

America's Scientific Revolutionaries

Weather Journaling with James Madison



AMERICAN PHILOSOPHICAL SOCIETY

RICHARD LOUNSBERY FOUNDATION

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AMERICA'S SCIENTIFIC REVOLUTIONARIES: Weather Journaling with James Madison

Introduction

Pair this learning activity with the short educational film
“Scientific Revolutionaries: James Madison.”

Learn about weather journaling with James Madison’s weather journals from the 1780s. Record and analyze your own weather observations. Consider how Madison applied this data to address weather-related challenges in his time.

How can weather journaling help us to better understand our environment?

Cover Image:
James Madison
by Charles Willson Peale, 1783
Library of Congress

Inquiry Design Model (IDM)

Compelling question:

How can weather journaling help us to better understand our environment?

PA State Aligned System standards:

See reverse.

Staging the Question:

How many of us look up the weather in the morning? Why? How does knowing the weather affect us? Why do we try to predict the weather?

Supporting question #1:

What are weather journals?

Supporting question #2:

What can we learn from weather journals?

Supporting question #3:

What can you learn from your own weather journal?

Formative performance task:

- Explore selected pages from Madison’s weather journal as an example.

Formative performance task:

- Watch “Scientific Revolutionaries: James Madison.”
- Identify and graph specific datasets from Madison’s journal.

Formative performance task:

- Record your own weather journal.
- Reflect on your findings.

Featured sources:

- Select pages from Madison’s weather journal.

Featured sources:

- “Scientific Revolutionaries: James Madison”
- Select pages from Madison’s weather journal.
- Graph worksheet.

Featured sources:

- Worksheet provided to guide journaling.

Summative performance task

Compare weather journal data with someone you know who lives/goes to school in a different location.

Extension: Identify a local environmental issue and collect data in your weather journal related to that issue. For example, if your town is experiencing a drought, collect information about rainfall and observations about its impact on plant life.

PA State Aligned System standards:

Grades 6-8

Science, Technology & Engineering, and Environment Literacy & Sustainability (STEELS)

3.4.6-8.E: Environmental Literacy & Sustainability: Environmental Literacy Skills:

Environmental Experiences: Collect, analyze, and interpret environmental data to describe a local environment.

Science, Environmental Literacy and Sustainability (NAAEE) 5-8 Strand 1.C: Collecting

Information: Learners locate and collect quantitative and qualitative information about the environment and environmental topics, using a range of methods and sources. They explain why they used selected information collection methods.

Social Studies: Geography 7.2.6-8.A: Describe the characteristics of places and regions.

Grades 9-12 (add extension activity)

Science, Technology & Engineering, and Environment Literacy & Sustainability (STEELS)

3.4.9-12.E: Environmental Literacy & Sustainability: Environmental Literacy Skills:

Environmental Experiences: Plan and conduct an investigation utilizing environmental data about a local environmental issue.

Science, Environmental Literacy and Sustainability (NAAEE) 9-12 Strand 1.B: Designing investigations: Learners design investigations to explore environmental questions, problems, issues, phenomena, and models. They explain their reasoning.

ELA Science and Technical Subjects: CC.3.5.9-12.A: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

ELA Science and Technical Subjects: CC.3.5.11-12.A: Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

ELA Science and Technical Subjects: CC.3.6.9-12.B: Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

ELA Science and Technical Subjects: CC.3.6.9-12.H: Draw evidence from informational texts to support analysis, reflection, and research.

LEARNING ACTIVITY CONTENT

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Therm ^r Sun-rise	Wind Sun-rise	Weather Sun-rise	Therm ^r A 06.P.M	Wind A 06.P
54	NE	smoke	66	E
54	SW	somew	68	SW
60	NE	smokey N.W	60	W
54	W	somewhat cloudy		

INSTRUCTIONS

- Discuss as a group how many of us look up the weather in the morning? Why? How does knowing the weather affect us? Why do we try to predict the weather?
 - Reflect on the role weather plays in our daily lives and decision-making.
- What are weather journals?
 - Discuss weather journals as a scientific tool.
 - Examine selected pages from James Madison's weather journals from the 1780's.
 - As a group discuss your observations from the journal.
- What can we learn from weather journals?
 - Gather specific data from James Madison's weather journals and plot them on a graph.
 - Watch the film "Scientific Revolutionaries: James Madison" to understand how James Madison used this information.
- What can you learn from your own weather journal?
 - Use the worksheet provided to track the weather in your own weather journal. You can also use your own if you prefer.
 - Analyze your data by creating a graph.
 - Try to predict the weather using the data you collected.
- Weather Pals
 - Invite someone in a different location to record a weather journal at the same time as you.
 - Compare the data you both collect and identify similarities and differences.



WHAT ARE WEATHER JOURNALS?

A weather journal is a record of daily weather conditions. These conditions can include air temperature and pressure, humidity, cloud coverage, precipitation, and wind speed.

These observations can be made using just your senses. What do the clouds look like? Does the air feel hot or cold, humid or dry?

You can also use instruments to help record your observations like a thermometer or a rain gauge.

Typically, weather journals record weather conditions at the same time each day over many days, months, or years. On the following pages, pages 8 to 15 of this activity, you will find selected pages from James Madison's weather journals from the 1780s. There are transcriptions of these selected pages on pages 16 to 21 of this activity.

Who was James Madison?

James Madison (1751-1836) is most famous for being the fourth President of the United States and the "Father of the Constitution."

He was also a citizen scientist who was deeply interested in the natural world. In the 18th century, citizen scientist meant people who participated in science but were not necessarily trained in a school.

Starting in 1784, at the urging of his friend Thomas Jefferson, Madison began keeping detailed daily weather records at his Virginia plantation, Montpelier. This work, which included noting temperatures and rainfall, was made possible by the labor of many enslaved people who worked on the plantation.

59
62
66
70
74
73
70
62 1/2
72
72
70
70
68
66
6
70
72
62

E
E
S.W.

fair
fair
smokey
fair
cloudy

blow

moon vine in blossom

Year	Therm ^m sun-rise	Wind sun-rise	Weather sunrise	Therm ^m A. 06. PM	Wind A. 06. PM	Weather A. 06. PM
1785						
Apr. 18	59	S. W	atmosphere thick & somewhat cloudy	67 1/2	S W	somewhat cloudy
19	59	NE	rainy	55	NE	rainy. -- Sun sets clear.
20	46	W.	fair. ground thinly frozen. ^{dash of snow} After 8. some chips in west killed some reaches. fair. black frost. A. high in garden. ice in N.	46	N	somewhat cloudy.
21	42 1/2	S. W.	fair.	55	S. W	fair. Daffodil blossoms killed. - Inquil. N. touched by
22	48	S. W.	fair. atmosphere thick N. W.	65	S.	fair.
23	58	S.	fair. sky muddy N. W.	69	S.	fair. atmosphere thick N. W.
24	65	S.	fair.	77	S.	fair. atmosphere thick N. W.
25	64	E.	fair.	78	S.	fair. atmosphere thick N. W.
26	71.	S.	fair. atmosphere thick N. W.	81 1/2	S.	fair. atmosphere thick N. W.
27	72	S.	fair. atmosphere thick N. W.	82.	S.	fair. atmosphere thick N. W.
28	70	S.	fair. atmosphere thick N. W.	82	S.	fair. atmosphere thick N. W.
29	72	S.	cloudy.	78		cloudy. light shower with some thunder
30	69		fair.	68	N. W	somewhat cloudy
May 1	56	NE	fair.	63	N	fair
2	56	SE	fair.	60	E.	cloudy
3	54	NE	somewhat cloudy	55 1/2	NE.	raining still moderately
4	55	NE	raining moderately	62	N	fair
5	58	NNE	still raining 8 O'cl. fair	65	S	showery -
6	60	NNW	somewhat cloudy & moist	66	NE.	clouded Horizon N. W. 1/2 after 6 O'cl. thundr
7	59	N	cloudy & foggy	65	N.	fair
8	58	NW	fair	66 1/2	N	fair
9	62	E	fair	69 1/2	W	fair

APRIL 18 - MAY 9, 1785

Shooting etc. of plants etc.

- Peach trees in full blossom
Taste
Hichory buds opening. tops of moun
- poplar leafing, mulberry buds opening.

- Gooseberry bushes in blossom.
- Cherry trees & plum tree in full blossom.

- peach blossoms falling

- tulip in blossom

- Cherry blossoms falling

Garden peas begin to blossom
about 14 inches high

- Narcissus first in blossom

Appearance & disappearance
of birds

Miscellanea

Asparagus at dinner

APRIL 18 - MAY 9, 1785 CONTINUED

Therm. sun-rise	Wind sun-rise	Weather sun-rise	Therm. A 06 P.M.	Wind A 06 P.M.	Weather A 06 P.M.
1785					
May 10	62 SW	fair	65 SE	SE	somewhat cloudy
11	59 NE	raining	61 NE	NE	still raining
12	60 NW	thick fog	66 S	S	fair
13	60 SW	sky muddy	69 SSW	SSW	fair
14	62 SW	fair	64 N	N	showery
15	60 SW	fair	65 SW	SW	cloudy
16	63 SW	somewhat cloudy	68 N	N	somewhat cloudy
17	61 NNE	fair	66 E	E	somewhat cloudy
18	61 S	fair	72 SW	SW	somewhat cloudy
19	66 NE	raining	70 N	N	fair
20	62 W	fair	70 SSW	SSW	somewhat cloudy
21	67 E	fair	70 W	W	thunder cloud NNE
22	67 SW	cloudy & damp	66 NE	NE	still raining, a great deal having fallen
23	63 NNE	cloudy & foggy	67 SW	SW	nearly fair
24	63 SSW	clouds breaking after much rain.	68 1/2 NW	NW	fair, &
25	63 SW	fair	70 SW	SW	fair
26	63 N	fair	68 W	W	fair
27	60 SW	fair	65 N	N	fair
28	58 SW	fair	64 NNE	NNE	scattered & moist clouds
29	58 SW	fair	68 SW	SW	fair
30	62 SSW	fair	72 E	E	sky somewhat muddy
31	67 E	cloudy, from 606. light rain	67 NE	NE	showery
June 1	64 SW	fair	76 1/2 SW	SW	fair
2	68 SW	fair	80 1/2 S	S	fair

MAY 10 - JUNE 2, 1785

Shooting &c. of Plants &c.

Pionys blowing, Primrose blowing
Monthly honeyuckle blowing
Snowdrop in blossom
- Woodbine in blossom

Locusts in blossom

Strawberries beginning to redder

Cherries beginning to redder
Damask rose blossoms

Strawberries beginning to be ripe

-- Garden peas first at dinner
Cherries begin to be ripe

Appearance &c. of Birds &c.

Cherry birds appear.
Horse-ear flies first observed

Cherry birds disappear

Miscellanea

MAY 10 - JUNE 2, 1785 CONTINUED

Shooting &c. of Plants &c.

White Hyacinth blossoming

White Hyacinth blossoming
{Black hies blossoming in high situations
Anquils blossoming}

Cherry trees blossoming
Garden-peas coming up

Paffadil blossoming

Appearance &c. of birds &c.

Miscellanea

Forward cherries & a few peaches killed.
Paffadil
Paffadil blossoms bit, & some killed.

MARCH 23 - APRIL 14, 1786 CONTINUED

1786	Therm ^m Sun-rise	Wind Sun-rise	Weather Sun-rise	Therm ^m A 06 P.M.	Wind A 06 P.M.	Weather A 06 P.M.
April 15	54	NE	smokey	66	E	fair
16	54	SW	somewhat cloudy	68	SW	smokey
17	60	NE	smokey NW	60	W	somewhat cloudy & windy
18	54	W	somewhat cloudy			fair
19	56	E	smokey NW	65	S E	somewhat cloudy
20	56	NE	cloudy & damp	55	E	cloudy & damp
21	48	NE	raining	52	NE	still raining
22	54	S	cloudy & foggy after much rain	60	SE	broken clouds
23	58	NE	foggy & cloudy	59	E	cloudy & damp
24	57	NE	raining	62	NE	almost fair
25	58	SW	somewhat cloudy	66	N	somewhat cloudy & windy
26	60	N by E	fair	70	N	fair
27	58	SW	fair	74	N by E	fair
28	62	SW	fair	73	W	somewhat cloudy
29	67	SW	somewhat cloudy	70	N	fair, windy
30	55	N	fair	62 1/2	N	fair
May 1	57	SW	fair	72	NE	sky muddy NW
2	62	NE	fair, somewhat smokey	72	NE	fair
3	62	E	air thick	70	SE	fair
4	60	SE	sky somewhat muddy	70	NE	air thick
5	60	E	air thick	68	NE	sky muddy
6	57	NE	somewhat cloudy	66	NE	sky muddy
7	60	NE	air thick	6		fair
8	62	W	sky muddy, air thick			fair
9	62	NE	somewhat cloudy, air thick	70	E	smokey
10	63	NE	cloudy NW	72	E	fair
11	61	SW	cloudy, foggy (12.00. raining)	62	SW	cloudy

APRIL 15 - MAY 11, 1786

Shooting of plants &c.

Appearance &c of birds &c.

Miscellanea

Whip poor Will first heard

(25) Humming bird appears

(24) Asparagus first at dinner

→ tulips blowing

primrose begins to blow

primroses blowing
Woodbine in blossom.

(29) ^{5:06 P.M.} scattered & transient beams of aureole. Bar. from ^{NNW to NNE}

(A) forward peas beginning to blossom

Humming birds frequent

APRIL 15 - MAY 11, 1786 CONTINUED

Madison's Observations at Montpelier: Apr 18, 1785-May 8, 1785

Apr 18	Mon	Apr 19	Tue	Apr 20	Wed	Apr 21	Thu	Apr 22	Fri	Apr 23	Sat	Apr 24	Sun				
sunrise 59°F Wind: SW Conditions: Cloudy Meteorological: atmosphere thick and somewhat cloudy 4:00 PM 68°F Wind: SW Conditions: Cloudy Meteorological: somewhat cloudy	sunrise 59°F Wind: NE Conditions: Rain Meteorological: rainy 4:00 PM 55°F Wind: NE Conditions: Rain Meteorological: rainy. Sun sets clear Other observations: Peach trees in full blossom	sunrise 46°F Wind: W Conditions: Fair, Snow Meteorological: fair. Ground thinly frozen & dash of snow after 8:00 4:00 PM 46°F Wind: N Conditions: Cloudy Meteorological: somewhat cloudy Other observations: Hickory buds opening on tops of mountains	sunrise 43°F Wind: SW Conditions: Fair, Frost Meteorological: Fair. Black frost 3/4 inch high in garden. Ice in branches. Cherries in part killed & some peaches 4:00 PM 55°F Wind: SW Conditions: Fair Meteorological: fair. Daffil blossoms killed. Jonquil ditto. Touched by [illegible] Other observations: poplars leafing, mulberry buds open	sunrise 48°F Wind: SW Conditions: Fair Meteorological: fair 4:00 PM 65°F Wind: S Conditions: Fair Meteorological: fair Other observations: asparagus at dinner	sunrise 58°F Wind: S Conditions: Fair Meteorological: fair. Atmosphere thick NW 4:00 PM 69°F Wind: S Conditions: Fair Meteorological: fair. Atmosphere thick NW Other observations: gooseberry bushes in blossom	sunrise 65°F Wind: S Conditions: Fair, Muddy Meteorological: fair. Sky muddy NW 4:00 PM 77°F Wind: S Conditions: Fair Meteorological: fair. Atmosphere thick NW Other observations: cherry trees & plum tree in full blossom	sunrise 70°F Wind: S Conditions: Fair Meteorological: fair. Atmosphere thick NW 4:00 PM 82°F Wind: S Conditions: Fair Meteorological: fair. Atmosphere thick NW Other observations: tulip in blossom	sunrise 72°F Wind: S Conditions: Cloudy Meteorological: cloudy 4:00 PM 78°F Wind: — Conditions: Cloudy, Rain, Thunder Meteorological: cloudy, light shower with some thunder Other observations: cherry blossoms falling	sunrise 69°F Wind: — Conditions: Fair Meteorological: fair 4:00 PM 68°F Wind: NW Conditions: Cloudy Meteorological: somewhat cloudy	sunrise 56°F Wind: SE Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 60°F Wind: E Conditions: Cloudy Meteorological: cloudy	sunrise 54°F Wind: NE Conditions: Rain Meteorological: raining moderately 4:00 PM 56°F Wind: NE Conditions: Rain Meteorological: raining still moderately	sunrise 55°F Wind: NE Conditions: Fair, Rain Meteorological: still raining. 8:00 fair 4:00 PM 62°F Wind: N Conditions: Fair Meteorological: fair	sunrise 58°F Wind: N.NW Conditions: Cloudy, Foggy Meteorological: cloudy & foggy 4:00 PM 65°F Wind: S Conditions: Rain Meteorological: showery Other observations: garden peas begin to blossom about 14 inches high	sunrise 60°F Wind: N.NW Conditions: Cloudy, Foggy Meteorological: cloudy & foggy 4:00 PM 66°F Wind: NE Conditions: Cloudy Meteorological: clouded horizon NW 1/2 after 6:00. Thunder clouds NE & SE cloudy	sunrise 59°F Wind: N Conditions: Fair Meteorological: fair 4:00 PM 65°F Wind: N Conditions: Fair Meteorological: fair	sunrise 59°F Wind: N Conditions: Fair Meteorological: fair 4:00 PM 65°F Wind: N Conditions: Fair Meteorological: fair	sunrise 58°F Wind: NW Conditions: Fair Meteorological: fair 4:00 PM 67°F Wind: N Conditions: Fair Meteorological: fair
sunrise 64°F Wind: E Conditions: Fair Meteorological: fair 4:00 PM 78°F Wind: S Conditions: Fair Meteorological: fair. Atmosphere thick NW	sunrise 71°F Wind: S Conditions: Fair Meteorological: fair. Atmosphere thick NW 4:00 PM 82°F Wind: S Conditions: Fair Meteorological: fair. Atmosphere thick NW Other observations: peach blossoms falling	sunrise 72°F Wind: S Conditions: Fair Meteorological: fair. Atmosphere thick NW 4:00 PM 82°F Wind: S Conditions: Fair Meteorological: fair. Atmosphere thick NW	sunrise 70°F Wind: S Conditions: Fair Meteorological: fair. Atmosphere thick NW 4:00 PM 82°F Wind: S Conditions: Fair Meteorological: fair. Atmosphere thick NW Other observations: tulip in blossom	sunrise 72°F Wind: S Conditions: Cloudy Meteorological: cloudy 4:00 PM 78°F Wind: — Conditions: Cloudy, Rain, Thunder Meteorological: cloudy, light shower with some thunder Other observations: cherry blossoms falling	sunrise 69°F Wind: — Conditions: Fair Meteorological: fair 4:00 PM 68°F Wind: NW Conditions: Cloudy Meteorological: somewhat cloudy	sunrise 56°F Wind: SE Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 60°F Wind: E Conditions: Cloudy Meteorological: cloudy	sunrise 54°F Wind: NE Conditions: Rain Meteorological: raining moderately 4:00 PM 56°F Wind: NE Conditions: Rain Meteorological: raining still moderately	sunrise 55°F Wind: NE Conditions: Fair, Rain Meteorological: still raining. 8:00 fair 4:00 PM 62°F Wind: N Conditions: Fair Meteorological: fair	sunrise 58°F Wind: N.NW Conditions: Cloudy, Foggy Meteorological: cloudy & foggy 4:00 PM 65°F Wind: S Conditions: Rain Meteorological: showery Other observations: garden peas begin to blossom about 14 inches high	sunrise 60°F Wind: N.NW Conditions: Cloudy, Foggy Meteorological: cloudy & foggy 4:00 PM 66°F Wind: NE Conditions: Cloudy Meteorological: clouded horizon NW 1/2 after 6:00. Thunder clouds NE & SE cloudy	sunrise 59°F Wind: N Conditions: Fair Meteorological: fair 4:00 PM 65°F Wind: N Conditions: Fair Meteorological: fair	sunrise 58°F Wind: NW Conditions: Fair Meteorological: fair 4:00 PM 67°F Wind: N Conditions: Fair Meteorological: fair	sunrise 59°F Wind: NW Conditions: Fair Meteorological: fair 4:00 PM 67°F Wind: N Conditions: Fair Meteorological: fair				

Madison's Observations at Montpelier: May 9, 1785-May 29, 1785

May 9	May 10	May 11	May 12	May 13	May 14	May 15
Mon	Tue	Wed	Thu	Fri	Sat	Sun
<p>sunrise 62°F Wind: E Conditions: Fair Meteorological: fair 4:00 PM 70°F Wind: W Conditions: Fair Meteorological: fair Other observations: Narsissus first in blossom</p>	<p>sunrise 62°F Wind: SW Conditions: Fair Meteorological: fair 4:00 PM 65°F Wind: SE Conditions: Cloudy Meteorological: somewhat cloudy Other observations: Pionys blooming, Primrose blooming, Monthly honeysuckle blooming</p>	<p>sunrise 59°F Wind: NE Conditions: Rain Meteorological: raining 4:00 PM 61°F Wind: NE Conditions: Rain Meteorological: still raining Other observations: Snowdrop in blossom w</p>	<p>sunrise 60°F Wind: NW Conditions: Foggy Meteorological: thick fog 4:00 PM 66°F Wind: S Conditions: Fair Meteorological: fair Other observations: Woodbine in blossom</p>	<p>sunrise 60°F Wind: SW Conditions: Muddy Meteorological: sky muddy 4:00 PM 69°F Wind: S.SW Conditions: Fair Meteorological: fair</p>	<p>sunrise 62°F Wind: SW Conditions: Fair Meteorological: fair 4:00 PM 64°F Wind: N Conditions: Rain Meteorological: showery</p>	<p>sunrise 60°F Wind: SW Conditions: Fair Meteorological: fair 4:00 PM 65°F Wind: S by W Conditions: Cloudy Meteorological: cloudy</p>
<p>sunrise 63°F Wind: SW Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 68°F Wind: N Conditions: Cloudy Meteorological: somewhat cloudy</p>	<p>sunrise 61°F Wind: N.NE Conditions: Fair Meteorological: fair 4:00 PM 66°F Wind: E Conditions: Cloudy Meteorological: cloudy Other observations: Locusts in blossom</p>	<p>sunrise 61°F Wind: S Conditions: Fair Meteorological: fair 4:00 PM 72°F Wind: SW by W Conditions: Cloudy Meteorological: somewhat cloudy</p>	<p>sunrise 66°F Wind: NE Conditions: Rain Meteorological: rainy 4:00 PM 70°F Wind: N Conditions: Fair Meteorological: fair</p>	<p>sunrise 62°F Wind: W Conditions: Fair Meteorological: fair 4:00 PM 70°F Wind: S.SW Conditions: Cloudy Meteorological: somewhat cloudy</p>	<p>sunrise 67°F Wind: E Conditions: Fair Meteorological: fair 4:00 PM 70°F Wind: W Conditions: Cloudy Meteorological: thundercloud N.NE</p>	<p>sunrise 67°F Wind: SW Conditions: Cloudy, Rain Meteorological: cloudy & damp 7:00 raining 4:00 PM 66°F Wind: NE Conditions: Rain Meteorological: still raining, a great deal having fallen Other observations: Strawberries beginning to redden</p>
<p>sunrise 63°F Wind: N.NE Conditions: Cloudy, Foggy Meteorological: cloudy & foggy 4:00 PM 67°F Wind: SW by W Conditions: Fair Meteorological: nearly fair</p>	<p>sunrise 63°F Wind: S.SW Conditions: Overcast, Rain Meteorological: Clouds breaking after much rain during the night Other observations: Cherries beginning to redden 4:00 PM 69°F Wind: N.NW Conditions: Fair Meteorological: fair</p>	<p>sunrise 63°F Wind: SW Conditions: Fair Meteorological: fair 4:00 PM 70°F Wind: SW Conditions: Fair Meteorological: fair Other observations: Damask rose blossoms</p>	<p>sunrise 63°F Wind: N Conditions: Fair Meteorological: fair 4:00 PM 68°F Wind: W Conditions: Fair Meteorological: fair</p>	<p>sunrise 60°F Wind: SW Conditions: Fair Meteorological: fair 4:00 PM 65°F Wind: N Conditions: Fair Meteorological: fair</p>	<p>sunrise 58°F Wind: SW Conditions: Fair Meteorological: fair 4:00 PM 64°F Wind: N.NE Conditions: Cloudy Meteorological: scattered & moist clouds Other observations: Strawberries beginning to be ripe</p>	<p>sunrise 58°F Wind: SW by W Conditions: Fair Meteorological: fair 4:00 PM 68°F Wind: SW Conditions: Fair Meteorological: fair Other observations: Cherry birds appear; Horse-ear flies first observed</p>

Madison's Observations at Montpelier: May 30, 1785--Jun 2, 1785

May 30	Mon	May 31	Tue	Jun 1	Wed	Jun 2	Thu
<p>sunrise 62°F Wind: S.SW Conditions: Fair Meteorological: fair 4:00 PM 72°F Wind: E Conditions: Muddy Meteorological: sky somewhat muddy Other observations: Garden peas first at dinner</p>	<p>sunrise 67°F Wind: E Conditions: Cloudy, Rain Meteorological: cloudy, from 6:00 light rain 4:00 PM 67°F Wind: NE Conditions: Rain Meteorological: showery Other observations: Cherries begin to be ripe</p>	<p>sunrise 64°F Wind: SW Conditions: Fair Meteorological: fair 4:00 PM 77°F Wind: SW by S Conditions: Fair Meteorological: fair</p>	<p>sunrise 68°F Wind: SW by W Conditions: Fair Meteorological: fair 4:00 PM 81°F Wind: S Conditions: Fair, Rain Meteorological: fair, 8:00 light shower of rain Other observations: Cherry birds disappear</p>				

Madison's Observations at Montpelier: Mar 23, 1786-Apr 12, 1786

Mar 23	Thu	Mar 24	Fri	Mar 25	Sat	Mar 26	Sun	Mar 27	Mon	Mar 28	Tue	Mar 29	Wed		
sunrise 44°F Wind: W Conditions: Fair Meteorological: fair 4:00 PM -°F Wind: NW Conditions: Cloudy Meteorological: blustering and moist flying clouds Other observations: White Hyacinth blossoming	sunrise 47°F Wind: NW Conditions: Fair Meteorological: fair Other observations: {Blue Hyacinth blossoming} {Peach trees blossoming in high situations} 4:00 PM 57°F Wind: WSW Conditions: Fair Meteorological: fair	sunrise 52°F Wind: SW Conditions: Fair Meteorological: fair Other observations: Jonquils blossoming 4:00 PM 70°F Wind: SW Conditions: Fair, Smoke Meteorological: fair & smokey	sunrise 58°F Wind: SW Conditions: Smoke Meteorological: very smokey 4:00 PM 71°F Wind: SW Conditions: Smoke Meteorological: very smokey	sunrise 40°F Wind: W Conditions: Fair Meteorological: fair, snow frozen so hard as to bear a man. 4:00 PM 52°F Wind: SSW Conditions: Fair Meteorological: snow nearly gone, fair	sunrise 49°F Wind: S Conditions: Cloudy, Rain Meteorological: cloudy, snow gone. 9 o'clock beginning to rain. 4:00 PM 51°F Wind: E Conditions: Rain Meteorological: still raining	sunrise 45°F Wind: SW Conditions: Fair Meteorological: fair Other observations: Cherry trees blossoming 4:00 PM 55°F Wind: SW Conditions: Fair Meteorological: fair	sunrise 50°F Wind: S Conditions: Cloudy Meteorological: cloudy 4:00 PM 60°F Wind: S Conditions: Muddy Meteorological: sky muddy NW Other observations: Garden peas coming up	sunrise 44°F Wind: SW Conditions: Fair Meteorological: fair surface of ground thinly frozen, tops of blue ridge covered with snow 4:00 PM 58°F Wind: W Conditions: Fair Meteorological: fair	sunrise 52°F Wind: SW Conditions: Fair Meteorological: fair 4:00 PM 58°F Wind: N Conditions: Fair Meteorological: fair	sunrise 51°F Wind: SE Conditions: Cloudy Meteorological: cloudy 4:00 PM 54°F Wind: SE Conditions: Cloudy Meteorological: somewhat cloudy	sunrise 50°F Wind: NE Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 58°F Wind: E Conditions: Cloudy Meteorological: somewhat cloudy	sunrise 47°F Wind: NE Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM -°F Wind: NE Conditions: Muddy Meteorological: sky muddy	sunrise 47°F Wind: NE Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 58°F Wind: E Conditions: Muddy Meteorological: sky muddy	sunrise 50°F Wind: S Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 54°F Wind: NE by E Conditions: Cloudy Meteorological: somewhat cloudy, windy	sunrise 46°F Wind: NE by E Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 54°F Wind: NE by E Conditions: Cloudy Meteorological: somewhat cloudy, windy
sunrise 60°F Wind: S Conditions: Cloudy Meteorological: cloudy and moist 4:00 PM 64°F Wind: SE Conditions: Cloudy Meteorological: somewhat cloudy	sunrise 62°F Wind: NE Conditions: Cloudy, Foggy Meteorological: cloudy and foggy 4:00 PM 57°F Wind: E Conditions: Rain Meteorological: very light rain Other observations: Daffadil blossoming	sunrise 43°F Wind: NE Conditions: Snow Meteorological: mixture of snow & hail driving with considerable force 4:00 PM 52°F Wind: SSW Conditions: Snow, Hail Meteorological: still snow and hail arriving from NE. Thermometer 26 in air. Other observations:	sunrise 36°F Wind: NW Conditions: Cloudy Meteorological: windy, clouds broken, snow 3.5 inches deep and very firm Other observations: Daffodil and Jonquil blossoms bit and some killed 4:00 PM 45°F Wind: NW Conditions: Fair Meteorological: fair	sunrise 40°F Wind: W Conditions: Fair Meteorological: fair, snow frozen so hard as to bear a man. 4:00 PM 52°F Wind: SSW Conditions: Fair Meteorological: snow nearly gone, fair	sunrise 49°F Wind: S Conditions: Cloudy, Rain Meteorological: cloudy, snow gone. 9 o'clock beginning to rain. 4:00 PM 51°F Wind: E Conditions: Rain Meteorological: still raining	sunrise 45°F Wind: SW Conditions: Fair Meteorological: fair Other observations: Cherry trees blossoming 4:00 PM 55°F Wind: SW Conditions: Fair Meteorological: fair	sunrise 50°F Wind: S Conditions: Cloudy Meteorological: cloudy 4:00 PM 60°F Wind: S Conditions: Muddy Meteorological: sky muddy NW Other observations: Garden peas coming up	sunrise 44°F Wind: SW Conditions: Fair Meteorological: fair surface of ground thinly frozen, tops of blue ridge covered with snow 4:00 PM 58°F Wind: W Conditions: Fair Meteorological: fair	sunrise 52°F Wind: SW Conditions: Fair Meteorological: fair 4:00 PM 58°F Wind: N Conditions: Fair Meteorological: fair	sunrise 51°F Wind: SE Conditions: Cloudy Meteorological: cloudy 4:00 PM 54°F Wind: SE Conditions: Cloudy Meteorological: somewhat cloudy	sunrise 50°F Wind: NE Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 58°F Wind: E Conditions: Cloudy Meteorological: somewhat cloudy	sunrise 47°F Wind: NE Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM -°F Wind: NE Conditions: Muddy Meteorological: sky muddy	sunrise 47°F Wind: NE Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 58°F Wind: E Conditions: Muddy Meteorological: sky muddy	sunrise 46°F Wind: NE by E Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 54°F Wind: NE by E Conditions: Cloudy Meteorological: somewhat cloudy, windy	sunrise 46°F Wind: NE by E Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 54°F Wind: NE by E Conditions: Cloudy Meteorological: somewhat cloudy, windy

Madison's Observations at Montpelier: Apr 13, 1786-May 3, 1786

Apr 13	Thu	Apr 14	Fri	Apr 15	Sat	Apr 16	Sun	Apr 17	Mon	Apr 18	Tue	Apr 19	Wed
sunrise 46°F Wind: NE Conditions: Cloudy Meteorological: somewhat cloudy and moist 4:00 PM 55°F Wind: NE Conditions: Cloudy Meteorological: somewhat cloudy	sunrise 48°F Wind: N Conditions: Fair Meteorological: temperature is 32 in open air 4:00 PM 64°F Wind: NE Conditions: Fair Meteorological: fair	sunrise 54°F Wind: NE Conditions: Smoke Meteorological: smokey 4:00 PM 66°F Wind: E Conditions: Fair Meteorological: fair	sunrise 54°F Wind: NE Conditions: Cloudy, Foggy Meteorological: cloudy and foggy after much rain 4:00 PM 60°F Wind: SE Conditions: Cloudy Meteorological: broken clouds	sunrise 58°F Wind: NE Conditions: Cloudy, Foggy Meteorological: foggy and cloudy 4:00 PM 59°F Wind: E Conditions: Cloudy Meteorological: cloudy and damp	sunrise 57°F Wind: NE Conditions: Rain Meteorological: raining 4:00 PM 62°F Wind: NE Meteorological: almost fair Other observations: Asparagus first at dinner	sunrise 58°F Wind: SW Conditions: Cloudy Meteorological: somewhat cloudy Other observations: Humming bird appears 4:00 PM 66°F Wind: N Conditions: Cloudy Meteorological: somewhat cloudy	sunrise 54°F Wind: W Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM —°F Wind: — Conditions: Fair Meteorological: fair cloudy and windy	sunrise 60°F Wind: NE Conditions: Smoke Meteorological: smokey NW 4:00 PM 60°F Wind: W Conditions: Cloudy Meteorological: somewhat cloudy and windy	sunrise 54°F Wind: W Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 65°F Wind: SE Conditions: Cloudy Meteorological: somewhat cloudy	sunrise 56°F Wind: E Conditions: Cloudy Meteorological: cloudy and damp 4:00 PM 55°F Wind: E Conditions: Cloudy Meteorological: cloudy and damp	sunrise 62°F Wind: SW Conditions: Fair Meteorological: fair Other observations: blooming 4:00 PM 73°F Wind: W Conditions: Cloudy Meteorological: somewhat cloudy	sunrise 62°F Wind: NE Conditions: Fair, Smoke Meteorological: fair, somewhat smokey 4:00 PM 72°F Wind: NE Conditions: Muddy Meteorological: sky muddy NW	sunrise 62°F Wind: E Meteorological: air thick 4:00 PM 70°F Wind: SE Conditions: Fair Meteorological: fair
Apr 20	Thu	Apr 21	Fri	Apr 22	Sat	Apr 23	Sun	Apr 24	Mon	Apr 25	Tue	Apr 26	Wed
Apr 27	Thu	Apr 28	Fri	Apr 29	Sat	Apr 30	Sun	May 1	Mon	May 2	Tue	May 3	Wed

Madison's Observations at Montpelier: May 4, 1786-May 11, 1786

May 4	May 5	May 6	May 7	May 8	May 9	May 10	Wed
<p>Thu sunrise 60°F Wind: SE Conditions: Muddy Meteorological: sky somewhat muddy 4:00 PM 70°F Wind: NE Meteorological: air thick Other observations: primrose begins to bloom. Forward peas beginning to blossom</p>	<p>Fri sunrise 60°F Wind: E Meteorological: air thick 4:00 PM 68°F Wind: NE Conditions: Muddy Meteorological: sky muddy Other observations: piones blooming</p>	<p>Sat sunrise 57°F Wind: NE Conditions: Cloudy Meteorological: somewhat cloudy 4:00 PM 66°F Wind: NE Conditions: Muddy Meteorological: sky muddy</p>	<p>Sun sunrise 60°F Wind: NE Meteorological: air thick 4:00 PM —°F Wind: — Conditions: Fair Meteorological: fair Other observations: Humming birds frequent Wood bine in blossom</p>	<p>Mon sunrise 68°F Wind: W Conditions: Muddy Meteorological: sky muddy, air thick 4:00 PM —°F Wind: — Conditions: Fair Meteorological: fair</p>	<p>Tue sunrise 62°F Wind: NE Conditions: Cloudy Meteorological: somewhat cloudy, air thick 4:00 PM 70°F Wind: E Conditions: Smoke Meteorological: smokey</p>	<p>Wed sunrise 63°F Wind: NE Conditions: Cloudy Meteorological: cloudy NW 4:00 PM 72°F Wind: E Conditions: Fair Meteorological: fair</p>	
<p>Thu sunrise 61°F Wind: SW Conditions: Cloudy, Rain, Foggy Meteorological: cloudy and foggy (12 o'clock raining) 4:00 PM 62°F Wind: SW Conditions: Cloudy Meteorological: cloudy</p>							

WHAT ARE WEATHER JOURNALS?

What types of weather conditions did Madison record?

What other information does Madison gather?

Consider why he recorded that information.

Madison's Big Ideas in Action

The Weatherman's Diary: Following Jefferson's detailed instructions, Madison's daily log included much more than just temperature. He noted wind direction, clouds, rain and snow, and even natural events like when flowers bloomed or when birds migrated. He did this with simple tools, using a thermometer and eventually a rain gauge made from a tin cup. He took measurements twice every day, and when he was away on political business, his family members kept the records going.

Science and the Constitution: Madison's most recognized achievement was shaping the U.S. Constitution, which established the new nation's system of government. Even here, his scientific thinking played a role. In his famous essays in *The Federalist Papers*, he used scientific metaphors to explain his political ideas, invoking concepts like "balance" and "equilibrium" (a state in which opposing forces or influences are balanced) to argue for a government with separated powers.

59
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70
74
73
70
62 1/2
72
72
70
70
68
66
6

22

fair
fair
smokey
fair
cloudy

blow

Woodbine in blossom

WHAT CAN WE LEARN FROM WEATHER JOURNALS?

Looking at weather conditions over a long period of time can help us to see patterns in the weather. Using the selected journal entries, graph the morning or evening temperatures for every Saturday. You will find a worksheet for this activity on the next page. Place the date along the x-axis and the temperature in the y-axis. Plot the temperature recorded for each Saturday.

Or, if you want to make a larger dataset, graph the morning or evening temperatures for every even date.

What patterns do you observe in the temperatures? Can you predict what the next temperature reading might be? Why is it important to know this?

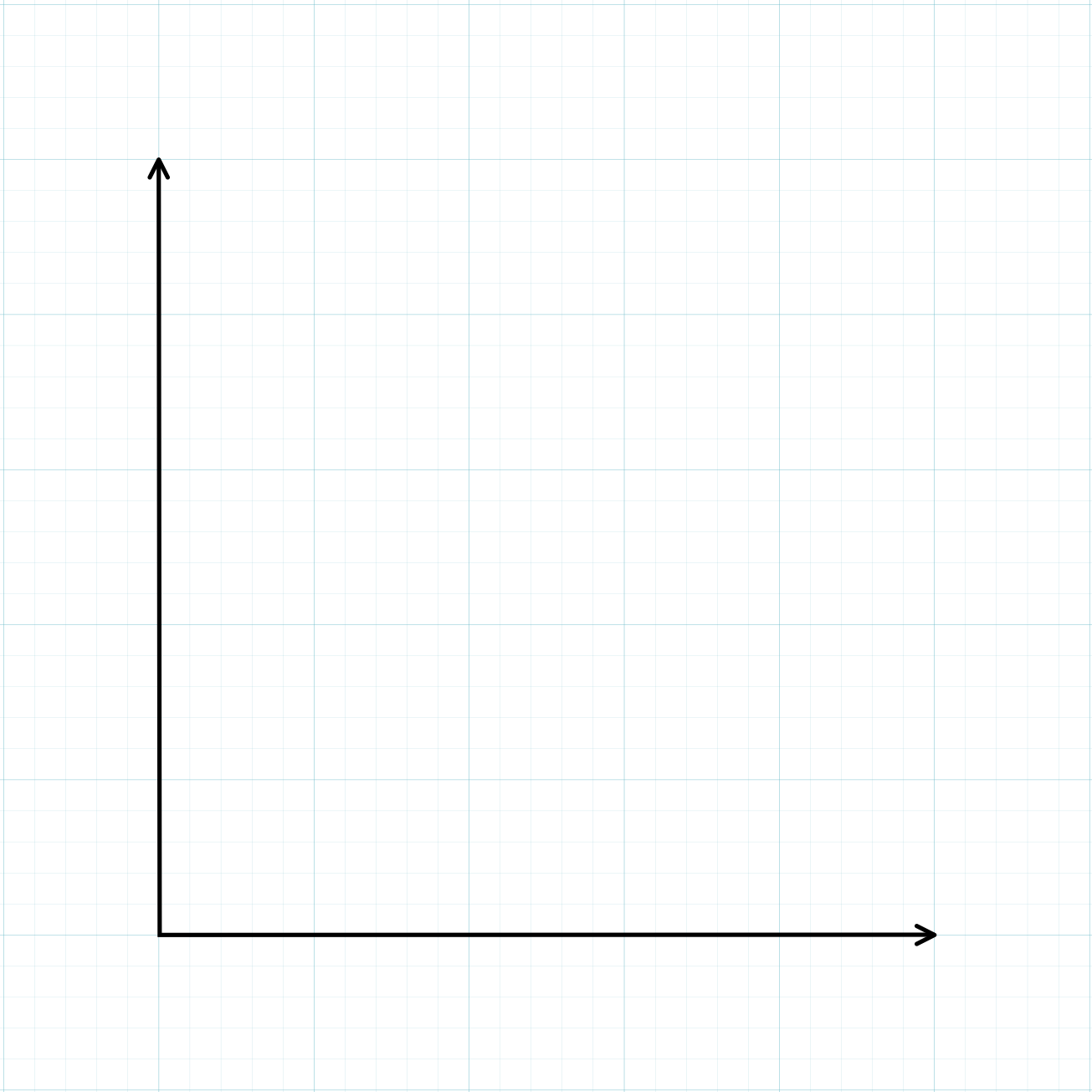
59	E	cloudy & damp
62	NE	almost fair
66	N	somewhat cloudy & windy
70	N	fair
74	N by E	fair
73	W	somewhat cloudy
70	N	fair, windy
62 1/2	N	fair
72	NE	sky muddy NW
72	NE	fair
70	SE	fair
70	NE	air thick
68	NE	sky muddy
66	NE	sky muddy
6		fair
		fair
70	E	smokey
72	E	fair
62	SW	cloudy

tulips blowing

primrose begins to blow

pionies blowing
Woodbine in blossom

Place the date along the x-axis and the temperature in the y-axis.



WHAT CAN WE LEARN FROM WEATHER JOURNALS?

Madison used the information he gathered in his weather journal to help find solutions to the weather-related challenges he experienced on his plantation, such as pest management and crop rotations.

Now watch the video “Scientific Revolutionaries: James Madison” to learn more about his weather journaling and how he applied his observations:

<https://youtu.be/A7uKkVO5Gq4>

What was happening in the world in 1784?

Madison and other American thinkers were trying to prove that their new nation was equal to those in Europe. They used science to do this, responding to Buffon’s degeneration theory—a claim by a famous French scientist that North America’s cold, damp climate produced smaller and weaker plants, animals, and even people than Europe’s did. Madison’s weather data was collected to prove this theory wrong. You can read more about this debate here: <https://www.americanscientist.org/article/jefferson-buffon-and-the-moose>

In the 1780s, the new United States faced a major infestation of the Hessian fly. This tiny insect was wiping out wheat fields, which threatened the entire country’s economy. In response, the American Philosophical Society, an organization in Philadelphia where Members shared—and still share—ideas and information, asked Madison and a growing network of observers to track the fly. They studied its connection to weather and farming conditions to find a solution. The information they gathered led to useful farming strategies like crop rotation and burning wheat stubble (leftover bits of plant and roots after harvest) to destroy the pest’s larvae.

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72
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68
66
6

E
E
S.W.
fair
fair
smokey
fair
cloudy

Woodbine in blossom

blow

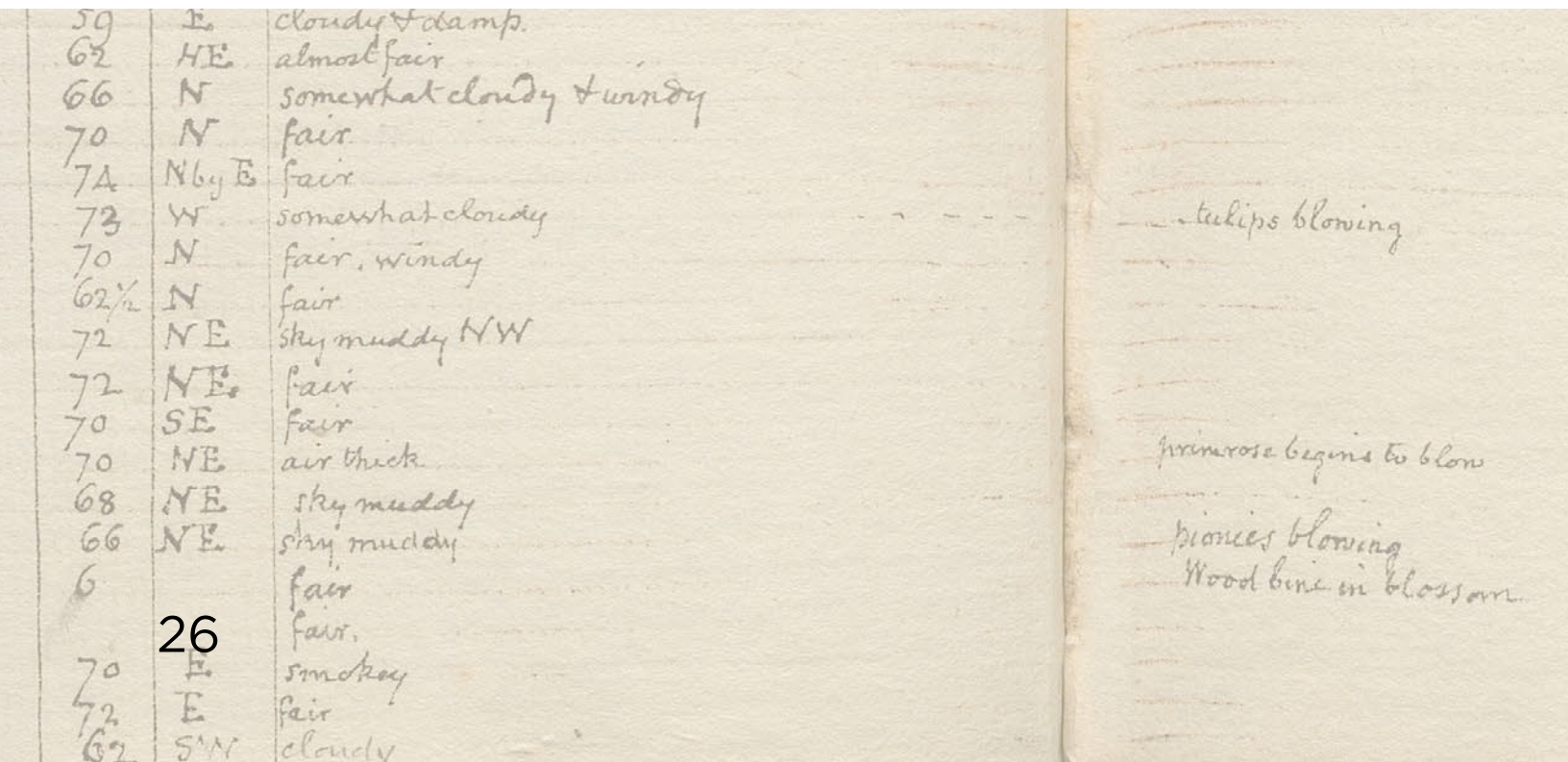
WHAT CAN YOU LEARN FROM YOUR OWN WEATHER JOURNAL?

It's your turn now to create your own weather journal. On the next page is a template you can use to record information. Print out as many copies of the template as you need. You can also make your own if you prefer.

Like Madison you should be consistent about the time, or times, of day you make observations, what observations you make (temperature), and how you observe them (thermometer).

It is also important to include anecdotal observations as Madison did.

Try to record your weather journal for at least a week, but the more days you include, the stronger your data will be.



WHAT CAN YOU LEARN FROM YOUR OWN WEATHER JOURNAL?

Look at the information you collected.

Did you observe anything unexpected?

Do you see any patterns?

How do different conditions compare? For instance, is it colder when it rains?

Create a graph on the next page for the temperatures, or other information you collected. Place the date along the x-axis and the temperature (or other weather condition) in the y-axis and plot your points.

What patterns do you see using a graph? Can you predict the weather for tomorrow?

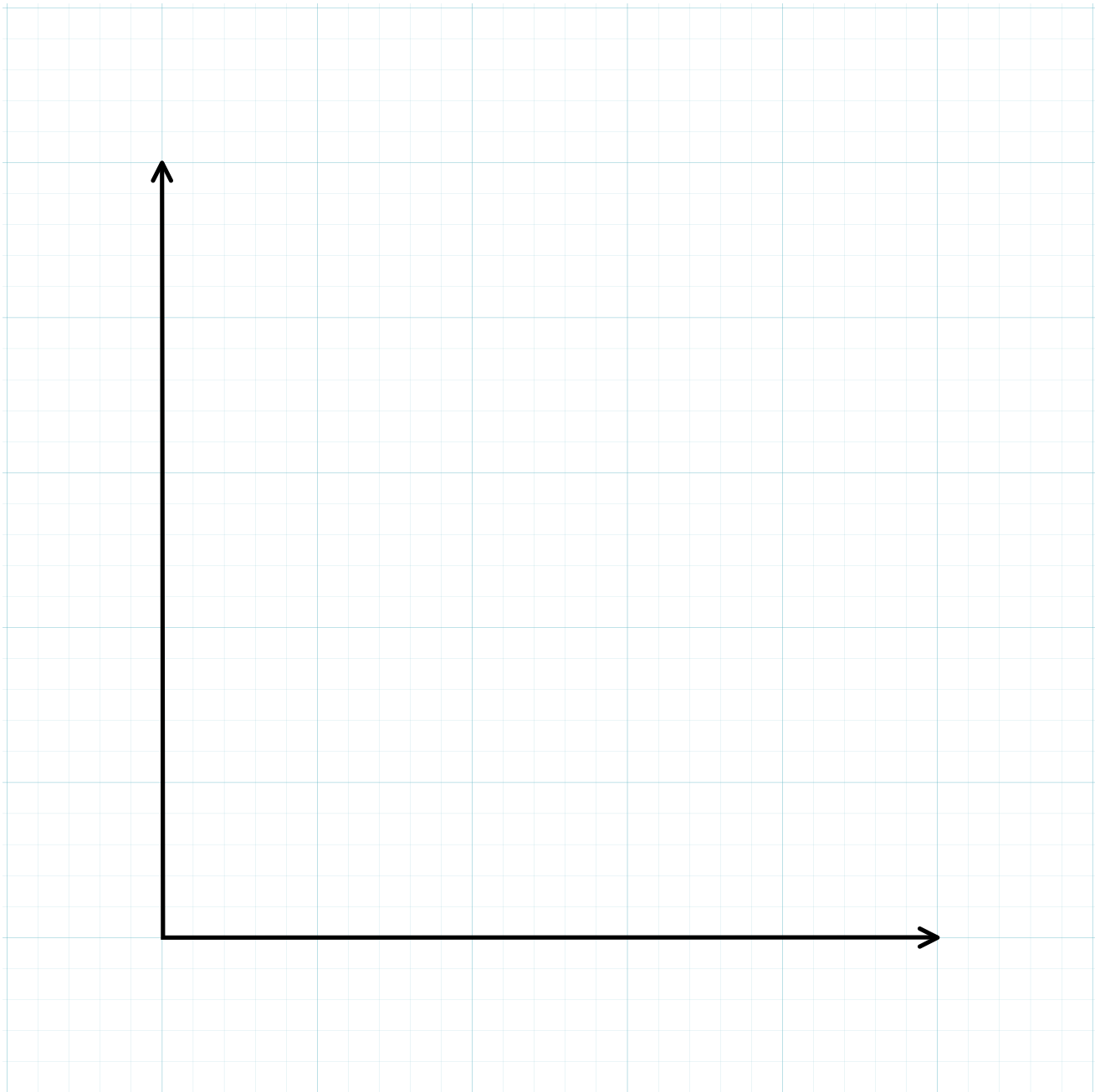
59	E	cloudy & damp
62	NE	almost fair
66	N	somewhat cloudy & windy
70	N	fair
74	N by E	fair
73	W	somewhat cloudy
70	N	fair, windy
62 1/2	N	fair
72	NE	sky muddy NW
72	NE	fair
70	SE	fair
70	NE	air thick
68	NE	sky muddy
66	NE	sky muddy
6		fair
28		fair
70	E	smokey
72	E	fair
62	SW	cloudy

tulips blowing

primrose begins to blow

pionies blowing
Woodbine in blossom

Place the date along the x-axis and the temperature
(or other weather condition) in the y-axis.



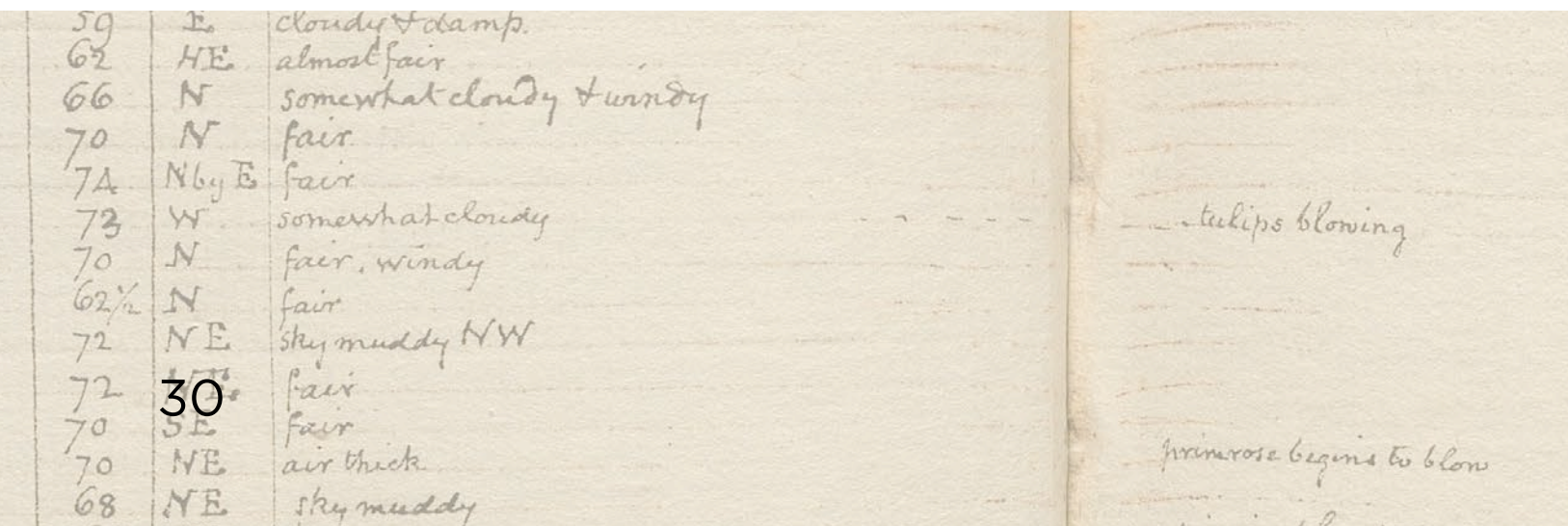
SUMMATIVE ACTIVITY AND DISCUSSION: WEATHER PALS

Now, invite someone you know (friend, relative, neighbor) to be your weather pal and start a weather journal with you at the same time.

- They should live or go to school in a different location (another state, town, side of the street).
- Both of you should agree on the time, or times, of day you make observations, about what observations you make (temperature), and with what tools (thermometer).
- It is important that both of you are consistent about recording your observations.
- Try to record your weather journals for at least a week, but the more days you include, the stronger your data will be.

After a week or more, compare your weather observations with your weather pal.

Were the weather conditions similar or different in these two locations? What was the same? What was different? Reflect on why there might be differences. What might be affecting the weather conditions across the street or in the next town?



EXTENSION ACTIVITY

Identify a local environmental challenge and collect data in your weather journal related to that challenge. For example, if your town has experienced drought conditions before, collect information about rainfall and observations about the impact on plant life.

Continue your weather journal over the course of at least one month to create a fuller dataset to make observations around this challenge.

TAKING INFORMED ACTION

Weather data is important to help us identify patterns and changes in our environment. Consider how your observations might help inform decisions in your community. Continue your data collection over a longer period of time. Share your findings and interpretation with decision makers in your community. Your advocacy could impact the climate and environment in your community.

59		
62		
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70		
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73		
70		
62		
72		
72	NE	fair
70	SE	fair
70	NE	air thick
68	NE	sky muddy
66	NE	sky muddy
6		fair
		fair
70	E	smokey
72	E	fair
62	SW	cloudy

primrose begins to bloom
pionies blowing
Woodbine in blossom

AMERICAN PHILOSOPHICAL SOCIETY

About the Center for the History of Science

The Center for the History of Science encourages greater engagement with the extensive holdings on this topic housed at the American Philosophical Society's Library & Museum. The Society has promoted research across the sciences since its founding in 1743, an objective that in turn shaped the scope of its collections. Many of the APS's earliest Members engaged in the pursuit of "natural philosophy" – what might now be considered scientific or technological inquiry. Throughout the 19th, 20th, and into the 21st centuries, the Society supported the development of new scientific theories and discoveries in topics as diverse as geology, paleontology, astronomy, medicine, evolutionary biology, genetics, physics, mathematics, and computing. The Society continues to collect broadly in these and other areas; today, the history of science collections represent well over half of the materials held at the Library & Museum.

"America's Scientific Revolutionaries"

Inspired by the 250th anniversary of the Declaration of Independence, "America's Scientific Revolutionaries" is a two-year initiative exploring the contributions of lesser-known scientists and physicians active during the Age of Revolutions. The project is generously supported by the Richard Lounsbery Foundation, and consists of public programs, educational resources, podcasts, and written profiles intended to enrich public understanding of the historical significance of scientific ideas in the formation of the United States. To learn more, please visit <https://www.amphilsoc.org/americas-scientific-revolutionaries>.

RICHARD LOUNSBERY FOUNDATION
EST. 1959