

A Cosmic Sense of Place 2013-2014

Teacher name: Rob Hanson

Grade level: 6

Length of Units – Year-long

Upper Valley Linkages for Environmental Literacy Timeline

September 2013 – May 2014: Cosmic Scales Photography / Power Spots on Barnard Brook

September-April 2013-2014: Cosmic Scales Research

September 23-26: MBR National Park Week:

WCSU sixth grade students spend four consecutive days connecting scales from the microscopic (pond water organisms), human scale (nature photography and art), cosmic scale (astronomy), and exploring the Park itself (with emphasis on stewardship and sustainability). See Cosmic Scale web site: [Sites.google.com/a/wcsu.net/marshbillings2013](http://sites.google.com/a/wcsu.net/marshbillings2013)

September 27-October 4 - Cosmic Scales Performance Task:

Students engaged in research and reflection of Cosmic Scales Performance Task

October 17 – Appalachian Trail Hike:

Pomfret Section (Sense of Place: mapping, photography, writing, service learning, art, AT history)

October 21-December 20 – Cosmic Scales Research: Astronomy - In depth research writing

February/March/April: Human Scale, Microscopic Scale research/writing

January – May 2014: Comparative Zoology Unit

Comparative Zoology Tasks

Scientific drawings with Susan Sawyer

Animal Tracking / Adaptations (at MBR National Park with Ed Sherron) – March 2014

VINS Field Day (May 30th)

April 29th May 6th, 2014: Cosmic Scales Exhibit at ArtisTree

June 9th, 2014 – One Less Travelled Hike

UVLEL unit roadmap

6/11/2014

GOALS

Cosmic Sense of Scale Component (from VT Standards)

- ◆ **Expressive Writing: Reflective**
- ◆ **Artistic Dimensions, Intent, and Proficiency**
- ◆ **Information Tech: Information Literacy and Research**
- ◆ **Problem Solving**
- ◆ **Sustainability/Stewardship**
- ◆ **Understanding of Place**
- ◆ **Understanding of Biological Systems**
- ◆ **Understanding of The Universe, Earth, and Environment Systems**
- ◆ **Interdisciplinary Connections**

Comparative Zoology Component

- ◆ **Understanding of how variation in traits enables organisms to adapt and survive in a changing environment**
- ◆ **Effect of biological adaptations on species habitat**
- ◆ **Understanding of energy flow through biological systems**

ESSENTIAL QUESTIONS

Comparative Zoology Component

How might a variation in each animal's skeletal structure (trait) enable the animal to adapt and survive in a changing environment?

How does energy flow through an ecosystem in at least two of the following:

- your owl pellet? (Note: depends on keyed species)
- a VINS raptor?
- A species selected from natural selection performance task?
- YOU? – Two to four food items from your favorite meal

A Cosmic Sense of Scale Component

What pieces, patterns, and processes occur in the subjects of your photograph of a pond water microorganism, a human scale object(s), and a celestial object?

ACTIVITIES TO SUPPORT LEARNING TARGETS

Comparative Zoology Pieces, Patterns, and Processes

Task 1: Owl Pellet Dissection and Skeletal Comparison

- 1. Pieces: Dissect owl pellet by separating bones from fur.**
- 2. Pattern: As you dissect, group bones of the same kinds together.**
- 3. Pattern: Compare your prey animal bone groups to the bones of the human skeleton. Find any bones that have similar structures (corollary bones).**

Task 2: Naming and Comparing Bones / Keying Prey Animal

1. Pieces: Using the class skeleton, “Dem Bones”, identify and name the basic bones of human body.
2. Pattern: Using the Bone Sorting Chart, Mouse Skeleton sheet, and what you know of corollary bones, learn the names of the bones you found in your pellet. Be prepared to name and match your mammal bones to the human skeleton.
3. Pattern: Using at least two biological keys, complete the Owl Pellet Prey Species Identification sheet.

Zoologist _____

Owl Pellet Prey Species Identification

Part 1: Keys and References

Check a minimum of two keys and/or references listed below you used to identify your prey animal. Take detailed notes as you key your bones for reference when you write your constructed response.

_____ The Barn Owl and the Pellet

_____ Key to Skulls

_____ Key to Lower Jaws

_____ Other

Part 2: Prey Identification Constructed Response / Diagrams

Write an argumentative constructed response to the following question:

Your owl pellet contained the skeleton and fur of what animal species? Provide specific details to support your assertion.

Attach the final draft of your Prey Identification Constructed Response and well illustrated, labeled, and referenced diagrams (with skull and mandible measurements) to this cover sheet. Your response will be assessed using the Argumentative Writing Rubric (on reverse side).

Part 3: Specimen Name

Common Name _____ Scientific Name _____

Part 4: Peer Review

Present the above work to two peers. They are to initial below only when convinced that the evidence strongly supports your identification.

#1 peer confirmation _____

#2 peer confirmation _____

Task 3

Comparing Prey and Human Skeletons: Structure and Function

1. Pieces: Choose a bone or bone group. Carefully draw the bone(s) for each animal on a sheet of art paper. Neatly label your drawing and include specific information for each bone. (Refer to Eyewitness Skeleton on pages 50-53 and other resources.)
2. Pattern: Compare and contrast the skeletal group. How are the bone(s) similar? How are they different?
3. Process: Write a conjecture (as a constructed response) for the following question: How is the structure of the bone group adapted to each animal's environment?

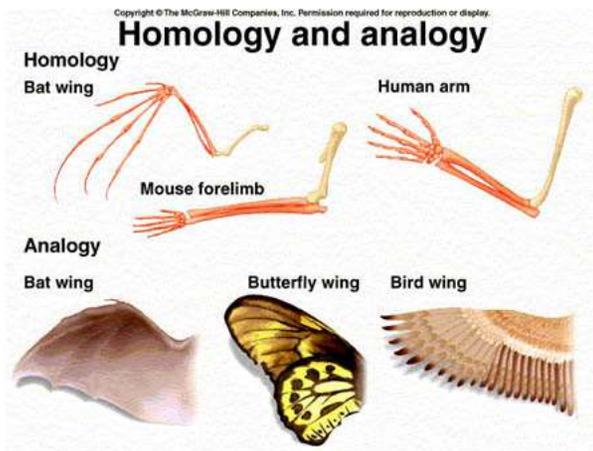
Homologous and Analogous Traits

Study Images and make conjectures:

What are homologous traits? What are analogous traits?

What causes them?

Can one structure be BOTH homologous and analogous? Explain.



Comparative Zoology Performance Tasks

Task 1: Natural Selection and Adaptation

Part 1: Select any two vertebrate animals. Carefully draw a corollary bone or bone group for each animal on a sheet of art paper. Neatly label your drawings. As part of your display, compare and contrast each skeletal group. How are the bone(s) similar? How are they different?

- Refer to Zoobooks, Skeletons, Eyewitness Skeleton (especially pages 50-53), the web, and other resources.

Part 2: Write a detailed conjecture (as a constructed response) for the following question:

How might a variation in each animal's skeletal structure (trait) enable the animal to adapt and survive in a changing environment?

Key Search Words: adaptation, natural selection, evolution, homologous traits, analagous traits, variation, fitness, habitat

- Refer to the books, web, Brain Pop, and other resources.

Next Generation Science:

MS-LS4 Biological Evolution: Unity and Diversity

MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. [Clarification Statement: mphasis is on explanations of the evolutionary relationships among organisms in terms of similarity or differences of the gross appearance of anatomical structures.]

Vermont Standard: S5-6:39 - (DOK 2) - Students demonstrate their understanding of Evolution/Natural Selection by explaining how a variation in a characteristic (trait) enables an organism to survive in a changing environment.

Task 2: Tracking with Ranger Sharron Natural Selection and Adaptation

SINGLE PRINT

Process: Adaptation: Describe the evidence for biological adaptation found in a print.

Process: Natural Selection: Explain the survival value of this adaptation. Give at least one example of how this adaptation may have been “naturally selected”.

TRACK PATTERNS

Process: Adaptation: Describe the evidence for biological adaptation in this pattern.

Process: Natural Selection: Explain the survival value of this adaptation. Give at least one example of how this adaptation may have been “naturally selected”.

Performance Task 3:
Energy Flow Through an Ecosystem

Zoologist _____

Use different models to illustrate the energy flow in the ecosystem for at least two of the following:

- Owl pellet
- VINS raptor
- Species selected from natural selection performance task
- YOU! – Two to four food items from your favorite meal

Your energy flow model will be assessed based on the following components:

_____ Piece: Visual representation of each “piece” or species (1 point each = 4 pts.)

_____ Pattern: Clear indication of direction of energy flow (1 pt.)

_____ Pattern: Proportional representation of ecosystem biomass at each energy level (2 points)

_____ Process: Labeled AND detailed description (attached) of how energy is produced by each “piece” / species (3 points)

Performance Task 3: VINS (Alternative) Energy Flow Through an Ecosystem

Zoologist _____

Illustrate the energy flow in the ecosystem for a VINS raptor. Your energy flow model will be assessed based on the following components:

_____ Piece: Drawing of each “piece” including abiotic essential, biotic producer, first order consumer, and second order consumer. (1 point each = 4 pts.)

_____ Pattern: Clear indication of direction of energy flow (1 pt.)

_____ Pattern: Proportional representation of ecosystem biomass at each energy level where base level equals 1,000 eu (energy units). (2 points)

_____ Process: Labeled AND detailed description (attached) of how energy is produced by each “piece” / species (3 points)

- Refer to the class posters, books, web, Brain Pop, and other resources.

<i>Energy Flow Assessment</i>	Piece (0-4 pts.)	Pattern-1 (0-1 pt.)	Pattern-2 (0-2 pts.)	Process (0-3 pts.)	Total 10 poss.
Student					
Teacher					

Microscopic Scales Research → Writing

Author: _____

Microorganism: _____

____ **PREWRITING 1:** Create a neat **scientific drawing** of your image.

____ **PREWRITING 2:** Now **research** your microorganism. After identifying the organism, create **Notefacts** using your own words for the three topics: Pieces, Patterns, and Processes. Color notes based on the topics.

- What are the **pieces** (attributes, elements) that make up this microscopic object and might help determine its identity? Include its size using scientific notation.
- What **patterns** (larger structures, behaviors, etc.) emerge in the “whole organism” as a result of the **pieces**?
- What are the larger **processes** (life cycle, place in food chain) of the microscopic organism? Find its place within the ecosystem using *A World in a Drop of Water* and at least two websites:

(a) <http://www.msnucleus.org/watersheds/mission/plankton.pdf>

(b) “The Smallest Page on the Web”

<http://uk.org.uk/mag/indexmag.html?http://www.microscopy-uk.org.uk/mag/wimsmall/smal1.html>

(c) _____ (Your choice)

As you research, take **Notefacts** in **your own words**.

_____ **PREWRITING 3:** Sort your Notefacts into pieces, patterns, and processes (according to color). Organize these three piles into a logical sequence or story.

_____ **NOTES:** Create a Word document of your notes. Use the Desmid example as a guide.

_____ **SCIENTIFIC DRAWING:** Add labels and short notes to your drawing related to the *pieces* and *patterns* you observe. Include the size of the organism and at least one essential question as part of your drawing.

_____ **WRITING 1:** Now turn your notes into two or three paragraphs or a poem. Create a **one** page Word document that incorporates your photo and writing. (See Desmid example.) Use the Desmid prose example or Randall Jarrell's Bats as models.

_____ **WRITING 2:** Make additions and deletions as necessary. This will probably require you to edit down your writing until you have only the "best of the best" from your notes. You should have worked your writing until it is polished. When your writing is in superb form, complete the Microscopy Rubric.

_____ **EDITING CONFERENCE:** Print a copy of your work and arrange for a conference with Mr. Hanson.

_____ **WRITING – FINAL DRAFT:** Make your final changes, then print final copy.

Expanding Horizons Research Project



Taken a good look at the Andromeda Galaxy lately? How about exploring the great constellation of Orion whose red supergiant star Betelgeuse is thousands of times larger than our Sun, where Rigel shines with a luminosity of 50,000 suns, and where stars are being born in the stunning Orion Nebula, some 1,500 light years from our pale blue planet. Take your pick from these celestial objects or from the likes of star clusters containing thousands of suns or, closer to home, the ringed jewel of Saturn, our fusion powered, life giving Sun - even its solar wind which creates the massive curtains of reds and greens we know as aurora borealis. Or explore something no one will ever see, a supermassive black hole beyond whose event horizon not even light can escape and whose properties resemble the singularity of the Big Bang itself.

These are but a few of the dozens of objects and topics you may choose to research, write about, photograph, and present to the others via PowerPoint multimedia. Not only is the choice of object entirely yours, but you will have full use of the Horizons Observatory, including its knowledgeable astronomy docents, its telescopes, and an astronomy library to help you observe, photograph, analyze, write about, and otherwise explore what interests you most about our universe. (Or is that “multiverse”?)

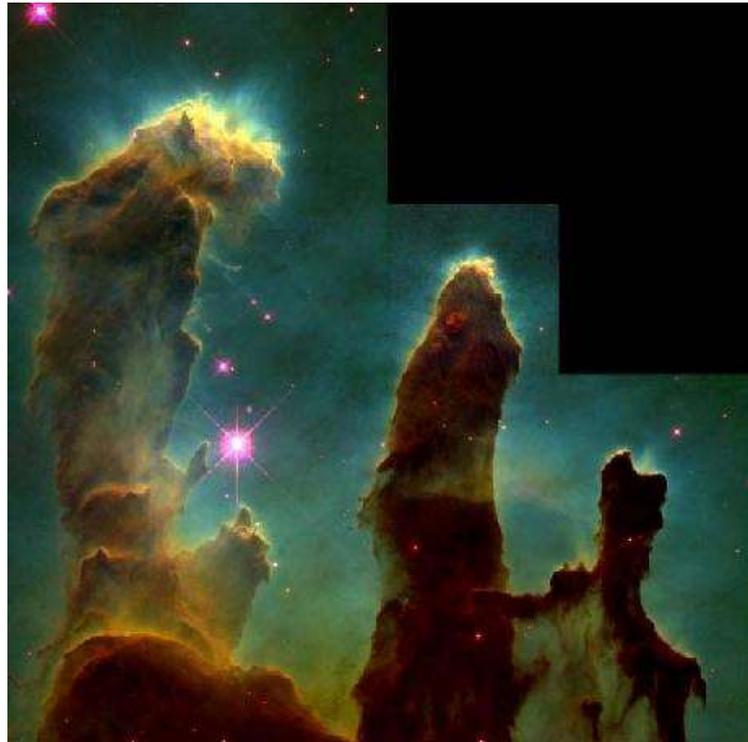
What’s the catch? Simple: You are expected to complete each of the Expanding Horizons tasks with both enthusiasm and a commitment to quality. Expanding your horizons should be both enriching and fun. Enjoy!

**Expanding Horizons
Checklist and Grade Sheet**

Astronomer	Research Topic	
Task 1: Choosing Your Topic		
Due date:		/ 5 points
Task 2: Prior Knowledge		
Due date:		/ 5 points
Task 3: Expert Research		
Due date:		
Notefacts	/ 5 points	
Bibliography	/ 5 points	/ 10 points
Task 4: Organizing		
Due date:		/ 5 points
Task 5: Research Essay		
Due date:		/ 40 points
Task 6: Astrophotography, Illustrations, and Art		
Due date:		/ 5 points
Task 7: Publish with Illustrations		
Due date:		/ 10 points
Task 8: PowerPoint Presentation		
Due date:		/ 10 points
Task 9: Audience Assessment Activity		
Due date:		/ 5 points
Task 10: Research Self-Evaluation		
Due date:		/ 5 points
Final Evaluation Conference		
Final Due Date:	Final Score:	/ 100

Task 1 Choosing Your Topic

Attend library session with Ms. Bees on researching possible topics. Use The Pomfret School library, our class astronomy library, The Norman Williams Library, computer software, and the suggested web sites to help you decide on three prioritized astronomy topics. Write a paragraph for each topic explaining why you selected it and your degree of commitment to studying the topic in depth.

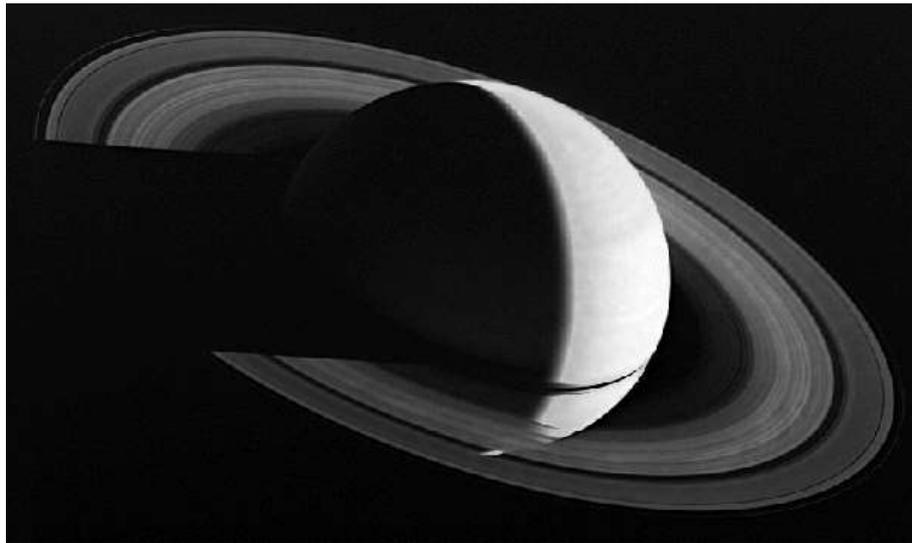


**Pillars of Creation
Stellar Nursery in the Eagle Nebula (M 16)**

Task 2 Prior Knowledge

Section 1: Summarizing Prior Knowledge

In note form, brainstorm the most important things you know about your topic.



Saturn: Day and Night

Section 2: Questioning

Write a minimum of five important questions you have about your topic. When finished, circle and prioritize the two most significant and interesting questions to guide your research. These will be your focus, or thesis, questions.

Task 3 Expert Research

Using the following Steps to Taking Notefacts as your guide to complete the Expert Research requirements:

1. Each resource you use will have its own number. Write that number in the large magnifying glass and on all the small magnifying glasses on you Notefacts pages.

2. Record required bibliography information in proper form on the top solid lines. See Bibliography Reference Sheet for proper form.

3. Take notefacts in the spaces below the bibliographical information. Notefacts are short (notes) and true (facts). They should be:

- Written in your own words**
- Short but complete enough to make sense**
- Related to your thesis questions**
- Written between the dotted lines - one notefact per space**
- Documented by page number**
- Not fewer than 25 notefacts from 3 different sources**
- Written neatly**

Task 4 Organizing Research

Complete the following steps to organize your research before writing:

- 1. Think about categories as you read all your notefacts.**
- 2. List categories on the Categories Sheet. You should have between three to eight categories.**
- 3. Color the handle of each category lens a different color.**
- 4. Write categories on Organizing Notefacts pages, one sheet for each category.**
- 5. Color code all your notefacts according to category colors. Color handle only.**
- 6. Cut notefact strips.**
- 7. Place color-coded notefact strips on each Organizing Notefacts page.**
- 8. Rearrange the notefacts in a sequence that makes sense.**
- 9. Conference with teacher before gluing.**
- 10. Glue strips to pages.**

Task 5 Horizons Research Writing

Now that your research is organized, it's time to begin writing! Use the research Writing Checklist as your overall guide. your prewriting chart with your notefacts should guide your writing. remember to cite all sources both in your writing (author, page number) and in your bibliography.

Your Project must be presented in this order:

- **Research Writing Rubric**
- **Research Writers' Checklist**
- **Second printing with title page (cover), body, and bibliography (final page)**
- **First printing (with your and your editor's penciled corrections)**
- **Notefacts and Research Organization sheets**
- **Prewriting Chart**

Task 6 Horizons Visual Arts Astrophotography, Illustrations, and Art

Complete at least two of the following astronomy visual arts tasks:

- **Astrophotography: Photograph your celestial object or related object using the horizons observatory. See mr. hanson to schedule your photography session with an horizons docent.**
- **using the medium of your choice, Complete an original work of art related to your topic.**
- **Acquire at least two digital images of your celestial object or related object from the internet. The images should include an caption (three to six sentences) which provides significant information about your topic. Be sure to properly cite the source(s) of your images.**

Task 7
illustrated Research publication

Create a distinctive cover page including title, author, school, class, and date. Insert cited and captioned illustrations (astrophotograph, art work, and other illustrations) into your research report in proper order. Bind.

Human Scale Photograph: Writing Checklist

Author: _____

Photo title: _____

_____ PREWRITING 1: Select, then neatly trace or sketch your “human scale” photo.

_____ PRE-WRITING 2: Select a theme of your photograph that allows you to complete substantial research and writing about one or more of the following:

- the essentials of life,
- connections across the scales (microscopic, human, cosmic)
- “Sight is a Faculty, Seeing is an Art”
- “In the ordinary is the extraordinary”

_____ PRE-WRITING 3: Using books, human resources, and the web, conduct research on your theme. As you research, determine importance and make clear notes and/or diagrams regarding the pieces, patterns, and processes you discover.

_____ PRE-WRITING 4: Choose one of the following writing genres to accompany your photograph: explanatory essay, descriptive essay, poem, narrative.

_____ PRE-WRITING 5: With your theme, research, and writing genre in mind, complete a graphic organizer for your writing.

_____ WRITING 1: Neatly compose then type human scale writing.

_____ WRITING 2: Revise and edit. Length: three-fourths to one page typed (Size 12, block font).

_____ EVALUATE: Complete Human Scale Photograph Research and Writing Rubric.

ASSESSMENTS

Cosmic Scales Nightly Question Rubric

Nightly Essential Question: How is your understanding of place different than it was this morning (before today’s session)? Use your journal notes and vocabulary words. If possible, include examples related to one of the following quotes: *Sight is a faculty, seeing is an art* (George Perkins Marsh) OR *In the ordinary is the extraordinary* (Buddhist proverb).

Exceeds	Meets	Lacking	Not present	NA
<p>Response:</p> <ul style="list-style-type: none"> • is clear and legible • reflection moves beyond simple recall • provides two specific written examples related to one at least one of the quotes • includes at least one neat, labeled drawing • uses station vocabulary • WOW!: makes a real world connection, extends understanding beyond activity, asks question(s) that extend learning 	<p>Response:</p> <ul style="list-style-type: none"> • is clear and legible • reflection moves beyond simple recall • is detailed (including two examples) • includes one neat drawing • uses station vocabulary 	<p>Response:</p> <ul style="list-style-type: none"> • lacks sufficient clarity and neatness • provides limited detail (one example) • drawing of poor quality • reflection limited to simple recall • lacks station vocabulary 	<p>Response:</p> <ul style="list-style-type: none"> • is unclear • provides little or no detail (no examples) • drawing is lacking • no reflection • lacks station vocabulary 	<p>Response:</p> <ul style="list-style-type: none"> • does not address prompt

A Cosmic Sense of Scale Assessment

Make three colored drawings of one piece (object or organism), pattern, or process (reason for pattern) that is similar across the scales (microscopic, human, and astronomical).

Write at least one paragraph describing and/or analyzing each drawing. Elaborate on specific understandings you have of the drawing from both your research and your Park experience.

Based on your drawings, write one or more paragraphs making a conjecture about connections you observe or deduce along the spectrum. Use of smaller sketches or other graphics (with explanatory captions) is encouraged.

A Cosmic Sense of Scale Assessment

Name: _____

Student

Teacher

Journal (appearance/notes)	_____ / 10 pts	_____ / 10 pts
Journal Prompt (4@5 pts)	_____ / 20 pts	_____ / 20 pts
Art Panels (3@5 pts)	_____ / 15 pts	_____ / 15 pts
Writing Panels (3@10 pts)	_____ / 30 pts	_____ / 30 pts
Connections Conjecture	_____ / 25 pts	_____ / 25 pts
Total points	_____ / 100 pts	_____ / 100 pts
		Final Grade _____

Human Scale Photograph Research and Writing Rubric

Exceeds – 9-10 pts.	Meets - 7-8 pts.	Lacking - 3-6pts.	Not present: 1-2 pts.
<p>Writing:</p> <ul style="list-style-type: none"> • is clear and legible • includes substantial and correct information • contains vivid details, rich voice tone • contains outstanding GUM: word choice, spelling, capitalization, punctuation • contains powerful closing related to theme • WOW!: makes a real world connection that significantly extends understanding 		<p>Writing:</p> <ul style="list-style-type: none"> • is clear and legible • includes correct research information • contains some detail, voice, and tone • contains satisfactory GUM: word choice, spelling, capitalization, punctuation • contains closing related to theme 	<p>Writing:</p> <ul style="list-style-type: none"> • is unclear or illegible • includes limited research information • contains very limited detail, voice, and tone • contains poor GUM: word choice, spelling, capitalization, punctuation • Closing unrelated to theme
		<p>Writing:</p> <ul style="list-style-type: none"> • is unclear or illegible • includes inaccurate research information • contains little detail, voice, and tone • contains poor GUM: word choice, spelling, capitalization, punctuation • Lacks closing 	

Cosmic Sense of Scale Research Report Rubric
Student Assessment

0 - - - - - 1 - - - - - 2
rarely sometimes frequently

_____ *Main Idea*: Near the beginning of the piece, there is a sentence that clearly states the main idea. The author returns to this idea throughout the piece. The conclusion restates main points in a unique way.

_____ *Elaboration on Main Idea*: Information is factually correct. Details are vivid, explicit, and appropriate. Precise verbs and nouns are evident. Borrowed language, ideas, photos, and direct quotes are cited. Direct quotes or paraphrases have signal phrases (“According to . . .”), are well-chosen, and well incorporated.

_____ *Organization*: Organized from beginning to end, logical progression of ideas, clear focus, transitions evident. There are no significant gaps or jumps. Paragraphs include topic and supporting sentences. Materials from various sources are interwoven. Bibliography contains at least three resources from three different sources.

_____ *Voice and Tone*: Writing sounds like you and shows expression.

_____ *Usage, Mechanics, and Grammar*: Word choice, spelling, capitalization, punctuation, complete sentences, and sentence variety are evident and proficient.

Total points _____ / 10 points

Comments: _____

Cosmic Sense of Scale Research Report Rubric
Teacher Assessment

0 - - - - - 1 - - - - - 2
rarely sometimes frequently

_____ *Main Idea:* Near the beginning of the piece, there is a sentence that clearly states the main idea. The author returns to this idea throughout the piece. The conclusion restates main points in a unique way.

_____ *Elaboration on Main Idea:* Information is factually correct. Details are vivid, explicit, and appropriate. Precise verbs and nouns are evident. Borrowed language, ideas, photos, and direct quotes are cited. Direct quotes or paraphrases have signal phrases (“According to . . .”), are well-chosen, and well incorporated.

_____ *Organization:* Organized from beginning to end, logical progression of ideas, clear focus, transitions evident. There are no significant gaps or jumps. Paragraphs include topic and supporting sentences. Materials from various sources in interwoven. Bibliography contains at least three resources from three different sources.

_____ *Voice and Tone:* Writing sounds like you and shows expression.

<p>_____ <i>Usage, Mechanics, and Grammar:</i> Word choice, spelling, capitalization, punctuation, complete sentences, and sentence variety are evident and proficient.</p> <p><i>Total points</i> _____ / 10 points</p> <p><i>Comments:</i> _____</p> <p>_____</p>			
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Student Initial Score: _____ Teacher Initial Score: _____

Student Final Score: _____ Teacher Final Score: _____

KEY GEs/GSEs ASSESSED

Comparative Zoology

Next Generation Science: MS-LS4 Biological Evolution: Unity and Diversity MS-LS4-2.

Next Generation Science: MS-LS2 Ecosystems: Interactions, Energy, and Dynamics

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

Vermont Standard: S5-6:39 - (DOK 2)

Students demonstrate their understanding of Energy Flow in an Ecosystem by...

- Developing a model that shows how the flow of energy from the sun is transferred to organisms as food in order to sustain life.

Cosmic Sense of Scale

NGSS and CCSS for Scales Park Week: Astronomy

NGSS

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)

Patterns: Patterns can be used to identify cause-and-effect relationships. (MS-ESS1-1)

Scale, Proportion, and Quantity: Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-3),(MS-ESS1-4)

Common Core State Standards Connections

ELA/Literacy –

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS1-3),(MS-ESS1-4)

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ESS1-3)

UVLEL unit roadmap

6/11/2014

WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS1-4)

SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (MS-ESS1-1),(MS-ESS1-2)

CCSS

Presentation of Knowledge and Ideas

CCSS.ELA-Literacy.SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

CCSS.ELA-Literacy.SL.6.5 Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

Integration of Knowledge and Ideas

CCSS.ELA-Literacy.RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CCSS.ELA-Literacy.RST.6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

CCSS.ELA-Literacy.RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same to

SUPPORTING RESOURCES

Human Resources

Upper Valley Linkages to Environmental Literacy (UVLEL) – Lisa Purcell

Marsh-Billings-National Historic Park: Marie Hanson, Joan Hailey, Ed Sherron,
Davison, Kyle Jones

Scott

Scientific Drawing/Art: Susan Sawyer, Lisa Kaija

Horizons Observatory: Scott Holson, Scott Griswold, Paul Otasky, Bill Heston

Vermont Institute of Natural Science (VINS)

Web Sites

The Horizons Observatory - <http://www.horizonsobservatory.org/>

A Cosmic Sense of Scale - <https://sites.google.com/a/wcsu.net/marshbillings2013/>