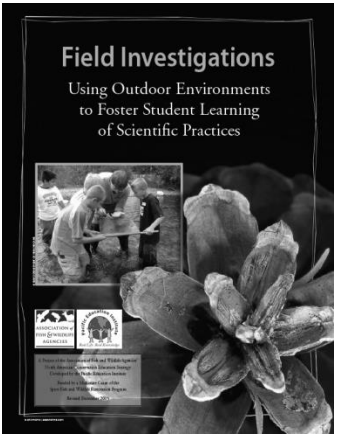
PACIFIC EDUCATION INSTITUTE

Field Investigation Journal



Name_____

A focus on practices (in the plural) avoids the mistaken impression that there is one distinctive approach common to all science—a single "scientific method."-NGSS Framework

Science and Engineering Practices-NGSS

1. Asking questions (S) and defining problems (E)
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 (S) and designing solutions (E)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Engage

1. **Is the temperature outside in the schoolyard the same in every place?**

2. **Think about a hot sunny day and you are wearing a black T-shirt. How did you feel?**

Draw and Label the Local Ecosystem

Ecosystem Questions

- What are the parts of the local ecosystem?
- What role/function do the plants in the ecosystem play?
- Identify one transfer or transformation of energy in the ecosystem.
- What are some inputs and outputs to the local ecosystem?
- What is the energy source that runs the local system?
- Name 2 subsystems within the local ecosystem.
- What might happen if the _____ died in this local ecosystem?
- Is the local ecosystem an open or closed system? Why?
- Describe interactions between plants and animals in the ecosystem. Between living and non-living components

Comparative Field Investigation Format

Question

What is my question?

Prediction or Hypothesis

What do I think will happen?

Why?

Materials

What are the materials I need?

Procedure

What am I going to do?

What am I comparing?
(manipulated, independent variable)

What data am I collecting?
(responding, dependent variable)

What am I keeping the same?
Method for collecting data
(controlled variables)

Data Collection

What am I observing/measuring?

How will I record information?

Analysis and Interpretation

What are the averages: means, medians, or modes of the data?

How can I share data in graphs, tables, or on maps?
What trends do I see in the data?

Argument/Explanation

What is the place, date, and time of my investigation?

Claim: What is the answer to my question?

Evidence: What is my data that supports the claim?
Reasoning: Why does my evidence support my claim?

Discussion

How is this information important to understand the system?
Other questions I have.

Explore

Temperature Investigation

Comparative Question:

Which surface _____ or

_____has the highest temperature °C?

Prediction/Hypothesis: _____

_____

Data Collection:

Date: _____ Time: _____

Study Site (Location): _____

Study Site Description: _____

_____

Weather: _____

_____

Surface vs. Temperature °C											
Surface Type	Temperature °C										
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10	**Ave Surface Temp °C**

Explain

Temperature Data Graph

Analyzing and Interpreting Data

Once collected, data must be presented in a form that can reveal any ***patterns and relationships*** *and that allows results to be communicated to others.* -Next Generation Framework

Choose a table, graph, number line, or map from page 41 FI guide that presents temperature data. Identify an advantage and disadvantage of that way of sharing data?

Advantage

Disadvantage

Claim, Evidence, Reasoning Rubric

Important Attributes for Argument/Explanation

Note: Not all attributes will be in every explanation

.

Claim:

- Limits claim to place, date, and time of study-unique to field studies
- Directly and clearly responds to the question.

Evidence:

Appropriate:

- Measurements and/or observations are relevant to the claim
- Averages and/or totals of what was measured/observed are given

Sufficient:

- Enough data is given to share the trends of data without giving all the data
- Enough data is given to share the range of data from different conditions, organisms, locations, or times

Reasoning

Stands-out: Does not repeat claim or evidence.

Link:

- Describes why there is enough evidence to support the claim.
- Describes how the investigation method with controlled variables and/or multiple trials helps validate the data

Science Concept:

- A science concept is given that connects the evidence (results) with the claim
- The science concept is clear
- The science concept is accurate

Argument/Explanation

- Limit claim to place, date, and time of investigation
- Claim statement clearly answers the investigation question
- Provide supporting data-evidence
- Share why the data supports the claim

Claim
Evidence
Reasoning

Elaborate

Discussion Questions p 32

How does the temperature investigation help me understand the local ecosystem?

1. What are possible reasons the temperature was or was not different for the different surfaces?
2. What is the effect of plants on surface temperature?
3. What are inputs that affect temperatures in a local ecosystem?
4. How do various types of land surfaces affect the temperature of an area?
5. How might this information inform actions/decisions on campus or in their community?
6. How do human caused changes in the biosphere effect changes in the atmosphere (air temperatures)?
7. Describe the energy transfer/transformations from the sun to the thermometer.

Disciplinary Core Ideas:

- 4-ESS2-1-Biogeology -Living Things can affect the physical characteristics of their regions.
- 5-ESS2-1 Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.
- MS-ESS3-3- Human Impacts on Earth Systems-Human activities have altered the biosphere, sometimes damaging it although changes to environments can have different impacts for differently living things
- MS-ESS2-2-The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future.

How might you address these Disciplinary Core Ideas in this investigation?

Cross Cutting Concepts- Next Generation Science Standards

1. **Patterns.** Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.
2. **Cause and effect: Mechanism and explanation**. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.
3. **Scale, proportion, and quantity**. In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance
4. **Systems and system models**. Defining the system under study-specifying its boundaries and making explicit a model of that system-provides tools for understanding and testing ideas that are applicable throughout science and engineering.
5. **Energy and matter: Flows, cycles, and conservation.** Tracking fluxes of energy and matter into, out of, and within systems helps one understand the system's possibilities and limitations.
6. **Structure and function.** The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.
7. **Stability and change.** For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

What Cross Cutting Concepts did I practice in this lesson?

Talk Moves

Answer the Question: *Which surface* _____ *or* _____ *has the highest temperature?*

1. Today, , we compared the temperature of _____surface to the temperature of_____ surface and we found _____

2. I agree/disagree with your claim that_____ and the evidence is that _____ (give median or mode data)

3. One reason the surface temperatures were _____ is probably because_____. What do you think #4?

4. I agree/disagree with that reason and think another reason for _____ might be_____