**Index Fossil Lab**

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**Teacher(s):** David Lambert

**Lesson Length**: (5 class periods)

**Background/Context:**

 This lesson will allow students to use the knowledge they have gained about index fossils and use a method absolute dating to find the age of rocks. This project is intended for students to complete at the end of “The Age of Earth’s Rocks” Unit.

**Resources and Materials:**

* Lab sheet for each student.
* Textbook
* Chromebook/Computer
* Writing Utensil
* Fab Lab

**Key Terms:**

* Relative Dating, Index Fossils, Relative Age, Fossil Record, Absolute Dating, Geologic Time Scale

**Standards/ “I can” Statements**

**NGSS**

* MS-ESS1-4 . Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth’s 4.6-billion-year-old history.
	+ I can analyze rock formations and the fossils they contain to establish relative ages of major events in Earth’s history.
* MS-ETS1-4. Develop a model to generate data for testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
	+ I can determine the ages of Earth's rocks and fossils using absolute dating methods and analyze evidence used to organize Earth's long history.
	+ I can gather and use evidence about geologic processes, rocks, and fossils to construct explanations for how Earth’s history is organized into the geologic time scale.

Wisconsin Model Academic Science (identify standards)

* SCI.SEP2.A.m Students develop, use, and revise models to describe, test, and predict more abstract phenomena and design systems.
	+ I can develop a model that shows how absolute dating works.
	+ I can use a model to identify a specific time period on Earth.
	+ I can compare and contrast the different types of fossils to organize the geologic time scale on Earth.

**Career Cluster links:** <https://careertech.org/career-clusters>

* <https://careertech.org/STEM>

**Procedure:**

Introduction/Hook: The students are Paleontologists tasked with creating models for a museum to use in their junior paleontology educational center. Research a time period and create a model rock outcrop. Within your group create index fossils that could be present in a rock layer of that age. Use both the chart of index fossils and the chart of the geologic timescale to create your fossil models.

Instruction: You and your group are tasked with building a 3-D models of index fossils. You MUST create your fossils using the fab lab 3D printer.

* Day 1 and 2 students’ research and decide which historical time they want to base their model rock outcrop on, fill out their lab sheet, and draft their fossils on the computer.
* Day 3 and 4 students will 3-D print their fossils they have drafted. When they have their fossils created the group can begin building their model rock outcrop using different colors of clay.
* Day 5 students will finish assembling their model and begin embedding the index fossils into the correct layers of rock. Make sure to include some rock layers that do not contain any index fossils.

Closing: Have each group swap their outcrop with another group and use the charts of index fossils and geologic timescale to determine the approximate

age of each layer in the rock outcrop. Afterwards the students should complete questions 4-6 on their lab sheet (individually).

For an exit slip have each group write what went well and what they could have done to make their model better. Also what was the biggest difference between the model they built and the model they used to answer the questions on the lab sheet?

**Assessment:**

* Pre-assessment: Because of time restraints, in a large group have the students give the definition of the vocab terms aloud.
* Formative: Student engagement and time management will be assessed throughout the 5 day project. The teacher can critique and guide student performance if an issue arises.
* Summative: Upon completion of the project, including sharing their model with their classmates. Students will turn their model, lab sheet, and exit slip into the teacher.

**References:**
We use HMH Dimensions textbook in our school district. I took a Quick-Lab worksheet from the HMH Dimensions Module F Unit 2 “Earth through Time” from the student text book and modified it to incorporate the Fab Lab.

**Attachments:**

* Modified Quick-Lab worksheet from the HMH Dimensions Module F Unit 2 “Earth through Time.”

**Contact Information:**

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**Reflection/Notes:**