Explore Magnets

Explore how magnetism is connected to the aurora!

The Earth acts a giant magnet. Energy from the Sun combines with the Earth's magnetic field and atmosphere to produce the aurora!

Left: UAF photo by Todd Paris, 2015.

Materials Needed:

Magnets in a variety of shapes and sizes, paper clips, small metal objects.
Optional: Small container with a lid.

Caution: Closely supervise children during this activity. Recommended for ages 3 and older. Magnets are choking hazards, and can be dangerous if swallowed.

Instructions:

Try different experiments with the magnets to explore how they work! Remember to keep the magnets away from electronic objects such as cell phones.

Hint: For young children, place a magnet inside a container with a lid so they can explore its effects without accessing it directly.

Challenges to Try:

- What's Magnetic?: Use a magnet to find both magnetic and non-magnetic metals.
- Powerful Magnets: How many paper clips can you pick up with one magnet?
- Magnet Shapes: Try picking up objects with differently shaped magnets. Does a magnet's shape affect its strength?
- Magnetic Poles: What happens when two similar poles are put together? Two opposite poles? Try stacking magnets with like poles together.
- Combining Magnets: Try to make a one long magnet using two smaller magnets. How many poles does it have?

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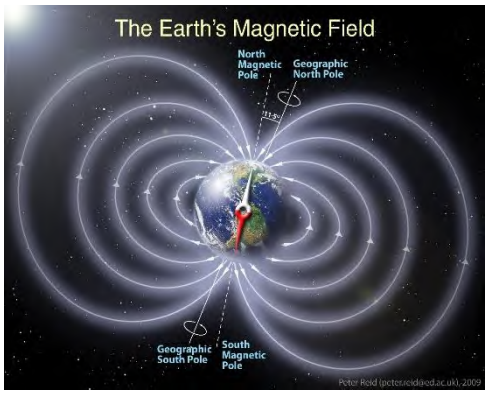
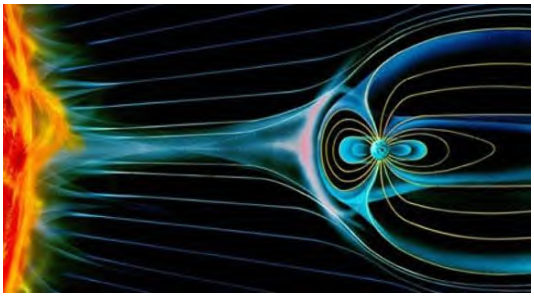
Magnetic Fields and the Aurora

The Earth acts a giant magnet! Just like smaller magnets, it has North and South magnetic poles. Earth's magnetic field is created by the movement of molten iron and nickel within its outer core. The magnetic field is strongest near the poles.



Right: Earth's magnetic field. *Image: Wikimedia Commons.*



The solar wind squishing Earth's magnetic field. *Image: Cultural Connections.*

The Sun emits a constant stream of charged particles, called the **solar wind**, that travels across the Solar System. As the solar wind nears Earth, it causes the Earth's magnetic field to be drawn into a giant teardrop shape, squashed on the side closest to the Sun and drawn out into a long tail on the far side.

Some of the particles get trapped in long tail of the magnetic field. The stretched magnetic field lines become unstable and snap like rubber bands. This sends the charged particles back toward Earth, where they follow the magnetic field lines toward the North and South Poles and crash into gases in the atmosphere. This excites the gases, and they give off light, creating the aurora.

Because of the shape of the Earth's magnetic field, the aurora forms in ovals over the North and South Poles. In the Northern Hemisphere, it is called the *aurora borealis*, or the northern lights; in the Southern Hemisphere, it is called the *aurora australis*, or the southern lights.

Aurora oval around the North Pole. Image: NASA.

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