

Lesson 2 Rocks

Objectives

By the end of this lesson, students will be able to:

- Sort stones and rocks into groups.
- Describe the common features of stones and rocks.
- Understand the many ways that stones and rocks are used.

Overview

We focus in this lesson on stones and rocks. Some rock was formed through the cooling and solidification of magma or lava, and is called “igneous rock”. Some rock was formed by the deposition of material at the earth’s surface and within bodies of water and is called “sedimentary rock”. Some rock has been changed due to huge pressures and temperatures within the earth’s crust and is called “metamorphic rock”. However, it is not the aim of this lesson to create a formal classification of rocks, but to encourage students to experience the ways stones and rocks feel and appear, and to compare their different shapes and surfaces. Grouping by common features is part of the science skill we call “classifying”.



Lesson 2 Rocks

Look at the mountains (山). What are they made of?



Key Words

rock	(岩石)
rough	(粗糙的)
smooth	(光滑的)
speckled	(布满斑点的)
striped	(带条纹的)

Activity 1

Observe some different rocks.





Stimulus Activity

The stimulus activity asks what mountains are made of. The simple answer might be rocks. But not all mountains look the same, as they are made of different types of rock. Mountains can be millions of years old, some more than a hundred million years old. During these long periods of time, weather and water flow gradually reshape a mountain landscape.

How do they look? How do they feel? Draw lines.



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Activity 1

To prepare for this activity, you should try to gather together as many different types of stones and rocks as you can. A park, coast, builder's shop or garden shop might be good places to gather them. We have offered a set of images which can be used, but having some real stones and rocks in the classroom is much more valuable. If you have only a few samples, put your collection of stones and rocks on a side table for students to visit during the lesson. Encourage students to touch the objects and describe what they feel and what they see. A rich descriptive language can emerge from this activity, including words such as "rough", "smooth", "speckled" and "striped". There are few "correct" answers here. What is important is that students extend their own experiences of stones and rocks through touch and descriptive language.

As an extension, you might ask students "Do stones and rocks make sounds?" This can be an interesting question to put to your class. If you bang two stones and rocks together, they will make a sound. Walking on pebbles on a beach makes a sound. A stone falling onto the floor makes a sound. Small stones placed in a jar can be used as a percussion instrument (a shaker).

Lesson 2

Activity 2

This is the main classification activity in the lesson. Groups of students will need to have a number of different stones and rocks to select from. Small pebbles or gravel can provide plenty of objects. Encourage students to talk about their colours, shapes and textures. The main idea is that students should describe the stones, and then gather stones which “belong” together into groups. Invite students to tell you just why the stones belong together. You may find that your students create four or five distinct groups such as: these stones are smooth, these have stripes, these have speckles, these seem to sparkle, these have sharp edges, etc.

Unit 4
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Activity 2

Collect (收集) some stones and rocks. How do you group (将……分组) them together?



Draw your results.

A large, empty rectangular box with a light beige background, intended for students to draw their results. In the bottom right corner of this box, there is a small, colorful icon of a paint palette.

Activity 3

How do we use stones and rocks?



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Activity 3

Here is an activity which looks beyond the separate stones and rocks and asks about where and how we make use of them. The images offer you a starting point. They show stones and rocks used for a house, a bridge, a milestone and a sculptured stone lion. Stones can also be used to make paths and roads, jewellery, doorstops, paperweights, and tools such as axes, spears and knives. (The use of stone tools was immensely important to early human beings.) They can be used to sharpen knives and other metal tools. Stones can also be used to count with, such as in a primitive abacus, and can be used as pieces in games. This list is not exhaustive: stone is such a versatile material that students may think of other uses for it.

Lesson 2

Now I Know ...

岩石有不同的种类。
岩石有很多用途。

How I Know ...

Learning in this lesson is again by observation and hands-on tactile experience. Students also group stones and rocks according to certain features.

Find Out More!

The image shows a pile of coloured stones, including some precious stones. Ask students where they might see these stones. (These are the stones which appear as jewellery in costume brooches, rings, earrings, etc.) They are valued for their colours and the way that light shines and sparkles through them. Diamonds are thought to be one of the most precious (and expensive) stones, particularly the rare red diamond. Jade, a green gemstone, is particularly important in Chinese culture, and a form of jade called “jadeite” can rival or exceed diamond in value.

Unit 4 Lesson 2

Now I Know ...

There are many different kinds of rocks.
Rocks have many uses (用途).

How I Know ...

- ☒ I observed rocks.
- ☐ I weighed (称) rocks.
- ☒ I grouped different kinds of rocks by some features (特征).



Find Out More!

These are all stones. They have beautiful (漂亮的) colours.
Some stones can sparkle (闪闪发光). Where can you see these stones?



我是如何知道的……

本课的学习是通过观察和动手实验完成的。

- ☒ 我把土壤分离成不同的组分。
- ☒ 我比较了不同种类的土壤。
- ☐ 我观看了一段录像。

发现更多!

我们踩在脚下的土壤称为“表层土”。表层土在土壤的最表层，植物的根系一般存在于表层土中，并从中吸取所需的大部分养分。表层土由沙子、石头和动植物一类的有机质组成。表层土很薄，一般只有 **5 cm** 到 **20 cm** 的厚度。它下面为“底层土”。底层土与表层土非常相似，但是含有的有机质较少。底层土下面是黏土层或岩石层。所有这些构成了地壳的一部分。地壳的平均厚度为 **17 km**，最厚的地方也只有 **70 km**。而地球半径约为 **6000 km**，因此地壳覆盖在地球表面就像是薄薄的苹果皮覆盖着果肉一样。

学生可能会意识到向下挖掘土壤可以发现很多有用或有趣的事物。比如图中展示的四幅图片。地面下方的水称为“地下水”，可用来灌溉农作物。地下水是一种重要的资源，因此需要严格管理。对世界上的一些地方尤其像美国的加利福尼亚州和德克萨斯州来说，它们的农业十分依赖地下水资源。毋庸置疑，石油是工业社会中必不可少的能源。变成化石的骨头可以帮助科学家重现历史。岩石含有可供人利用的金属和其他物质，比如煤和宝石。挖掘含有有用或者贵重材料的岩石是采矿业的基础，而采矿业也是世界上最古老和最重要的工业之一。

第二课 岩石

教学目标

通过本课的学习，学生将能够：

- 对石头和岩石分类。
- 描述一些石头和岩石的共同特征。
- 理解石头和岩石的多种用途。

概述

在本课中，我们重点关注石头和岩石。有些岩石是由岩浆或者熔岩冷却固化形成的，我们称之为“火成岩”。有些岩石是由地球表面或水体内的物质沉积而成的，称为“沉积岩”。还有一些岩石是由于地壳内的巨大压力和高温而发生了改变，称为“变质岩”。但本课的目的并非对岩石进行正式的分类，而是鼓励学生体验石头和岩石的触感，感受它们的外观，并比较其不同的形状和表面。按共有的特征进行归类是一种科学技能，我们称之为“分类”。

导入活动

导入活动提出了山是由什么组成的问题。简单的答案就是岩石。但并非所有的山看起来都一样，因为它们由不同类型的岩石组成。山脉在数百万年之前形成，有的更是超过一亿年。在如此长的时间内，天气和水流会逐渐重塑山地景观。

活动一

在本活动中，教师应该尽可能多地收集不同类型的石头和岩石。公园、海岸、建材店、园艺店都是收集石头和岩石的好地方。我们已提供了一组图片，教师可以使用这些图片，但如果在课堂上提供真实的石头和岩石会对学生的学习更有帮助。如果教师只有几块石头的样本，将这些收集到的样本放在靠墙的桌子上以供学生在本课学习时参观。鼓励学生触摸岩石，并让他们描述岩石的触感和外观。在本活动中，学生可以使用丰富的描述性语言，比如“rough”、“smooth”、“speckled”和“striped”。这一部分很少有所谓的“正确”答案。本活动的重点是让学生通过触摸和使用描述性语言拓展自己有关石头和岩石的经验。

作为拓展，教师可以问学生“石头和岩石会发出声音吗？”这是一个有趣的问题。如果将两块石头或者岩石互相撞击，它们就会发出声音。走在海滩上时，踩到鹅卵石会发出声音。石头落到地上会发出声音。小石头放置在罐子里可以作为一种打击乐器（手摇沙锤）。

活动二

这是本课主要的分类活动。给学生准备不同种类的石头与岩石。小鹅卵石或砂砾可以作为很好的样本。教师应鼓励学生对石头的颜色、形状及质地进行讨论。活动的主要内容是让学生对石头进行描述，然后将同类的石头归成一类，并向教师解释归类原因。

学生可能会将石头分为四到五个不同的组，例如：这类石头表面光滑，这类石头带条纹，这类石头上有斑点，这类石头闪闪发光，这类石头边缘锋利，等等。

活动三

在对石头和岩石进行观察和分类之后，本活动请学生思考我们在哪里使用石头和岩石以及如何使用它们。教师可以先从书中的图片入手。图片展示了石头和岩石用于建造房屋和桥梁，制作里程碑和石狮。我们还可以用石头建造小路和公路，制作珠宝首饰、门挡、镇纸以及斧子、矛和匕首等工具（石器的使用对于远古人类非常重要。），打磨刀具或者其他金属工具。石头还可以用来计数，比如在原始算盘中的应用，还可以在游戏中的用作棋子。石头的用途很多，此处仅举几个例子，学生也许还会想出其他的用途。

现在我知道……

岩石有不同的种类。

岩石有很多用途。

我是如何知道的……

本课的学习同样是通过观察和亲手触摸的体验完成的。学生还根据某些特征给石头和岩石分类。

☒ 我观察了岩石。

☐ 我称了岩石的重量。

☒ 我根据某些特征对不同种类的岩石进行了分类。

发现更多!

图片中呈现了一堆色彩斑斓的石头，包括一些宝石。询问学生他们在哪里能够看到这些石头。（这些石头通常作为时装胸针、戒指、耳环等首饰上的宝石。）这些宝石因其鲜艳的色彩和闪耀的光芒而有价值。钻石被认为是最珍贵（也最昂贵）的石头之一，尤其是稀有的红宝石。翡翠，一种翠绿色的宝石，在中国文化中极为重要，翡翠中有一种“硬玉”在价值上足以与钻石匹敌，甚至超过了钻石。