TASK OVERVIEW

MIDDLE SCHOOL EARTH & SPACE SCIENCE: PLATE TECTONICS

Three-Dimensional Claim

Students will construct scientific explanations of the current location of matching rock types on different continents and the age of rocks on the seafloor using graphs, charts, and images in data to identify patterns in the distributions of fossils on different continents as evidence of the gradual process of plate tectonics.

Disciplinary Core Ideas   Crosscutting Concepts   Science and Engineering Practices

Tennessee Academic Standards for Science

This task is intended to elicit student learning of the following Tennessee Science Standard:

8.ESS2.5: Construct a scientific explanation using dat~~a that explains the gradual process~~ of plate tectonics accounting for (A) the dis~~tribution of fossils on different continents, (B) the occ~~urrence of earthquakes, and (C) continental and ocean floor features (including mountains, volcanoes, faults, and trenches).

Next Generation Science Standards

This task is intended to elicit student learning of the following NGSS elements for each of the three dimensions:

Disciplinary Core Ideas

ESS2.B: Plate Tectonics and Large-Scale System Interactions

- *Middle School Element:* Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart.

Science and Engineering Practices

Constructing Explanations and Designing Solutions

- *Middle School Element:* Apply scientific ideas, principles, and/or evidence to construct, revise and/or use an explanation for real-world phenomena, examples, or events.

Crosscutting Concepts

Patterns

- *Middle School Element:* Graphs, charts, and images can be used to identify patterns in data.

Note: The strikeout language is not targeted in this assessment.

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	STRENGTHS	OPPORTUNITIES FOR IMPROVEMENT
SCENARIO	A specific phenomenon for student to explain – the distribution of Kannemeyeria fossils – is presented in the scenario by using text, a map, and images.	Adding the puzzling aspect of how the plates move to the scenario to make the phenomenon more compelling and better drive sense-making throughout the task.
SENSE-MAKING	This task provides opportunities for students to show three-dimensional thinking to make sense of a phenomenon (the fossil distribution of Kannemeyeria).	The sense-making is mostly present in Question 3 as this is where students are asked to begin to figure out the mechanism that causes plates to move. It may be beneficial to make this sense-making opportunity more central to the task.
INTEGRATED DIMENSIONS	Multi-dimensional prompts are used throughout the task, which allow students to demonstrate their understanding of the targeted core ideas, practices, and crosscutting concepts.	None.
EQUITY	By requiring students to support their claims with evidence and reasoning, students of varying achievement levels can demonstrate their understanding. Also, many of the questions seem to serve as a scaffold for the final question.	There may be opportunities to improve coherence and motivation. For example, Question 1 expects students to respond that the fossil distribution was caused by plate movement. It may be unclear to students why the following questions are about rock type and age. Some modifications to the order or framing would improve the coherence of the task from the student perspective. Consider giving options for students besides writing to demonstrate their understanding.
FEEDBACK SUPPORT	The task elicits artifacts that show how students can use the targeted practices, core ideas, and crosscutting concept elements together to make sense of the phenomenon and fulfill the task's intended purpose.	The scoring component should include exactly what should be in student answers for them to demonstrate an understanding of the standards that are currently listed as the scoring components. Some sections of the teacher guide could be more robust.

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Suggestions for Use

This task would best be used during instruction as a formative assessment to give students an opportunity to apply their learning of plate tectonics to a new phenomenon and to begin to extend their understanding to the mechanism of plate movement. The task elicits evidence of student understanding of all three dimensions.

What Are The Major Takeaways?

SUMMARY POINTS	SUGGESTIONS FOR IMPROVEMENT
This task provides students the opportunity to demonstrate their three-dimensional understanding to explain a specific phenomenon (the distribution of Kannemeyeria fossils) with appropriate scaffolds. While the students receive information in various ways (text, a map, images), the task would benefit from giving students more ways to share their thinking (besides writing).	Some modifications to the order or framing of the questions could improve the coherence and compelling nature of the task from the student perspective. For example, Question 1 expects students to respond that the fossil distribution was caused by plate movement, and it may be unclear to students why the following questions are about rock type and age. Focusing on how the plates move (which is touched on in Question 3) in the scenario could make the task more compelling and better drive sense-making.

What Should I Do Before Using This Task?

Users should review the provided guidance to familiarize themselves with instructions and disclosures before using these tasks.

How Were These Tasks Developed?

The tasks were developed and revised by teacher work groups from participating districts in the Tennessee District Science Network (TDSciN), which was launched in early 2019 and managed by NextGenScience. Tasks were evaluated using an adapted version of the Science Task Screener. Teachers worked collaboratively across districts to develop and revise these tasks after attending multiple professional learning sessions. Find out more about the development process here.

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