**QUALITY PERFORMANCE ASSESSMENT PLAN**

**Task Title:** Lithosphere Comparative Analysis Paper

**Subject Area/Course:** Earth Systems Science

**Grade Level:** 9

**Abstract/Summary:** Students analyze (compare, contrast, infer, apply prior knowledge) and research both New England and another pre-selected world region on which to write an analysis paper.

**Time Needed to Complete Task:** 7 week unit**;** 3 days **(**2 days in-class time – 100 minute class periods) for performance task

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| **ALIGN: Instructional Goals** |
| **New Hampshire Competencies**  |
| Cause and Effect: Students will demonstrate the ability to investigate, explain, and evaluate potential causal relationships by using evidence to support claims and predictions about the mechanisms that drive those relationships. Nature of science: Student will demonstrate the ability to work collaboratively and individually to generate testable questions or define problems, plan and conduct investigations using a variety of research methods in a various settings, analyze and interpret data, reason with evidence to construct explanations in light of existing theory and previous research, and effectively communicate the research processes and conclusions.  |
| **New Hampshire Work Study Practices**  |
| Communication:I can use various media to interpret, question, and express knowledge, information, ideas, feelings, and reasoning to create mutual understanding. |
| **Other Goals** |
| **Souhegan HS Science Practices*** Generating Interpretations
* Communicating Findings
* Following Conventions

**NH Science Frameworks**S:ESS1:11:2.3 – Explain the theory of plate tectonicsS:ESS1:11:2.4 – Describe the movement of crustal plates and explain how the effects have altered the Earth’s features.S:ESS1:11:4.1 – Provided with geological data (including movement of plates) on a given locale, predict the likelihood for an earth event (e.g., volcanoes, mountain ranges, islands, earthquakes, tides, tsunamis).S:ESS1:11.5.2 – Relate plate movement to earthquakes and volcanic activity, and explain how it results in tectonic uplift and mountain building. NGSS Practices#4: Analyzing and Interpreting Data. *I can adequately organize, analyze and interpret data.*#6: Constructing Explanations and Designing Solutions. *I can adequately develop an explanation of scientific phenomenon.*#8: Obtaining, Evaluating, and Communicating Information. *I can adequately process information, articulate and effectively communicate information.*#8: Obtaining, Evaluating, and Communicating Information. *I can adequately use language and tone appropriate to the purpose and audience.* |
| **Depth of Knowledge Alignment** |
| DOK 3: synthesis information from multiple sources; produce an original product. |
| **Essential Questions to Guide Learning and Inquiry**  |
| How are the current locations of geographic landforms affected by plate tectonics? |
| **Students will know (content) . . .**  | **Students will be able to (skills). . .**  |
| Students will understand:* The theory of plate tectonics
* The movement of crustal plates and how it effects two different regions of the world, one being New England.
* That geological data (including movement of plates) on a given locale, can help them predict the likelihood of an earth event (e.g., volcanoes, mountain ranges, islands, earthquakes, tides, tsunamis).
* That plate movement relates to earthquakes, volcanic activity, and land formations.
 | Students will be able to:* - Generate Interpretations
* - Communicate Findings
* - Follow Conventions
* - Explain the theory of plate tectonics
* - Describe the movement of crustal plates and explain how the effects have altered the Earth’s features.
* - Predict the likelihood for an earth event (e.g., volcanoes, mountain ranges, islands, earthquakes, tides, tsunamis) when provided with geological data (including movement of plates) on a given locale.
* Relate plate movement to earthquakes and volcanic activity, and explain how it results in tectonic uplift and mountain building.
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| **DESIGN: Performance Task and Evidence**  |
| **Common performance task summary**  |
| Students write a comparative analysis paper comparing New England to another region of the world by answering the Essential Question. They incorporate prior knowledge, information from graphs and data provided, as well as independent research. |
| **Group Work and Individual Work** |
| Group: Peer research and discussion of evidence and comparisons.Individual: Students work individually to evaluate their locations and the evidence. |
| **Key criteria for performance assessment** . |
| Cause and EffectNature of science Communication |
| **Possible Accommodations** What will teachers do in terms of instruction, curriculum and assessment to support the learning of SPED/ELL/other students in class?  | **Resources/Texts/Scaffolding Materials** What’s included here depends on the task assignment. It is recommended that a variety of resources are provided that allow students to make choices to access the information needed to complete the assignment. |
| * Interpret New England data only; no comparison
* Analyze only New England’s crustal movements and earth events (past and present).
* Written response format accommodations (i.e., outline)
* Timing and schedule accommodations
 | * Folder contains: maps (geological, plate movement, seismicity)
* Earthquake and volcanic activity charts/data, if applicable
* Website resources
* Textbook and class notes
* Venn diagram/comparative templates and charts
* Comparative essay outline formats
* http://www.geologycafe.com/images/north\_america.jpg
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| **Teacher Guide**  |
| **Pre-requisites and Placement in the Curriculum** |
| Can be placed anywhere in the year’s progression. Skills and concepts covered prior to performing task include:* Plate Theory of Plate Tectonics
* Crustal Movement
* Resulting Landforms
* Interpreting graphs and data
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| **Possible Formative Assessments** |
| * Knowledge quizzes and summative test (Plate Theory of Plate Tectonics, Crustal Movement, Resulting Landforms, Vocab)
* Data interpretation
* Relating current events to crustal movement/plate tectonics
* Dramatic interpretation of vocabulary/unit concepts
* Plot earthquakes and volcanoes on world maps; overlay plates; label and diagram with direction of crustal movement
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| **Teacher Instructions**To ensure the fidelity in implementation, this section includes:* Step-by-step procedures to implement task as designed
* Information on the time allotted for each step of the task
* Materials needed
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| Day One:1. Intro. Project sheet, rubric, Teacher explains packet contents

On day #1 of the assignment, the project sheet and rubric were reviewed and clarifying questions answered. Each group were given 2 folders, one from NE and one from another region. The students used the attached graphic organizer (some also used the Venn diagram) as they looked and interpreted each graph or map supplied.  The class was divided into groups of 3 or 4. Each group received a folder on New England and a folder from another region of the world, (their choice). Each folder contained a geological map of the region, maps showing recent earthquakes and depths & magnitudes, and recent volcanic activity, if applicable.  New England’s folder’s also contained a picture of the faults in New Hampshire (<http://aki.bc.edu/>).       1. Group students; group chooses comparative region (notes, textbooks, region packets – New England and Choice Region)

These are typical regions:* Iceland
* Japan
* Hawaii
* Nepal
* Chile
* Southern California
* Central America
1. Hand out comparison chart and venn diagram; student use resources to complete chart/diagram.

Use the geographic maps and the other information supplied in their folders as a starting point for their comparisons.  They could easily fill in the graphic organizer from the information in the folders. I added the geographic map because it shows where the region is in comparison to the closest plate boundary. This is particularly important for the NE and Hawaii regions (use the boundary map in the materials). Use the venn diagram to scaffold students in the comparison of the two regions.1. Students review packet materials and complete chart/venn by the end of class. The venn diagram is to help students scaffold their thinking as a formative tool.
2. HW: Student draft paragraphs 2-4 (see Project Sheet)

Day Two1. Review Day One work. Use peer discussion to evaluate evidence so far.

The last question the graphic organizer asks them is… what you are wondering about? When they come in for day #2—they again have their folders, but also have computers to research their ‘wonders’ and begin to write their comparative essays.  Graphic organizers are given to assist with writing the comparative essay. Use the links to share with them and help them research if they are struggling.  1. Students conduct independent research to enhance their evidence of their comparisons.
2. HW: Students write final paper.

**Links:** New England:      ~ New Hampshire Seismicity Map: earthquake.usgs.gov/earthquakes/states/new\_hampshire/seismicity  ~  Weston Observatory Boston College – New England Seismic Network :  <http://aki.bc.edu/>    ~  <http://www.geologycafe.com/images/north_america.jpg>   New England and other world regions:    ~    <http://earthquake.usgs.gov/earthquakes/?sources=site.nav>  (latest information; has world             seismology maps and by regions)     ~   [Http://volcano.si.edu](http://volcano.si.edu/)      ~  Volcano.si.edu/reports\_weekly.cfm     ~   <http://www.volcano.discovery.com/earthquakes.iceland.html>  (great for Iceland but use for               other regions as well)     ~  geomapnavi: <http://maps.nationalgeographic.com/maps> (able to show larger  view of region in            relationship to the nearest plate boundary- especially good for NE and Hawaii)     ~  [http://geology.about.com](http://geology.about.com/)     search: country name     ~  <http://www.scan.org/graphics/station_map.gif> (southern Calf)     ~  <http://www.sjvgeology.org/geology/earthquakes2.gif>  (southern Calf)     ~  <http://www.hobotraveler.com/na_2_volcanoes-in-nepal.php>  (volcanoes in Nepal)     ~  Japan Meteorological Agency     ~  <http://volcano.oregonstate.edu/vwdocs/volc_images/north_asia/japan_tec.html>\*\*  ~  <https://www2.bc.edu/~kafka/Why_Quakes/why_quakes.html>  The above links were used for the folders, but also for the students on day #2.  |

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| **Teaching/Learning Plan***To be completed by individual teacher, as learning plan may vary by teacher* The lesson plan is written as an outline that other teachers could understand and/or apply in their respective classroom (s). This generally outlines the scope and sequence of the lesson plans within the unit. It is recommended that the following are included: * The lesson plan includes how the goals will be addressed (what students know and can do
* The different steps and the specific instructions that correspond with each step of the process
* A timeline for each task
* Time or space for student reflection and feedback
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| * Earth’s layers and density of the layer
* Seismology (How we know what we know about the earth’s interior)
* Vocabulary: divergent, convergent, transform boundaries, subduction zone, Ring of fire, Hot Spot, Mantel plume, trench, Pangaea, continental drift, rift valley, sea floor spreading, tectonic plates
* The heat within—how plates move
* Evidence that exists for plate tectonicsWegner theories
* What landforms are the result of the different plate boundaries
* Plotting earthquakes and volcanos (relationship between seismic activity and plate boundaries) and drawing in the world’s platesLots of activities with raised maps and ocean floor maps (studying type of boundaries, plates involved and resulting landform)
* Understanding new crustal floor and sea floor spreading – trenches
* Hawaii hot spot
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