Lesson 1 Magic Magnets

Objectives

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

- State that magnets can attract some things without contact.
- State that magnets can attract some metal materials.
- Test if a material can be attracted by a magnet.

Overview

The main theme in this lesson is exploration and extension of students' experience with magnets. Have a range of magnets and different materials available. You can even use letter magnets to make "magnet" words such as "magnet", "force" and "attract".

Stimulus Activity

The stimulus cartoon shows Bob and Susan observing whether magnets stick to different things. Ask students questions such as: Have you ever seen a magnet? Can you find one in the classroom today? What can it stick to? Students will find that magnets do not stick to everything.

Activity 1

For this activity, each group of students will require a small magnet, a piece of paper and a metal paperclip. The objective is to use the magnet below the paper to move the paperclip along the paper racetrack. The magnetic force can be felt through the paper. If the magnet is strong enough, it does not even have to touch the paper.

This task can be extended by suggesting students try the same task through two thicknesses of paper, and then three.

Lesson 1

Activity 2

In this activity, students will extend their experience of materials. We want them to look at materials in terms of magnetism — which ones can a magnet attract? Or conversely, to which materials is a magnet attracted? It is impossible to say which attracts which. Does the magnet attract iron or does iron attract the magnet? Both are required for the attraction to happen, and both play a part. If you want to avoid explaining this aspect, you may wish to identify the magnet as the attractor and the other material as "being attracted by/to" the magnet. (Language tip: We can say that a material is "attracted by the magnet" or "attracted to the magnet". These expressions mean the same.) Materials that can be attracted by a magnet are called "magnetic materials".


Unit 3 Lesson 1

Activity 2

Which materials can the magnet attract? What do you think?

I think the magnet can attract iron (鐵).

Let's find out.

Write the numbers.

1 plastic 2 wood 3 paper 4 iron 5 aluminium 6 copper

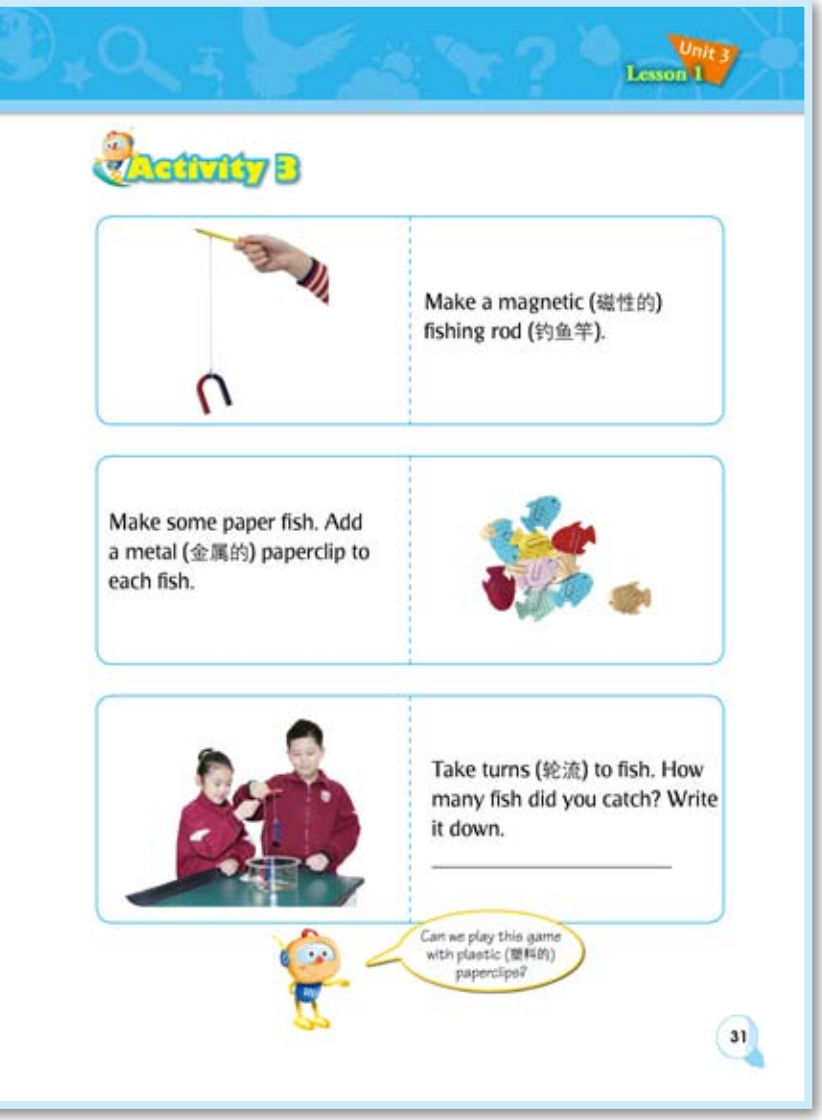
I think the magnet can attract 4.

Use the magnet to attract the materials. What did you find? Write the numbers.

The magnet can attract 4.

30

To begin with, ask students to identify the materials of which the objects are made. Allow each group to make a prediction and then explore materials you provide, and also all the materials found in and around the classroom. Students often think that all metals can be attracted by magnets. However, this is not the case. Magnets can attract some metals such as iron, cobalt and nickel. Magnets cannot attract copper or aluminium, or some forms of stainless steel. It is important for students to realize that not all metals can be attracted by a magnet.



Activity 3

This activity involves making and exploring. Each group will need a sheet of paper and scissors, about a dozen paperclips, a short length of string, a magnet, and a pencil or similar for the fishing rod. Allow students to make a magnetic fishing rod for their group. You may have to manage setting up this task by inviting a pair of students to make the rod while the others cut out some "fish" and add paperclips to them. Students then take turns to catch the paperclip fish. To make it more interesting, you could write numbers, say 1 to 10, on the fish. Students can add up the total score for their "catch".

The game cannot be played with plastic paperclips, as plastic is not magnetic.

Lesson 1

Now I Know ...

磁铁不接触某些物体就能吸引它们。
磁铁能够吸引某些金属材料。

How I Know ...

Learning in this lesson is through hands-on practical experience. Students make predictions, and test materials with magnets. They also play a fishing game using magnets.

Let's Practise!

In this task, students explore how strong a magnet's influence is. You will need to prepare a magnet, a magnetic key and some pieces of paper for each group. How strong is a magnet's influence? Can it reach through two or three or more pieces of paper? The answer will depend on the strength of the magnet, the weight of the key and the thickness of the paper. A paperclip or nail can be substituted for the key. As an extension, you could ask students to suggest other ways of testing the strength of a magnet. For example, students could test how many keys a magnet can attract. The more keys the magnet can attract, the stronger the magnet is.

第一课　神奇的磁铁

教学目标

通过本课的学习，学生将能够：

- 说出磁铁无需接触就能吸引某些物体。
- 说出磁铁能吸引某些金属材料。
- 检验某种材料能否被磁铁吸引。

概述

本课的主题是探究磁铁，拓展学生对磁铁的体验。教师应准备一些磁铁和不同的材料，甚至可以用字母磁性贴组合成与磁相关的单词，比如“magnet”、“force”和“attract”。

导入活动

在导入活动的卡通图片中，鲍勃和苏珊在观察磁铁能否吸引不同的物体。向学生提问，比如：你们见过磁铁吗？你们现在能在教室里找到磁铁吗？磁铁能吸附在哪里？学生将会发现，磁铁并不能吸附在所有的物体上。

活动一

在本活动中，给每组准备一块小磁铁、一张纸和一个金属曲别针。活动目标是用纸下方的磁铁带动曲别针顺着跑道移动。透过纸张磁力仍能发挥作用。如果磁力够强，磁铁甚至无需碰到纸张。

作为拓展，教师可以建议学生把纸张增加到两张和三张，完成同样的实验。

活动二

在本活动中，学生将拓展对材料性质的认识。他们将从磁性的角度来研究材料——磁铁能吸引哪些材料？或者反过来说，磁铁能被哪些材料吸引？很难说是谁吸引谁，是磁铁吸引铁还是铁吸引磁铁？若产生吸引，则双方都要存在并发挥作用。如果教师不想解释这一点，可以把磁铁当作吸引的一方，把另一种材料当作“被磁铁吸引”的一方。（语言小贴士：我们可以说“A material is attracted by the magnet”或“A material

is attracted to the magnet”。这两种表达意思相同。）能被磁铁吸引的材料就叫做“磁性材料”。

活动一开始，可以先让学生辨认物体都是用什么材料制成的。让每个组都先作出预测，然后对教师提供的材料以及教室或周边能找到的材料的磁性进行探究。学生通常认为所有的金属都能被磁铁吸引，然而事实并非如此。磁铁能够吸引某些金属，如：铁、钴和镍。磁铁不能吸引铜、铝或某些种类的不锈钢。让学生认识到不是所有金属都能被磁铁吸引，这一点很重要。

活动三

本活动包括制作和探究。给每组学生准备一张纸、几把剪刀、一些曲别针、一根短线、一块磁铁和一根铅笔或者类似可制作鱼竿的物体。让每组学生制作一根有磁性的钓鱼竿。教师可以这样设定小组分工：请两个学生负责制作鱼竿，其他学生用纸裁剪一些“鱼”，并把曲别针固定在上面。学生再轮流捕捉曲别针做成的鱼。要想让活动更加有趣，教师可以给鱼标上数字，比如 1 到 10。学生可以算出最终“捕鱼”的总得分。

本游戏不能使用塑料曲别针，因为塑料不是磁性材料。

现在我知道……

磁铁不接触某些物体就能吸引它们。

磁铁能够吸引某些金属材料。

我是如何知道的……

本课的学习是通过动手实践完成的。学生作出预测，并用磁铁吸引各种材料来验证预测。他们还用磁铁完成了钓鱼游戏。

☐ 我读了一本书。

☑ 我用磁铁对材料的磁性进行了检验。

让我们练习吧！

在本活动中，学生将探究磁铁的磁力强弱。教师需要为每组准备一块磁铁、一把有磁性的钥匙和几张纸。磁铁的磁力有多强？能穿透两张、三张甚至更多张纸吗？后面这个问题的答案取决于磁铁的磁力、钥匙的重量以及纸张的厚度。可以用曲别针或者钉子代替钥匙。作为拓展，教师可以让学生提出测试磁铁磁力强度的其他方法。例如，学生

可以测试一块磁铁可以吸引多少把钥匙。磁铁能吸引的钥匙越多，其磁力越强。

第二课　吸引和排斥

教学目标

通过本课的学习，学生将能够：

- 说出两块磁铁可以相互吸引或者相互排斥。
- 识别磁铁的两极。
- 说出同名磁极相互排斥，异名磁极相互吸引。

概述

本课的主要内容是当两块磁铁靠近时会发生什么。给每组学生一些磁铁，磁铁的南北两极最好有明显的标识。大多数学生也许熟悉磁铁能吸引物体的特性，但是可能没有体验过两块磁铁的排斥力。

导入活动

导入活动的卡通图片引导学生思考两块磁铁间的相互作用。两块磁铁不需要接触就可以发生相互作用。当两块磁铁相互靠近时，人们就能感受到磁力。

活动一

在本活动中，学生将探究两块磁铁的相互作用。注意保管好磁铁。如果磁铁经常被摔，它们会失去磁性。为保持磁性，需要将磁铁成对存放，南北极倒置。让学生两人一组进行游戏和探究。如果学生没有发现磁铁间的排斥力，教师需要引导他们把其中一块磁铁颠倒方向。如果磁铁两端有颜色标记，教师可以让学生思考不同颜色的两端靠近会发生什么，相同颜色的两端靠近会发生什么。

活动二

本活动与活动一类似，但这次需要学生先研究自己的磁铁，并分清北极和南极。这些词对学生来说都是新术语。我们用“pole”这个单词表示磁铁的两端。我们希望学生能够使用“north”、“south”、“pole”这些单词，认识到异名磁极相互吸引，同名磁