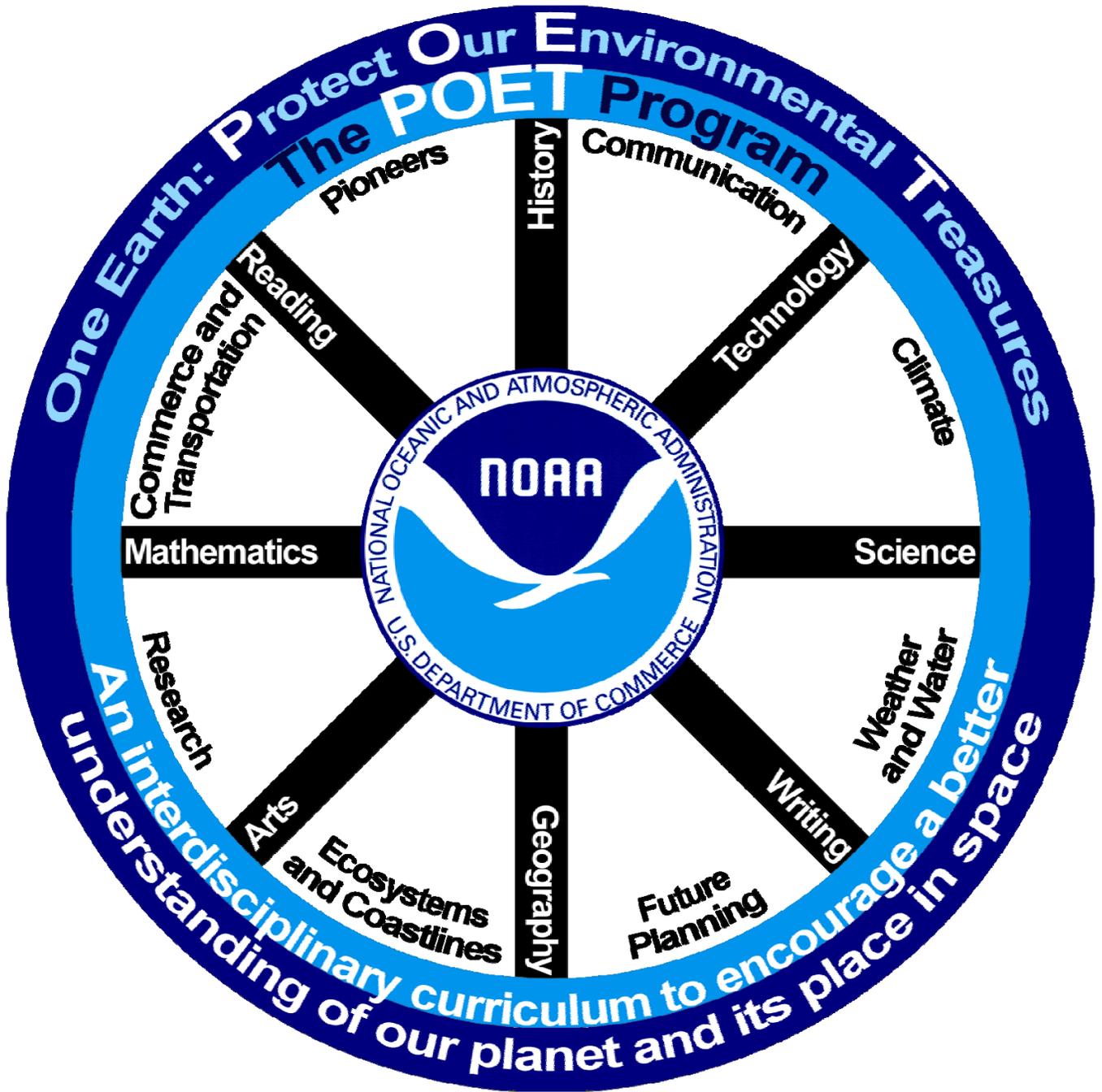


# POET

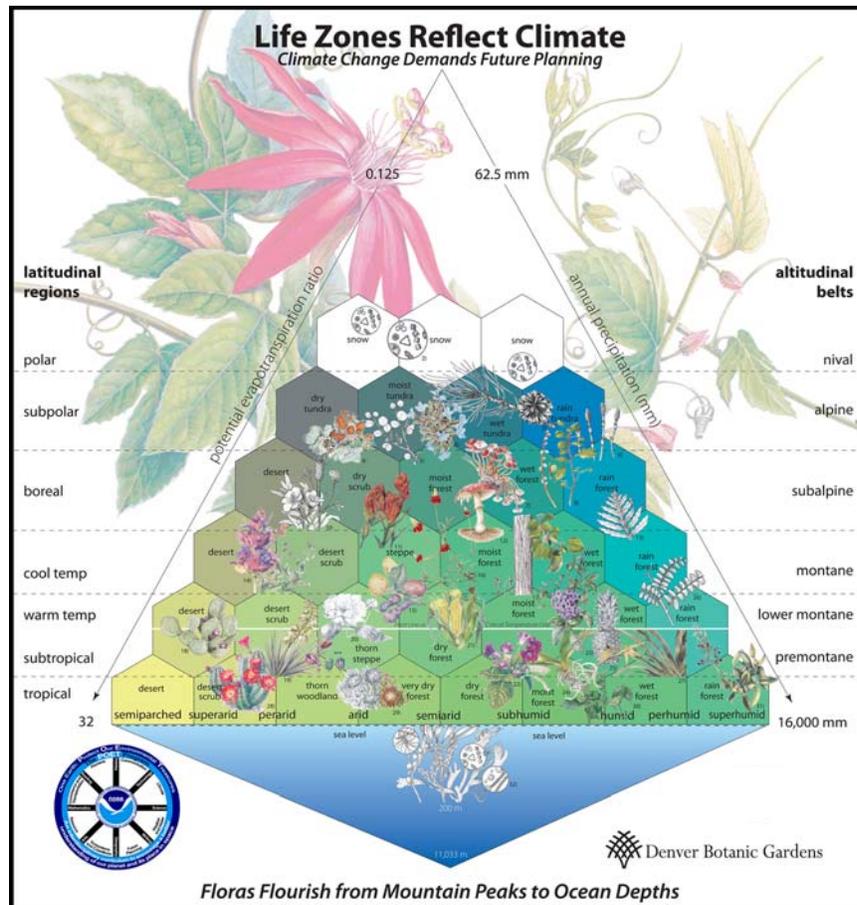


**Environmentally-Based  
Interdisciplinary  
Student Activities**



# POET

## Protect Our Environmental Treasures



## **Environmentally-Based Interdisciplinary Student Activities**

### *Draft*

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(Science, Mathematics, Reading)

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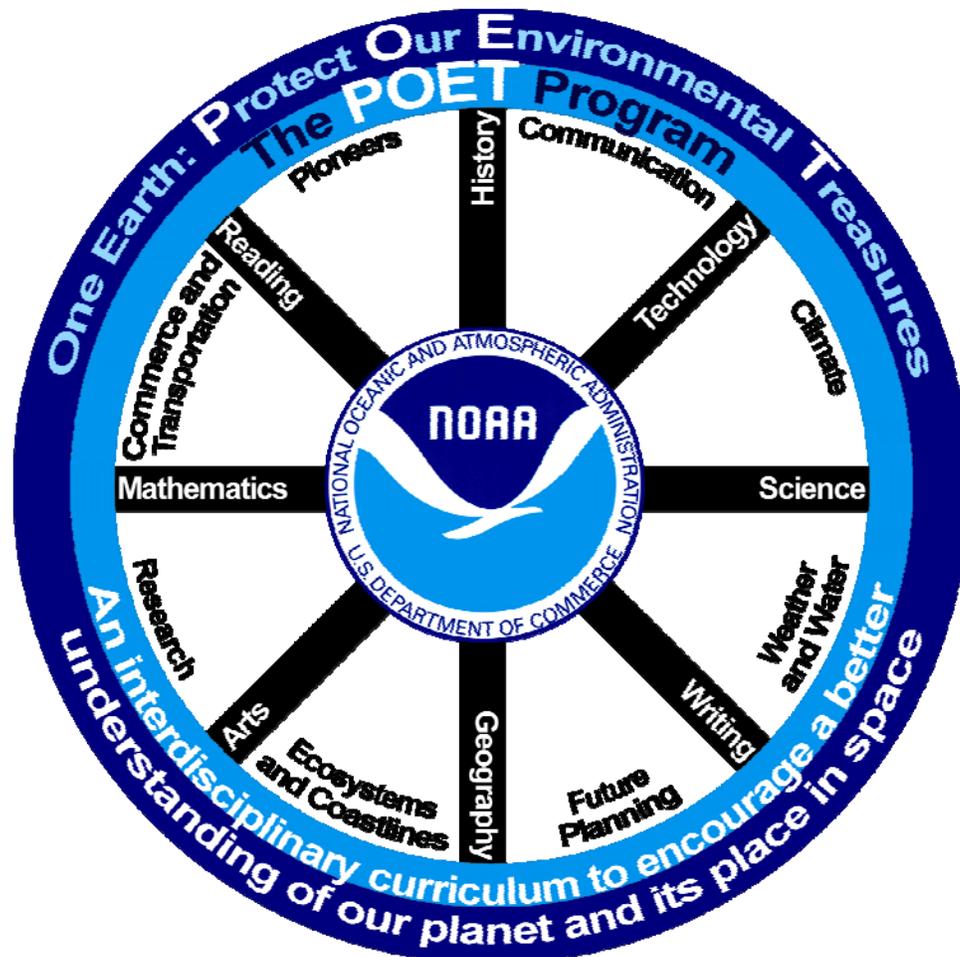
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## Answer Key and Conclusions for POET Activities



# Introduction

The National Oceanic and Atmospheric Administration, NOAA, is an international leader on scientific and environmental matters that extend from the far reaches of the Sun, through Earth's atmosphere, to ocean depths. Locally, since arriving in Boulder over a quarter of a century ago, NOAA has been a strong and very visible supporter of education. Always eager to share information, explain research, visit science classes, judge science fairs, it seems only natural that the Boulder, Earth System Research Laboratories included education as a prominent component of the NOAA Celebration: 200 years of Science, Service and Stewardship. The product is the **POET Program** (Protect Our Environmental Treasures), fifteen environmentally based, interdisciplinary lessons for teachers in grades 6 – 12.

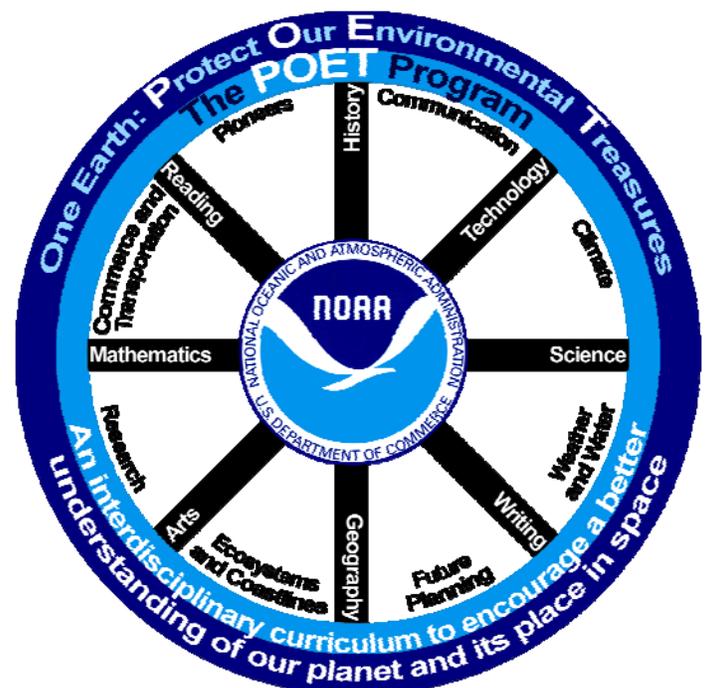
As suggested by its name, National Oceanic and Atmospheric Administration, researchers strive to understand the interaction between Earth's oceans and atmosphere in an effort to better know and predict changes in the environment around us. Just as understanding inter-relationships in our natural world is the basis of scientific research, making connections between subjects of study in school, known as interdisciplinary learning, indicates mastery comprehension for our students. The **POET Program** provides an opportunity for students to combine learning from other areas; helps students make connections between topics of study in school and the adult world; and promotes a better knowledge and understanding of interactions between the surrounding land, air, water and living organisms.

## Goals

To be competitive in a global economy, educators, employers, and ordinary citizens agree that students need to "learn how to learn", that is, to contemplate and evaluate information, not simply memorize information and answer questions by rote. The POET activities provide a perfect opportunity for students to practice using the "brain tools" inherent in the "learn how to learn" process. Examples of "brain tools" in the POET lessons include the following...

- Compare and Contrast
- Cause and Effect
- Observe and Infer
- Calculate
- Identify
- Communicate
- Analyze
- Interpret
- Graph
- Draw Conclusions
- Make Judgments
- Construct Models
- Analyze Models

In addition, students need to understand that the topics and classes of study in school are related to one another. Since scientific investigation is innately inter-disciplinary, the process of connecting various subjects or disciplines flows naturally: asking a question; making a hypothesis; gathering, analyzing and interpreting data – all demand mastery of skills in many different subjects, including reading, writing, mathematics, the arts, and social sciences. Furthermore, the whole process of investigation is highly dynamic and intellectually active – just what students need to engage in learning, and just what the POET activities provide.



# Lesson Structure

For most of the POET activities, each lesson has five parts.

1. At the beginning there is...
  - > a **problem question (inquiry)** to be answered as a result of the investigation so that students clearly understand what is expected;
  - > a **category** that names the interdisciplinary subjects of study that are emphasized in the lesson;
  - > a **connection to the real world** that identifies how the lesson is used in real life;
  - > an opportunity to **identify prior knowledge**, a technique that helps to set the stage for the lesson. Students write what they know about a topic before the lesson. After the lesson, they add what they have learned; and
  - > **background information** to encourage reading and discussion.
2. An **activity** (the investigation) is designed to actively engage students in the learning process.
3. **Questions** (analysis) lead students toward a more complete understanding of each activity. The questions are arranged in order of difficulty with the intent of challenging each student to an individual "best".
4. **A conclusion** helps students to demonstrate new knowledge by integrating the various parts of the lesson in a short essay.
5. **Compare and contrast** prior knowledge with the conclusion. Students can easily see improvement.

POET topics were chosen so that students are exposed to trend-setting scientific research as they practice the processes of science – learning basic concepts and principles, posing a question to be investigated, collecting data, graphing, analyzing, and predicting – all in an interdisciplinary setting.

For teachers, POET was designed to be self-contained with little extra effort beyond gathering materials. The lessons are versatile enough to adapt to different teaching styles and can be used in either small-group, large-group, or individual instruction.

Although created for middle and high school, students in upper elementary school could benefit by doing parts of each lesson.

The questions that accompany the activities are graduated in difficulty. By design, easier questions are at the beginning followed by more difficult questions toward the end of the question section.

The POET activities conform to the National Science Education Content Standards.

***I hear...I forget, I see...I remember, I do...I understand!***

**University of Colorado College of Engineering  
Integrated Teaching**

# Acknowledgements

With respect and admiration, I thank my colleagues at NOAA (National Oceanic and Atmospheric Administration), for the opportunity to create The POET Program. My charge, to design a series of interdisciplinary activities for teachers to use in the classroom, became a journey of discovery. Stimulating conversation, availability of scientific data, and unending support was an inspiration in itself. My sincere thanks to all.

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And...to **John Osborn**, a special note of thanks – for design, graphics, and layout, suggesting improvements, proof reading, and for patience and support while helping me to meet deadlines.

I hope that the POET activities prove to be interesting to students and help to promote an on-going curiosity about Earth and its place in space.



Sincerely,

*Beverly L. Meier*

**Beverly L. Meier**

*Delight...in the Wonders of the Universe*

***“Sunshine is delicious, rain is refreshing,  
wind braces up, snow is exhilarating;  
there is no such thing as bad weather,  
only different kinds of good weather.”***

**John Ruskin**

# ***National Science Education Content Standards and The Essential Principles of Climate Sciences***

The matrix that follows combines the seven *National Science Education Content Standards* with the *Essential Principles of Climate Sciences* (across the top) and contains a cross reference to the POET activities (along the left side). The standards, targeted at middle and high school, are based on the recommendations made in 1996 by the National Research Council in their publication, "*National Science Education Standards*".

Standards POET Activities	Earth and Space	Life Science	Physical Science	History and Nature of Science	Personal and Social Perspectives	Science and Technology	Science Is Inquiry
<b>Section 1 – Modeling Earth</b>							
Activity 1 – Nighttime Lights of the World	X				X	X	X
Activity 2 – Using Different Models of Earth	X		X	X		X	X
Activity 3 – Topography and Bathymetry	X					X	X
Activity 4 – The U.S. Coast and Geodetic Survey to the Rescue	X			X	X	X	
<b>Section 2 – Weather</b>							
Activity 5 – Tornado Over Kansas	X	X			X		
Activity 6 – Hurricanes							
1. Environmental Satellites	X		X	X		X	X
2. Creating a Satellite Image Using Pixels	X				X	X	X
3. A Cross-Section Through the Eye	X					X	X
Activity 7 – Winter at the South Pole	X	X			X		
<b>Section 3 – Global Warming</b>							
Activity 8 – Carbon Dioxide and Seasons	X	X		X	X	X	X
Activity 9 – Global Warming	X	X		X	X	X	X
Activity 10 – Arctic Sea Ice	X			X		X	X
<b>Section 4 – The Carbon Cycle</b>							
Activity 11 – How It Works	X	X		X	X	X	X
Activity 12 – CarbonTracker	X	X		X	X	X	X
Activity 13 – The Annual Greenhouse Gas Index	X	X		X	X	X	X
Activity 14 – Students Help Control Their Carbon Footprint	X	X		X	X	X	X
<b>Section 5 – Planning for the Future</b>							
Activity 15 – Life Zones Reflect Climate: Climate Change Demands Future Planning	X	X		X	X	X	X