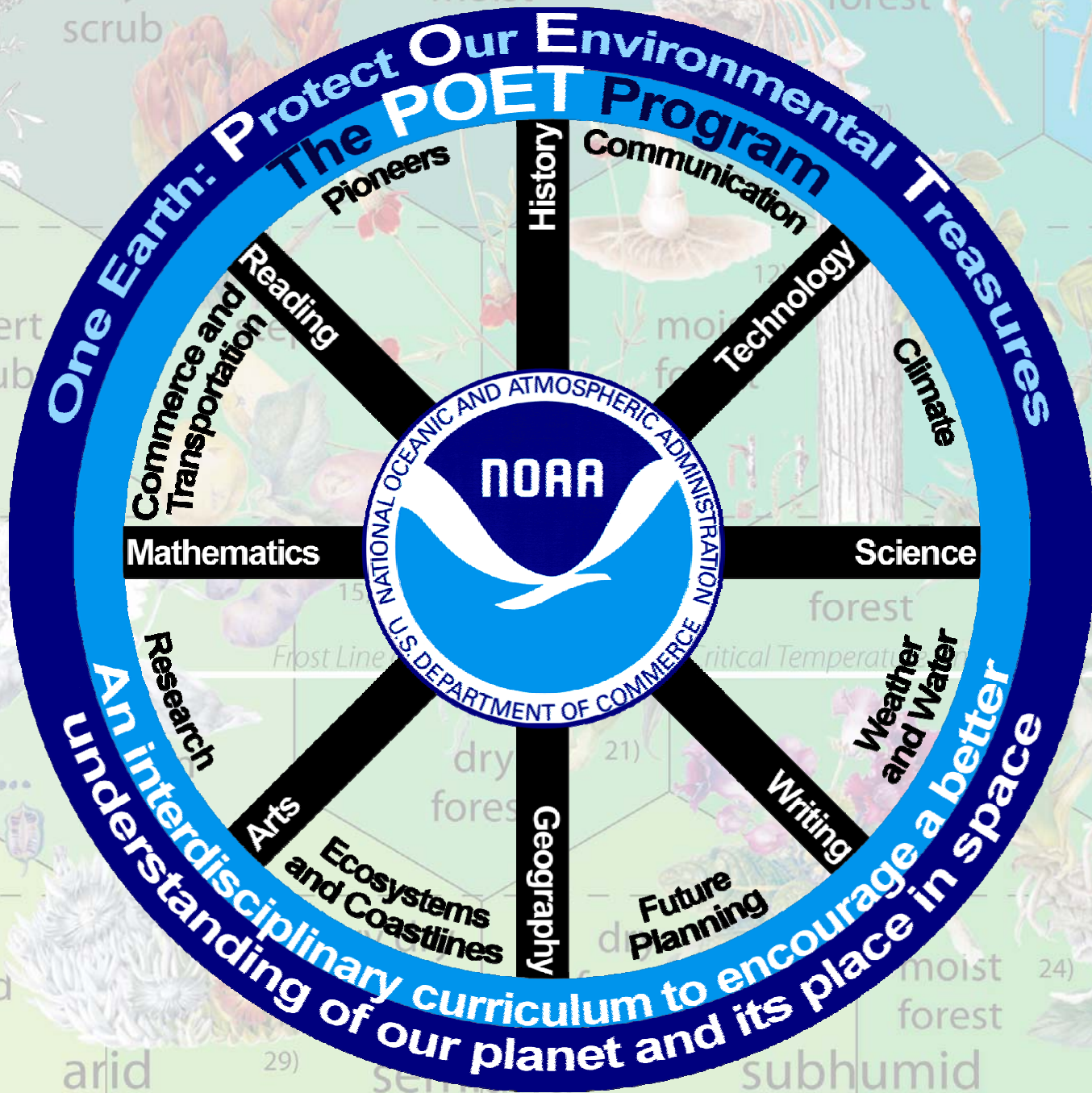


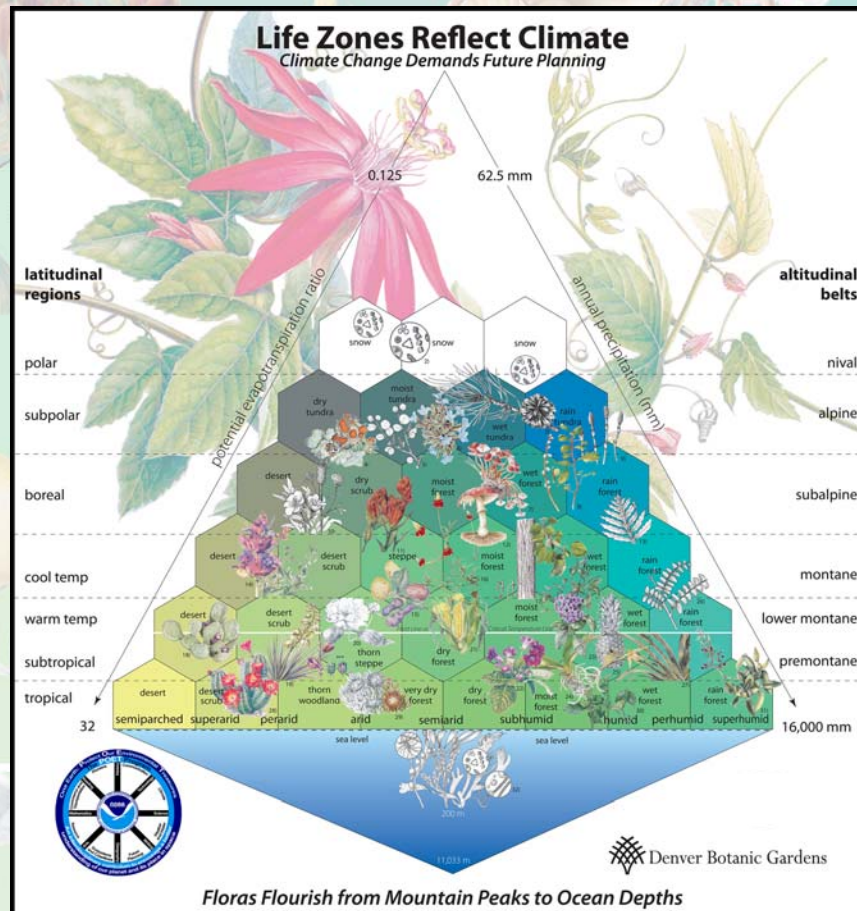
POET



**Environmentally-Based
Interdisciplinary
Student Activities**

POET

Protect Our Environmental Treasures



Environmentally-Based Interdisciplinary Student Activities *Draft*

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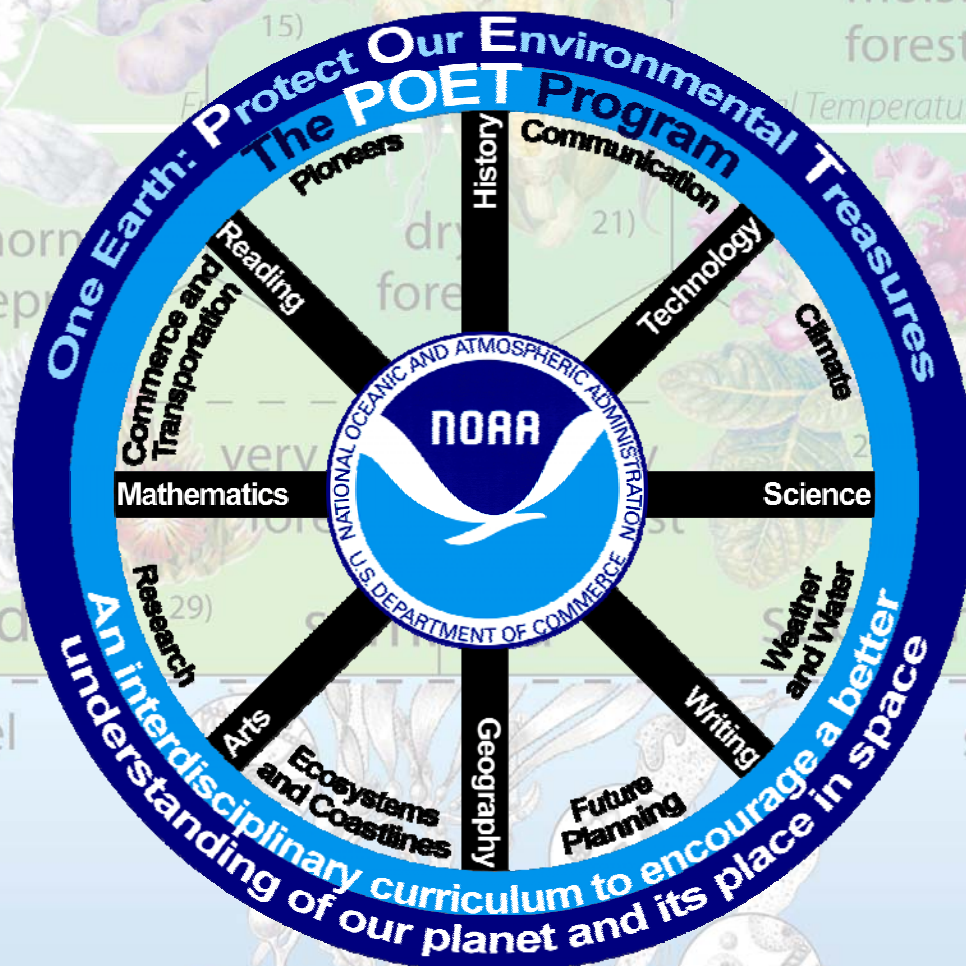
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Answer Key for POET Activities



Introduction

The National Oceanic and Atmospheric Administration, NOAA, has been a strong and very visible supporter of education since it first appeared in Boulder. Always eager to share information, explain research, visit science classes, judge science fairs, it seems only natural to include education as a prominent component of the NOAA Celebration: 200 years of Science, Service and Stewardship.

As suggested by its name, National Oceanic and Atmospheric Administration, researchers strive to understand the interaction of Earth's oceans and atmosphere to better understand the world 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.

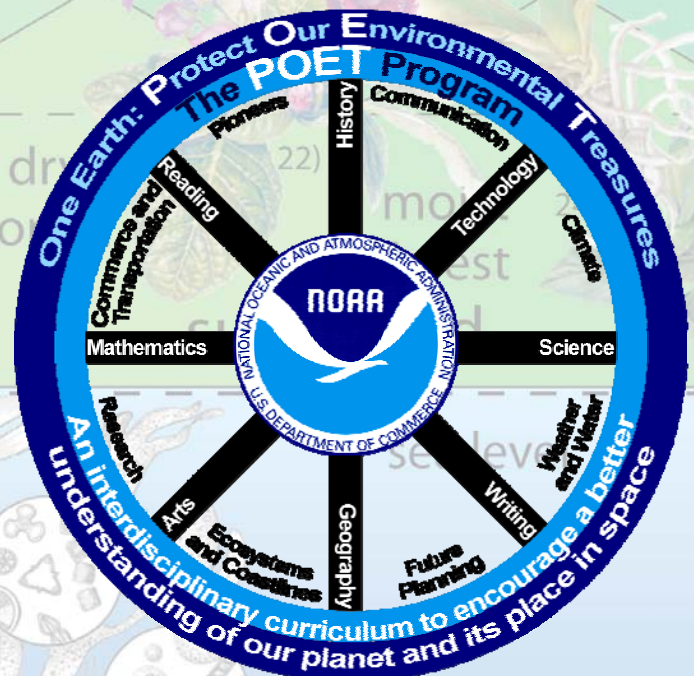
My task, to produce a series of lessons from an interdisciplinary approach, for students in middle and high school, came at an opportune time. For decades, I have been accumulating ideas for interdisciplinary activities, built around scientific research. Recently retired, the joys and challenges of teaching remain fresh. Thus a willing collaborator met a unique opportunity, and the **POET Program** (Protect **O**ur **E**nvironmental **T**reasures) emerged.

Goals

Using science as a foundation, my goal is to provide a series of lessons that integrate the various subjects that students learn in school and to relate these subjects to practical application in "real life" (notice the POET logo). In addition, an interdisciplinary approach to learning provides the perfect opportunity to practice what I call "brain tools" – "thinking" or "reasoning" skills that students need in order to be successful in school and later as adults. Therefore, the following skills, along with other age-appropriate strategies, are incorporated into each POET lesson as frequently as possible.

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

Since scientific investigation is innately interdisciplinary, 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, math, the arts and social sciences. Furthermore, the whole process of investigation is dynamic – just what students need to engage in learning and what I attempt to achieve with the POET activities – keeping in mind the constraints of a normal classroom.



Lesson Structure

The POET Program is an interdisciplinary curriculum designed to encourage a better understanding of our planet Earth, and its place in space so that students then better understand the relationship between learning school subjects and their success later in life. Imbedded in each lesson are multiple goals – scientific, pedagogical and interdisciplinary. 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
Section 1 – Modeling Earth							
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	
Section 2 – Weather							
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		
Section 3 – Global Warming							
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
Section 4 – The Carbon Cycle							
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
Section 5 – Planning for the Future							
Activity 15 – Life Zones Reflect Climate: Climate Change Demands Future Planning	X	X		X	X	X	X