



雨树落落

英国最具影响力的青少年科普读物之一

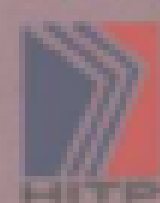
(英)劳姆(Raum,E.) 著
孙杰 刘爱国 译



科学家的磁力

【磁力】

What's the Attraction?



哈尔滨工业大学出版社
HARBIN INSTITUTE OF TECHNOLOGY PRESS



为什么有些物质能够互相吸引呢？磁悬浮列车是如何利用磁力在空中悬浮的呢？

作者简介：
伊丽莎白·劳姆家的冰箱门上有12个磁贴，在她房间里到处贴着提醒她做各种工作的磁贴。特别值得一提的是，在她的电脑上还贴着一个提醒她为孩子们写书的小磁贴。

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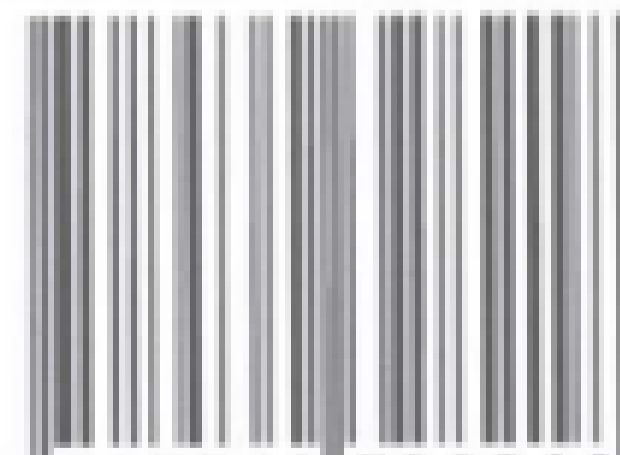
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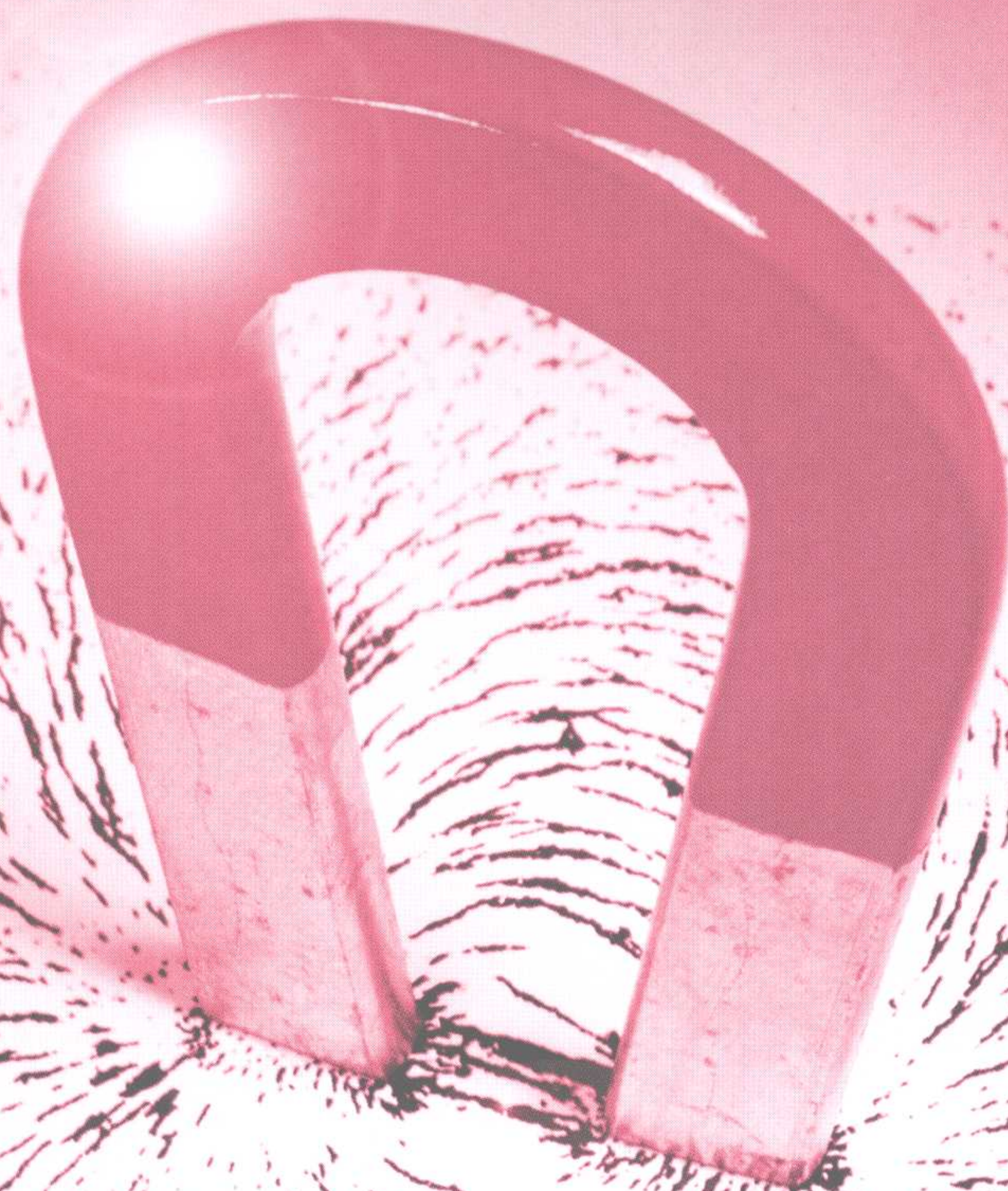
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科学中的磁力

（磁力）

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哈尔滨工业大学出版社

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有些单词被印刷成粗体，**就像这样**。你可以在第30页中找到它们的意思，还可以在单词第一次出现时，在相关书页下方的方框内发现它们的含义。

What is a magnet?

什么是磁铁?

You probably use **magnets** every day. Without magnets, your life would be slower. It would be quieter. It would also be a lot less fun!

A magnet is a special piece of metal. It **attracts** certain kinds of metal. These metals pull toward a magnet. They may stick to it. Most magnets are made of **iron** or **steel**. Iron and steel are metals.

The man in the picture calls himself Mr. Magnet. When he puts a fork on his chest, it sticks there. Is he really a magnet? No. Doctors have checked him over. Mr. Magnet just has sticky skin! Only metal objects can be magnets.

你可能每天都会用到**磁铁**。没有磁铁，生活的节奏会变得很缓慢，少了很多喧嚣，也少了很多乐趣。

磁铁是一种特殊的金属，它能**吸引**某些金属，拉着它们朝着自己运动，甚至会粘到自己身上。绝大多数磁铁是由**铁**或**钢**制成的，铁和钢都是金属。

图中这个人自称是磁铁先生。叉子放在他的胸前就能粘住。他真是一块磁铁吗？不是。医生对他进行了全面检查，结论是磁铁先生的皮肤是粘性的！只有金属物体才能是磁铁。

▼ This is Liew Thow Lin. He is known as Mr. Magnet. Things stick to his skin. He is not really a magnet. He is not made of metal.

这是林柳寿，人称磁铁先生。东西可以粘在他的皮肤上。但他不是真的磁铁，他不是金属的。



*Magnets have been
around forever...*

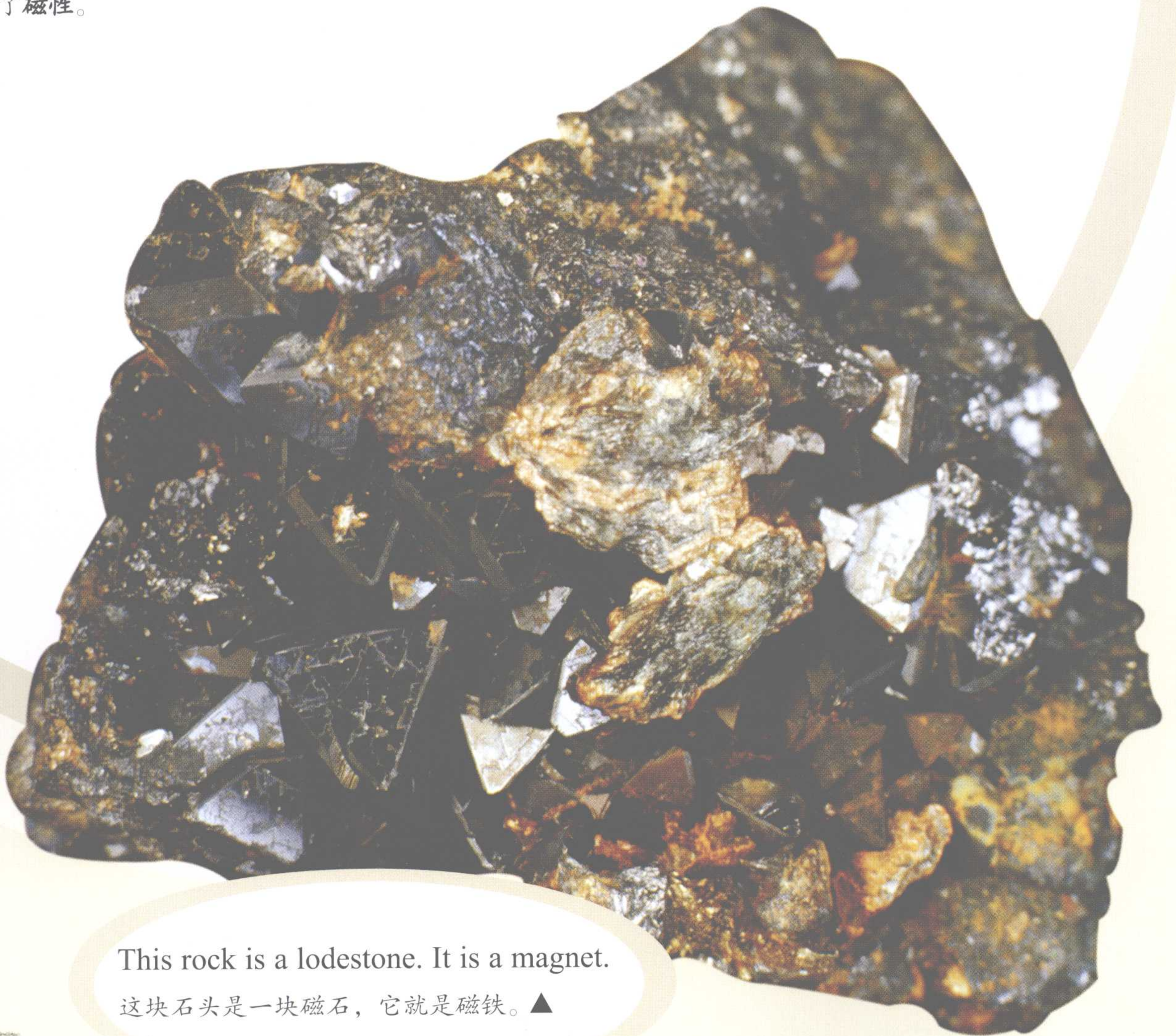
磁铁自古有之……

The first magnetic tools

最早的磁性工具

No one knows who first discovered **magnets**. It may have been people in China or Greece. They found **lodestones** thousands of years ago. Lodestones are special rocks. They are full of **iron**. They have been struck by lightning. This makes them **magnetic**.

没有人知道是谁最先发现了**磁铁**，也许是中国人，也许是希腊人，他们在几千年前发现了**磁石**。磁石是一种特殊的石头，里面含有大量的**铁**，被闪电击中后，就具有了**磁性**。



This rock is a lodestone. It is a magnet.

这块石头是一块磁石，它就是磁铁。▲

Greek sailors used a lodestone to make a **compass**. A compass helps people find out which direction is north and which is south. The sailors used a needle-shaped piece of lodestone. They put it on top of an object. The object was floating in a bowl of water. One end of the lodestone pointed north. The other end pointed south.

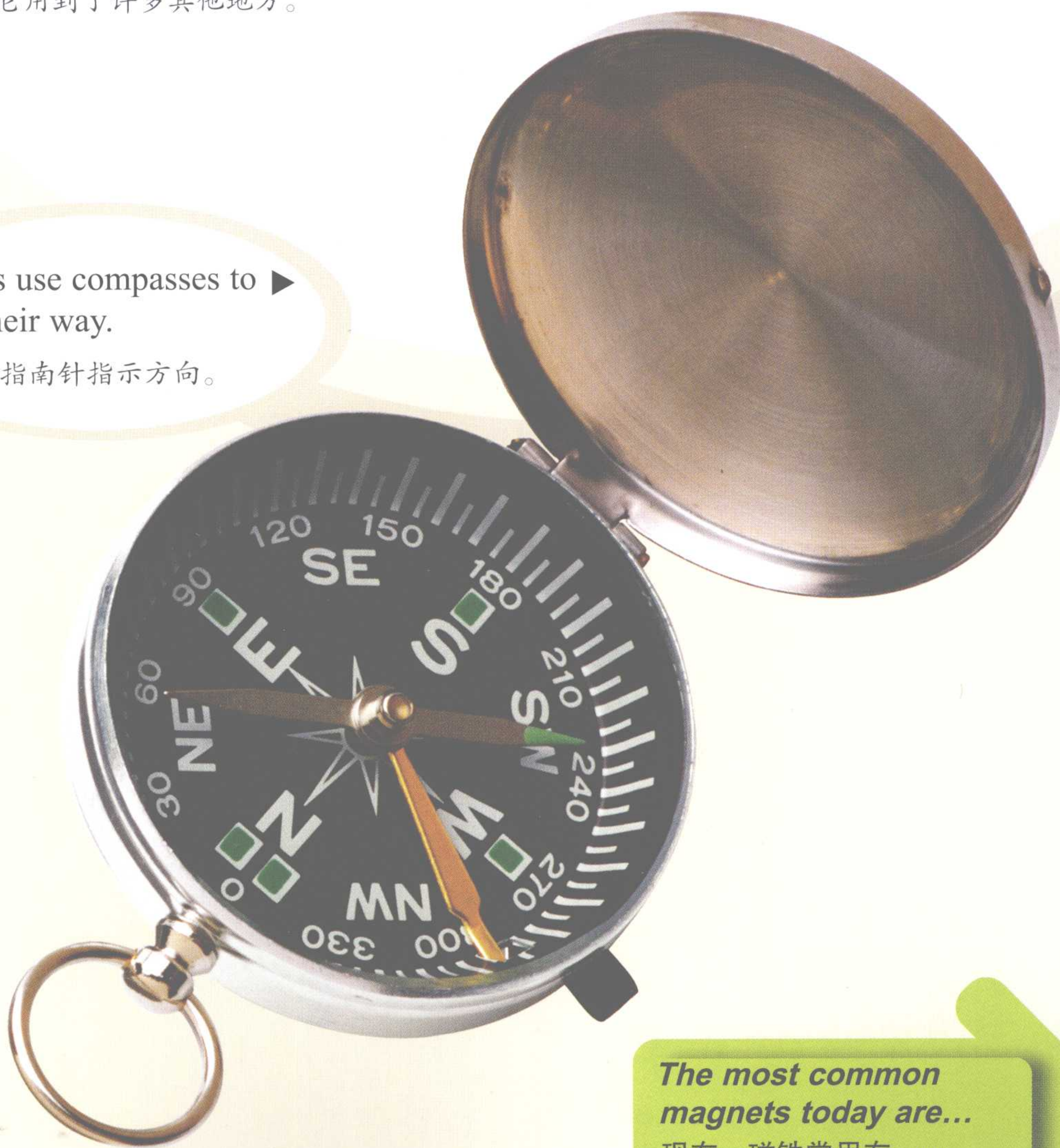
Compasses showed sailors which direction to travel. Sailors could travel long distances without getting lost. People were amazed by the power of magnets. They found other ways to use magnets.

希腊水手用磁石来制造**指南针**。指南针可以指示方向。一个盛满水的碗里漂浮着一个物体，水手把一小块针状磁石放在这个物体上。磁石的一端指向北，另一端指向南。

指南针给水手指出航向，这样他们可以航行很远也不迷路。人们对磁铁的神奇魔力非常着迷，又把它用到了许多其他地方。

Sailors use compasses to find their way. ▶

水手用指南针指示方向。



The most common magnets today are...

现在，磁铁常用在……

Fridge magnets

冰箱磁贴

Do you have **magnets** on your fridge? These magnets have a small piece of **iron** on the back. They are **permanent magnets**. That means they stay **magnetic** for a long time. They keep the power of a magnet.

Fridges are not magnets. The fridge door only acts like a magnet. It does this when you put a permanent magnet on it. The door becomes a **temporary magnet**. It is only magnetic for a short time. When you remove the magnet, the door loses most of its magnetic power.

Some fridge magnets look like plastic cards. Plastic is not magnetic. Iron powder is added to the plastic. The iron turns the plastic into a permanent magnet.

你家冰箱上有**磁贴**吗？这些磁贴背后有一小块铁，它是**永磁铁**。也就是说，它的**磁性**可以长期保存，具有长久的磁力。

冰箱不是磁铁。冰箱门暂时发挥磁铁的作用。把一块永磁铁放在它上面，冰箱门就变成了一块**临时磁铁**，它的磁性保持时间短。拿开磁铁，冰箱门就没有磁性了。

有的冰箱磁贴看起来像一张塑料卡片。塑料没有磁性，在塑料里加入磁性铁粉后，就变成了永磁铁。

What a collection!

多么巨大的收藏啊！

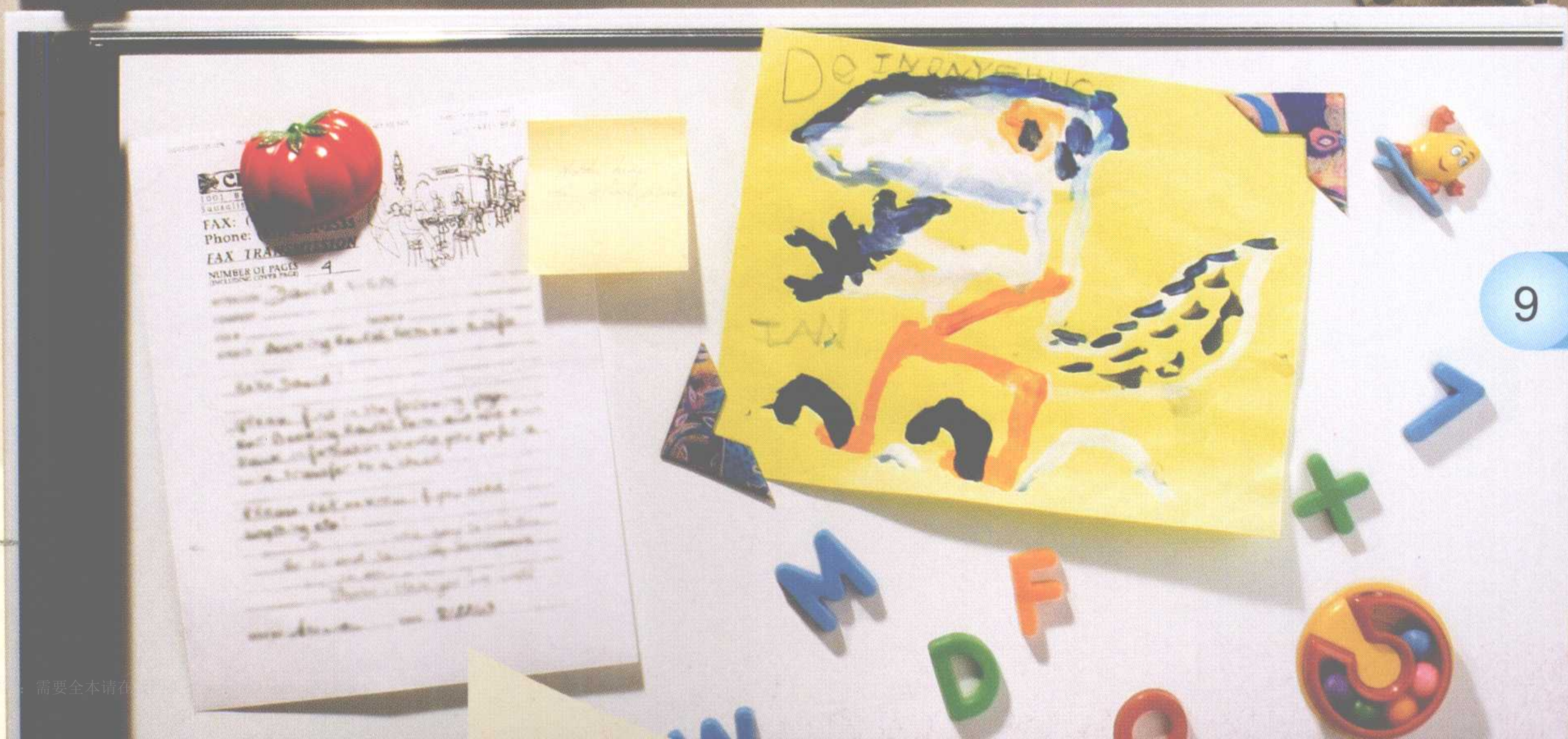


Some people are mad about magnets! Marlou Freeman lives in Maryland in the United States. She has collected more than 2300 fridge magnets.

有人对磁贴简直着了魔。美国马里兰州的玛露·弗雷曼收集了超过2300个冰箱磁贴。

▼ Some people use magnets to stick notes on the fridge.

有人用磁贴把便条贴在冰箱上。



Powerful pullers

攀爬高手

Another kind of **magnet** is a gripper magnet. These magnets allow workers to climb tall buildings. Scientists use **magnetism** to make gripper magnets. Magnetism is the strong pulling power of magnets.

Grippers are **permanent magnets**. They stay **magnetic** for a long time. They can turn a steel building into a **temporary magnet**. The building becomes magnetic for a short time. The grippers are strong enough to hold a person up.

A gripper magnet would not help you to climb a tree. It would not let you climb an icy hill. Magnets do not work on wood or ice. They only work on **iron** or **steel**.

磁铁也用在磁性攀爬靴上。工人穿着它能爬上高大的建筑。科学家利用**磁力**来制造磁性攀爬靴。磁力就是磁铁间强大的吸引力。

攀爬靴是**永磁铁**，一直具有**磁性**，它可以把钢铁建筑变成**临时磁体**，暂时具有磁性。攀爬靴的磁力很强，足可以支撑一个人。

不能穿磁性攀爬靴爬树，也不能爬冰山。磁铁对木头和冰不起作用，它只对**铁**和**钢**起作用。

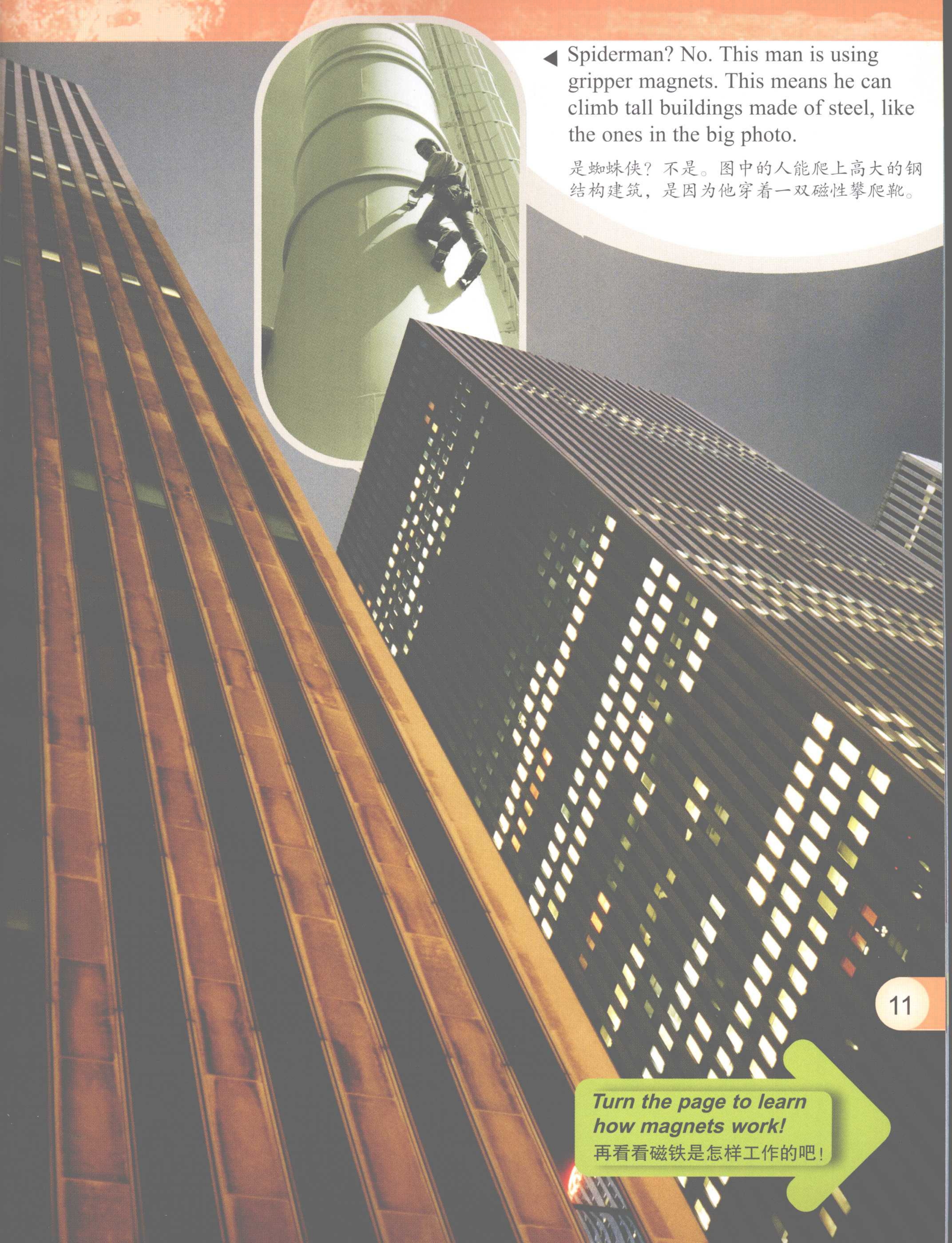
Special powers

特殊的力



Magnets can work when they are not touching an object. Put a piece of paper between a magnet and a paper clip. Move the magnet. The paper clip will follow!

磁铁不和物体接触就能发挥作用。用一张纸隔开磁铁和曲别针，移动磁铁，曲别针也会跟着移动。



◀ Spiderman? No. This man is using gripper magnets. This means he can climb tall buildings made of steel, like the ones in the big photo.

是蜘蛛侠？不是。图中的人能爬上高大的钢结构建筑，是因为他穿着一双磁性攀爬靴。

*Turn the page to learn
how magnets work!*

再看看磁铁是怎样工作的吧！

One magnet, two poles

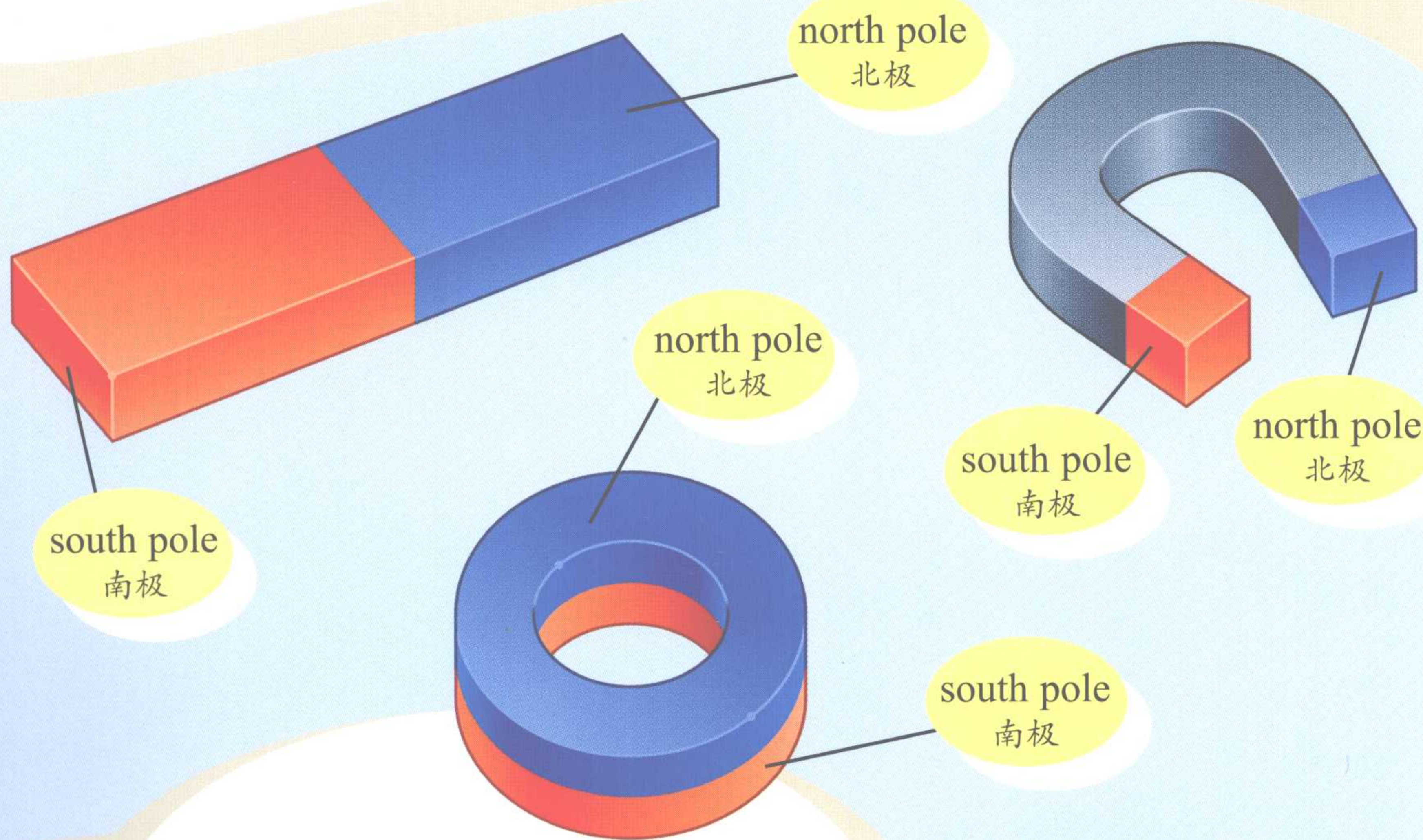
一块磁铁，两个磁极

Magnets can pull things together. This is called **attraction**. It makes a magnet stick to a fridge door. It makes a gripper stick to a metal building.

Magnetic force can also keep things apart. This is called **repulsion**.

磁铁可以把物体向一起拉，这称为**引力**。引力使磁贴贴在冰箱门上，也可以使磁性攀爬靴牢牢抓住钢结构建筑。

磁力还能把物体往外推，这称为**斥力**。

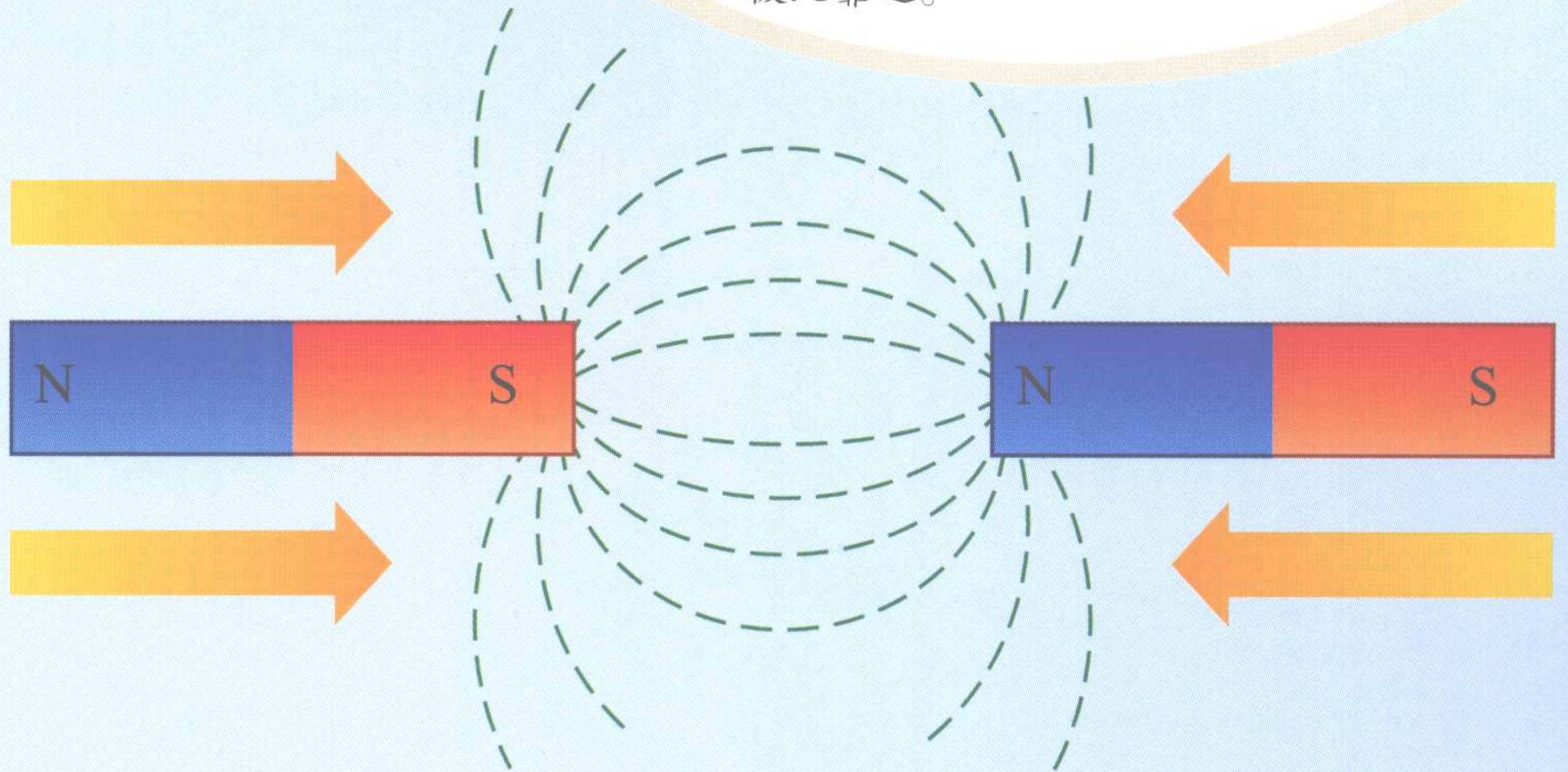


Every magnet has two poles. One is ▲ called the north pole. The other is called the south pole.

每块磁铁都有两极，一个称为北极，另一个称为南极。

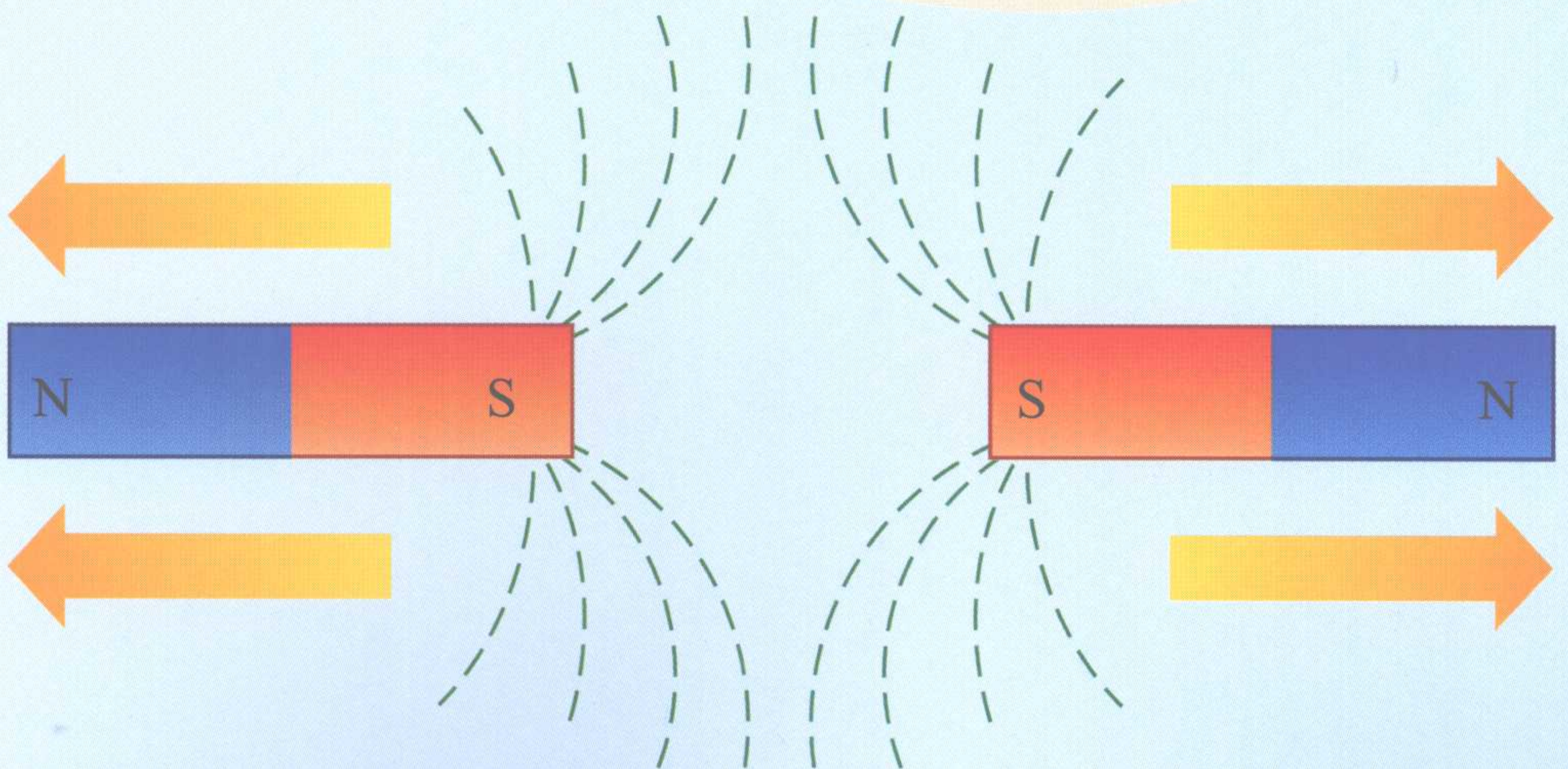
▼ Magnets attract when you put a north pole near a south pole. They pull together.

当北极和南极靠近时，磁铁互相吸引，彼此靠近。



▼ Magnets **repel** when you put two north poles together. They repel when you put two south poles together.

当两个北极或南极相互靠近时，磁铁相互排斥。



Speeding magnets

高速磁悬浮

Maglev trains are the fastest trains in the world. The word maglev is short for “**magnetic levitation.**” This means lifted by **magnets.** The trains run on magnetism, or the force of magnets. They lift up off the track as they move.

磁悬浮列车是世界上最快的列车。Maglev是英文**磁悬浮**的缩写，意思是靠**磁力**停留在空中。列车靠磁力驱动，在前进时不与钢轨接触。

Maglev trains use the ►
power of magnets.

磁悬浮列车靠磁力驱动。

Maglev trains do not have wheels. There are powerful magnets on the track. These face magnets underneath the train. The magnets **repel** (push away from) each other. The magnets lift the train just above the track.

Maglev trains do not have engines. Magnets on the track **attract** (pull) magnets on the train. They pull the train forward. Maglev trains can travel at 500 kilometres (300 miles) per hour.

磁悬浮列车没有车轮。由于钢轨上磁力强大的磁铁与列车底部的磁铁相互**排斥**，列车就悬浮在钢轨上了。

磁悬浮列车也没有发动机。钢轨上的磁铁**吸引**列车上的磁铁，就能驱动列车向前运动。磁悬浮列车的时速可以达到500公里(300英里)。

World's fastest train

世界上最快的列车



A maglev train runs between the airport and the city of Shanghai in China. It takes only 7 minutes and 20 seconds to make the 31-kilometre (19-mile) trip.

从上海机场到市中心有一列磁悬浮列车，它只要7分20秒就能跑完31公里(19英里)的路程。

What makes these magnets so strong?

是什么使磁铁的力量如此强大呢?