

DAY 11: A Burning Question



MINI-LESSON

Teacher introduces the “Organizing a Reference List” anchor chart and the Reference List Graphic Organizer.

SCIENCE INQUIRY CIRCLES

Teams work to complete a Reference List Graphic Organizer.



GUIDED SCIENCE INVESTIGATIONS

Teams use information from newsclips to compare incineration to other methods of waste disposal.



ABBREVIATED STANDARDS

- ELA and Reading TEKS: 5.13(G)
- CCSS: W.5.8
- NGSS: 5-LS2.B
- TEKS: 5.1(A)(D)(E), 5.3(B), 5.5(E)(G), 5.11, 5.12((A)(B)(C)

Day 11: A Burning Question

Literacy Strategy: Organizing a reference list

Science Concept: Incineration reduces the amount of waste that goes to landfills, but nutrients from wasted food are lost and there is negative health and environmental impact.

Science and Literacy Connection: Scientists support their claims with evidence both from their investigations and their research.

Mini-Lesson (15 minutes)

OVERVIEW

When scientists share their work, they always include a reference list. A reference list gives credibility to the work of scientists because it shows that they have read the work of other scientists. Scientists use a reference list to show readers that their claim can be validated by investigations made by other scientists and authors.

Looking at an author's reference list is one way to evaluate the claim the author is making. Each source on a reference list includes specific pieces of information, such as the author, title, publisher, and publication date of a source. This is because other scientists should be able to use a reference list to find and read any of the sources listed.

NOTE: You are encouraged to create the "Organizing a Reference List" anchor chart with your learners as you move through the lesson, using the provided anchor chart as a model. Post it for easy reference when completed and remind learners to refer to the anchor charts during inquiry circles.

MATERIALS

Teacher needs:

- chart paper
- marker(s)
- Reference List Graphic Organizer
- "Organizing a Reference List" anchor chart as a model
- informational text about food waste to model the strategy (see the "Food Waste Resources" spreadsheet for ideas)

PROCEDURE

The *italicized statements* below offer suggested wording the teacher may choose to use in the lesson.

Tell what the strategy is (declarative knowledge)

1. *Today we will learn how to organize a reference list. A reference list is a record of all the sources (books, eBooks, websites, and videos) a scientist uses throughout an investigation. You can think of a reference list as a map that you can use to retrace the steps of your investigation. Anyone who wants to know more about your work can retrace your steps too.*

Tell when and why to use the strategy (conditional knowledge)

1. *I use a reference list whenever I want to share my work with others. I always include the author, title, publisher, and publication year for each source on my reference list because this specific information helps readers look up my sources for their own research. Listing my references gives my work credibility—it shows that I have read the work of other scientists and that I have evidence to support my claims.*

Tell how to use the strategy (procedural knowledge)

1. *First, I look at the “Sources” column on my Inquiry Chart to find all the sources I have used during my inquiry investigation.*
2. *Then I determine if each source is a book, eBook, website, web article, or video—this tells me where I will record each source on my Reference List Graphic Organizer and what information I need to include.*
3. *I take note of any important information I already wrote down about my sources and add this to my Reference List Graphic Organizer. Important information includes the name of the author; the title of the book, eBook, website, web article, or video; the publisher of the source; and the year the source was published. For online sources, I also include the URL (the link to the source).*
4. *I go back to each source and look for any important information I haven’t recorded yet. This information can be tricky to find.*
 - *For a book, the author and title are usually on the cover. The publisher and year are usually in the first few pages or on the back cover. I might need to look through the fine print on these pages. The same is true for an eBook.*
 - *For a website or web article, the title, author, publisher, and date are usually at the top of the webpage, but sometimes it is helpful to scroll to the very bottom of the page to look for additional information.*
 - *For a video, important information, such as the video’s title, the name of the person (or entity) who posted it, and the year (or how many years ago) it was posted is usually right below the video.*
 - *For online sources (websites and videos), the author is sometimes an organization rather than a person. If you can’t find a person’s name, look for an organization. Such as “Clark Green Schools” or “Scholastic News.” This might be found in the URL.*

Finally, I record “no author,” “no date,” or “no publisher” if a piece of information isn’t available.

Science Inquiry Circles (30 minutes)

OVERVIEW

Today, teams work together to complete the Reference List Graphic Organizer. You may need to make adjustments for teams who are still working on their synthesis statements.

MATERIALS

Each team needs:

- team Inquiry Chart
- access to informational texts/media previously used
- copy of the Reference List Graphic Organizer (print or digital copies; a digital copy, e.g., on Google Docs, that can be shared by the team might make it easier for learners to collect the URLs for digital sources)

PROCEDURE

The *italicized statements* below offer suggested wording the teacher may choose to use in the lesson.

Before Inquiry Circles (5 minutes)

1. *It is time to get into our inquiry circle teams. You will be with the same inquiry team as yesterday.*
2. *Today we will organize our reference lists, so we need to be sure we have completed the Inquiry Chart and our synthesis statements. (Make adjustments for teams that have not yet finished.)*
3. *Now, inquiry teams will work together on their reference lists.*

During Inquiry Circles (20 minutes)

1. *Your will work together as a team to complete the Reference List Graphic Organizer that includes all the resources you used for your inquiry.*
2. *You can look at each source one at a time together or divide up the work, but be sure to include every source (books, eBooks, websites, and videos) your team used.*
3. *If your team and another team used the same source, you might help each other find the reference information for that source.*
4. *My role is to help guide the inquiry circles, but I expect you to work as a team to solve your problems together. (While teams are working together, walk around the room to facilitate as needed.)*

After Inquiry Circles (10 minutes)

1. *The Lab Directors will lead the discussion about today's results. What did the team learn about organizing a reference list? Which reading strategy did the team use, and how did it help? What problems did the team encounter? How did the team resolve those problems?*
2. *As we conclude our inquiry circles for today, the Data Scientist from each team will have a chance to share what they accomplished and any reading strategies they used.*
3. After you have allowed the teams to gather their thoughts, have the Data Scientists share with the class.

Guided Science Investigation (30–45 minutes)

OVERVIEW

Learners use information from newsclips to compare incineration to other methods of waste disposal.

GUIDING QUESTIONS

Is incineration of solid waste a better option than sending it to a landfill? How does incineration compare to landfills and composting? What happens to matter and energy during incineration?

BACKGROUND INFORMATION FOR THE TEACHER

Incineration is the burning of solid waste. It is, however, one of the least-preferred methods of waste disposal because valuable nutrients from organic waste are not recoverable.

In the past, burning garbage may have been the only way to eliminate waste especially in rural areas. But today the need for burning household trash on personal property has been minimized by large scale waste collection and disposal. That said, backyard burning of household trash is still common in many areas, despite restrictions and prohibitions put in place by many local, state, and tribal governments.

The issue is that backyard burning is a health hazard both to humans and the environment because it produces harmful quantities of a group of highly toxic chemicals called dioxins. Dioxins can settle on crops and in our waterways and can eventually wind up in our food, affecting our health. And there is also the danger of unintentional fire spread, yet many people continue the practice.

Burning solid waste in large-scale incinerating facilities can reduce the amount of waste going into landfills, but since the waste is not sorted materials that could have been recycled are also burned. As a result, incinerators can be more toxic than landfills because the combustion creates toxic chemicals and metals that can contaminate the air and leach into groundwater.

New technologies have helped to improve the efficiency and safety of incinerating waste, including the use of scrubbers to remove contaminant particles from flue gas and the creation of waste-to-energy facilities that recover energy from the waste burning process to generate electricity. The waste to energy process also reduces carbon emissions by offsetting the need for energy from fossil sources and helps to reduce methane generation from landfills.

DAILY OBSERVATIONS

Teams will make daily observations of their bottles and record information in their Investigation Journals. Observations can be made at any time of the day.

SAFETY

- Remind learners not to shake the bottles during observations or move them in a way that disturbs the layering.

MATERIALS

Each team member needs:

- Investigation Journal
- pencil
- colored pencils or crayons

Each team needs:

- 1 bag of newsclips
- Managing Waste Chart

Teacher needs:

- “Newsclips” pages
- “Backyard Burn” image
- resealable plastic bags

SETUP

- Make copies of the “Newsclips” pages (1 set of pages per team) and place in resealable bags. (Optional: the clippings can be cut out for individual use.)
- Prepare to project “Backyard Burn” image.

PROCEDURE

The *italicized statements* below offer suggested wording the teacher may choose to use in the lesson.

Engage

1. Project the “Backyard Burn” image. *What do you see? What do you think is in this pile of burning garbage?* Accept responses.
2. *Do you think it’s a good idea to burn garbage? Why or why not?*
3. Tell the class that today, they will explore another means of waste disposal: incineration, the burning of waste materials.

Explore

1. Instruct the Equipment Directors to collect one bag of newsclips for their team.
2. Explain that they are to read the newsclips and then engage in a discussion, led by the team’s Lead Scientist, about what the team has learned. The team can decide the best way to read all the newsclips, either individually or as a group.
3. After their discussion, they will add new information about incineration to the team’s “Managing Waste” chart.
4. Let them know they have 10–12 minutes to complete this. As they work, circulate among the teams, listening to their thinking and offering clarification, if needed.

Explain

1. When work is complete, ask the Data Scientist from each team to report on one new fact the team learned about the incineration of waste.

Elaborate/Evaluate

1. After teams have shared, have them consider the information on their “Managing Waste” chart and create an argument for which of these waste disposal methods is most effective, and why.
2. Explain that a scientific argument uses evidence to make a case for whether an idea or claim is accurate or inaccurate. Emphasize that they must use evidence from their chart to support their argument.
3. Let them know they have 5-10 minutes to create their argument and should be prepared to present their arguments in the next class.

Science Language

- **Incineration** is the burning of waste materials.
- A **scientific argument** uses evidence to make a case for whether an idea or claim is accurate or inaccurate.

Expanded Standards

English Language Arts and Reading TEKS

5.13(G) develop a bibliography.

CCSS

W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

NGSS

LS2.B Matter cycles between the air, water, and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water from the environment, and release waste matter (gas, liquid, or solid) back into the environment.

Science TEKS

5.1(A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations; **(D)** use tools, including calculators, microscopes, hand lenses, metric rulers, Celsius thermometers, prisms, concave and convex lenses, laser pointers, mirrors, digital scales, balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, notebooks, timing devices, materials for building circuits, materials to support observations of habitats or organisms such as terrariums and aquariums, and materials to support digital data collection such as computers, tablets, and cameras to observe, measure, test, and analyze information; **(E)** collect observations and measurements as evidence; **5.3(B)** communicate explanations and solutions individually and collaboratively in a variety of settings and formats; **5.5(E)** investigate how energy flows and matter cycles through systems and how matter is conserved; **(G)** explain how factors or conditions impact stability and change in objects, organisms, and systems; **5.11** The student understands how natural resources are important and can be managed. The student is expected to design and explain solutions such as conservation, recycling, or proper disposal to minimize environmental impact of the use of natural resources. **5.12(A)** observe and describe how a variety of organisms survive by interacting with biotic and abiotic factors in a healthy ecosystem; **(B)** predict how changes in the ecosystem affect the cycling of matter and flow of energy in a food web; **(C)** describe a healthy ecosystem and how human activities can be beneficial or harmful to an ecosystem.