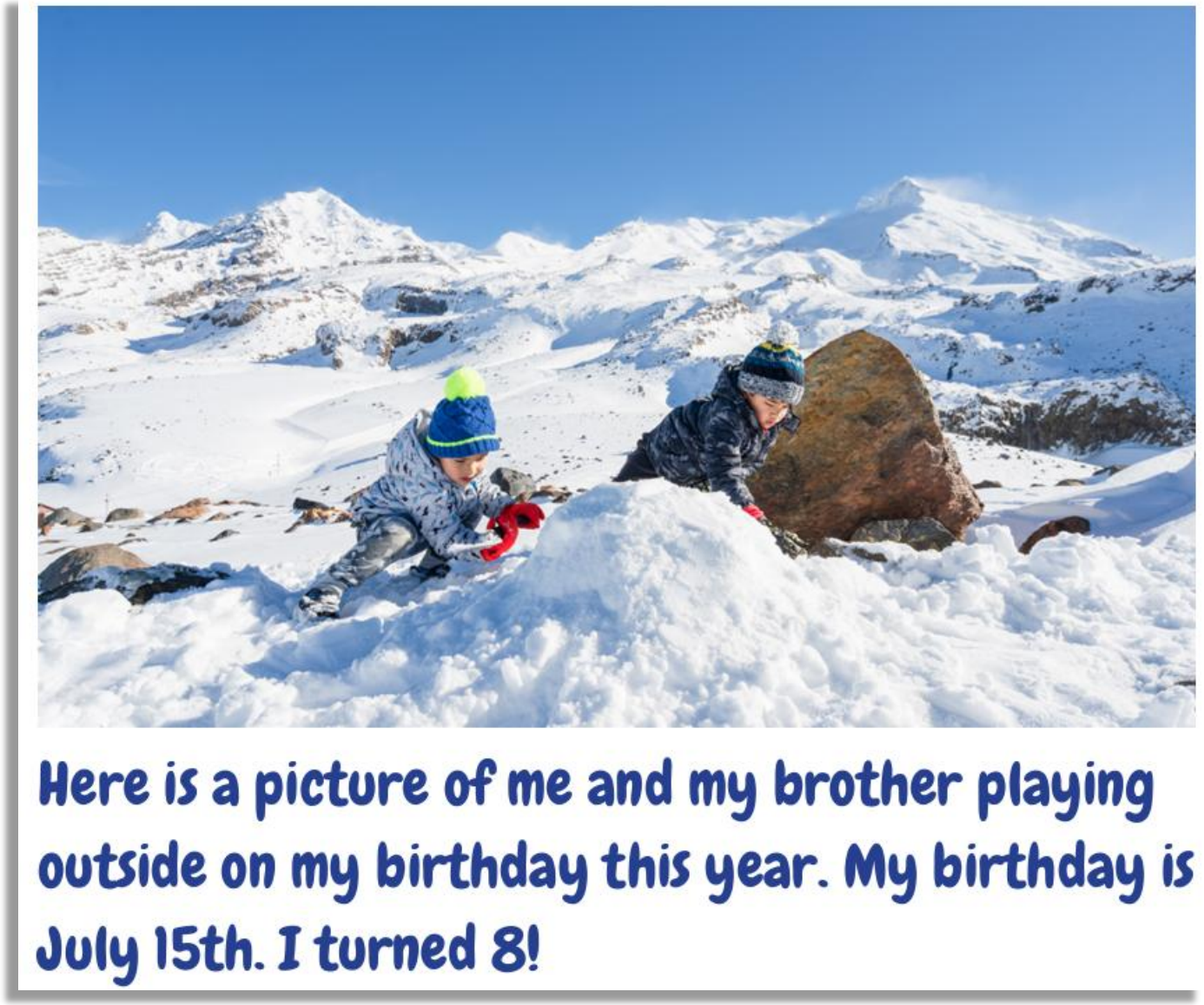
CAROLINA UNLEASH LEARNING

Smithsonian | SCIENCE for the classroom

3rd Grade



Phenomenon: Children are playing in the snow in the month of July.



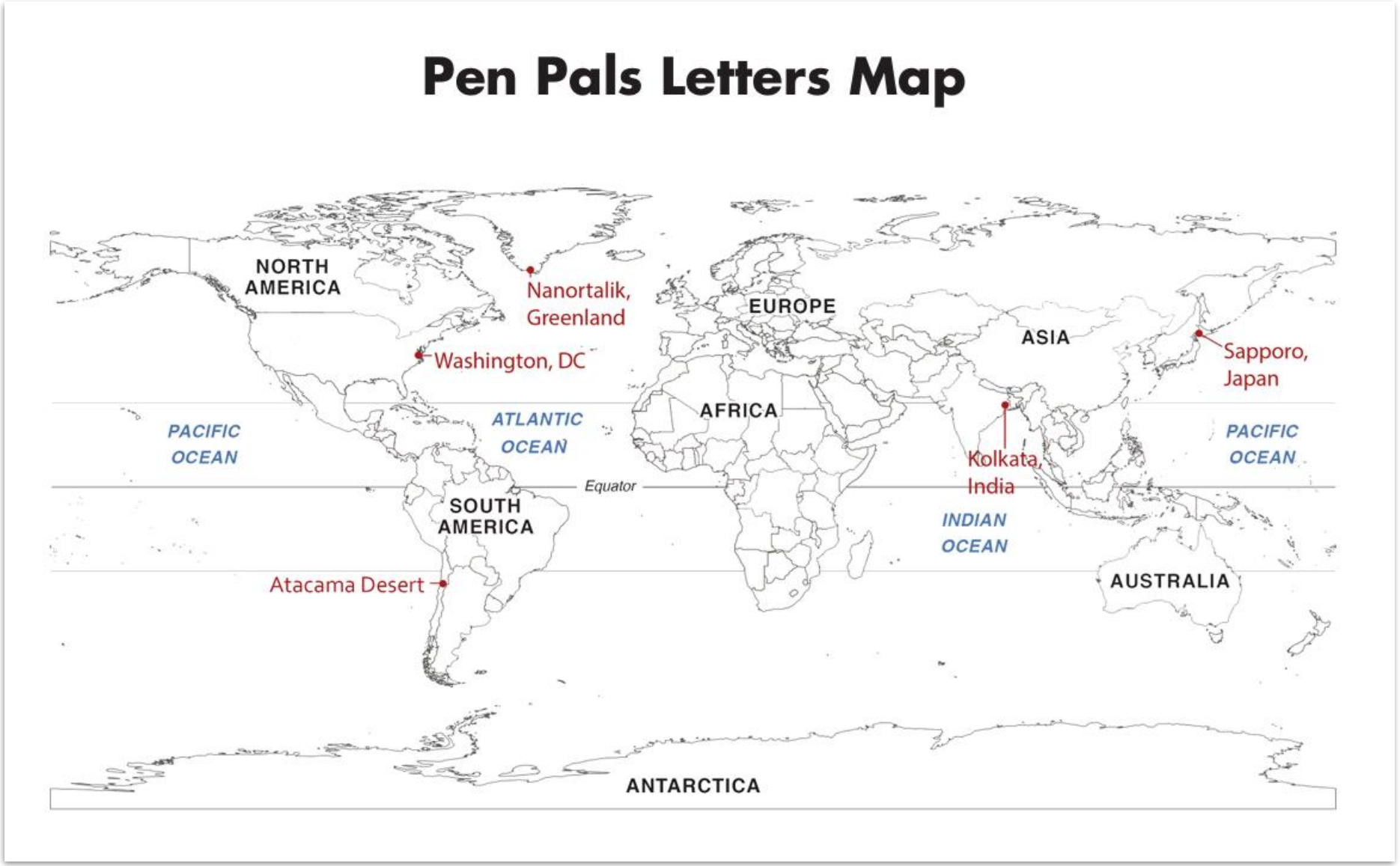
CAROLINA UNLEASH LEARNING

Lesson

6

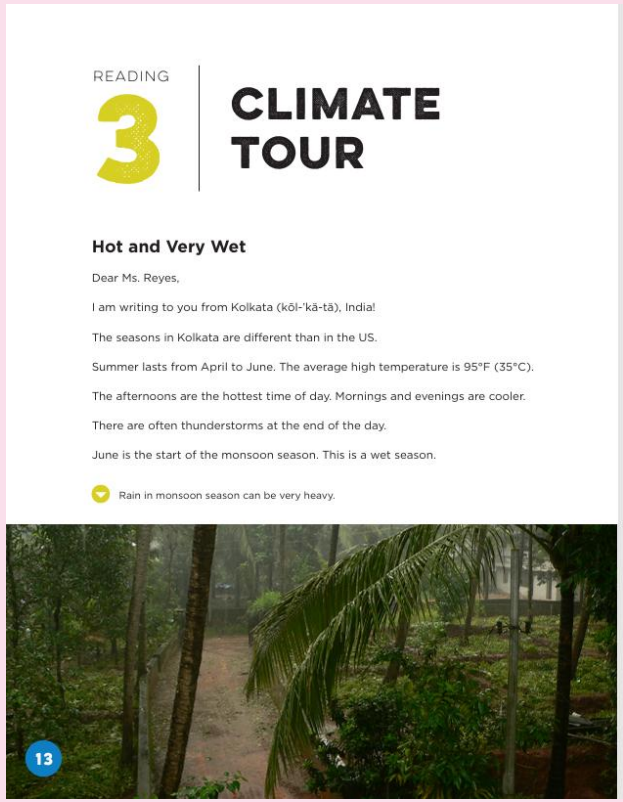
World Climates

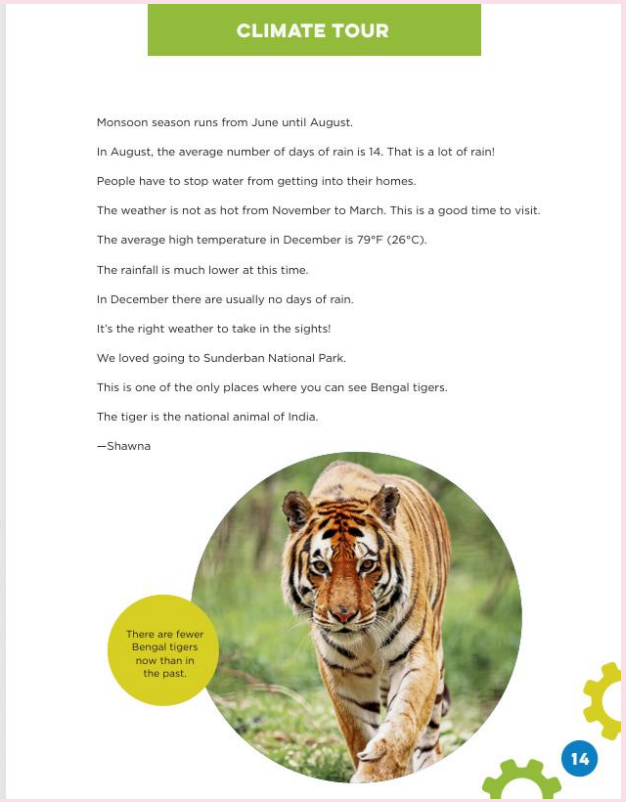
Scientists Share Ideas



Reading: Raindrops and Rooftops

Read “Climate Tour”
Each pair reads one section.





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Reading: Raindrops and Rooftops

READING 3

CLIMATE TOUR

Hot and Very Wet

Dear Ms. Reyes,

What a great time my family and I have had in Kolkata (kōl-'kä-tä), India!

The seasons in Kolkata are different than in the US.

Summer lasts from April to June. The average high temperature is 95°F (35°C).

The afternoons are the hottest time of day. Mornings and evenings are cooler.

There are often thunderstorms at the end of the day.

June is the start of the monsoon season. This is a wet season.

Rain in monsoon season can be very heavy.

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CLIMATE TOUR

Monsoon season runs from June until August.

In July, the average number of days of rain is 20. That is a lot of rain!

People have to stop water from getting into their homes.

The weather is not as hot from November to March. This is a good time to visit.

The average high temperature in December is 81°F (27°C).

The rainfall is much lower at this time.

In December there are usually no days of rain.

It's the right weather to take in the sights!

We loved going to Sunderban National Park.

This is one of the only places where you can see Bengal tigers.

The tiger is the national animal of India.

—Shawna

There are fewer Bengal tigers now than in the past.

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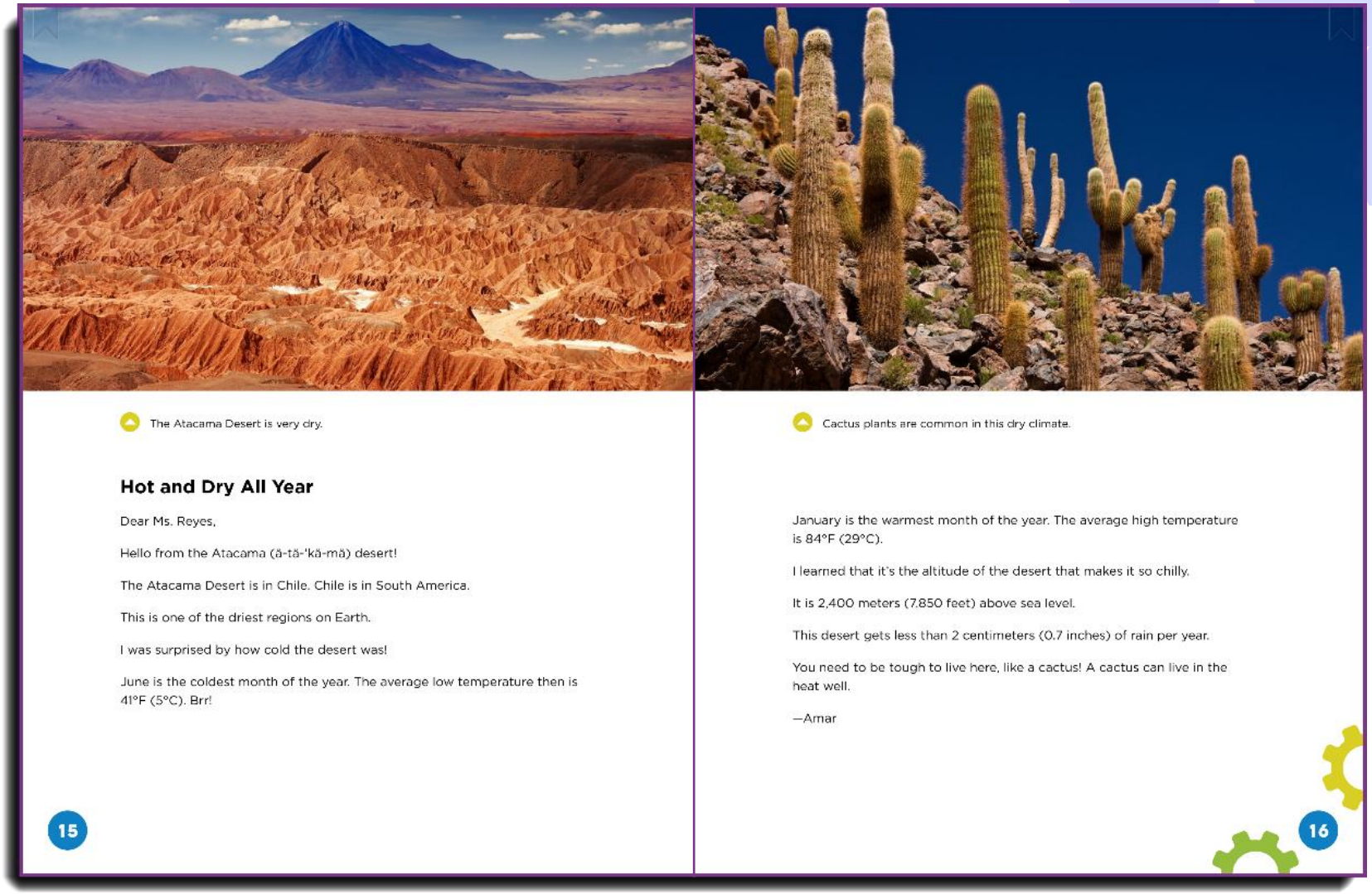
Reading: Raindrops and Rooftops



The Atacama Desert is very dry.

Hot and Dry All Year

Dear Ms. Reyes,

Hello from the Atacama (ä-tä-'kä-mä) desert!

The Atacama Desert is in Chile. Chile is in South America.

This is one of the driest regions on Earth.

I was surprised by how cold the desert was!

June is the coldest month of the year. The average low temperature then is 41°F (5°C). Brr!

15

Cactus plants are common in this dry climate.

January is the warmest month of the year. The average high temperature is 84°F (29°C).

I learned that it's the altitude of the desert that makes it so chilly.

It is 2,400 meters (7,850 feet) above sea level.

This desert gets less than 2 centimeters (0.7 inches) of rain per year.

You need to be tough to live here, like a cactus! A cactus can live in the heat well.

—Amar

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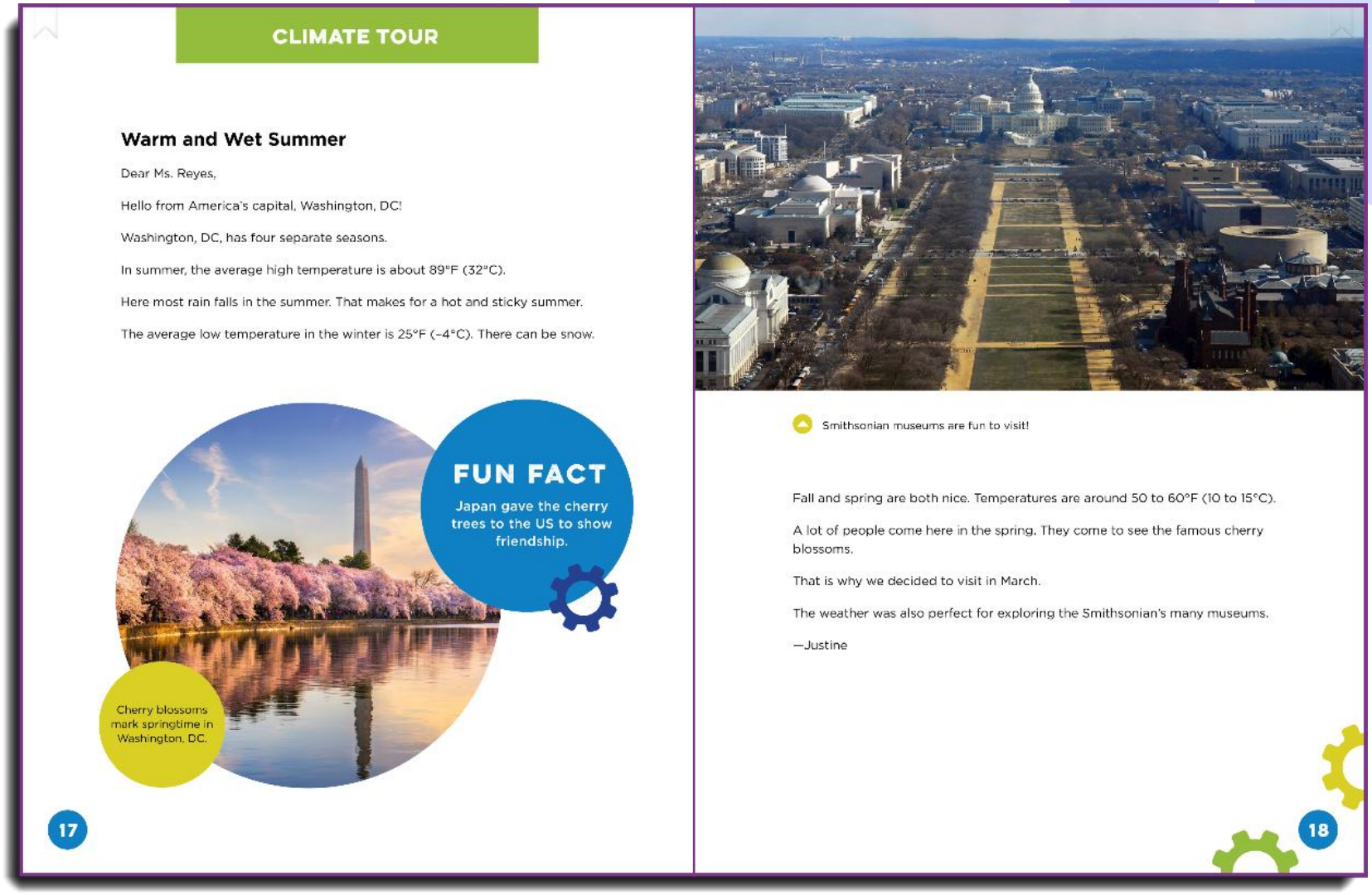
Reading: Raindrops and Rooftops



CLIMATE TOUR

Warm and Wet Summer

Dear Ms. Reyes,

Hello from America's capital, Washington, DC!

Washington, DC, has four separate seasons.

In summer, the average high temperature is about 89°F (32°C).

Here most rain falls in the summer. That makes for a hot and sticky summer.

The average low temperature in the winter is 25°F (–4°C). There can be snow.

FUN FACT

Japan gave the cherry trees to the US to show friendship.

Cherry blossoms mark springtime in Washington, DC.

17

Smithsonian museums are fun to visit!

Fall and spring are both nice. Temperatures are around 50 to 60°F (10 to 15°C).

A lot of people come here in the spring. They come to see the famous cherry blossoms.

That is why we decided to visit in March.

The weather was also perfect for exploring the Smithsonian's many museums.

—Justine

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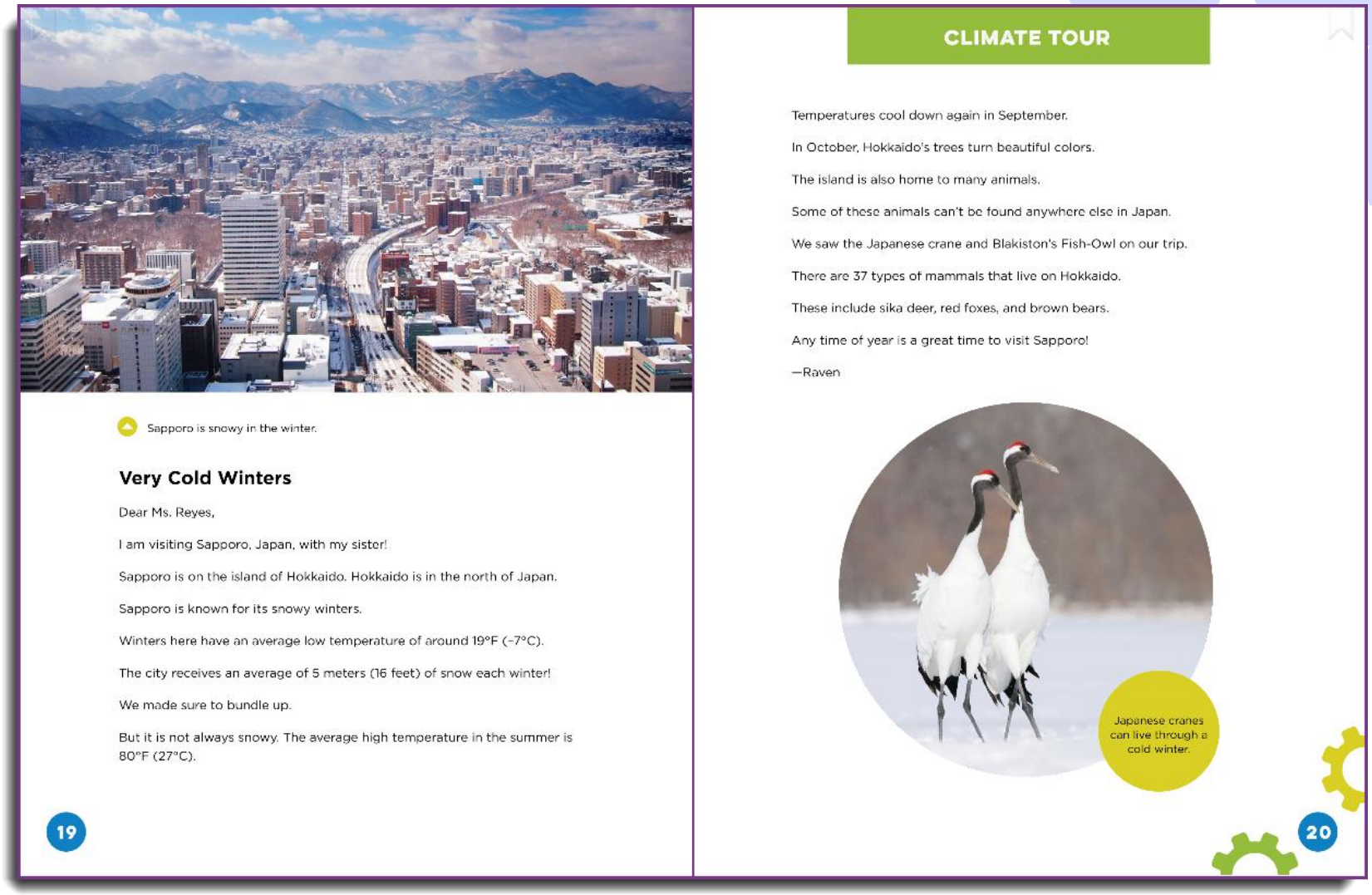
Reading: Raindrops and Rooftops



Sapporo is snowy in the winter.

Very Cold Winters

Dear Ms. Reyes,

I am visiting Sapporo, Japan, with my sister!

Sapporo is on the island of Hokkaido. Hokkaido is in the north of Japan.

Sapporo is known for its snowy winters.

Winters here have an average low temperature of around 19°F (–7°C).

The city receives an average of 5 meters (16 feet) of snow each winter!

We made sure to bundle up.

But it is not always snowy. The average high temperature in the summer is 80°F (27°C).

19

CLIMATE TOUR

Temperatures cool down again in September.

In October, Hokkaido's trees turn beautiful colors.

The island is also home to many animals.

Some of these animals can't be found anywhere else in Japan.

We saw the Japanese crane and Blakiston's Fish-Owl on our trip.

There are 37 types of mammals that live on Hokkaido.

These include sika deer, red foxes, and brown bears.

Any time of year is a great time to visit Sapporo!

—Raven

Japanese cranes can live through a cold winter.

20

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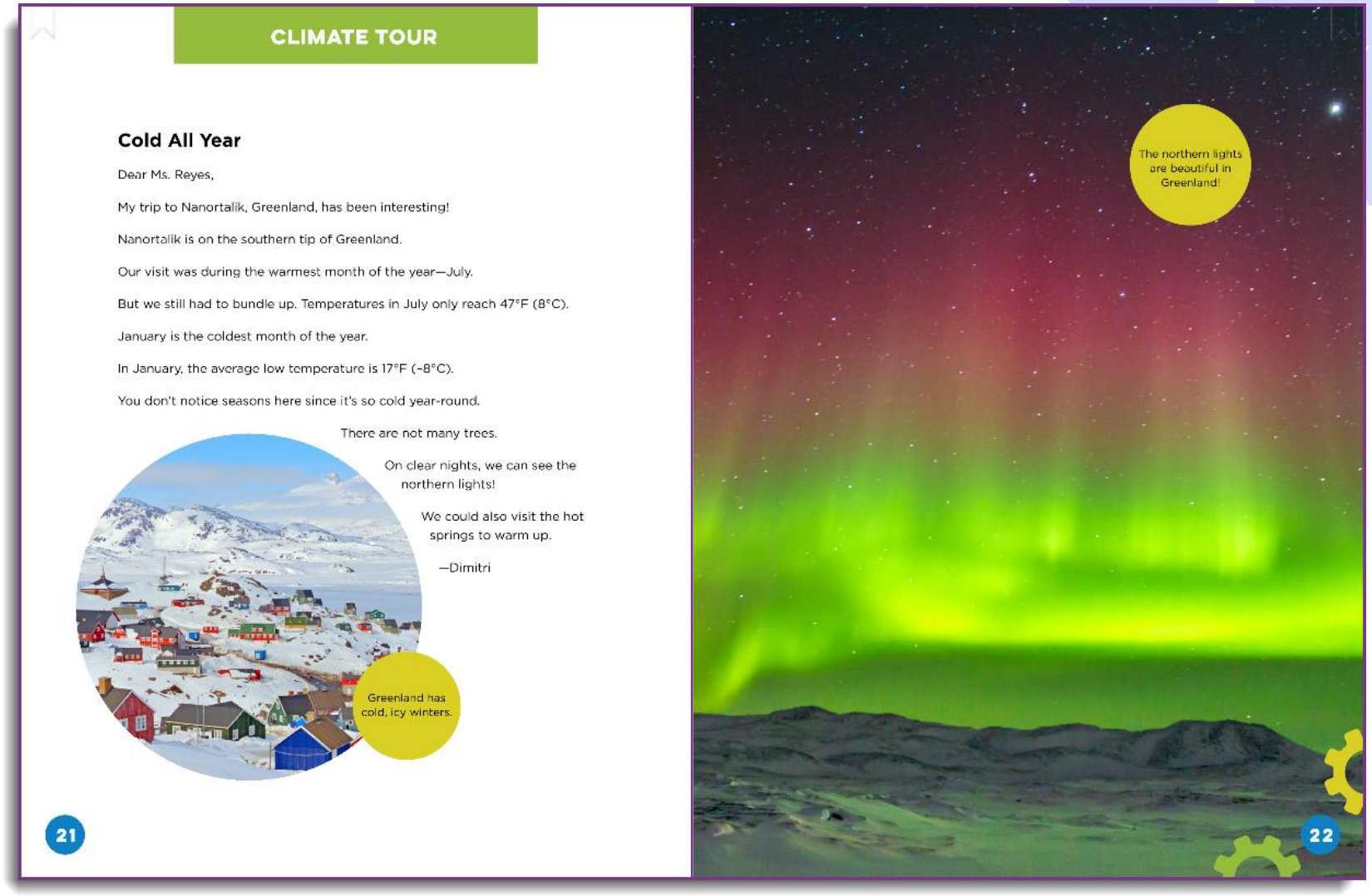
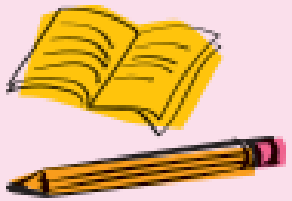
Reading: Raindrops and Rooftops



STEM Notebook



Lesson 6 Notebook Sheet A

Where Does the Pen Pal Live?

Blackline Masters 261

1. Location:

2. Describe the climate of this location.

3. Could the pen pal live in this location?

4. Evidence:

Scientists Investigate

Climate Data: Nanortalik, Greenland

Average temperature (°F)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
26	26	26	38	31	37	41	43	39	35	29	25

Average precipitation (number of days)

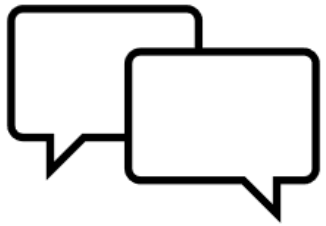
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3	4	2	3	2	5	1	4	2	5	4	2

Weather Words

Temperature (°F/°C)	Description
43°F (6°C) and below	Cold 
Between 44°F and 59°F (7°C and 15°C)	Cool 
Between 60°F and 79°F (16°C and 26°C)	Warm 
80°F (27°C) and above	Hot 

Precipitation (number of days per month)	Description
5 days or fewer	Very little rain or snow 
Between 6 and 14 days	Some rain or snow 
15 days or more	A lot of rain or snow 

Scientists Investigate



If the average temperature in July in Nanortalik is 41°F, could the temperature on July 15 of one year be 32°F?

If the average temperature in July in the Atacama Desert is 48°F, could the temperature on July 15 of one year be 32°F?

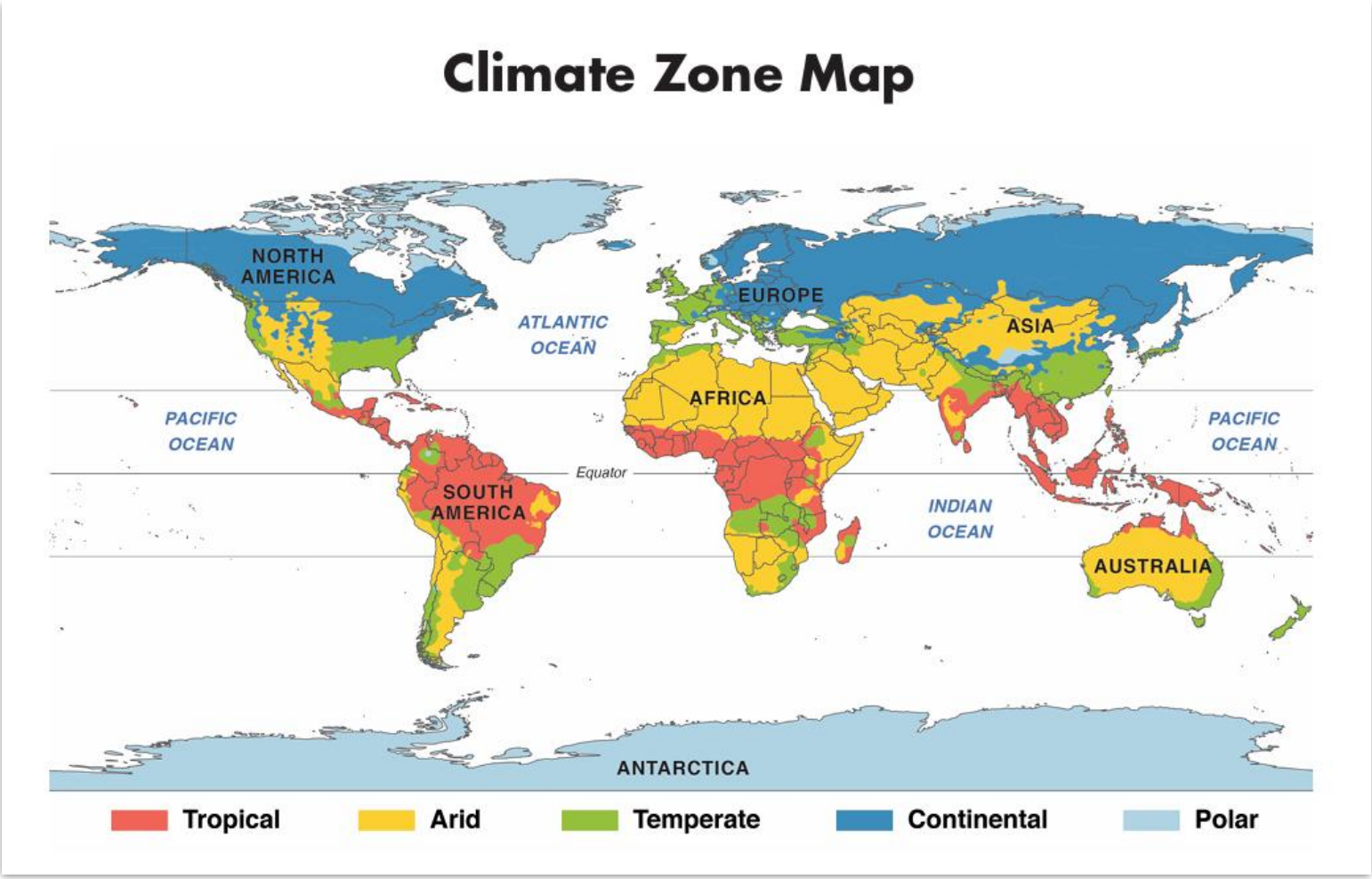
When we graphed the high and low temperatures on July 15 for our location, how much did the weather vary from one year to the next?

Do you think the low temperature on one day could vary as much as 9°F or 12°F from the average temperature?

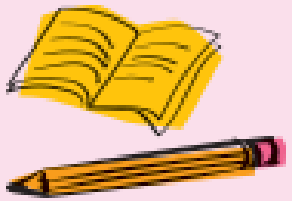
Where does the pen pal live?	Evidence

Scientists Investigate

How could we come up with other possible places that the pen pal could live?



STEM Notebook



Lesson 6 Notebook Sheet B

Where Does the Pen Pal Live?

1. What is the climate zone of your location?

2. Could the pen pal live in this climate zone?

3. What is your evidence?

Scientists Make Claims

Can the pen pal live in this climate zone?	Evidence
Tropical	
Arid	
Temperate	
Continental	
Polar	

Lesson

7

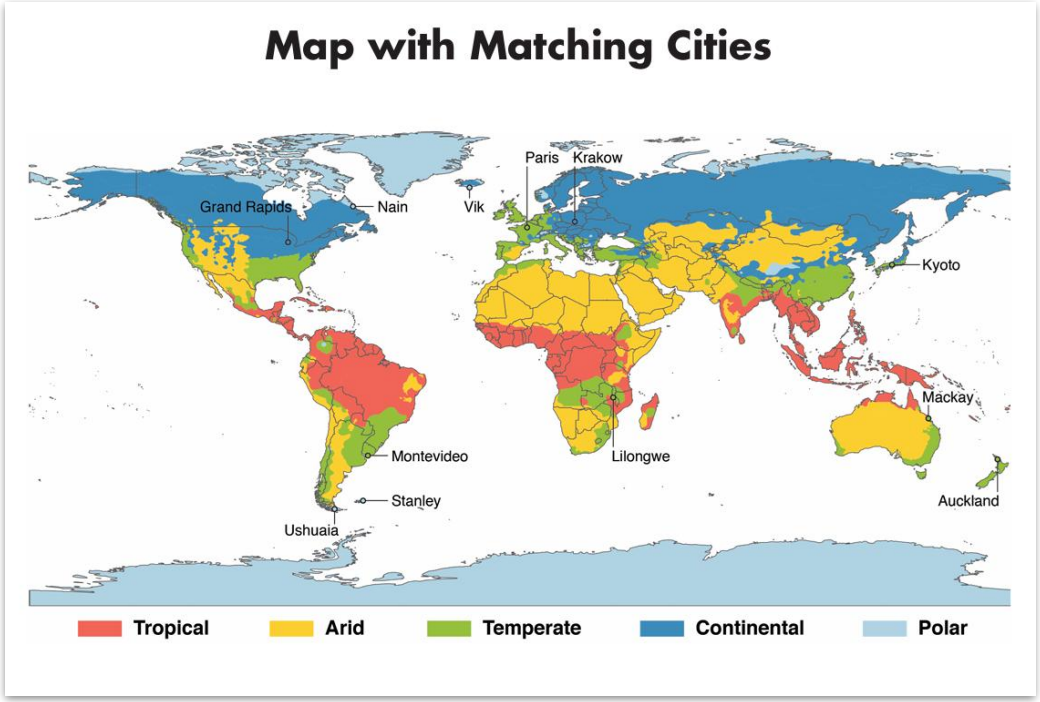
North and South

Scientists Investigate

Here is a picture of me and my brother playing outside on my birthday this year. My birthday is July 15th. I turned 8!

Can the pen pal live in this climate zone?	Evidence
Tropical	
Arid	
Temperate	
Continental	
Polar	

Scientists Investigate



Where does the pen pal live?	Evidence

Scientists Investigate

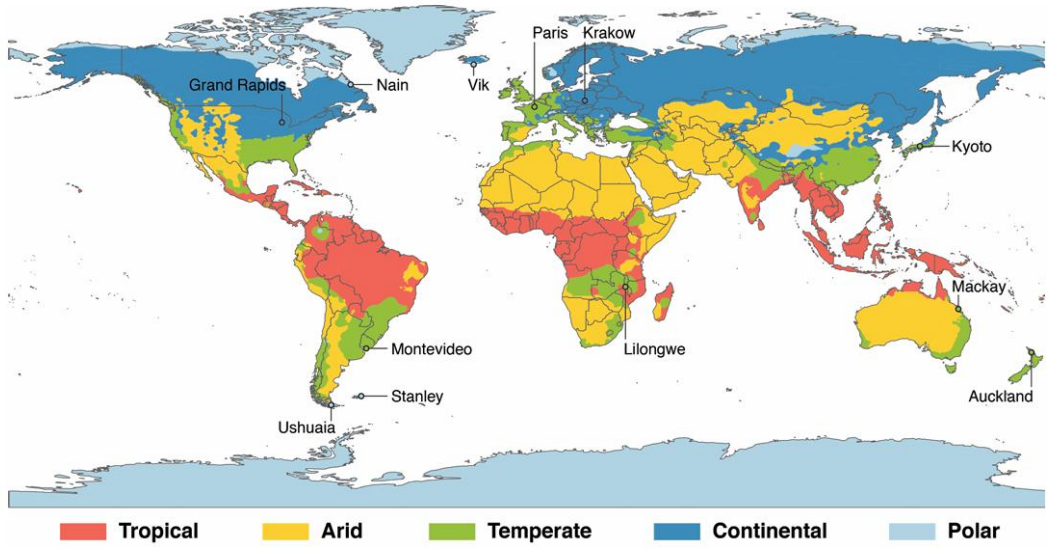
Mrs. Reyes gave us more information about the climate!

Weather Words

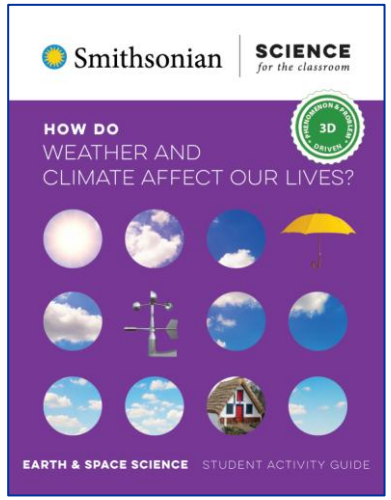
Temperature (°F/°C)	Description
43°F (6°C) and below	Cold
Between 44°F and 59°F (7°C and 15°C)	Cool
Between 60°F and 79°F (16°C and 26°C)	Warm
80°F (27°C) and above	Hot

Precipitation (number of days per month)	Description
5 days or fewer	Very little rain or snow
Between 6 and 14 days	Some rain or snow
15 days or more	A lot of rain or snow

Map with Matching Cities



Student Activity Guide: Complete Step 1



Lesson 7: **North and South**

Materials

For each student

- STEM notebook
- 1 Lesson 7 Notebook Sheet

For each group of four students

- 1 Matching City card set
- 6 Markers, different colors
- 1 Lesson 7 Activity Sheet

Procedure

1. Set up the card game.
   - Put the cards on the table face down.
   - Mix them up.

6

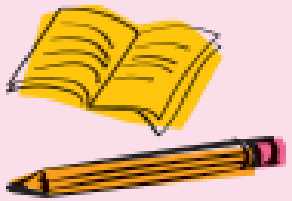
2. Take turns turning up two cards at once.
   - If they match, keep that pair.
   - If they don't match, turn the cards face down again.

Stop & Think Are you matching all the information on the card?

3. For each matching pair, write on your notebook sheet:
   - The name of each city
   - The weather in June
   - The weather in December
4. Mark each matching pair with a different color marker on the map.
5. Write on your notebook sheet:
   - Cities that are in the Northern Hemisphere (N)
   - Cities that are in the Southern Hemisphere (S)
6. Discuss any patterns you observe with your group.

7

STEM Notebook



Lesson 7 Notebook Sheet

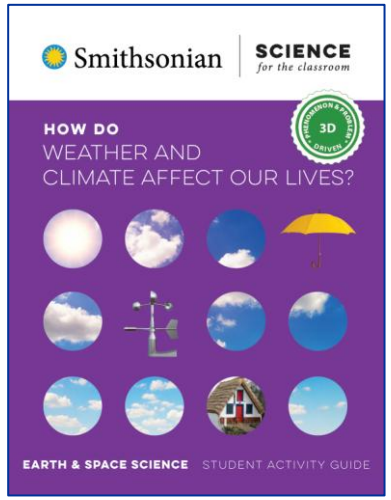
Card Game Data

For each city:

a) Write the weather in June and December.
b) Write whether it is in the Northern (N) or Southern (S) Hemisphere.

Pair	City	June weather	December weather	N or S
1				
2				
3				
4				
5				
6				

Student Activity Guide: Complete Steps 2-3



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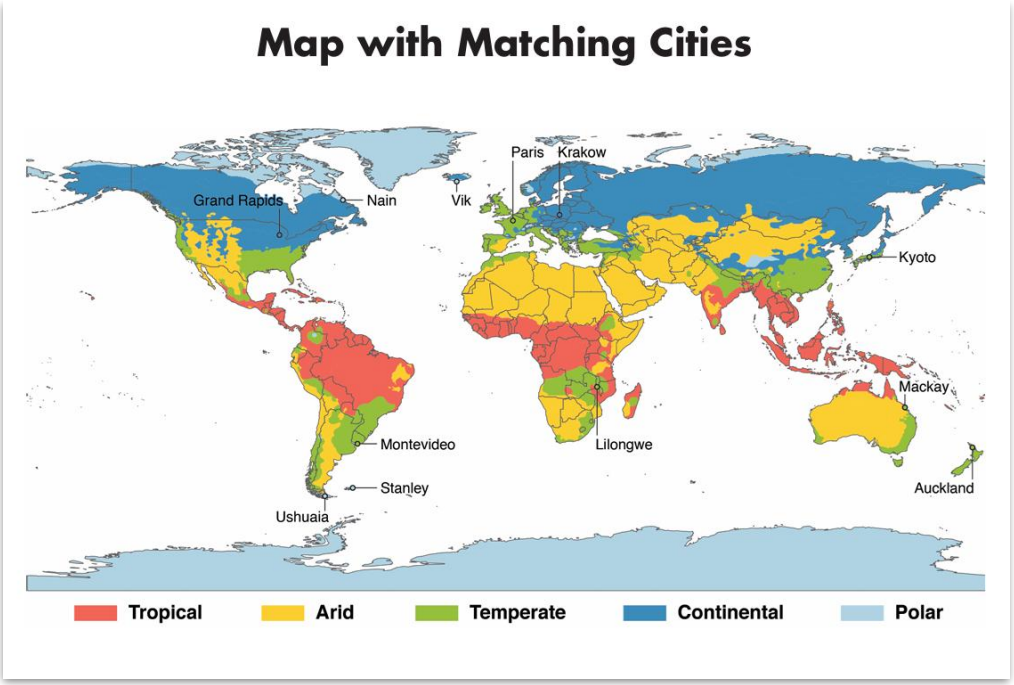
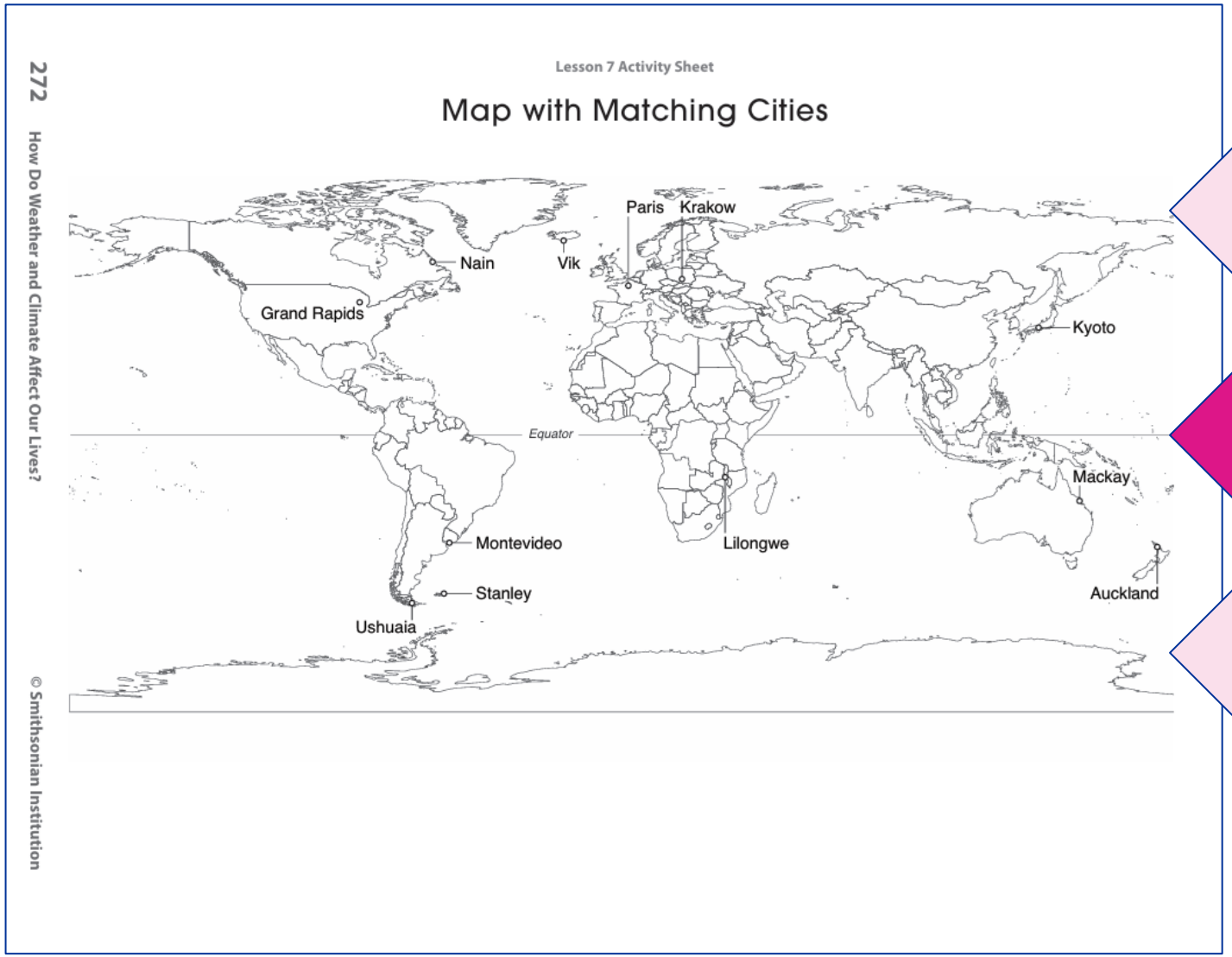


Scientists Investigate



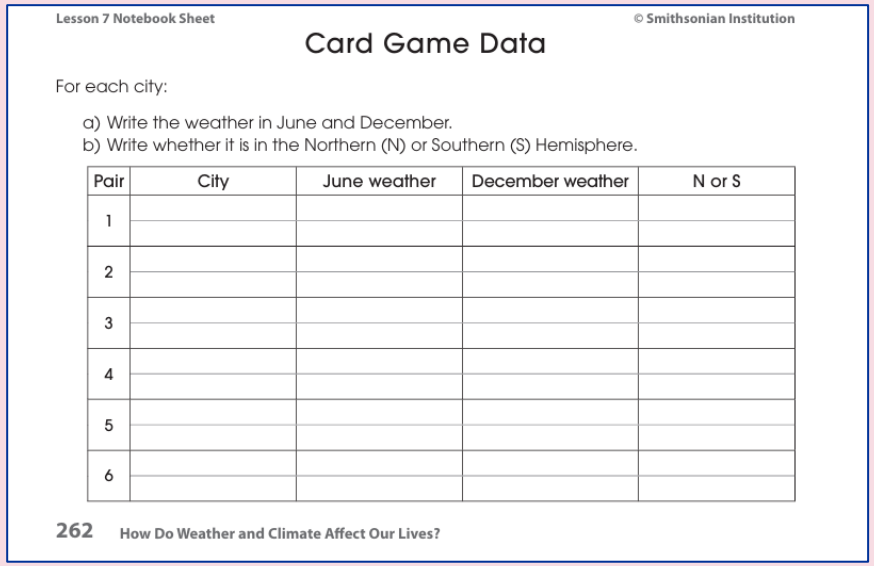
Northern Hemisphere

Equator

Southern Hemisphere

Scientists Look for Patterns

Review the information you collected and look for **patterns** in the data.



Lesson 7 Notebook Sheet © Smithsonian Institution

Card Game Data

For each city:

a) Write the weather in June and December.
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Pair	City	June weather	December weather	N or S
1				
2				
3				
4				
5				
6				

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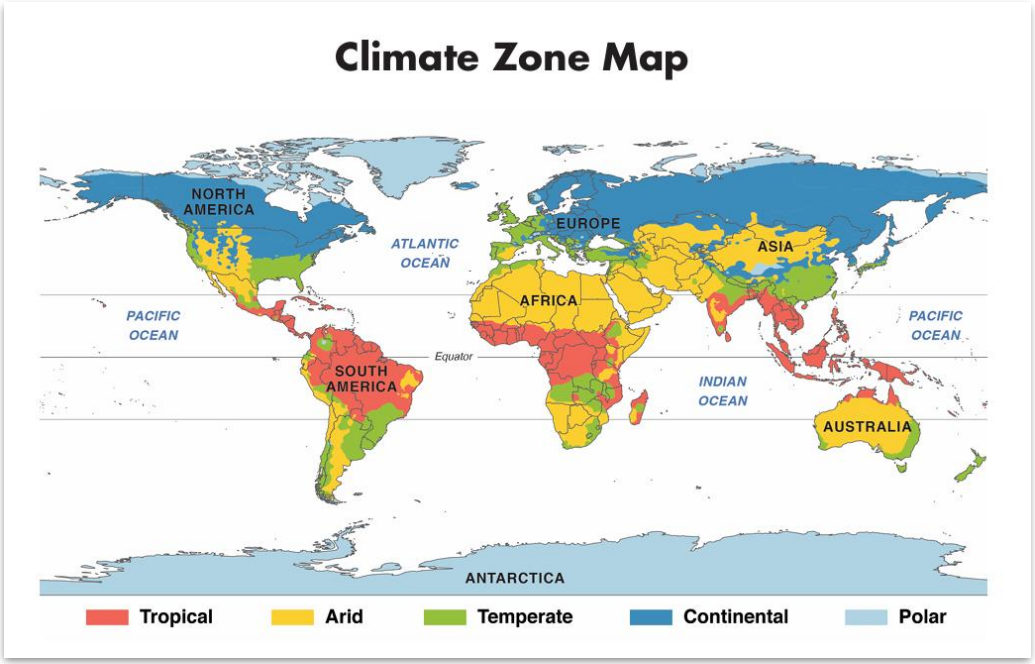
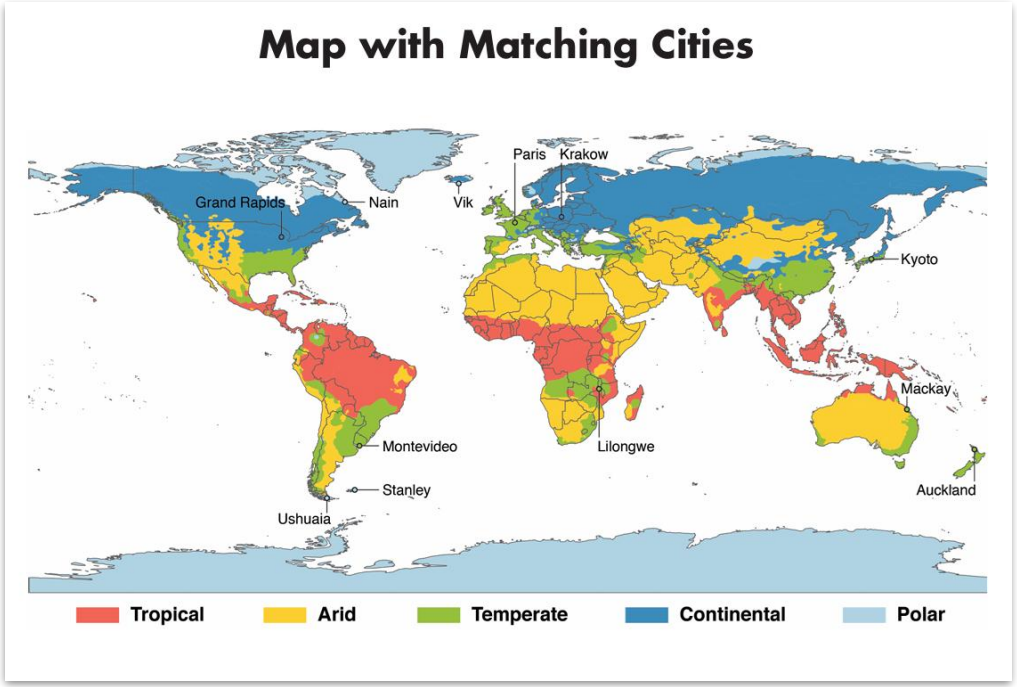
Patterns

Scientists Review Claims



Can the pen pal live in this climate zone?	Evidence
Tropical	
Arid	
Temperate	
Continental	
Polar	

Scientists Review Claims



Where does the pen pal live?	Evidence

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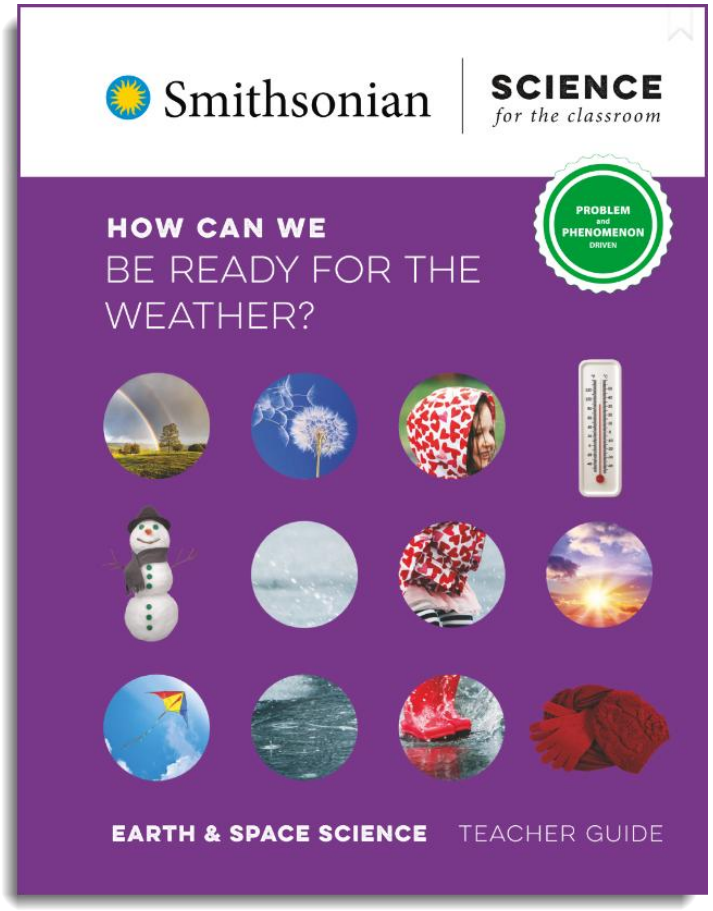
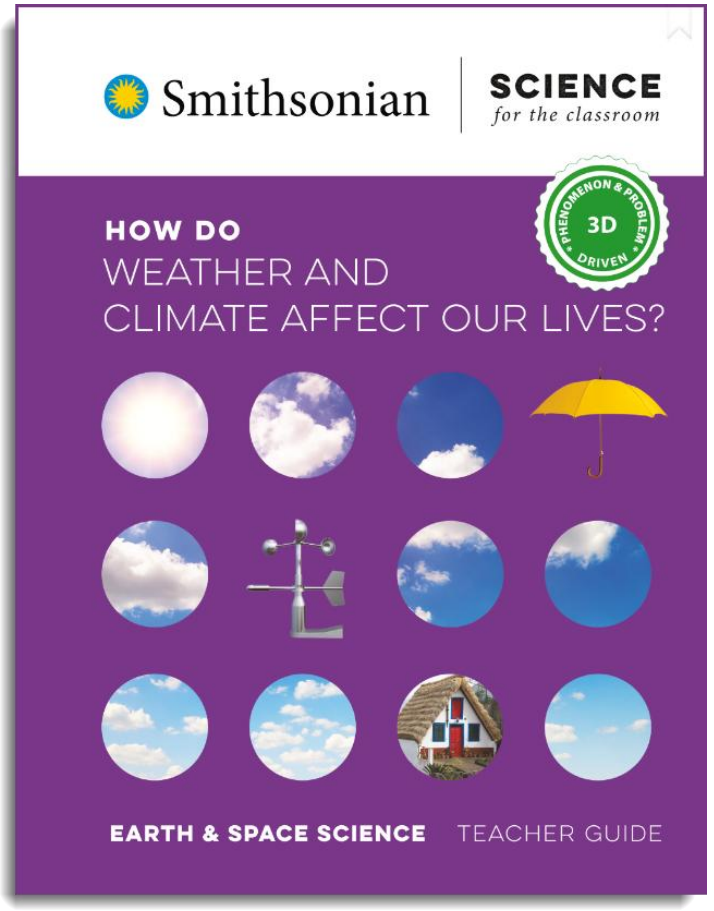
Kindergarten



3rd Grade



CAROLINA UNLEASH LEARNING

All Green Rating from EdReports.org

Gateway Ratings Summary

Kindergarten — VIEW REPORT

Gateway 1	96%
Gateway 2	100%
Gateway 3	92%

MEETS EXPECTATIONS

1st Grade — VIEW REPORT

Gateway 1	100%
Gateway 2	100%
Gateway 3	92%

MEETS EXPECTATIONS

2nd Grade — VIEW REPORT

Gateway 1	96%
Gateway 2	100%
Gateway 3	92%

MEETS EXPECTATIONS

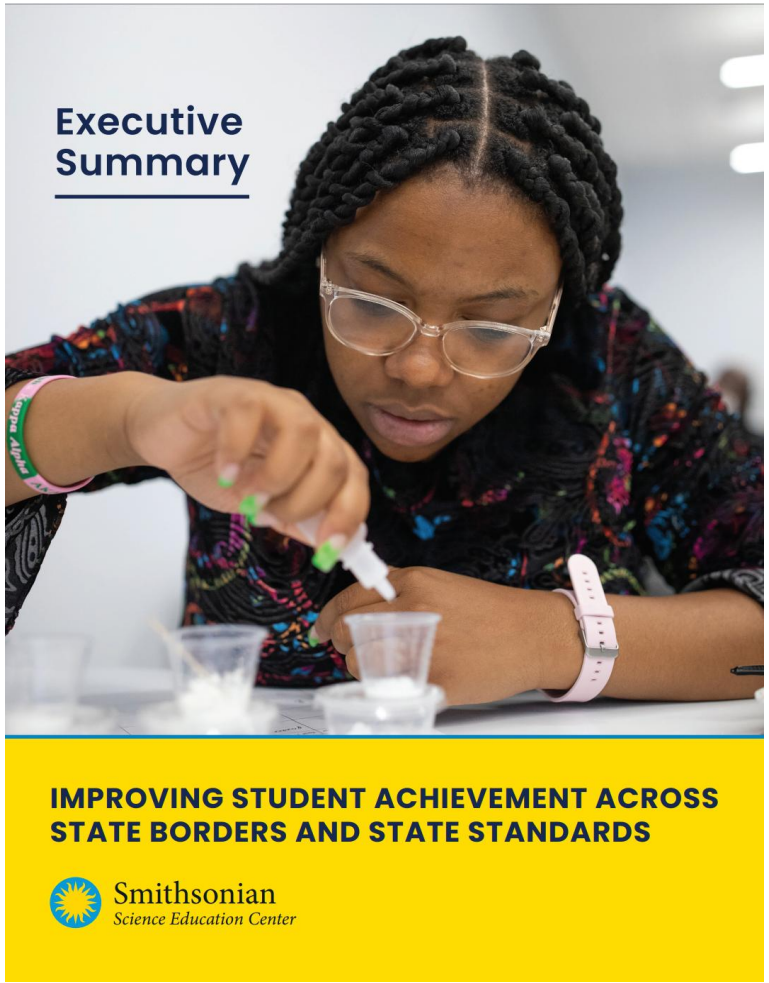
Gateway Ratings Summary

3rd to 5th Grade — VIEW REPORT

Gateway 1	91%
Gateway 2	100%
Gateway 3	94%

MEETS EXPECTATIONS

Improving Student Achievement Across State Borders and State Standards



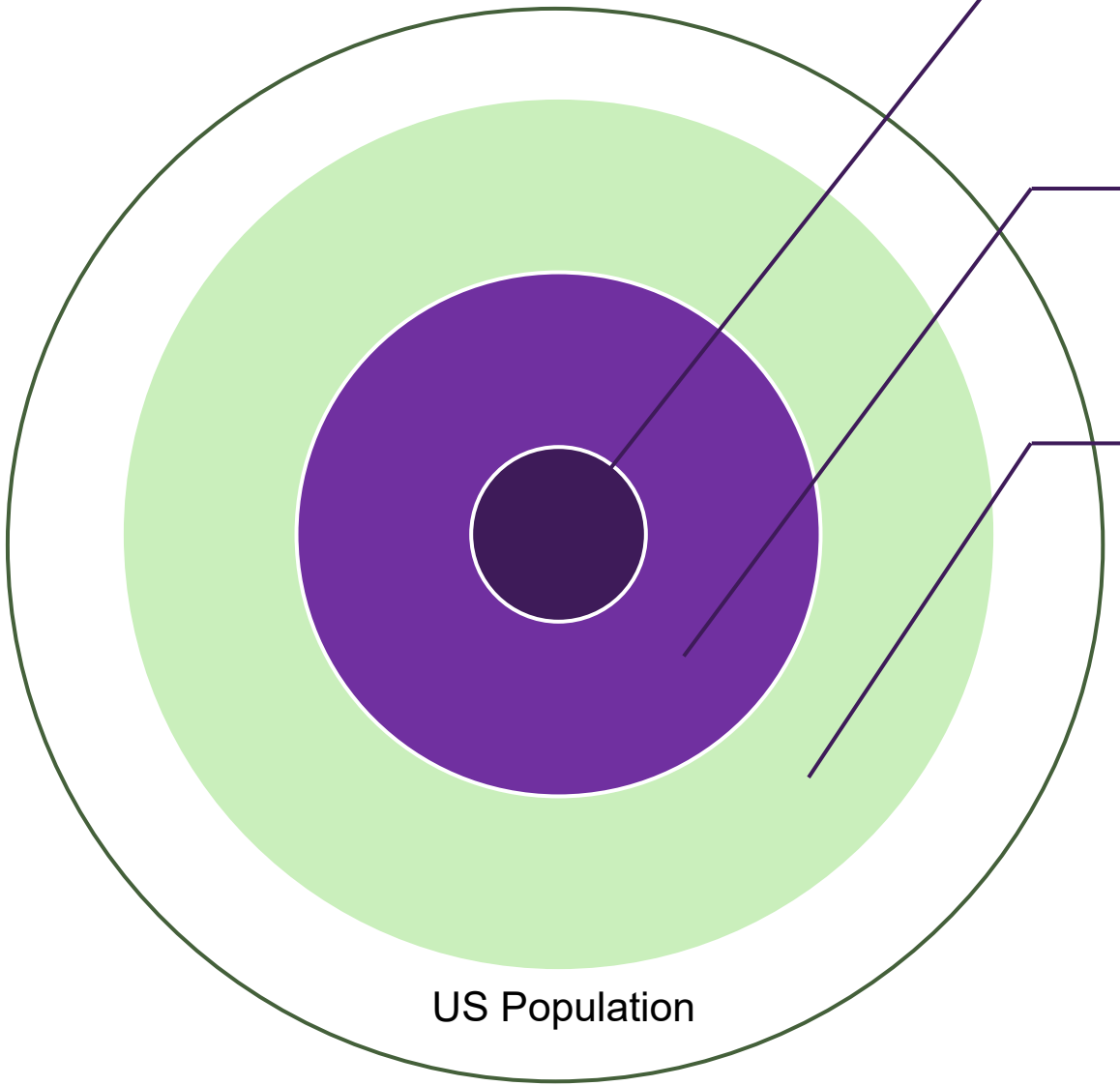
- 5-year longitudinal study of the *Smithsonian Science for the Classroom* curriculum 2019–2024
- Funded by Education Innovation and Research (EIR) Grant
- Externally evaluated by the Center for Research in Educational Policy (CREP) at the University of Memphis
- In collaboration with NC SMT Center led by Dr. Sam Houston

www.ncsmt.org/perspective-smithsonian-brings-power-of-science-to-nc-schools/

Research Question

Does implementation of *Smithsonian Science for the Classroom* with supporting professional learning improve **student achievement**, particularly achievement of high needs students, in **science**, **math**, and **reading** to a statistically significant extent, relative to “business as usual”?

Proven Results



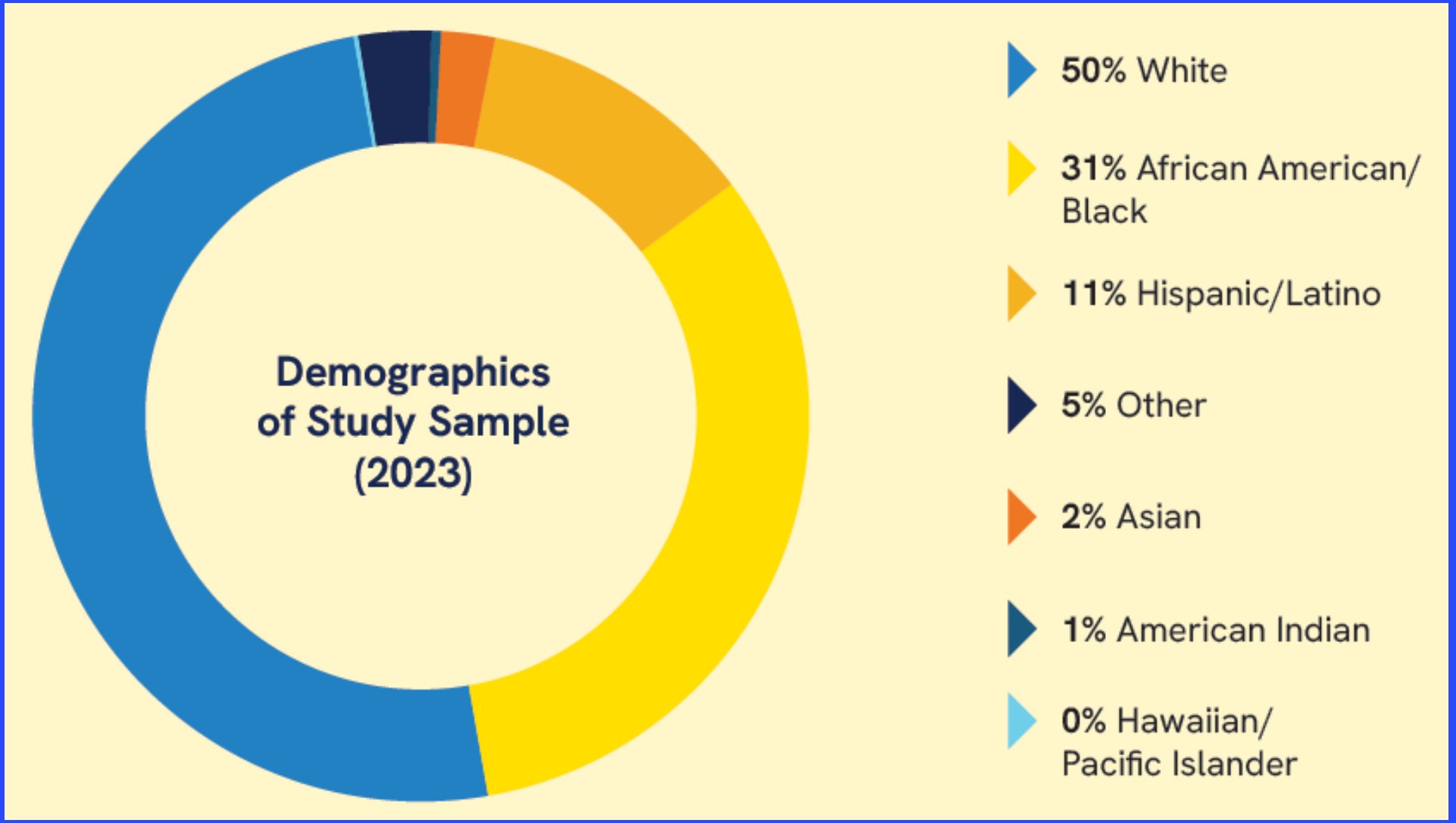
37 high-need/rural schools

7 school districts

2 states in US (NC & SC)

~10,000 students impacted
300 teachers
Grades 3rd, 4th, 5th

Demographics



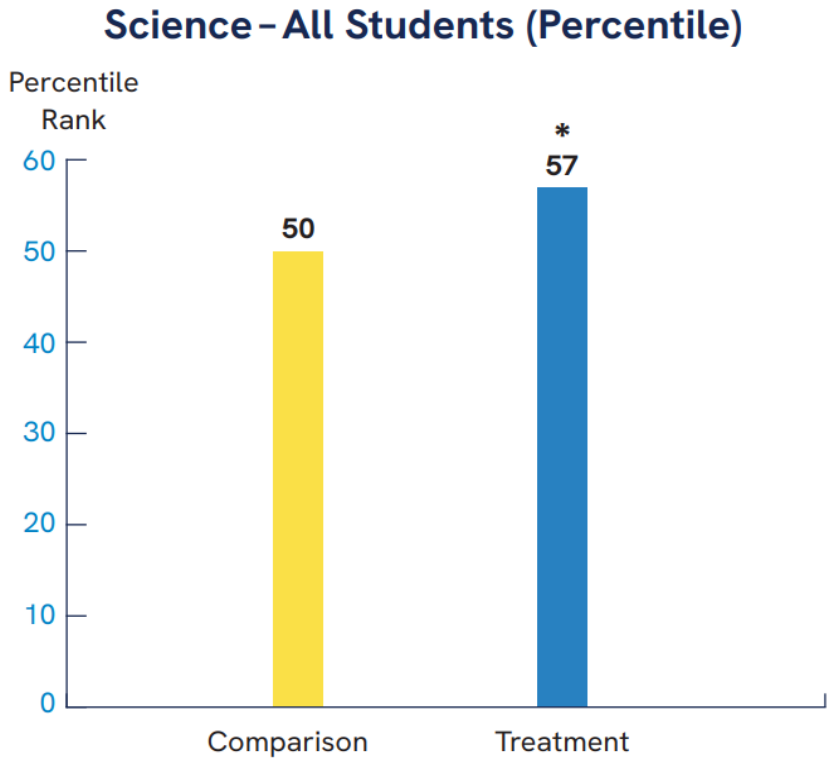
HIGH-QUALITY INSTRUCTIONAL MATERIALS (HQIM) ARE:

- Aligned with state science standards
- Research-based and/or externally validated
- Comprehensive to include engaging texts, tasks, and assessments
- Based on fostering vibrant student learning experiences
- Culturally relevant, free from bias
- Accessible for all students

HIGH-QUALITY PROFESSIONAL LEARNING (HQPL) CHARACTERISTICS:

- Content focused
- Incorporates active learning
- Supports collaboration
- Models effective practice
- Provides coaching
- Offers opportunities for reflection
- Sustained duration

Positive and Statistically Significant Findings: Stanford-10 Science



Comparison *N* = 838

Treatment *N* = 913

Smithsonian Science for the Classroom curriculum improved outcomes in the treatment group by **7 percentile points.**

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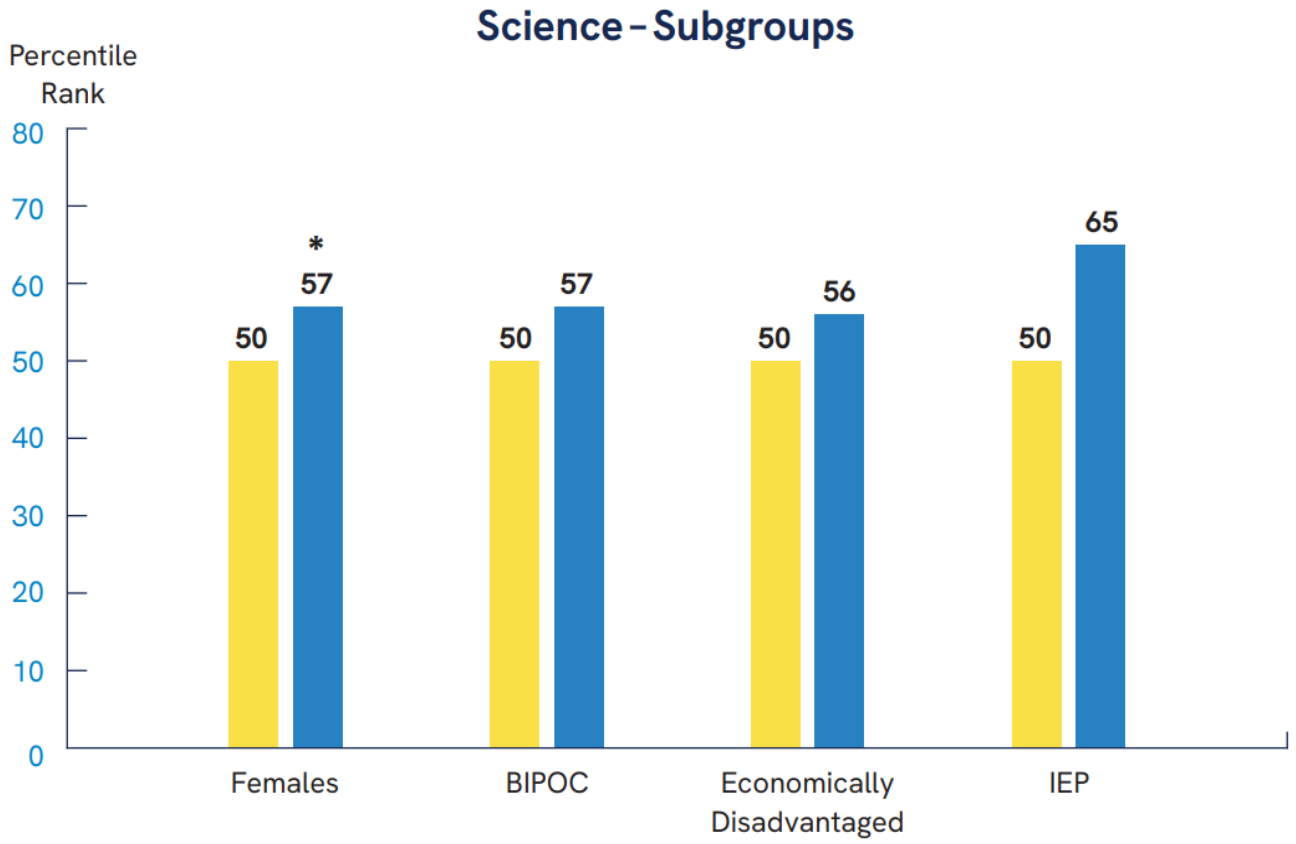
Positive Subgroup Findings: Stanford-10 Science



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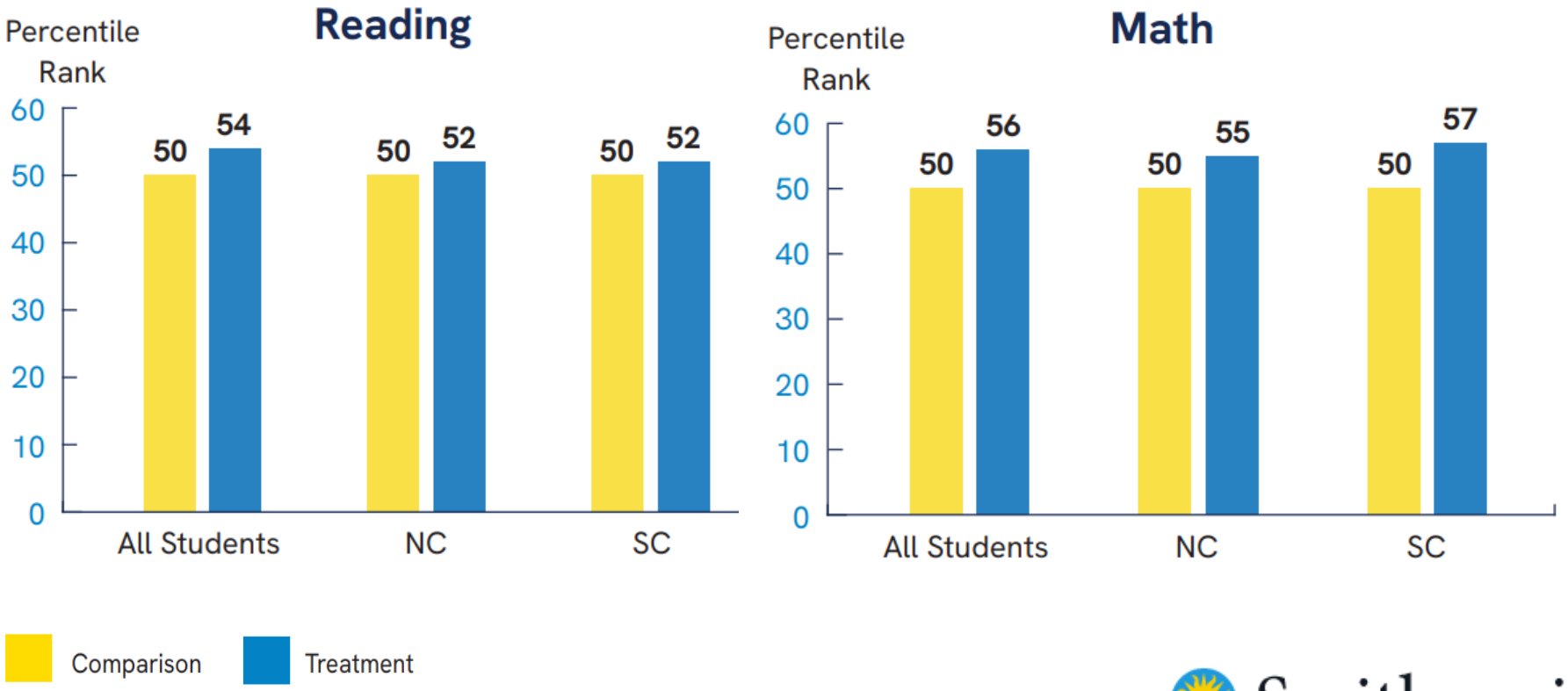
Positive Findings: State Reading and Math



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Join us on social media to stay up-to-date with new kits and free lessons!

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