



Olivine basalt  
Igneous

# What type of rock?

## Week 11

*Three main types of rocks are igneous, metamorphic, and sedimentary.*

*Sandstone is which type of rock?*

*Rocks that are changed by heat and pressure are called \_\_\_\_\_?*

*When Limestone, a sedimentary rock, is changed by heat and pressure it becomes what?*

### Introduction

What is the difference between a rock and a mineral? Very simply, a mineral is a single substance, like quartz, often formed in a crystal. A rock contains several minerals, for example, granite usually contains the minerals quartz, feldspar, and mica. Sandstone contains the mineral quartz.

Rocks can be further divided into three main types:

**Sedimentary:** a layered rock formed when matter collects and is buried under pressure. Sand forms sandstone, crushed shells on the ocean bottom form limestone, and compressed mud, like from the bottom of a lake forms mudstone, or shale. Conglomerate is formed when visible pebbles join with smaller particles and compress to a hard rock.

**Metamorphic:** When sedimentary rock is changed under further heat and pressure, it becomes metamorphic rock. Metamorphic means change, similar to the word metamorphosis, the change from a caterpillar to a moth. Limestone becomes marble, sandstone can become quartzite, and shale becomes slate. Gneiss and schist are metamorphic rocks formed from igneous rock.

**Igneous:** Igneous rocks form when molten magma cools, either below or on the earth's surface. They include granite, gabbro, obsidian, pegmatite, and basalt. Beautiful mineral crystals and geodes can form in air pockets as igneous rock cools.

The rock cycle perpetually remakes rock into other rock. Sedimentary and igneous rocks may be changed into metamorphic rocks, which then erode to become sedimentary rocks again.

### Supplies

- An assortment of **rocks** including the three main types
- Mineral crystals may also be nice to share
- Crayons for crayon shavings, optional
- Grater, optional

### Procedure

*Today, we will learn the difference between the three main types of rocks, and have a chance to be geologists while identifying our own rocks.*

- Arrange rocks so students have several rocks each at their place. Of course, they should only look until you give them permission to touch.
- Welcome students, then give them a few minutes to handle and explore the rocks.
- Call students' attention away from their rocks. Show them an example of each specimen and explain how the rocks were formed.
- Pass out magnifying glasses.
- "Now we will all become geologists. One of the things geologists do is to study and identify rocks."
- Allow students to examine their specimens up close and determine whether they are sedimentary (layers are key), metamorphic (the pressure often reorganizes minerals into bands), and igneous (never layered, minerals evenly distributed)
- Call on students one at a time to identify their rocks, as well as explain why they think so. This is a great opportunity for them to realize that scientist don't just find answers, they also must be able to explain how they arrived at those answers.

### Procedure - part 2

- If you have an oven available at your site, consider doing the bonus activity below with your students.
- First grate crayons to show the weathering process.
- Then fill muffin cups and pack, showing the sedimentary process
- Then heat showing how rocks are changed inside the earth.

Igneous



Granite

Sedimentary



Limestone often contains fossils

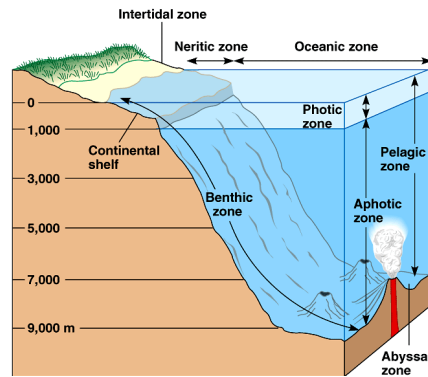
Metamorphic



When limestone is compressed it becomes marble

### Bonus

Try making your own igneous "rocks." Fill well-oiled muffin tins with crayon shavings, then pack them down with a piece of wax paper. Finally heat in a low oven.



# Ocean survival

## Week 12

*Regions of the ocean include tidal zones, continental shelf, continental slope, abyssal plane, and oceanic trench.*

*In which part of the ocean do the most fish live?*

*What is the deepest part of the ocean?*

*What adaptations do animals have that live in the abyssal plain?*

### Introduction

The ocean zones are divided by their location, depth, and the type of life that exists in them.

**Tidal zone:** Contains organisms that can live with changing conditions and exist in or out of water. It contains snails, muscles, crabs, sea stars, sand dollars, and burrowing animals.

**Continental shelf:** Contains an abundance of life because of the sunlight available in shallow waters. Coral, Starfish, and many common fish live in the waters of the continental shelf.

**Abyssal plain:** Flat, deep area of the ocean floor. Not nearly as much life as in the continental shelf. Life forms are uniquely adapted to survive in cold temperatures, high pressure, and dark conditions. Animals are dependent on what falls or wanders into this area for food. Bioluminescence helps them hunt and see.

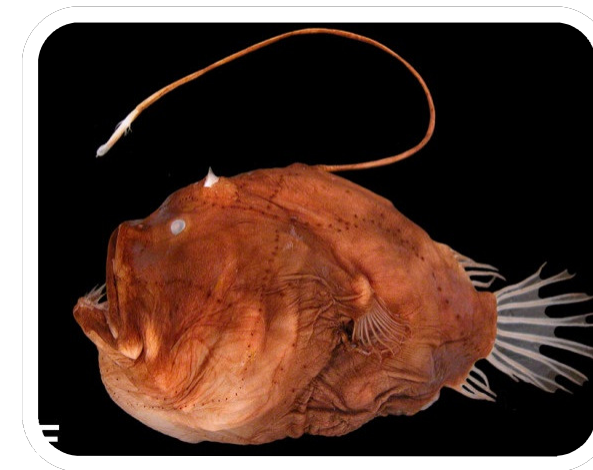
**Oceanic trench:** Deepest part of the ocean with virtually no light making photosynthesis impossible. Life exists near hydrothermal vents which are rich in sulfur and other minerals. Sulfur digesting bacteria, vent crabs, mussels, and tubeworms live here.

### Supplies

- **Glow sticks**, available at dollar stores
- **Dark area**

### Procedure

- Ocean creatures are specially adapted for the areas in which they live.
- The abyssal plane and oceanic trenches are the deepest part of the ocean.
- At this depth, no sunlight can penetrate. It is completely dark. So, how do fish survive without light? Could they use photosynthesis? (no) So, must they be consumers? (Well, that is interesting. On the abyssal plane they are, but in the trenches where there are openings in the crust called hydrothermal vents, there are a special form bacteria that can use the heat and sulfur released from the earth to make their food through a process called chemosynthesis. These bacteria become the beginning of a food chain including tube worms, tiny shrimp and vent crabs.)
- If the creatures living on the abyssal plain are consumers, how can they possibly see to hunt? One of the unusual adaptations they have is bioluminescence, or glowing.
- Let's try an experiment.
- Take students to a dark area if available; a store room or restroom is probably your best choice.
- Assign one student to be the predator. Luckily, some other fish have wandered into his part of the ocean. Have him, without moving, try to touch another "fish" to simulate catching prey. (It should be impossible in the dark.)
- Then give the predator a glow stick. Have him hold it out with his arm. Ask your other fish to be curious and try to touch the glow stick.
- Is it easier for the predator to catch prey? This is how the angler fish uses bioluminescence. His body has a glowing part that he dangles out in front of his head like a fisherman. When other fish approach, he can eat them.



Angler Fish with bioluminescence

### Bonus

Make a poster with the zones of the ocean labeled. Cut out and glue pictures of fish and ocean life in the correct zones.