
How Old is Old?



Purpose: This lesson will help students visualize the geologic time scale and identify when and where regional features were formed in the Rogue Valley.

Objectives:

Students will:

- Identify the point in time when their assigned geological formation was formed by calculating how many centimeters from the end of the ribbon their tag should be placed.
- Teach the class about their assigned geological formations by conducting research about when they were formed, how they were formed, where they are located, and what they are made of, and preparing visual presentations in small groups.

Materials:

- Time scale ribbon (1)
- Time period tags (19)
- “Geology of Jackson County, Oregon” booklets (5)
- Geological formation half sheets (1 for each group with the name of their formation on it)
- Poster boards (not provided)
- Markers (not provided)

Time Required: 1.5 hours (can be broken into 2 class periods)

Appropriate grades: 6th-8th

NGSS and Common Core Standards:

MS-ESS2-2: Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

CCSS.ELA-LITERACY.SL.6-8.4: Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.

CCSS.ELA-LITERACY.SL.6-8.5: Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

Activity:

Introduction	Prep: cut the geological formation half sheets along the solid line in the middle of the page. Each group of students will get a half sheet with the name of their geological formation. 1. Ask students what they consider to be “old” and “young”. Generate a
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	<p>list on the board with student ideas. If certain geological formations, such as mountains, have not been brought up, ask students if they consider mountains or other land formations to be “old” or “young”.</p> <ol style="list-style-type: none"> a. Are some mountains older than others? <p>2. Explain to students that they are going to learn about local geological formations and how old they all are.</p>
<p>Body</p>	<ol style="list-style-type: none"> 3. Break students up into five groups and assign them each a different geological formation (Klamath Mountains, Hornbrook Formation, Payne Cliffs Formation, Western Cascades, and High Cascades). Hand each group the half sheet with the name of their formation on it, and give each group a copy of “Geology of Jackson County, Oregon”. 4. Instruct students to open their booklets to the map that shows where each geological formation is located (p. 14 and 15). <ol style="list-style-type: none"> a. Do you think the formations are all the same age? 5. Bring out the time scale ribbon, stretch it out, and show students the different time periods by placing the tags on the ribbon. Point out that the Holocene, which is our time period, is too small to even label on the ribbon. <i>Note: the color on the outer rim of each tag corresponds with the color on the ribbon. Please see the table at the end of the lesson for the order of time periods.</i> 6. Students will then work in groups to color their tag for their formation on the top of their worksheet (instruct them to cut along the dotted line to separate the tag with the name). 7. Groups will calculate the distance in centimeters (from the end of the ribbon) to place their tag. This information is provided on the half sheet they were given. 8. Students will also find out information about their formation, using the “Geology of Jackson County, OR” booklets and any other resources available. <ol style="list-style-type: none"> a. This information can be organized on a poster board for a presentation for the class. b. For the presentation, ask groups to answer the following questions: <ol style="list-style-type: none"> i. When was it formed? ii. How was it formed? iii. Where is it in Oregon?



	<p>iv. What is it made of?</p> <p>v. One neat fact about it.</p>
Closure	<p>9. Groups will place their tag on the ribbon and explain their formation to the class, using their decorated poster board as a presentation tool.</p> <p>10. Ask students again what they consider to be “old” and “young”. Are their formations old or young? Discuss geologic time and what makes something young or old.</p> <ol style="list-style-type: none"> a. What geological formations are “young” on the ribbon? What formations are “old”? b. Where are humans on this ribbon? c. Are geological formations still occurring? Why can’t we see this happening?

Modifications:

- **Elementary:**
 - Focus on the time scale itself and the idea about “old” versus “young”, but simplify the research project.
- **High School:**
 - Break students up into nine groups and have them research all of the geological formations in the table at the end of this lesson, using multiple resources (internet, books, etc.)



The oldest time period is the Hadean, represented by molten rock. The earth's crust was still forming at this point. The epoch we are in currently is the Holocene which started about 12,000 years ago. A guide to the time period tags for the lesson and what the symbols on them is listed below.

Time Period	Millions of years ago	Symbol	Explanation
Hadean	4600	Molten rock	The earth's crust was still forming
Achaean	4000	bacteria	The first single celled organism showed up.
Proterozoic	2500	Oxygen	Due to photosynthesizing bacteria, oxygen becomes part of the atmosphere.
Cambrian	542	Clam	Cambrian explosion- lots of complex life forms show up.
Ordovician	488	Nautiloid	Nautiloids were large predators during this time.
Silurian	444	Trilobite	Trilobites were one of the most common animals during this time.
Devonian	416	Leaf	Terrestrial plants took off during the Devonian.
Carboniferous	359	Dragonfly	There was a giant 30-inch dragonfly alive in this time period.
Permian	299	Dimetrodon	The first proto-dinosaurs appear.
Triassic	251	Volcano	As Pangaea was breaking apart there were huge volcanic eruptions.
Jurassic	200	Conifer	Conifer trees were very common during this time.
Cretaceous	146	T-rex	The t-rex is one of many dinosaurs walking around during the Cretaceous.
Paleocene	65.5	Meteorite	The Paleocene starts after a meteorite causes the extinction of most species on earth.
Eocene	55	Bird feather	Modern birds really take off during the Eocene
Oligocene	33.9	Horse	Horse hooves became much better at running.
Miocene	23	Himalayas	India and Asian crash into each



			other and create the Himalayas
Pliocene	5.3	Sabertooth cat	Dire wolves, sabertooth cats and mastodons were roaming around.
Pleistocene	1.8	Snowflake	The ice-age. Glaciers cover half of north America
Holocene	.01	Arrowhead.	Modern humans

Local Geological Formations. The first 5 are covered in the “Geology of Jackson County, Oregon” booklet, and the last 4 are additional formations that could be added to the lesson, providing the students had access to computers or other resources outside of this kit.

Formation	Age	Time Period
Hornbrook Formation	100 million years	Cretaceous
Payne Cliff Formation	66 million years	Cretaceous
Western Cascades	37 million years	Eocene
High Cascades	5 million years	Pliocene
Klamath Mountains	260 million years	Permian
Columbia Plateau	15 million years	Miocene
Oregon Cave Marbles	190 million years	Jurassic
Mount Ashland	200 million years	Jurassic
Oregon Caves	3 million years	Pliocene

