

CHAPTER 1

The heat of the sun



Everybody loves the sun! Most people feel happier and more optimistic when the sun shines. The sun gives us light and warmth and helps living things to grow. Without the sun, there would be no life on earth. So what is the sun?

Scientists think the solar system – the sun and its planets – was born from a cloud of gas and dust. A huge star on the edge of our galaxy exploded and caused the cloud to spin. At the centre of the cloud, the sun started to burn. Over a few hundred million years, the cloud collapsed and the solar system was formed.

The sun is a star made of very hot gases, mostly hydrogen (H) and helium (He), and has a temperature of around 5,500 degrees Celsius on its surface. The sun is no bigger than many other stars, but it looks brighter because it is closer to the earth. It takes one million years for the heat at the centre of the sun to arrive at the surface. However, this heat makes its journey to earth in just eight and a half minutes.

PROTECTING THE EARTH

Our atmosphere

The earth's atmosphere is only eighteen kilometres wide and is a line of gases around the earth including about 78% nitrogen (N), 21% oxygen (O₂) and 1% other gases like carbon dioxide (CO₂) and water vapour.

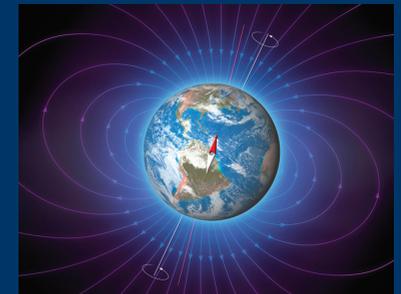


The mix of gases in our atmosphere allows us to breathe and protects us from the sun's heat. Compare our planet to Venus. Venus has a lot of CO₂ in its atmosphere and is too hot for any life.

Thanks to our atmosphere, life on earth is possible.

Our magnetic field

The earth is also protected by its magnetic field. As the earth spins, a magnetic field is produced from the North and South Poles. The magnetic field stops most of the solar winds and storms reaching us. But some of these storms can still affect satellites and power on earth.



Did you know?

You can follow the weather on the sun at:
www.solarstormwatch.com

What do these words mean? You can use a dictionary.
water vapour breathe magnetic solar wind

There have always been changes in the climate on earth. Natural climate change depends on how much warmth and light the earth receives from the sun. The earth is at an angle of about 23 degrees as it travels around the sun. Some scientists believe that, over hundreds of thousands of years, this angle changes a little. But this small difference can lead to huge changes in the earth's climate. At the time of the dinosaurs, the climate was warmer than now. In fact, there were dinosaurs walking around in forests very near the North and South Poles!

Around 160,000 years ago, parts of our planet were extremely cold. There was a wall of ice, two kilometres high, in the place where the city of New York is now. The surprising thing is that world temperatures at that time were not very different to today – only four degrees lower. Then 30,000 years later, the same area was under five metres of water. But temperatures were less than two degrees warmer than they are today.



Imagine an ice wall where New York is now ...



The Mayans believed in a sun god.

It isn't surprising that the sun was very important to the beliefs of people in the past. The Mayans lived in south Mexico three and a half thousand years ago. They studied the stars and worked out calendars using the sun and the movements of the planets. The Mayans knew that they needed the sun to grow food. They believed in different nature gods and the most important of these was the sun god.

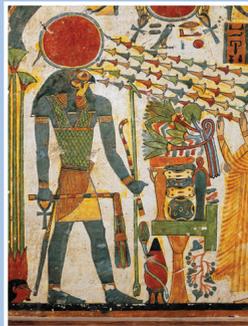
For around two thousand years, the Mayans were successful, but something went wrong in the ninth century. The Mayans left their cities and began to disappear. Some scientists think that the Mayans disappeared because of natural climate change. They now know that around this time there was a serious drought. The Mayans knew a lot about the sun, but without water, even this could not save them.

SUN WORSHIP

Many early civilisations studied and worshipped the sun. The sun was the centre of life because of its importance for growing food and for the changing seasons.

☀️ Stonehenge is a stone circle in England built about five thousand years ago. No one knows why it is there, but some people believe the circle was used for sun worship.

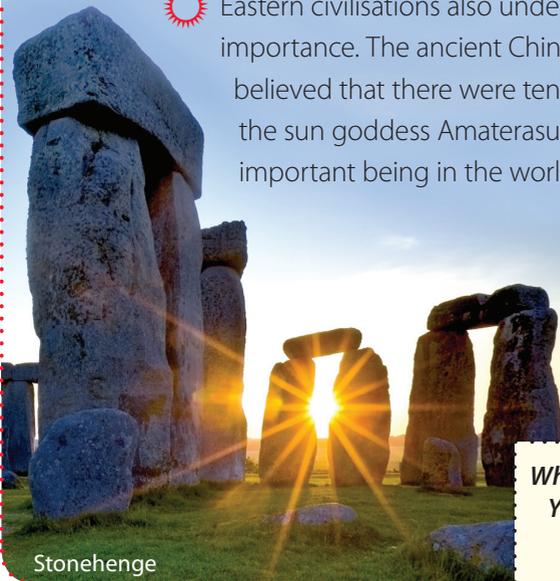
☀️ The Egyptian sun god, Ra, was worshipped as the god of all life and the first king of Egypt. The first Pharaohs, or kings of Egypt, thought of Ra as their father.



The sun god, Ra

The world's oldest sundial is in southern Egypt. It is six thousand years old. The sundial was used to record the passing seasons.

☀️ Eastern civilisations also understood the sun's importance. The ancient Chinese people believed that there were ten suns. In early Japan, the sun goddess Amaterasu was the most important being in the world.



Stonehenge

*What do these words mean?
You can use a dictionary.*
civilisation **worship**
sundial

All of this was happening long before man appeared on the earth. Scientists now know that the sun will burn for another five billion years. We also know that the earth is getting warmer because of climate change, natural or man-made. But is there anything we can do to protect our planet from this climate change?



Now watch Clips 2 and 3 and answer the questions on pages 14–15.