Project Planner

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| **How to use the document:** This planner offers guidance on how you might plan your daily lessons in the project calendar. Pick and choose what feels necessary to achieve the learning outcome and advance product development for all students. |

# 1. Project Overview

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| **Project Title** | Plate Tectonics and the Time Machine |
| **Driving Question** | What did the Earth look like at various points in Earth’s history? How did the configurations change? |
| **Grade Level/ Subject** | 9th grade Earth Science |
| **Time Frame** | 3 days |
| **Project Summary** | Students will use videos of plate reconstructions over the last 1.5 billion years of Earth’s history to describe the position of the Earth at given times at specific time frames. This project will be linked with Geologic Time in order to link the position of the plates with past climatic regimes and the evolution of key plants and animals. |
| **Public Product(s)** Individual and Team | Each member of the class will be given a particular time period to research and compile a set of defined information. Individuals will be placed in teams that compile a particular set of time periods together and summarize the overall era. The teams will then place their presentations into a larger group document. Each individual will present their information and provide a linkage/ segue to the next person. |

**2. Learning Goals**

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| **Standards** | **ES.7 The student will investigate and understand that plate tectonic theory explains Earth’s internal and external geologic processes. Key ideas include**  a) convection currents in Earth’s interior lead to the movement of plates and influence the distribution of materials in Earth’s layers, and may impact the magnetic field;  b) features and processes occur within plates and at plate boundaries;  c) interaction between tectonic plates causes the development of mountain ranges and ocean basins  **ES.9 The student will investigate and understand that many aspects of the history and evolution of Earth and life can be inferred by studying rocks and fossils. Key ideas include**  a) traces and remains of ancient, often extinct, life are preserved by various means in sedimentary rocks;  b) superposition, cross-cutting relationships, index fossils, and radioactive decay are methods of dating rocks and Earth events and processes;  c) absolute (radiometric) and relative dating have different applications but can be used together to determine the age of rocks and structures; |
| **Key Vocabulary** | **Plate Tectonics Terms**   1. Asthenosphere: the upper layer of the earth's mantle, below the lithosphere, in which there is relatively low resistance to plastic flow and convection is thought to occur. 2. Continental drift: the gradual movement of the continents across the earth's surface through geological time. 3. Convection: The movement of air, water and magma where warmer less dense materials rise and cooler denser materials sink. It is a transfer of thermal energy. 4. Convergent boundary: The collision of tectonic plates. 5. Core: The 2 innermost layers of the Earth’s crust. The outer core is liquid nickel and iron and the inner core is solid nickel and iron. 6. Crust: The solid outermost layer of the Earth. It includes the continental and oceanic crust. 7. Divergent boundary: Plates that move away from each other. 8. Earthquake: The violent shaking of the Earth's crust. 9. Fault: A crack in the Earth's crust that moves. 10. Lithosphere: The solid outermost layer of the Earth. 11. Mantle: The later of the Earth below the crust. It is the largest interior layer, it is mostly solid. 12. Mercalli scale: A twelve-point scale for expressing the local intensity of an earthquake, ranging from I (virtually imperceptible) to XII (total destruction). 13. Orogeny: The geologic process of folding and faulting of mountain building. 14. Pangaea: The ancient continent that joined all continents in one large landmass. 15. Physiographic provinces: Is a geographic region with a characteristic geomorphology, and often specific subsurface rock type or structural elements. 16. Plate tectonics: A theory explaining the structure of the earth's crust and many associated phenomena as resulting from the interaction of rigid lithospheric plates which move slowly over the underlying mantle. 17. Richter scale: A numerical scale for expressing the magnitude of an earthquake on the basis of seismograph oscillations. 18. Ring of Fire: also referred to as the Circum-Pacific Belt, is a path along the Pacific Ocean characterized by active volcanoes and frequent earthquakes. The majority of Earth's volcanoes and earthquakes take place along the **Ring of Fire**. 19. Seismic waves: **wave** that travels through the Earth, most often as the result of a tectonic earthquake, sometimes from an explosion. 20. Seismometer: is an instrument that responds to ground motions, such as caused by earthquakes, volcanic eruptions, and explosions. 21. Seismogram: is a graph output by a seismograph. 22. Seismograph: an instrument that measures and records details of earthquakes, such as force and duration. 23. Shadow zone: is the area of the earth from angular distances of 104 to 140 degrees from a given earthquake that does not receive any direct P waves. 24. Subduction: The geologic action where a denser tectonic plate is pushed under a less dense tectonic plate. This happens at a convergent plate boundary. 25. Transform boundary: a boundary where two plates slide past each other. The lithosphere is not created or destroyed here. 26. Volcano: any opening in the Earth’s crust where magma reaches the surface and becomes lava. |
| **Literacy Skills** | The literacy skills that are required in the project will be reading informational text, presenting evidence, and engaging in collaborative conversation. |
| **Success Skills** | Critical thinking, data analysis, collaboration, and self-management with regard to time on the project – link individual contributions to group deliverables. |
| **Rubric(s)** | Link/name rubric(s) you intend to use; [template for your use](https://docs.google.com/document/d/1A093gW7xgFMXTgfAxNseirn73IDOSpj1PTQtMJJ4p98/template/preview) |

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# 3. Project Milestones

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| **Directions:** Use this section to create a high-level overview of your project. Think of this as the broad outline of the story of your project, with the milestones representing the significant ‘moments’ or ‘stages’ within the story. As you develop these, consider how the inquiry process is unfolding and what learning will take place. The Project Calendar (Section 4) will allow you to build out the milestones in greater detail. |

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| **Milestone #1**  Consider indicating if this is tied to team or individual learning/products | **Milestone #2** | **Milestone #3** | **Milestone #4** | **Milestone #5** | **Milestone #6**  Public Product |
| E.g., Entry Event | E..g., Student generated questions; research | E..g., Field observation and data collection | E..g., Feedback from an expert and revision | E..g., Finalization of product and preparation for presentations | E.g., Final presentation and reflection |
| **Key Student Question** | **Key Student Question** | **Key Student Question** | **Key Student Question** | **Key Student Question** | **Key Student Question** |
| This is the anticipated need to know question that guides the learning for the milestone. |  |  |  |  |  |
| **Formative Assessment(s)** | **Formative Assessment(s)** | **Formative Assessment(s)** | **Formative Assessment(s)** | **Formative Assessment(s)** | **Formative Assessment(s)** |
| Identify how you will capture student learning to inform both teacher and student action in the project. These might be self, peer, or teacher assessments. |  |  |  |  |  |

# 4. Project Calendar

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| **Driving Question** |  |
| **Week #** |  |
| **Project Milestone** | The calendar is organized by milestone so that you have flexibility when it comes to implementing. You may also structure by weeks if that feels more intuitive. A given milestone may take more or fewer than 5 days. Feel free to flex the form to meet your needs. |
| **Key Student Question(s)** | This is the anticipated need to know question that guides the learning in each milestone. |

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| Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
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**Additional Notes**: Include any notes that will help you with the implementation of this project milestone (e.g., resources, notes to self, etc.)

# 4. Project Calendar (continued)

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| **Driving Question** |  |
| **Week #** |  |
| **Project Milestone** | Duplicate tables for each milestone as needed. |
| **Key Student Question(s)** |  |

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| Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
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**Additional Notes**:

# Lesson Planner: Supporting Resource

1. **Checking Prior Knowledge**   
   Identify how you will inventory student knowledge ahead of the task, lesson, or activity. (e.g., previous day’s exit tickets, warm-up activity, need to know list review, quiz, class discussion, etc.)
2. **Learning Outcome**   
   These can be related to success skills or standards. If your district uses a graduate profile or career pathway outcomes, include relevant outcomes here as well.
3. **Key Vocabulary**   
   Note which terms or academic vocabulary will be essential to this lesson. If you serve English language learners, consider what additional vocabulary might be necessary for them to access the content/skills during the instructional activities.
4. **Formative Assessment**   
   For each lesson, consider which assessment type best measures the learning outcome. For example, a quiz may be the best way to check for understanding of key terms while an annotated sketch might be best for determining student understanding of how the key terms fit together. In some cases, your assessment may be informal, such as an exit ticket, or more formal, as in a rough draft. Finally, when planning your formative assessment, diversify who is doing the assessment. Include self, peer, and teacher assessment opportunities, as appropriate for the age group. When possible, have external partners or end users provide feedback to improve or guide the work.
5. **Major Instructional Activities**   
   This can include lessons, tasks, activities, or learning experiences. Choose the instructional method that will best help students achieve the learning outcome. For example, a direct instruction lesson may be appropriate for introducing the key players in World War II while an artifact inquiry activity during which students examine primary source documents would be better suited for them to understand the impact of those key players on the pivotal events during the war. This would also be the space to include teaching and learning related to classroom culture, student collaboration, and/or project management tools or skills, as appropriate for students or project milestone needs. Included links show examples of such activities.
6. **Scaffolds**   
   Scaffolds are intended to be temporary supports that are removed when students no longer need them. These scaffolds can be used to support either content or the project process (e.g., need to know questions). Leverage “checking prior knowledge” to ensure you are offering the right scaffolds to the students who need them. Be sure to consider a wide range of needs, such as literacy skills, language acquisition levels, auditory/visual processing, building schema, learning style preferences, academic performance levels, etc.
7. **Reflection**   
   How will students reflect on their thinking, process, or learning?
8. **Student Need to Know Questions Addresses**   
   Which student questions will be answered, or are you aiming to answer, during this instructional activity?
9. **Tools/Resources**   
   Student-facing tools, human resources such as experts or community members, teacher tools, equipment, etc.