

Rocks of the Bear Creek Watershed

IGNEOUS – made from fire or heat

- Andesite: Black, greenish, or grayish with microscopic crystals. Harder than a carpenter's nail.
- Basalt: Black or dark green. Harder than a carpenter's nail. Has microscopic crystals.
- Cinder: Volcanic rock with many bubbles in it. It is typically red, brown or black.
- Dacite: Volcanic rock with lots of silica. Look for banding and layers of colors and textures.
- Diorite: Minerals are dark and light. A salt-pepper texture with more dark crystals than granite.
- Gabbro: A dark, coarse-grained rock, harder than a nail with mostly large, dark crystals.
- Granite: Harder than a carpenter's nail. Large pale crystals with a few dark crystals.
- Obsidian: Usually black, but also grey, greenish, red or colorless. Breaks like artificial glass.
- Peridotite: Dense and coarse-grained, greenish or brownish.
- Pumice: Looks soft and foamy, like a sponge. Floats on water and can be carved with a knife.
- Rhyolite: Fine-grained, pale gray, pink or purple. Swirling layers of different colors & textures.

SEDIMENTARY – made from sediments

- Chalk: Soft, porous rock made up of microscopic marine organisms.
- Chert: Very compact and hard rocks made of silica. Jasper is red while agates are banded.
- Conglomerate: Made of pebbles or cobbles with smaller particles filling the spaces between.
- Limestone: Often grayish in color and frequently contain fossil shells. Bubbles with vinegar.
- Mudstone: A fine-grained rock that looks like hardened clay.
- Petrified Wood: A type of fossil. The tissues of a dead tree are replaced with minerals.
- Sandstone: Small, rounded sand grains cemented together. Sometimes contains fossils.
- Shale: Black, grey, red or tan. Layered or plate-like form of mudstone or claystone.
- Siltstone: Made up of silt, grain sizes are between the size of coarser sandstone and finer shale.

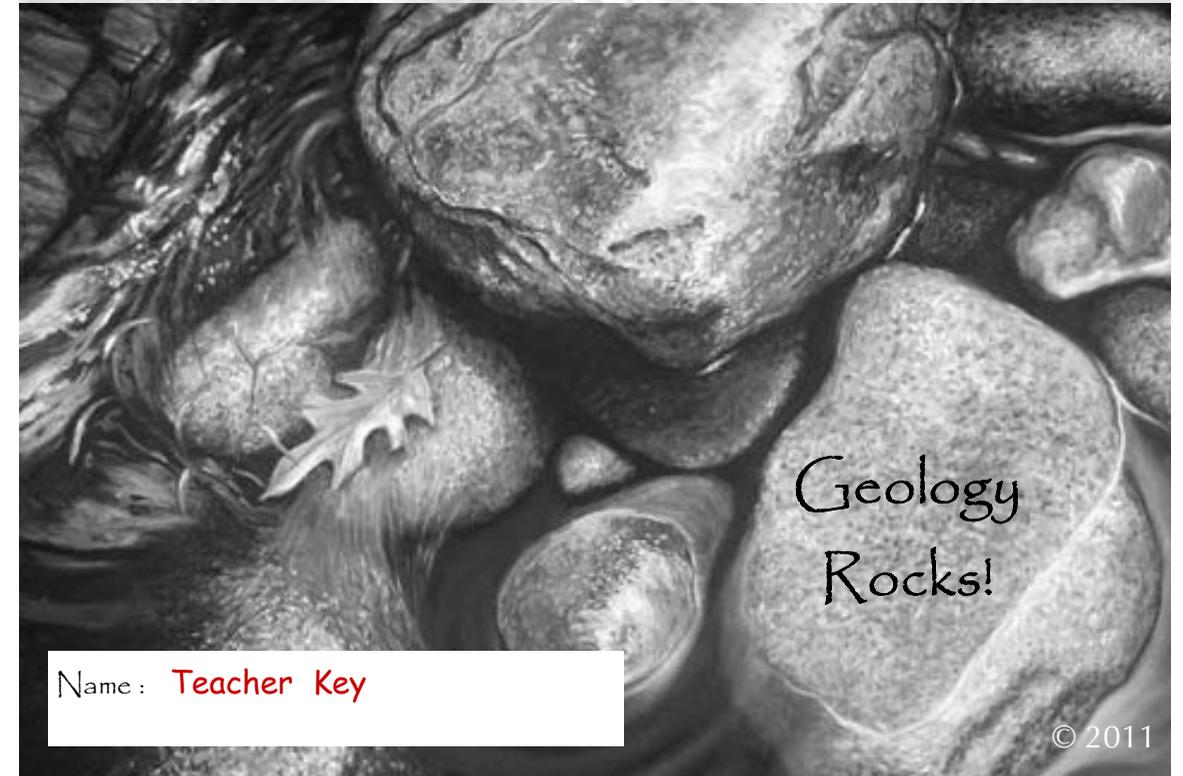
METAMORPHIC – changed from other rocks

- Gneiss: Medium to coarse-grained. Layered or banded in appearance.
- Marble: Locally, usually whitish to dark grey with streaks of black. Bubbles with vinegar.
- Phyllite: Glossy sheen and a wavy surface; splits into sheets.
- Quartzite: Cloudy white, tints of other colors. Inside looks like sugar. Harder than a nail.
- Schist: Contains fairly large crystals, plate-like or splintery. Commonly has flat, shiny mica.
- Serpentine: Greenish and greasy looking.
- Slate: Smooth & shiny. Splits into flat sheets. Black, grey or red. Softer than a carpenter's nail.

Geology of the Rogue Valley

An Activity Book for Grades 3-5

Welcome! You are about to embark on a journey exploring the Geology of the Rogue Valley. Your adventure begins at school and continues at North Mountain Park. This workbook will prepare you for your trip and help you remember many of the things you will see and learn along the way.



North Mountain Park Nature Center

620 N Mountain Ave ~ Ashland, OR 541.488.6606 www.northmountainpark.org



Pre-visit Activity

You Probably Know More Than you Think About Geology

Directions: Draw a line between the rock or mineral on the left and its useful item on the right. See how many connections you can make!

Do any of the rocks and minerals sound familiar?

granite

obsidian

quartz

clay

sand

marble

pottery

statues

glass

watches

countertops

arrowheads

Post-visit Activity

Try these fun activities back in your class or with an adult at home!

Create a pet rock!

Sometimes the best toys are the ones you make. First, find a special rock. Then, use smaller rocks, felt, google eyes, markers and glue to create a real or imaginary creature.



Grow a crystal!

Materials:
Saucepan
Saucer
Stove
Glass Jar
Spoon
Water
Thread
Pencil
Alum (available at a pharmacy)



Directions:

Measure 1 cup of water into a saucepan. Add 2 ounces of alum. Heat the solution but don't let it boil. Remove the pan from the heat and stir in more alum until no more will dissolve. This will give you a saturated solution. (Look for a few particles of alum starting to settle out on the bottom.) Pour a little of the solution into a saucer. Place the saucer in a draft-free place where it will remain undisturbed. Pour the remainder of the solution into a clean jar and cover it for later use. As the solution in the dish cools and some of the water evaporates, small crystals will begin to form. After a few days, these "seed" crystals should be big enough to handle. Tie one end of a piece of thread around one of the seed crystals and tie the other end around the center of a pencil. Pour the solution from the covered jar into a clean jar, leaving behind any crystals that may have formed. Then suspend the seed crystal completely in the solution by placing the pencil across the top of the jar. Leave the crystal undisturbed so it can continue to grow.

Start a rock collection!

This activity is easy! The next time you are playing outside or near a creek, collect some interesting looking rocks. With an adult helper and goggles, you can crack them open with a hammer. Use the chart on the back of this booklet to identify your rock and build your collection. See if you can find every rock on the list! Some rocks can be more accurately identified with a carpenter's nail or vinegar.

Post-visit Activity

Try these fun activities back in your class or with an adult at home!



Stack rock cairns

The next time you are in a place where there are lots of rocks, try this fun activity. See how many rocks you can stack on top of each other. Have a contest to see who can make the tallest cairn. Rock cairns are used as wayfinders for hikers in the wilderness. In areas where it is difficult to follow a hiking trail, people will often make a small stack of rocks to help hikers stay on the trail.

Build a volcano

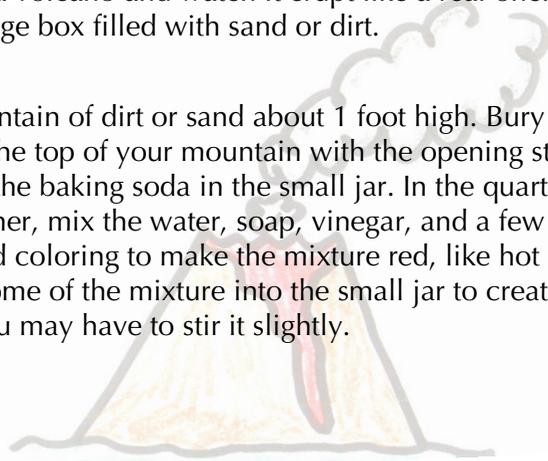
With some simple materials, you can build a volcano and watch it erupt like a real one. You can make it in your backyard or in a large box filled with sand or dirt.

Materials:

Dirt or damp sand
Small jar with wide neck
Quart-sized container
1/4 cup vinegar
1/4 cup dishwashing liquid
1/2 cup water
4 tablespoons baking soda
Red food coloring

Directions:

Make a mountain of dirt or sand about 1 foot high. Bury the small jar in the top of your mountain with the opening sticking out. Put the baking soda in the small jar. In the quart-sized container, mix the water, soap, vinegar, and a few drops of food coloring to make the mixture red, like hot lava. Pour some of the mixture into the small jar to create an eruption. You may have to stir it slightly.



Directions:

First, tie the string around the center of a pencil, allowing 2" to hang down from the pencil. Balance the pencil on the rim of the jar and set aside. Heat the water mixed with sugar over medium heat. When the sugar has dissolved, continue to add sugar until no more dissolves. Remove pot from stove and let cool until just warm. Pour sugar mixture into the jar around the string and pencil. Set aside. Within a few hours, crystals will begin to form. Leave overnight. Pull candy string out of the liquid in the jar and enjoy!

Make rock candy!

Materials:

Measuring cup
Large saucepan or pot
Spoon
Jar
Pencil
4" length of soft cord
1/2 cup water
1 cup sugar

Pre-visit Activity

In your own words . . .

You may already know some of these words. They are all part of the language that geologists use to describe the history of life on Earth. **Directions:** Read the definitions, then use as many of these words as you can to write your own story.

Mesozoic Era: From 245 to 65 million years ago. This is when the dinosaurs ruled the Earth.

Earthquake: Sudden movements of the Earth's crust when stress is released from a fault or volcano.

Basalt: A hard, dark rock formed from lava released by a volcano and cooled on the Earth's surface.

Lava: Molten, or melted, rock that reaches the Earth's surface through a volcano.

Volcano: An opening in the Earth's crust through which lava and gases are ejected.

Stegosaurus: A plant-eating dinosaur that had two rows of bony plates on its back, long hind legs, a short neck, and a small head.

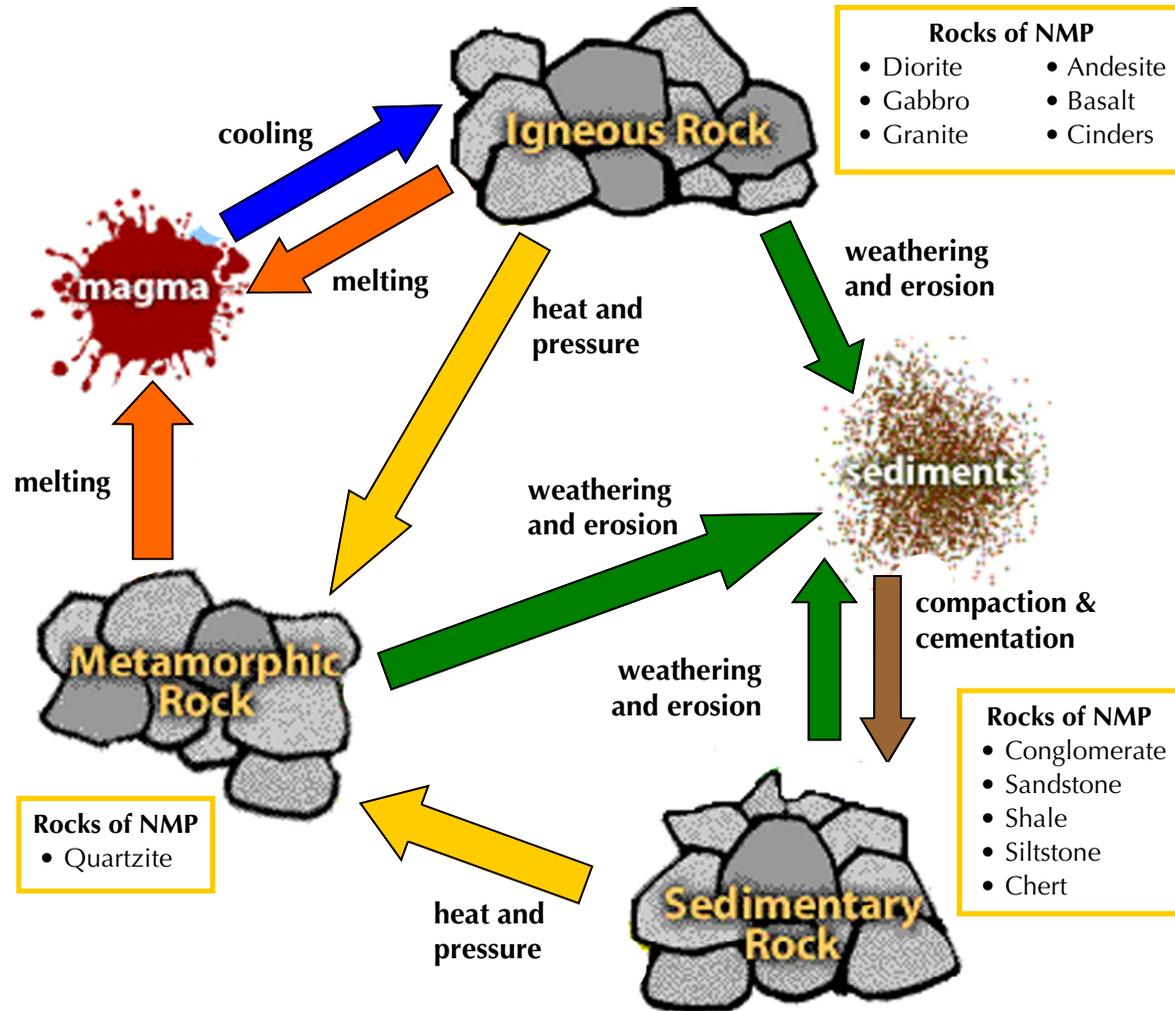
Write your story here:

100 million years ago, during the Mesozoic era, a stegosaurus was grazing on the slope of a volcano. Suddenly, the mountainside started to shake. The dinosaur ran away very quickly when he felt the huge earthquake. Lava began pouring out of the volcano, covering the ground and burning down trees.

100 million years later, you can still find the basalt rock that was formed from that eruption.

Pre-visit Activity Rocky Road

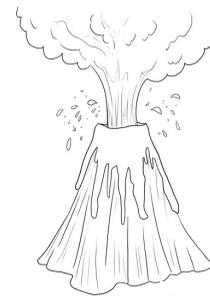
Did you know that not all rocks are the same? Various rocks look and feel different because of the way they were formed. The three main types of rocks are igneous, sedimentary, and metamorphic. Natural processes, like heating, cooling, and weathering can change a rock from one type to another in the rock cycle.



Post Visit Activity Rocky Review

Imagine each of these situations.

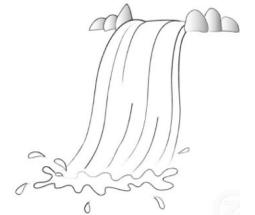
Then come up with some words or phrases to describe how you'd feel and what type of rock you might become next.



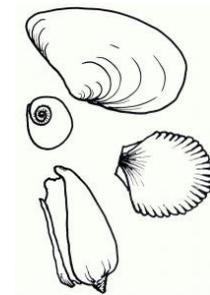
You are molten lava in an erupting volcano!

Hot... Explosive... Melting
Igneous

You are a rock beneath a powerful waterfall.



Wet... Squished... Breaking up
Sediments



You are a grain of sand at the bottom of the ocean.

Quiet... Cold... Lots of Pressure
Sedimentary

NMP Activity Rocky Road

ACT 1

I start out as a metamorphic rock. Then, (what happens)

I sink underground, get hotter and then melted

(I'll act this out by standing, sinking down, until under blanket)

Act 2

Now I am Magma. I feel sea sick and hot.

Next, I slosh around, get tossed out of volcano, cool, get hard

(I'll act this out by move under blanket, jump out, fall, & get stiff)

Act 3

I've become an igneous rock. But I change again

Because of falling in the water, hitting bigger rocks and breaking up into little pieces

(I'll act this out by rolling around, hitting each other gently)

Now I'm sediment. I wonder what I'll be next?

Pre-visit Activity Rocky Road

Directions: Color in the arrows on the rock cycle using this key:

Weathering and erosion	<i>green</i>
Compaction and cementation	<i>brown</i>
Melting	<i>orange</i>
Heat and pressure	<i>yellow</i>
Cooling	<i>blue</i>

Answer the following questions by looking at the rock cycle drawing:

1. How does a sedimentary rock become a metamorphic rock?

Heat and pressure

2. How are sediments made?

Weathering and erosion

3. What 2 types of rocks can melt into magma?

Metamorphic and igneous

4. When magma cools, what type of rock is formed?

Igneous

When you come to North Mountain Park on your field trip,
you will get to see some of these rocks!

Pre-visit Activity Making our Valley

The Earth timeline on the opposite page covers the last 600 million years of Earth history, but Oregon has only existed for the last 160 million years. **Directions:** answer the questions, then follow the directions for coloring the pictures.

1. Which era is the oldest? Cenozoic, Paleozoic, or Mesozoic?
Color the animals that swam in the ocean during the Paleozoic.

The Paleozoic era is the oldest.

2. During which era did the dinosaurs live and then become extinct?
Color all of the dinosaurs.

The Mesozoic era

3. How many years ago did reptiles evolve?
Color the earliest reptile and the first mammal.

About 300 MYA.

4. During which era did flowering plants evolve?
Color all of the land plants.

Flowering plants evolved in the Mesozoic era,

5. Which is older — the Rocky Mountains or the Grand Canyon?
Color them both.

The Rocky Mountains are older.

NMP Activity Geology Takes Time

1. On what mountain would you find granite?

Mt. Ashland

Mt. McLoughlin

2. What colors are the crystals in granite?

Green

Pink

Gold

White

Silver

Orange

3. On what mountain would you find cinders?

Mt. Ashland

Mt. McLoughlin

4. Which mountain is an active volcano?

Mt. Ashland

Mt. McLaughlin

5. Where would you find sandstone?

Hornbrook Formation

Payne Cliffs

Both

6. What kind of rock is sandstone?

Metamorphic

Igneous

Sedimentary

7. Where would you find shale?

Hornbrook Formation

Payne Cliffs

Both

8. Which rocks contains fossils?

Sandstone

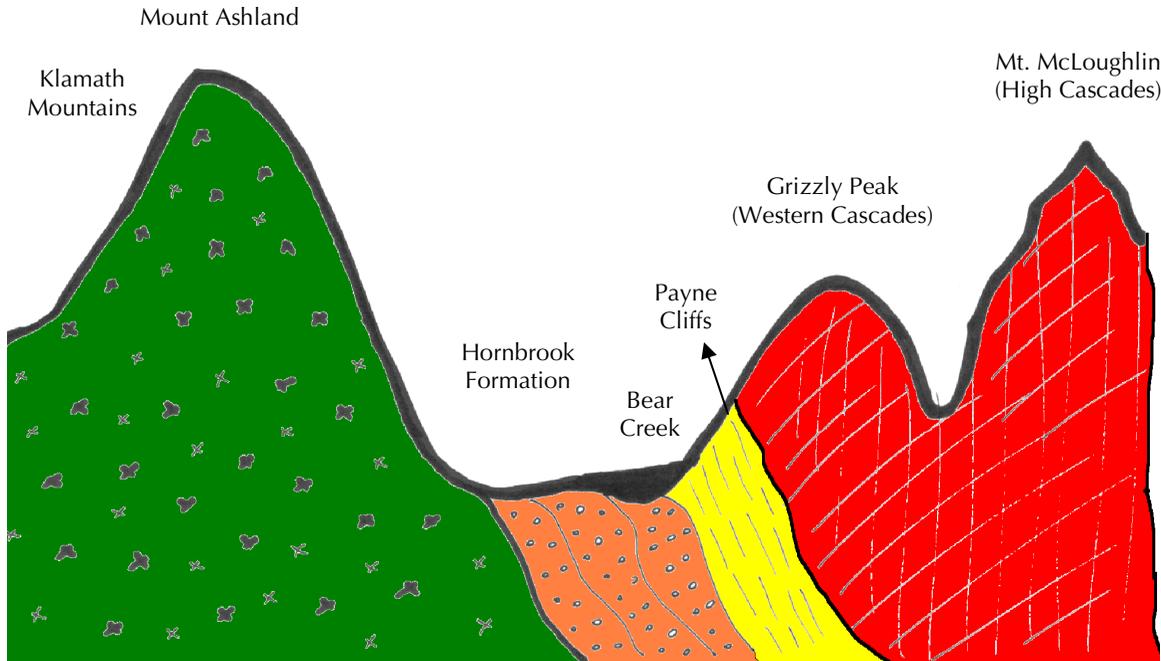
Shale

Both

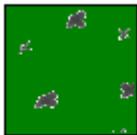
Pre-visit Activity

Geology Takes Time

We live in an amazing place! The mountains and valley that make up our local landscape have special rocks that can be found there. Did you know that Mt. Ashland and Grizzly Peak were formed from melted rocks? **Directions:** See if you can say the names of the rock types below and then color in the formations according to the key at the bottom.

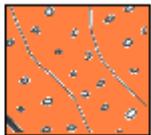


Klamath Mountains (Mt. Ashland)



Rock type: Granite (green)

Hornbrook Formation



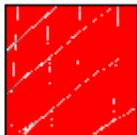
Rock types: Sandstone & shale with fossils (orange)

Payne Cliffs Formation



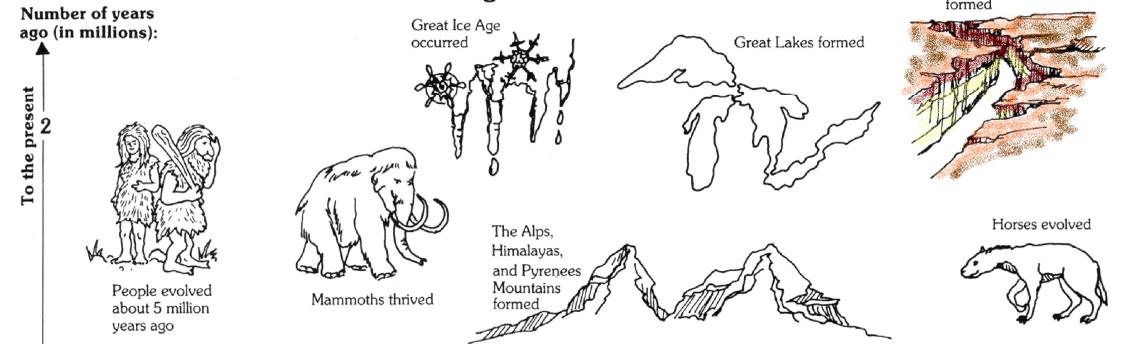
Rock types: Sandstone & conglomerate (yellow)

Cascade Mountains (Grizzly Peak)

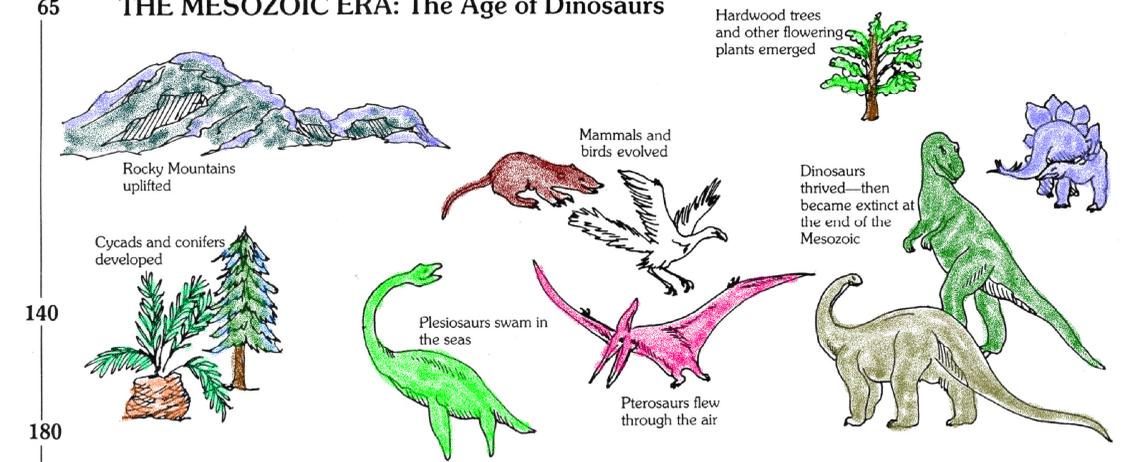


Rock types: Basalt & Cinders (red)

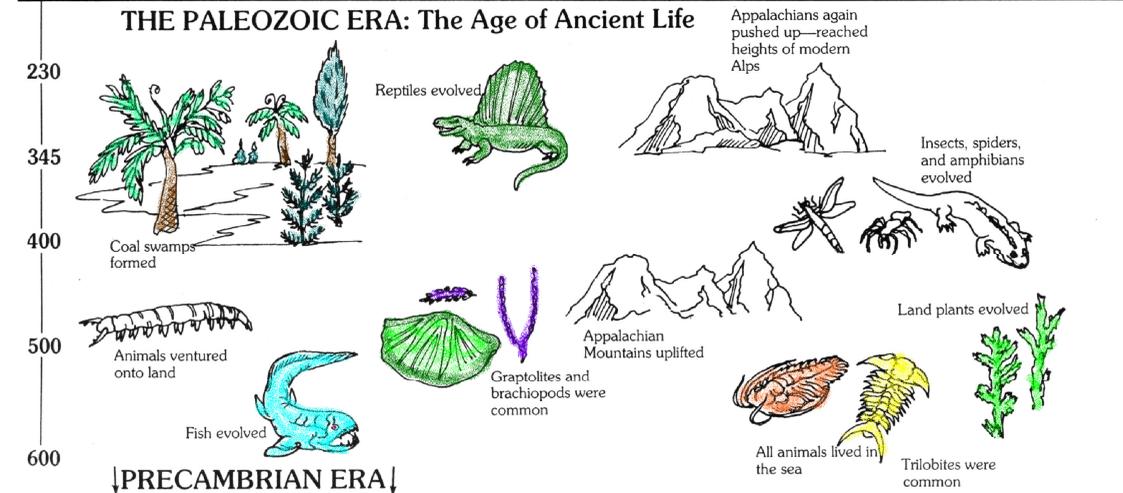
THE CENOZOIC ERA: The Age of Mammals



THE MESOZOIC ERA: The Age of Dinosaurs



THE PALEOZOIC ERA: The Age of Ancient Life



Pre-visit Activity

Geology Takes Time

Working with the 12 rock cards, you will learn the most common rocks found at North Mountain Park and their place of origin.

Directions: Look at the back of each rock card — it will tell you where the rock can be found. Fill in the names of the 4 kinds of rocks found in each area.

Klamath Mountains (Mt. Ashland)	Hornbrook/Payne Cliffs Formations (Valley Floor)	Cascade Mountains (Grizzly Peak)
Diorite	Conglomerate	Andesite
Gabbro	Sandstone	Basalt
Granite	Shale	Chert
Quartzite	Siltstone	Cinders

1. Name two rocks that you might find fossils in. (Hint: you find them on the valley floor.)

Sandstone and Shale

2. Name one rock that you can find on Mount Ashland.

Granite

3. Agate is a type of chert. Where can you find agates in the Rogue Valley?

In the Western Cascades and especially in the Agate Desert

4. What is shale made from?

Shale is made from layers of clay.

5. What are the three crystals found in granite?

Quartz, feldspar and hornblende

6. What kind of stone is made from sand grains cemented together?

Sandstone
