Take some time to explore the images at the back of the room.

Choose an image that appeals to you.

Be prepared to share why you chose that image.
Using Primary Sources as Anchoring Phenomena

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Parking Lot: https://padlet.com/breilly39/NSTA18
Today’s Agenda

• Welcome & Introductions
• What are Historical Primary Sources?
• How can we Use Primary Sources as Phenomena?
• Connections to NOS, SEPs, CCCs
• Where can you find Primary Sources?
Primary Sources

• A primary source is a document, picture, video, or physical object that was created at the time under study.

• Examining primary sources gives students a powerful sense of the complexity of the past, engages them in critical thinking skills, supports the process of scientific argumentation, and emphasizes the nature of science.
Secondary Sources

- Secondary Sources are accounts or interpretations of events created by someone without first hand experience.
This is a painting created in 1911 by Charles E. Mills. It depicts Benjamin Franklin flying a kite from a window to experiment with Electricity *Is this a primary or secondary source?*
What are the benefits of student analysis of primary sources in Science?

- Raises curiosity
- Unpacks prior knowledge
- Allows students to draw their own conclusions
- Explores past vs. present
- Gives a broader context
- All learners can participate
- Makes ideas/past less abstract
Why Use Primary Sources?

Engage Students

• Primary sources help students relate in a personal way to events of the past and promote a deeper understanding of history as a series of human events.

• Because primary source are snippets of history, they encourage students to seek additional evidence through research.

• First-person accounts of events helps make them more real, fostering active reading and response.

http://www.loc.gov/teachers/usingprimarysources/whyuse.html
Why Use Primary Sources?

Develop Critical Thinking Skills

• Primary sources require students to be both critical and analytical as they read and examine documents and objects.

• Primary sources are often incomplete and have little context. Students must use prior knowledge and work with multiple primary sources to find patterns.

• In analyzing primary sources, students move from concrete observations and facts to questioning and making inferences about the materials.

• Questions of creator bias, purpose, and point of view may challenge students’ assumptions. [http://www.loc.gov/teachers/usingprimarysources/whyuse.html](http://www.loc.gov/teachers/usingprimarysources/whyuse.html)
Why Use Primary Sources?

Construct Knowledge

• Inquiry into primary sources encourages students to wrestle with contradictions and compare multiple sources that represent differing points of view, confronting the complexity of the past.

• Students construct knowledge as they form reasoned conclusions, base their conclusions on evidence, and connect primary sources to the context in which they were created, synthesizing information from multiple sources.

• Integrating what they glean from comparing primary sources with what they already know, and what they learn from research, allows students to construct content knowledge and deepen understanding.

http://www.loc.gov/teachers/usingprimarysources/whyuse.html
Copyright and Fair Use

• Copyright refers to the creator’s exclusive right to reproduce, distribute copies, and publicly display their works.

http://www.loc.gov/teachers/usingprimarysources/copyright.html
Copyright and Fair Use

• *Fair Use* is the exception to the exclusive protection of copyright under US Law.

To determine whether a specific use under one of these categories is "fair," courts are required to consider the following factors:

1. the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
2. the nature of the copyrighted work;
3. the amount and substantiality of the portion used in relation to the copyrighted work as a whole (is it long or short in length, that is, are you copying the entire work, as you might with an image, or just part as you might with a long novel); and
4. the effect of the use upon the potential market for or value of the copyrighted work.

http://www.loc.gov/teachers/usingprimarysources/copyright.html
Copyright and Fair Use

• Generally speaking, using a source for educational purposes is *fair use*. If in doubt, provide students with a link instead of distributing or displaying an image.

• For more information visit:

  http://www.loc.gov/teachers/usingprimarysources/copyright.html
Promoting Inquiry with Primary Sources
# Strategies for Analyzing Primary Sources

## Primary Source Analysis Tool

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<th>Observe</th>
<th>Reflect</th>
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## Further Investigation

**PDF:** [https://drive.google.com/a/ewrsd.k12.nj.us/file/d/0B09eirXZStGPWTcxbk40dklVUDg/view?usp=sharing](https://drive.google.com/a/ewrsd.k12.nj.us/file/d/0B09eirXZStGPWTcxbk40dklVUDg/view?usp=sharing)

**Online Analysis Tool:** [http://www.loc.gov/teachers/primary-source-analysis-tool/](http://www.loc.gov/teachers/primary-source-analysis-tool/)

**Online Teacher Guides:** [http://www.loc.gov/teachers/usingprimarysources/guides.html](http://www.loc.gov/teachers/usingprimarysources/guides.html)
Strategies for Analyzing Primary Sources

**Primary Source Analysis Tool**

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<th>Observe</th>
<th>Reflect</th>
<th>Question</th>
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<tbody>
<tr>
<td>What do you see or read in the source?</td>
<td>What do you think that means?</td>
<td>What else do you want to know?</td>
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**Further Investigation**

What might you choose to explore after this?

PDF: [https://drive.google.com/a/ewrsd.k12.nj.us/file/d/0B09eirXZStGPWTcxbk40dkIVUDg/view?usp=sharing](https://drive.google.com/a/ewrsd.k12.nj.us/file/d/0B09eirXZStGPWTcxbk40dkIVUDg/view?usp=sharing)


Online Teacher Guides: [http://www.loc.gov/teachers/usingprimarysources/guides.html](http://www.loc.gov/teachers/usingprimarysources/guides.html)
In relation to NGSS

“…vision for education in the sciences and engineering in which students, over multiple years of school, actively engage in the scientific and engineering practices, and apply crosscutting concepts to deepen their understanding of the core ideas in these fields”

“The learning experiences should engage them with fundamental questions about the world and with how scientists have investigated and found answers to those questions.”

*A Framework for K-12 Science Education, pgs. 8-9*
The Science and Engineering Practices

1. Asking Questions and Defining Problems
2. Developing and Using Models
3. Planning and Carrying Out Investigations
4. Analyzing and Interpreting Data
5. Using Mathematics and Computational Thinking
6. Constructing Explanations and Designing Solutions
7. Engaging in Argument from Evidence
8. Obtaining, Evaluating, and Communicating Information

Link to NSTA Matrix of SEP Grade Band Progression:
The Cross Cutting Concepts

1. Patterns
2. Cause and Effect: Mechanism and Prediction
3. Scale, Proportion, and Quantity
4. Systems and System Models
6. Structure and Function
7. Stability and Change

Supporting SEPs and CCCs with Primary Sources
Supporting SEPs and CCCs with Primary Sources
Asking explicit questions: CCCs

Systems and System Models

• What are the parts of this item? (K-2)
• How do you think the parts of this system work together? (3-5)
• What systems are working together in this image? (6-8)
• What specific task was this system designed to do? (9-12)
How can we use Primary Sources as Phenomena?
What is a phenomenon?

● “Observable events that occur in the universe that we can use our science knowledge to explain or predict”

● Within NGSS, the “Goal of building science knowledge is to develop general ideas, based on evidence, that can explain and predict phenomena”
What is a phenomenon?

- “Observable events that occur in the universe that we can use our science knowledge to explain or predict”

- Within NGSS, the “Goal of building science knowledge is to develop general ideas, based on evidence, that can explain and predict phenomena”
So, what’s the deal?

Primary sources are **NOT** directly observable natural events

**BUT**

They help us natural phenomena that may not be observable otherwise
Let’s Try!
Jigsaw of Primary Sources

- 5 minutes of independent time to analyze your primary source
- Group together - Share your primary source: what did you notice and wonder?
  - On the back of your papers, record any NEW wonderings/ questions that are arising as you examine the primary sources in conjunction with the others
Driving Question Board:

Has the movement of bodies in the solar system changed over time?
Anchoring Phenomenon

Using primary sources to drive the investigation of the development of Geocentric and Heliocentric models in astronomy.
ESS1.A: The Universe and Its Stars

- Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1)
- Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2)

ESS1.B: Earth and the Solar System

- The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. (MS-ESS1-2), (MS-ESS1-3)
- This model of the solar system can explain eclipses of the sun and the moon. Earth’s spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS-ESS1-1)
- The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)
Supporting the **Nature of Science** with Primary Sources

Through the CCCs and SEPs, the NGSS support the understanding of the Nature of Science ([Appendix H, NOS Matrix of Progressions](https://example.com)). Students should understand that:

- Scientific Investigations use a variety of models
- Scientific knowledge is based on empirical evidence
- Scientific Knowledge is open to revision in light of new evidence
- Science models, laws, mechanisms and theories explain natural phenomena
- Science is a way of knowing
- Scientific knowledge assumes an order of consistency in natural systems
- Science is a human endeavor
- Science addresses questions about the natural and material world
<table>
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| **Scientific Investigations Use a Variety of Methods** | - Science investigations use a variety of methods and tools to make measurements and observations.  
- Science investigations are guided by a set of values to ensure accuracy of measurements, observations, and objectivity of findings.  
- Science depends on evaluating proposed explanations.  
- Scientific values function as criteria in distinguishing between science and non-science. |
| **Scientific Knowledge is Based on Empirical Evidence** | - Science knowledge is based upon logical and conceptual connections between evidence and explanations.  
- Science disciplines share common rules of obtaining and evaluating empirical evidence. |
| **Scientific Knowledge is Open to Revision in Light of New Evidence** | - Scientific explanations are subject to revision and improvement in light of new evidence.  
- The certainty and durability of science findings varies.  
- Science findings are frequently revised and/or reinterpreted based on new evidence. |
| **Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena** | - Theories are explanations for observable phenomena.  
- Science theories are based on a body of evidence developed over time.  
- Laws are regularities or mathematical descriptions of natural phenomena.  
- A hypothesis is used by scientists as an idea that may contribute important new knowledge for the evaluation of a scientific theory.  
- The term “theory” as used in science is very different from the common use outside of science. |
| **Science is a Way of Knowing**                      | - Science is both a body of knowledge and the processes and practices used to add to that body of knowledge.  
- Science knowledge is cumulative and many people, from many generations and nations, have contributed to science knowledge.  
- Science is a way of knowing used by many people, not just scientists. |
| **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** | - Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation.  
- Science carefully considers and evaluates anomalies in data and evidence. |
| **Science is a Human Endeavor**                      | - Men and women from different social, cultural, and ethnic backgrounds work as scientists and engineers.  
- Scientists and engineers rely on human qualities such as persistence, precision, reasoning, logic, imagination and creativity.  
- Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism and openness to new ideas.  
- Advances in technology influence the progress of science and science has influenced advances in technology. |
| **Science Addresses Questions About the Natural and Material World.** | - Scientific knowledge is constrained by human capacity, technology, and materials.  
- Science limits its explanations to systems that lend themselves to observation and empirical evidence.  
- Science knowledge can describe consequences of actions but is not responsible for society’s decisions. |
Supporting the Nature of Science with Primary Sources

Using primary sources to explore how a scientific idea has changed throughout time, and the interaction of science and society, helps students understand the nature of science

- Changing models of the Solar System
- Methods of Weather Forecasting
- Technology of the Industrial Revolution
- Wright Brothers: Evolution of Flight
- Electricity as a Scientific and Social Process
- Science and Invention PS Sets
Where to find Primary sources
Where to find Primary Sources

Students can reflect on how their work in a science class is a primary source, and use the same tools and strategies to reflect on their work.
Links

LOC Primary sources homepage

LOC Primary source sets

National Archives Primary sources