在太空中找到方向 Finding your way in space

Hello. This is 6 Minute English from BBC Learning English. I'm Sam. And I'm Rob.

大家好。这里是 BBC 学习英语栏目的六分钟英语。我是萨姆。我是罗布。

How good are you at finding your way from A to B, Rob?

罗伯，你能找到从A到B的路吗?

Can you read a map?

你会看地图吗?

Come on, Sam, this is the 21st century!

拜托，萨姆，这都21世纪了!

Everyone uses GPS and mobile phone apps to find their way around these days.

现在，大家都用全球定位系统和手机软件来规划路线了。

True, but before mobile phones were invented arriving at your destination wasn't so easy.

没错，但在发明手机之前，到达目的地并不容易。

At sea, sailors used the stars and Sun to navigate – to work out which direction they wanted to travel.

在海上，水手们利用星星和太阳的位置来导航，即找到正确的航向。

And navigating on land was almost impossible without a compass – an instrument for finding directions that uses a magnetic needle which moves to always point north.

如果没有指南针，在陆地上导航几乎是不可能的指南针是一种用磁针指示方向的仪器。磁针总是指向北方。

But, as we'll be hearing in this programme, navigation at sea is easy compared to finding your way in outer space.

但是，正如我们将在本期节目中听到的那样，与在外太空导航相比，在海上导航简直易如反掌。

After all, what's up and what's down for astronauts who are floating in zero gravity?

毕竟，对于漂浮在失重空间中的宇航员来说，哪边是上，哪边是下呢?

In space is there a true north, like here on Earth?

太空中存在真正的北方吗，就像地球上的北方一样?

And how is everything complicated by the fact that all the stars and planets are moving?

而所有运动着的恒星和行星又给太空航行带来了怎样的难题呢?

Some big questions there, Rob, but first I have a question of my own.

添加的词汇

这些问题都很复杂，罗伯，但首先我有一个问题要问你。

You asked how astronauts know which way is up, so who better to ask than the first person in space?

你想知道宇航员是如何分辨上和下的，那当然是第一个进入太空的人最有发言权了。

But who was that?

但那是谁呢?

Was it a Neil Armstrong? b) Yuri Gagarin? or c) Valentina Tereshkova?

是 a) 尼尔·阿姆斯特朗？ b) 尤里·加加林？ 还是 c) 瓦莲京娜·捷列什科娃?

Well, Neil Armstrong was the first man on the Moon, but I don't think he was the first person in space.

尼尔·阿姆斯特朗是第一个登上月球的人，但我不认为他是第一个进入太空的人。

So I think it's b) Yuri Gagarin.

所以我认为是 b) 尤里·加加林。

OK, I'll reveal the answer later in the programme.

好的，稍后我会在节目中揭晓答案。

Now let's get back to Rob's earlier question about whether there's such a thing as north in space.

现在让我们回到罗布之前提出的问题：太空中是否存在北方?

And to answer that it's first useful to know how north is found on Earth.

要回答这个问题，首先我们要知道在地球上如何辨别北方。

Listen to astrophysicist Ethan Siegal as he explains why a compass always points north to BBC World Service programme, CrowdScience.

下面请听天体物理学家伊桑·西格尔解释：为什么指南针总是指向北方。片段选自BBC世界服务栏目的《大众科学》。

Because Earth behaves like it has a giant bar magnet in it, and your compass needle will point north towards Earth's magnetic pole.

因为地球的内部就像有一个巨大的条形磁铁，而你的指南针会向北指向地球的磁极。

And we've arbitrarily defined north as, that's what we're going to say 'up' is, like, the North Pole – that's as 'up' as you can go.

我们已经人为地将北方定义为“上”方。比如，你能达到的最“上”方就是北极。

Planet Earth is like a giant magnet.

地球就像一块巨大的磁铁。

Because the needle of a compass is magnetised, it's attracted to the magnetic pole – the points near the North and South Poles where the Earth's magnetic field is concentrated.

因为指南针的指针是有磁性的，所以它被磁极吸引。地球的磁极在北极和南极附近，那里磁力最强。

This explains how we find north, but Ethan points out that the decision to call north 'up' and south 'down' is arbitrary – decided by random chance, not based on any particular reason.

这就解释了我们是如何找到北方的，但伊森指出，将北方称为“上”，将南方称为“下”是人为规定的，即随机规定的，没有什么特定的原因。

When we look at a world map, we think of north as 'up', the USA in the northern hemisphere is above Brazil, in the southern hemisphere.

我们看到世界地图时，自然就认为北方是“上”方，北半球的美国在南半球的巴西之上。

But from space, Earth can just as easily be seen the other way up, with Australia, South Africa and South America at the top.

但从太空中看，地球很可能是倒着的，澳大利亚、南非和南美洲就会在“上”方。

Both views are equally true.

这两种观点都是正确的。

Wow, that's a mind-blowing thought!

哇，这种见解真是让人大开眼界！

But even though we can argue which direction is up, it's still true that we can use a compass to navigate on Earth.

但是，即使我们可以争论哪个方向是“上”，我们仍然可以使用指南针在地球上导航。

However, this simply isn't true in space.

然而，这在太空里就行不通了。

Here's astrophysicist Ethan Siegal again to tell BBC World Service's CrowdScience why.

下面我们再听一下天体物理学家伊桑·西格尔在BBC世界服务栏目的《大众科学》上所做的讲解。

The problem with navigating in space is that the magnetic field flips irregularly every few hundred, or few thousand light years.

在太空中导航的问题是磁场每几百或几千光年就会不规则地翻转一次。

There's no central object, like the black hole at the centre of our galaxy.

太空中没有足够强大的中心物体，只有一个位于银河系中心的黑洞。

It doesn't dominate the whole galaxy.

而它不能掌控整个银河系，

It doesn't make a magnetic field that you can feel out here 25, 27-thousand light years from the centre.

它的磁场不够强大。在距离其25000或27000光年的地方根本感觉不到磁场。

So, magnetism is not a good guide to navigating in space.

因此，磁力不能很好地帮助人们在太空中找到方向。

A light year sounds like a measurement of time, but in fact it measures the distance that light travels in one year which, given that light can travel 7.5 times around the Earth in one second, is a very, very long way - around 6 trillion miles, in fact.

一光年听起来像是一个时间单位，但实际上它测量的是光在一年中运行的距离。考虑到光可以在一秒钟内绕地球7.5圈，一光年是一个非常非常长的距离，实际上大约是6万亿英里。

Well, the problem is that every few hundred light years the magnetic field flips - turns over or moves into a different position.

问题是，每隔几百光年，太空中的磁场就会翻转，即完全倒置或移动到不同的位置。

So, a compass, which depends on magnetism, is no good for navigating in space.

因此，依赖磁力的指南针不适合在太空中导航。

So how do spacecraft know where they are, and which way to go?

那么，航天器如何知道自己在哪，应该走哪条路呢?

The answer is both simple and very clever.

答案既简单又非常巧妙。

They use specialised heat sensors to detect the position of the Sun and use that to guide their way.

航天器使用专门的热传感器来探测太阳的位置，并以此指引方向。

So simple yet so ingenious!

如此简单却又如此巧妙!

I'm sure it would have impressed the first person in space, whoever they were.

我相信这会给第一个进入太空的人留下深刻的印象，无论他是谁。

Hm. Ah yes, in my question I asked who the first person in space was.

啊，是的，我问过你谁是第一个进入太空的人。

And I said it was b) Yuri Gagarin.

我说是 b) 尤里·加加林。

I've got to be right, haven't I?

一定是他，对不对?

It was right, of course!

回答正确!

Soviet cosmonaut Yuri Gagarin became the first man in space in 1961, with Valentina Tereshkova following in his footsteps to become the first woman in space two years later.

1961年，苏联宇航员尤里·加加林成为第一位进入太空的男性，两年后，瓦莲京娜·捷列什科娃追随他的脚步，成为第一位进入太空的女性。

OK, let's recap the vocabulary from this programme on how to navigate – or find your way - in space.

好了，让我们回顾一下本期关于如何在太空中导航或找到方向的词汇。

On Earth you can use a compass – an instrument with a magnetic needle that moves to point north, that is towards to the magnetic pole – a point near the North or South Poles where Earth's magnetic field is strongest.

在地球上，你可以使用指南针“compass”，即一种带有磁针的仪器。磁针永远指向北方，也就是指向磁极“magnetic pole”。地球的磁极在北极和南极附近，那里磁场最强。

Saying that north is 'up' is arbitrary – done randomly, not according to any particular reason or principle.

说北方是“上”方，这是人为规定的。“arbitrary”即随机的，没有特定的原因，没根据什么原则。

A light year is a unit measuring the distance that light travels in one year - around 6 trillion miles.

一光年“a light year”指光在一年中传播的距离，是大约6万亿英里。

And finally, to flip means to turn over or move into a different position.

最后，“flip”指完全颠倒或移动到不同的位置。

Once again, our time is up.

我们的时间又到了。

Goodbye for now! Bye bye!

下期再见！再见！