

Magnetism

What is Magnetism?
Inside a Magnet
Magnetic Earth

What is Magnetism?

What are the properties of a magnet?

- Magnets attract iron and materials that contain iron.
- Magnets attract or repel other magnets.
- One part of a magnet will always point north when allowed to swing freely.
 - Magnet: any material that attracts iron and materials that contain iron

What is Magnetism?

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How do magnetic poles interact?

- Magnetic poles that are unlike attract each other.
- Magnetic poles that are alike repel each other.
 - Magnetic pole: the ends of a magnetic object, where the magnetic force is strongest
 - Magnetic force: a force produced when magnetic poles interact

What is Magnetism?

What is the shape of a magnetic field?

- Magnetic field lines spread out from one pole, curve around the magnet, and return to the other pole.
- The direction of force is from the north pole to the south pole.
 - Magnetic field: the region around a magnet where the magnetic force is exerted
 - Magnetic field lines: invisible lines that map out the magnetic field around a magnet

Inside a Magnet

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- How can an atom behave like a magnet?
 - A spinning electron produces a magnetic field that makes the electron behave like a tiny magnet in an atom.
 - Atom: the smallest particle of an element that has the properties of that element
 - Element: one of about 100 basic materials that make up all matter
 - Nucleus: the core at the center of every atom
 - Proton: a positively charged particle that is part of an atom's nucleus
 - Neutron: the small uncharged particle that is found in the nucleus of an atom
 - Electron: a negatively charged particle that is found outside the nucleus of an atom

Inside a Magnet

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- How are magnetic domains arranged in a magnetic material?
 - In a magnetized material, all or most of the magnetic domains are arranged in the same direction.
 - Magnetic domain: a region in which the magnetic fields of all atoms are lined up in the same direction
 - Ferromagnetic material: a material that is strongly attracted to a magnet, and which can be made into a magnet

Inside a Magnet

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- How can magnets be changed?
 - Magnets can be made, destroyed, or broken apart.
 - Temporary magnet: a magnet made from a material that easily loses its magnetism
 - Permanent magnet: a magnet made of material that keeps its magnetism

Magnetic Earth

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- How is Earth like a bar magnet?
 - Earth has a magnetic field surrounding it and two magnetic poles.
 - Compass: a device with a magnetized needle that can spin freely
 - Magnetic declination: the angle between geographic north and the north to which a compass needle points

Magnetic Earth

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- What are the effects of Earth's magnetic field?
 - Earth produces a strong magnetic field and can make magnets out of ferromagnetic materials.

Magnetic Earth

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- What effect does the magnetosphere have on space particles?
 - Earth's magnetic field affects the movements of electrically charged particles in space.
 - Van Allen belts: two doughnut-shaped regions 1,000–25,000 kilometers above Earth that contain electrons and protons traveling at high speed
 - Solar wind: streams of electrically charged particles flowing at high speeds from the sun; solar wind pushes against Earth's magnetic field and surrounds it
 - Magnetosphere: the region of Earth's magnetic field shaped by the solar wind
 - Aurora: a glowing region produced by the interaction of charged particles from the sun and atoms in the atmosphere