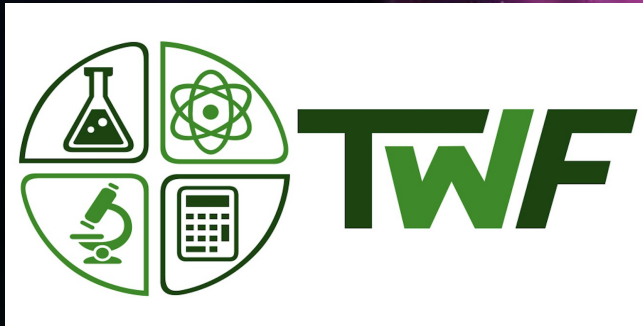


Fossils and Geologic Time

5E Lesson

The 5E model is a scientifically proven method to improve student engagement and learning in your classroom

- ✓ Engagement
- ✓ Exploration
- ✓ Explanation
- ✓ Elaborate
- ✓ Evaluate



Fossils and Geologic Time

5E Lesson

Fossils and Geologic Time – 5E Les

Your students will watch the video 'Fossil Rock Anthem' and complete the questions found in the file – Engagement – Fossil Rock Anthem Video.

- The video is about three minutes long
- You may need to show the video more than once or pause when an answer is given to one of the questions.

- In groups of 2-3, have your students complete Exploration – Lab Station Activity. Once they're done, they will submit their passport to you.

- The complete instructions for my Lab Station activity can be found in the [START HERE – Instructions](#) file.

- The lesson is found in the folder – Explanation – Lesson
- This lesson is designed to be completed over two days
- There are multiple embedded videos and plenty of opportunity to engage, interact and check for your students' understanding throughout the lesson
- The lesson covers the following topics:
 - What is a Fossil?
 - How Does Fossilization Occur?
 - Rock Strata
 - The Fossil Record
 - The Geologic Time Scale

- All videos can be accessed directly from the PowerPoint. To retrieve them, click on the video icon while in slideshow mode and it will automatically open for you. If they don't open, right-click the image and select Edit Hyperlink or something similar.
- I've created a video walkthrough if needed. It can be accessed here - <https://youtu.be/oC1KIP9SaDQ>
- I have also enclosed a PDF version of both the teacher and student versions.

Your students will complete – *Elaborate – Reading*. This reading will require your students to move beyond what was covered directly in the lesson and allow them to further develop their understanding.

- Students will work individually or in small groups
- This reading contains 10 comprehension questions and 2 extension questions. It is fully editable so I encourage you to remove any question(s) in order to meet the needs of your students as well as your time frame.

Have your students complete - Evaluate – Fossils and Geologic Time Quiz

- It's sometimes best to have the students peer evaluate
- Placing students in small groups and having them exchange papers to mark will accomplish two things
 - 1) Provide immediate feedback on the questions they just completed
 - 2) Significantly reduce your marking time
- Peer evaluation is not needed, only suggested when appropriate

Teacher Role – Facilitate learning and keep students focused

- ☐ Students use their newly obtained knowledge to propose solutions and extend their learning to new situations

Teacher Role – Distribute and collect evaluation

- ☐ Students are given the opportunity to demonstrate their understanding and evaluate their own progress

☐ Students are able to connect the content presented to previous experiences

Each phase is clearly described

A Complete Lesson

Casts and Molds

- Mold: organism imprint in rock

- Remains decompose
- Mold filled in by rock
- If rock erodes away, imprint remains



- Cast: fossil within a mold

- Also called replacement



Casts and Molds

- Mold: _____

- Remains decompose
- Mold filled in by rock
- If rock erodes away, imprint remains



- Cast: _____

- Also called replacement



← Make sure your students are on track

Student copies with blanks
Videos embedded right into
your slideshow



The Geologic Time Scale

- Means of organizing Earth's history

- Chronostratigraphy + geochronology

- Eons → Eras → Periods → Epochs → Ages

- Named for relative time and type of life present

- -zoic = animal life

- Paleo = ancient

- Meso = middle

- Ceno = recent

Interactive and Engaging Activities

Fossils and Geologic Time Lab Station Activity



EON	ERA	PERIOD	EPOCH	Ma
Phanerozoic	Cenozoic	Quaternary	Holocene	0.011
			Pleistocene	0.8
		Pliocene	Late	2.4
			Early	3.6
		Miocene	Late	5.3
			Early	11.2
		Oligocene	Late	16.4
			Early	23.0
		Eocene	Late	28.5
			Early	34.0
	Mesozoic	Cretaceous	Late	99.6
			Early	145
		Jurassic	Late	161
			Early	176
		Triassic	Late	200
			Early	228
		Permian	Late	251
			Early	260
		Pennsylvanian	Late	271
			Early	299
	Paleozoic	Mississippian	Late	306
			Early	311
		Devonian	Late	318
			Early	345
		Silurian	Late	359
			Early	385
		Ordovician	Late	397
			Early	416
		Cambrian	Late	419
			Early	428
Precambrian	Proterozoic	Late Proterozoic (Z)		444
				501
		Middle Proterozoic (Y)		513
				542
		Early Proterozoic (X)		1000
Hadaean	Archean	Early		1600
				2500
				3200
				4000

7 Lab Station Activities to get your kids out of their seats and engaged in their learning

Fossils Scientific Reading Comprehension Article and Extension Activity

Fossils

We've all heard of fossils, probably even seen some. A few of us may even have gone on a fossil dig. From giant dinosaur fossils strong together into a reconstructed skeleton to jewelry made from ammonites, relics of Earth's 4.6-billion-year history are an important part of the present and they tell us stories about the past. But what exactly are fossils and how did they form? What makes one dead animal or plant fossilize while millions of others simply decompose?

What Are Fossils?

Fossils are the ancient remains or traces of deceased life forms preserved in rock, amber, asphalt, or ice. Fossils fall into two categories: body fossils and trace fossils. Body fossils include preserved hard parts of organisms such as bones, teeth, shells, and seeds as well as rarely, whole or nearly whole organisms. Trace fossils are preserved traces of organisms, including burrows, footprints, or feces as well as impressions left behind in rock beds. Fossils are generally defined as being older than 10,000 years.

How Are Fossils Formed?

Specific conditions are required for fossils to form. Most fossils form in sedimentary rock and continuous accumulation of sediment is often necessary for fossilization. Deceased organisms must be quickly buried or otherwise isolated from external influences that cause decomposition (e.g., oxygen, bacteria, scavengers, insects, wind, water). Finally, to prevent destruction, the remains must not be excessively heated or under extreme pressure (though one type of fossilization requires a certain amount of both). Such conditions are often met in sediments deposited in bodies of water.

There are five broad types of fossilization: petrification, compression, molds and casts, mineralization, and complete preservation. Petrification is the process by which organic material (e.g., wood, bone, shell) transforms into another substance, typically stone. In this type of fossilization, the soft parts of an organism's remains have decomposed, leaving behind only the hard parts. Most fossils are formed via petrification in one of two ways: permineralization or replacement. Permineralization is the most common type of fossilization. In this process, water carrying various dissolved minerals seeps through the remains. Minerals are left behind in cavities and pores within the remains and these minerals crystallize, solidifying the remains just as sedimentary rock is cementing and solidifying around them. Permineralized

remains retain some of the original organic material. Replacement occurs when groundwater dissolves the remains of an organism. Minerals within the groundwater replace the material originally composed of the organism's hard parts. Replacement can take place slowly or quickly. When replacement is slow, more detail can be preserved, while fast replacement results in the shape of the original material.

Compression fossils are flattened organic remains of deceased organisms. Plants are often preserved in this way. There are two types of compression: carbonization and distillation. Carbonization occurs when remains decay under heat and high pressure from overlying sediments. Hydrogen, oxygen, and nitrogen are expelled from the remains, leaving only carbon behind. This results in a dark, two-dimensional impression in rock in the shape of the original organism. Distillation is a rare type of carbonization in which

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What Fossils Can Tell Us

Improve your students' **Literacy** and **Analysis Skills**, use as an **Emergency Substitute Plan**, or create **Applicability** in your classroom

Get away from tired practices and unengaged students



Provide a Scientifically-Proven means of instruction



Incorporate Technology and Increase Collaboration

