

# Igneous Rocks



## OBJECTIVES

In this lesson, students will learn about the types and formation of igneous rocks.

## ACARA CONTENT DESCRIPTIONS

Sedimentary, igneous and metamorphic rocks contain minerals and are formed by processes that occur within Earth over a variety of timescales (ACSSU153)

- representing the stages in the formation of igneous, metamorphic and sedimentary rocks, including indications of timescales involved

### Communicating:

Communicate ideas, findings and evidence based solutions to problems using scientific language, and representations, using digital technologies as appropriate (ACSI148)

- using digital technologies to construct a range of text types to present science ideas

## LESSON PLAN

### Activities

### Resources

#### Activity 1: Igneous Rocks - True or False?

Give out one Igneous Rocks - True or False? worksheet to each pair of students. Play Chapter 1 of the video and ask students to complete the worksheet. Depending on the ability of the students, you may need to play the video more than once.

Review answers when they have completed the task.



- Photocopies of the Igneous Rocks - True or False? worksheet
- ClickView video *Igneous, Sedimentary and Metamorphic Rocks* Chapter 1: <https://clickview.w/tp2/15>



#### Activity 2: Formation of Igneous Rocks

Give out the Formation of Igneous Rocks worksheet to students. Allow time for students to read through the instructions. Divide students into groups of 3-4 and distribute the materials required for the task. Walk around to offer guidance.

Review the answers with students when they have completed the task.

#### Safety warning

Ensure care is taken when handling the hot materials.



- Photocopies of the Formation of Igneous Rocks worksheet
- For each group of 3-4: 4 x beakers, 3 x test tubes, Epsom salts, 70°C water, water at room temperature, ice-water

#### Activity 3: Igneous Rocks and Their Uses

Give out the Igneous Rocks and Their Uses worksheet. Ask students to work in pairs and complete the worksheet by researching different types of igneous rocks online.



- Photocopies of the Igneous Rocks and their Uses worksheet
- Laptops

## ANSWERS

### Igneous Rocks - True or False?

	Statement	T	F
1	Igneous rocks make up the smallest amount of the volume of the Earth's crust.		✓
2	Igneous rocks form only from the solidification of lava.		✓
3	Magma is made of melted minerals and lava is magma contained beneath the Earth's surface.		✓
4	The cooling and solidification of magma/lava forms igneous rocks.	✓	
5	Volcanic rocks have large-grain crystals due to rapid cooling.		✓
6	The magma that settles beneath the Earth's surface cools slowly.	✓	
7	All igneous rocks have large crystals.		✓
8	Igneous rocks are classified according to their texture and composition.	✓	
9	Igneous rocks are also known as primary rocks and metamorphic and sedimentary rocks are derived from igneous rocks.	✓	

### The Formation of Igneous Rocks

1.

Largest size (immediately)	Smallest size (immediately)	Largest size (after 24 hours)	Smallest size (after 24 hours)
D	B	B	D

2.

Type of environment	Beaker
Deep beneath Earth's surface	B
Close to the surface of the Earth	C
Rapid expulsion from a volcano/flowing onto Earth's surface	D

### 3. Suggested answer:

The longer it takes for the molten rock to cool, the larger the crystals formed. This is because the crystals have more time to grow. Conversely, when the magma cools extrusively, the lower temperatures do not allow crystals to form and grow, resulting in smaller crystal formations.

### Igneous Rocks and Their Uses

	Intrusive igneous rock	Extrusive igneous rock
Name of rock	Granite	Basalt
Minerals it contains	Quartz, feldspar, mica, amphiboles	Plagioclase, pyroxene
How is it formed?	It forms when magma cools and solidifies slowly beneath Earth's surface.	It forms when lava cools quickly on the Earth's surface.
Physical characteristics	It is a light-coloured rock with large grains that can be seen with the unaided eye.	It is a dark-coloured rock with fine grains.
Uses	It is used to make many counter tops, tiles, stones and in constructing buildings.	It is used to make roadstones, flooring tiles and railroad ballast.
Famous rock structure	Mount Rushmore in South Dakota	Devils Tower in Wyoming

# Igneous Rocks - True or False?

Indicate whether each statement is true or false after watching the video.

	Statement	True	False
1	Igneous rocks make up the smallest amount of the volume of the Earth's crust.		
2	Igneous rocks are only formed from the solidification of lava.		
3	Magma is made of melted minerals and lava is magma contained beneath the Earth's surface.		
4	The cooling and solidification of magma/lava forms igneous rocks.		
5	Volcanic rocks have large-grain crystals due to rapid cooling.		
6	The magma that settles beneath the Earth's surface cools slowly.		
7	All igneous rocks have large crystals.		
8	Igneous rocks are classified according to their texture and composition.		
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# Formation of Igneous Rocks

Doesn't this look like a wave that is frozen in time? Aptly named, the Wave Rock is located 5 km east of the town of Hyden in Western Australia, about 340 km from Perth, in a region known as Australia's 'Golden Outback'. The Wave Rock is 15 m high and approximately 110 m long. This wave-like shape is the result of chemical weathering and erosion. This stone formation is about 2,700 million years old and is made up of mostly granite, which is a type of intrusive igneous rock with large crystals. The size of the crystals in an igneous rock is an important indicator of the conditions in which the rock was formed. Let us learn more about these conditions!



## Materials:

- 250 mL beaker A: 2 tbsp. of Epsom salts with enough water to dissolve the salt crystals
- 3 x test tubes
- 250 mL beaker B: 150 mL of 70°C water
- 250 mL beaker C: 150 mL of water at room temperature
- 250 mL beaker D: 150 mL of ice-water

## Instructions:

1. Mix the solution in beaker A until the salt crystals have completely dissolved.
2. Pour the solution in beaker A equally into 3 test tubes.
3. Place one test tube in beaker B, another in beaker C, and the remaining test tube in beaker D.

## Questions:

1. Compare the crystals sizes in all three test tubes immediately after the demonstration and then after a minimum of 24 hours. Note the conditions that yielded crystals of the largest size and the smallest size.

	Largest size (immediately)	Smallest size (immediately)	Largest size (after 24 hours)	Smallest size (after 24 hours)
Beaker				

2. The 3 beakers represent the different environments where magma/lava can cool or solidify. Match each beaker to its simulated environment.

Type of environment	Beaker
Deep beneath Earth's surface	
Close to the surface of Earth	
Rapid expulsion from a volcano/flowing onto Earth's surface	

3. What relationship can you derive between the size of the crystals in the different igneous rocks and their rate of cooling?

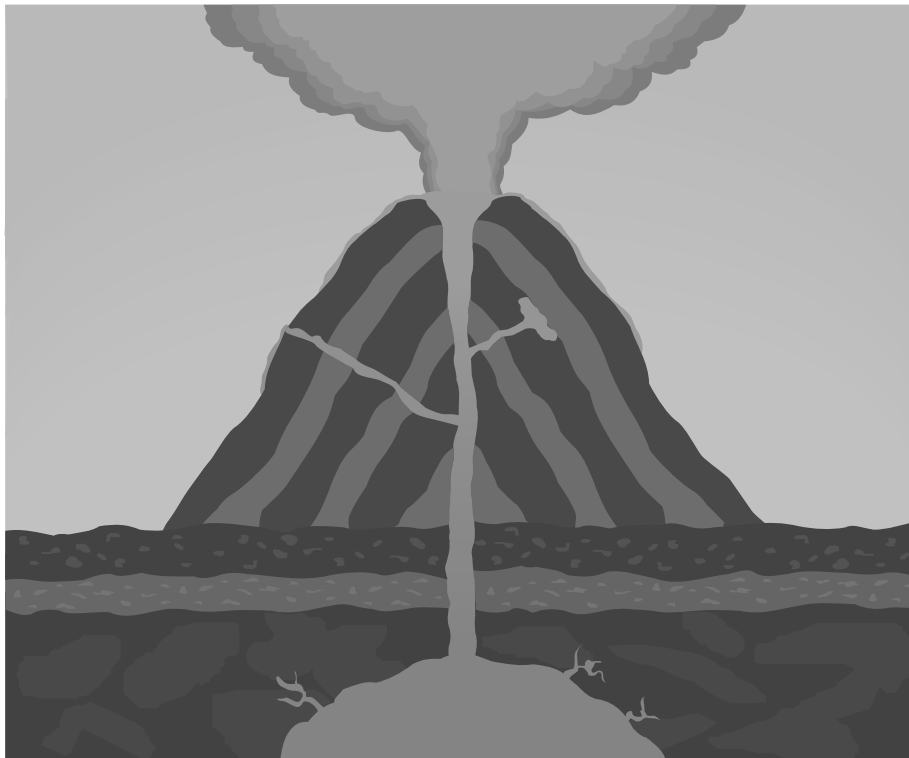
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# Igneous Rocks and Their Uses

Research two different types of igneous rocks: an extrusive igneous rock and an intrusive igneous rock. Then, complete the table below.



	Intrusive igneous rock	Extrusive igneous rock
Name of rock		
Minerals it contains		
How is it formed?		
Physical characteristics		
Uses		
Name of a famous stone structure made of this rock (if any)		
Indicate on the diagram above where each rock is most likely to form.		