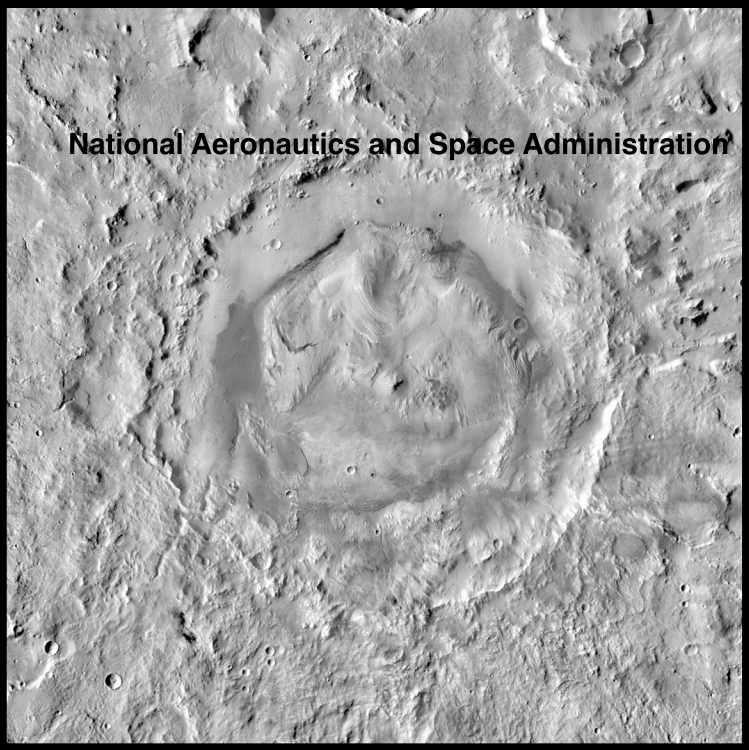

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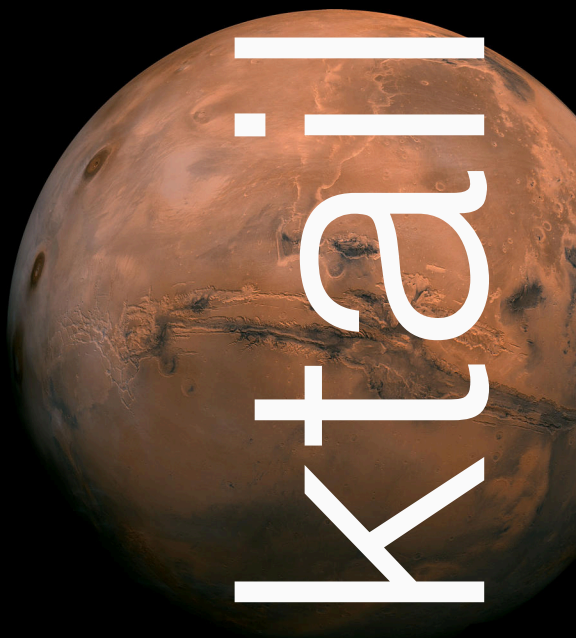

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High School Common Core Alignment Document

Mystery of Blacktail Canyon

High School Common Core State Standards Alignment

WHAT STUDENTS DO: Explore a virtual field trip of the Grand Canyon.

Students will explore Grand Canyon, AZ using a virtual field trip (VFT). They will observe the rock record and what these rocks tell us about the life and environments of the past. Then they will apply investigation techniques to the search for life in the solar system.

NRC FRAMEWORK/NGSS CORE & COMPONENT QUESTIONS

HOW AND WHY IS EARTH CONSTANTLY CHANGING?

NGSS Core Question: ESS2: Earth's Systems

Why do the continents move, and what causes earthquakes and volcanoes?

NGSS ESS2.B: Plate Tectonic and Large-Scale System Interactions

How do the properties and movement of water shape Earth's surface and affect its systems?

NGSS ESS2.C: The Roles of Water in Earth's Surface Processes

HOW CAN THERE BE SO MANY SIMILARITIES AMONG ORGANISMS YET

INSTRUCTIONAL OBJECTIVES (IO)

Students will be able to

IO1: Construct an explanation for why multiple missions are sent to a variety of locations on planetary bodies to investigate their geologic history and search for signatures of life.

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SO MANY DIFFERENT KINDS OF PLANTS, ANIMALS, AND MICROORGANISMS? HOW DOES THE BIODIVERSITY AFFECT HUMANS?

NGSS Core Question: LS4: Biological Evolution: Unity and Diversity

How does the environment influence populations of organisms over multiple generations?

NGSS LS4.C: Adaptation

What is biodiversity, how do humans affect it, and how does it affect humans?

NGSS LS4.D: Biodiversity and Humans

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1.0 About This Activity

How Students Learn: Science in the Classroom (Donovan & Bransford, 2005) advocates the use of a research-based instructional model for improving students' grasp of central science concepts. Based on conceptual-change theory in science education, the 5E Instructional Model (BSCS, 2006) includes five steps for teaching and learning: Engage, Explore, Explain, Elaborate, and Evaluate. The Engage stage is used like a traditional warm-up to pique student curiosity, interest, and other motivation-related behaviors and to assess students' prior knowledge. The Explore step allows students to deepen their understanding and challenges existing preconceptions and misconceptions, offering alternative explanations that help them form new schemata. In Explain, students communicate what they have learned, illustrating initial conceptual change. The Elaborate phase gives students the opportunity to apply their newfound knowledge to novel situations and supports the reinforcement of new schemata or its transfer. Finally, the Evaluate stage serves as a time for students' own formative assessment, as well as for educators' diagnosis of areas of confusion and differentiation of further instruction. The 5E stages can be cyclical and iterative.

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2.0 Instructional Objectives, Learning Outcomes, Standards, & Rubrics

Visit https://infiniscope.org/lesson/mystery-blacktail-canyon/ for access to the digital learning experience, lesson plans, standards alignment documents, and additional resources.

Instructional objectives and learning outcomes are aligned with

- Achieve Inc.'s, *Next Generation Science Standards (NGSS)*
- National Research Council's, *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*
- National Governors Association Center for Best Practices (NGA Center) and Council of Chief State School Officers (CCSSO)'s, *Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and* Technical Subjects
- Partnership for 21st Century Skills, *A Framework for 21st Century Learning*

The following chart provides details on alignment among the core and component NGSS questions, instructional objectives, learning outcomes, and educational standards.

- Your **instructional objectives (IO)** for this lesson align with the Common Core State Standards.
- You will know that you have achieved these instructional objectives if students demonstrate the related **learning outcomes (LO),** also aligned with the Common Core State Standards.
- You will know the level to which your students have achieved the learning outcomes by using the suggested **rubrics**.

Quick View of Standards Alignment:

This alignment document provides full details of the way in which instructional objectives, learning outcomes, 5E activity procedures, and rubric assessments were derived through, and align with the Common Core State Standards. For convenience, a quick view follows:

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HOW AND WHY IS EARTH CONSTANTLY CHANGING?

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HOW CAN THERE BE SO MANY SIMILARITIES AMONG ORGANISMS YET SO MANY DIFFERENT KINDS OF PLANTS, ANIMALS, AND MICROORGANISMS? HOW DOES THE BIODIVERSITY AFFECT HUMANS?

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Instructional Objective *Students will be able to*	**Learning Outcomes** *Students will demonstrate the measurable abilities*	**Standards** *Students will address*
IO1: Construct an explanation for why multiple missions are sent to a variety of locations on planetary bodies to investigate their geologic history and search for signatures of life.	**LO1a:** **Discuss and compare explanations for the observed change in rock patterns and the connections those patterns reveal between the Great Unconformity (earth science) and the Cambrian Explosion (life science).** **LO1b:** **Investigate the changing geologic patterns of the Grand Canyon and then integrate information from virtual media to make an inference about the processes that occurred here.** **LO1c:** **Explain the importance of collecting data from multiple sites to piece together the geologic history and evolution of life on a global scale.**	**WRITING STANDARDS FOR LITERACY IN SCIENCE AND TECHNICAL SUBJECTS:** • **Research to Build and Present Knowledge** **CCSS.ELA-LITERACY.WHST.9-10.9** **CCSS.ELA-LITERACY.WHST.11-12.9**

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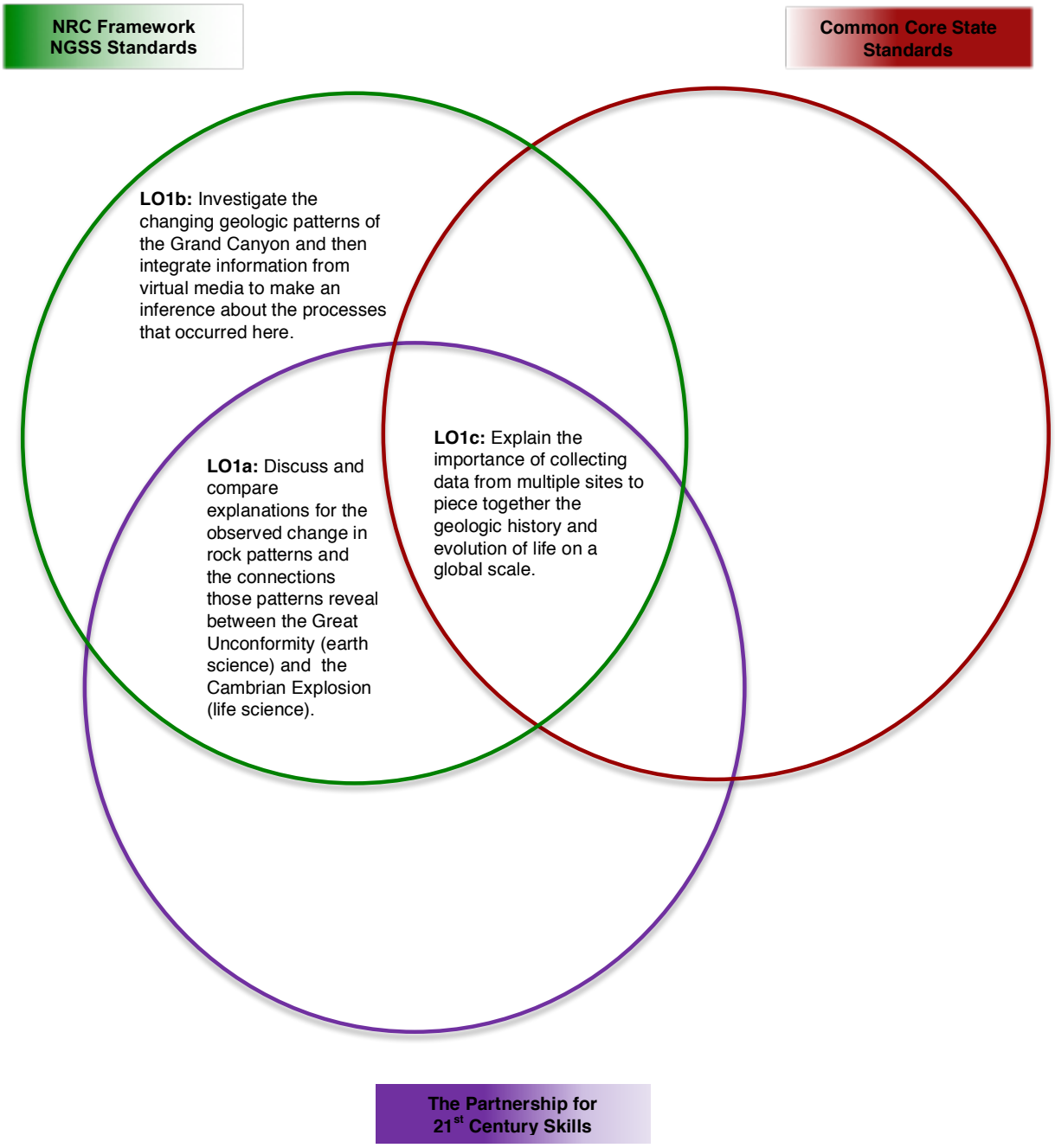
3.0 Learning Outcomes, NRC Framework, NGSS, Common Core, & 21st Century Skills Connections

The connections diagram is used to organize the learning outcomes addressed in the lesson to establish where each will meet the Next Generation Science Standards, Common Core Standards, and the 21st Century Skills and visually determine where there are overlaps in these documents. See NGSS Alignment Document and 21st Century Skills Alignment Document for details on their specific alignments.



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4.0 Evaluation/Assessment

Use the *(N) Mystery of Blacktail Canyon Alignment Rubric* as a formative and summative assessment, allowing students to improve their work and learn from mistakes during class. The rubric evaluates the activities using the Common Core State Standards.

5.0 References

Achieve, Inc. (2013). *Next generation science standards*. Achieve, Inc. on behalf of the twenty-six states and partners that collaborated on the NGSS.

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(M) Teacher Resource. Mystery of Blacktail Canyon Common Core State Standards Alignment (1 of 2)

You will know the level to which your students have achieved the **Learning Outcomes**, and thus the **Instructional Objective(s)**, by using the suggested **Rubrics** below.

Common Core State Standards		
Instructional Objective	**Reading Standards for Literacy in Science and Technical Subjects (9-12)**	**Writing Standards for Literacy in Science and Technical Subjects (9-12)**
IO1: **Construct an explanation for why multiple missions are sent to a variety of locations on planetary bodies to investigate their geologic history and for signatures of life.**		**Research to Build and Present Knowledge: CCSS.ELA-LITERACY.WHST.9-10.9** Draw evidence from informational texts to support analysis, reflection, and research. **Research to Build and Present Knowledge: CCSS.ELA-LITERACY.WHST.11-12.9** Draw evidence from informational texts to support analysis, reflection, and research.

(M) Teacher Resource. Mystery of Blacktail Canyon Common Core State Standards Alignment (2 of 2)

Common Core State Standards		
Learning Outcome	**Reading Standards for Literacy in Science and Technical Subjects (9-12)**	**Writing Standards for Literacy in Science and Technical Subjects (9-12)**
LO1c: Explain the importance of collecting data from multiple sites to piece together the geologic history and evolution of life on a global scale.		**Research to Build and Present Knowledge: CCSS.ELA-LITERACY.WHST.9-10.9** Draw evidence from informational texts to support analysis, reflection, and research. **Research to Build and Present Knowledge: CCSS.ELA-LITERACY.WHST.11-12.9** Draw evidence from informational texts to support analysis, reflection, and research.

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(N) Teacher Resource. Mystery of Blacktail Canyon Common Core State Standards Alignment Rubric

Related Rubrics for the Assessment of Learning Outcomes Associated with the Above Standard(s):

Common Core State Standards

	Expert	Proficient	Intermediate	Beginner
CCSS.ELA-LITERACY.WHST.9-12.9	Draws multiple lines of evidence from the VFT *and* instructional materials to support analysis, reflection, and research.	Draws one line of evidence from the VFT *and* instructional materials to support analysis, reflection, and research.	Draws lines of evidence exclusively from the VFT *or* instructional materials to support analysis, reflection, and research.	Draws lines of evidence from neither the VFT *or* instructional materials to support analysis, reflection, and research.

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