

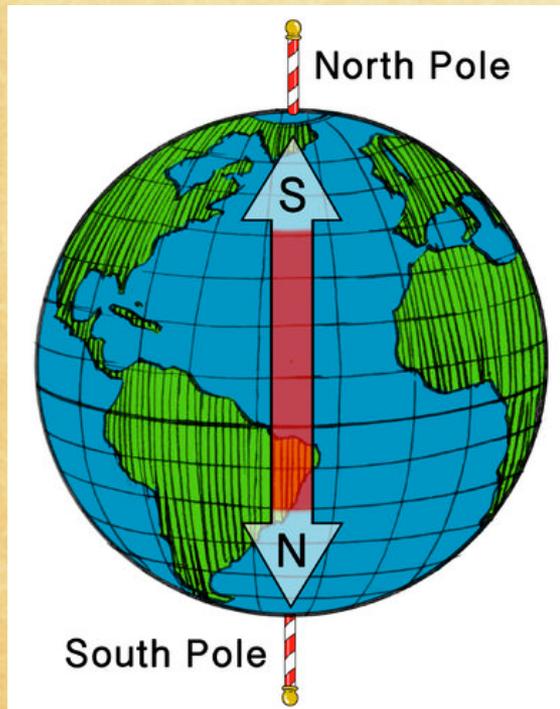
What Are Magnets?

Chapter 14 Lesson 1
Part 2

ByDesign Science, Level 6
By Allyssa Sharpe

Earth as a Magnet

- ◆ You have likely heard of the North and South Poles on Earth.



- ◆ We call these two locations poles because Earth acts like a magnet.
- ◆ Earth's liquid core rotates, producing a magnetic field.
- ◆ This magnetic field is almost the same as the one produced by a bar magnet.

Earth as a Magnet

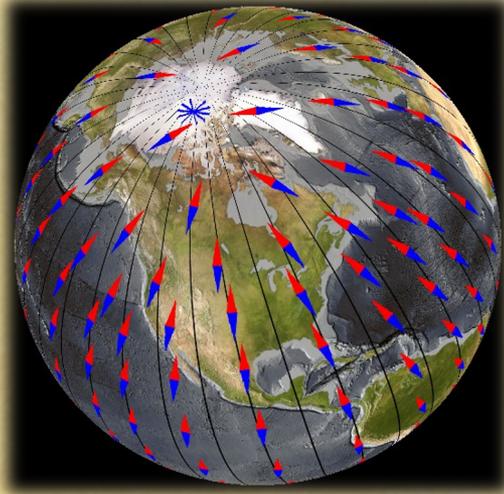
Compasses

- ◆ For at least 1000 years, people have used Earth's magnetic field to find direction.
- ◆ People in China discovered that lodestone always pointed in the same direction when it could swing freely.
- ◆ Later they discovered that a floating, magnetized needle also always points in the same direction.
- ◆ The invention of the *magnetic compass* was based on this discovery.
- ◆ At first, compasses were used exclusively on land.



Earth as a Magnet

Compasses



- ◆ The north-seeking pole of a compass points toward Earth's north magnetic pole.
- ◆ The south-seeking pole of a compass points toward Earth's south magnetic pole.
- ◆ The compass made long-distance ocean travel possible without getting lost.

Earth as a Magnet

Compasses

- ◆ Zheng He was a Chinese admiral.
- ◆ Zheng He was the first recorded person to use a compass to navigate.
- ◆ He made seven ocean voyages between 1405 and 1433.
- ◆ Later, European explorers used magnetic compasses to travel across the Atlantic Ocean.



Earth as a Magnet

Compasses

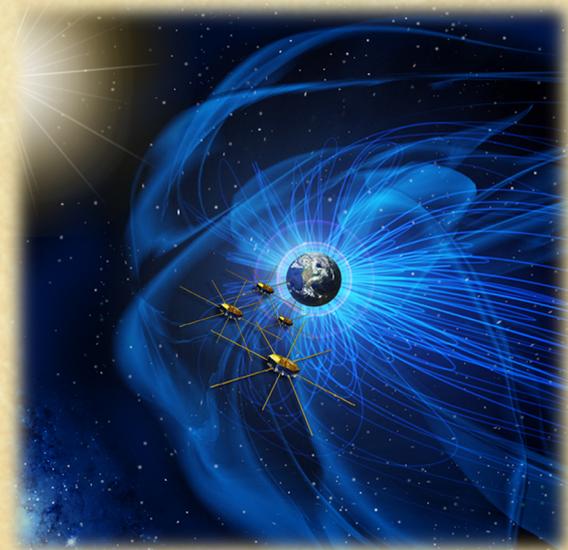


- ◆ Early navigational compasses were often suspended in water or hung from a silk cord.
- ◆ On land, the compass also was a valuable tool for early explorers.

Earth as a Magnet

Magnetosphere

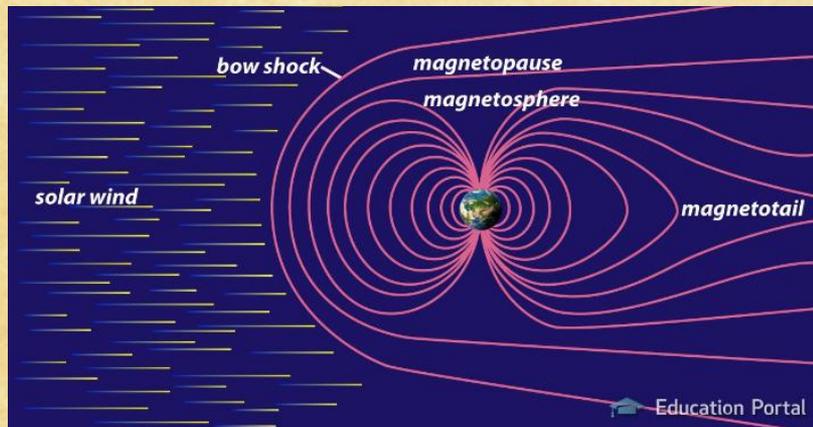
- ◆ The Sun ejects millions of charged particles into space.
- ◆ These particles, which are harmful to us, make up the solar wind.
- ◆ Fortunately, these dangerous particles encounter the magnetosphere.
- ◆ The magnetosphere is a region of Earth's magnetic field that extends about 36,000 miles into space.



Earth as a Magnet

Magnetosphere

- ◆ The magnetosphere deflects high-speed, charged particles in the solar wind and keeps them from entering Earth's atmosphere and striking Earth's surface.



- ◆ This protective feature is another demonstration of God's design to protect us from harm.

Earth as a Magnet

Auroras



- ◆ When charged particles of the solar wind reach the magnetosphere, they travel along magnetic field lines.
- ◆ The particles travel to the strongest part of Earth's magnetic field – the North and South Poles.
- ◆ At the poles, the particles travel down into Earth's upper atmosphere.
- ◆ There they collide with molecules of oxygen and nitrogen in the air.

Earth as a Magnet

Auroras

- ◆ Energy is transferred from the charged particles to the oxygen and nitrogen molecules.
- ◆ As these molecules return to a natural state, they give off their extra energy.
- ◆ Oxygen molecules give off green light or red light at different heights.
- ◆ Nitrogen molecules give off blue or purple/violet light.



Earth as a Magnet

Auroras



- ◆ These different colors of light, which produce glowing “streamers” or “curtains” of light in the night sky, are called auroras.
- ◆ In the northern hemisphere, they are called the Aurora Borealis.
- ◆ In the southern hemisphere, they are called the Aurora Australis.

Earth as a Magnet

Auroras

- ◆ Because the light given off is much dimmer than sunlight, the auroras cannot be seen during the daytime.
- ◆ Auroras occur at both poles at the same time.
- ◆ They most often occur in ring-shaped areas around Earth's magnetic poles.
- ◆ However, the complete rings can only be seen and photographed from space.



Earth as a Magnet

Auroras

